6.2   Enhanced Fabric Configuration Server

Editor's Note: The following definitions that need to be added to section 3.2.

Interconect Element: Any device in a Fabric that assists in the transport of Fibre Channel frames between VN_Ports.

Physical Object: Physical container for one or more Interconnect Elements.

Logical Port: Vx_Ports plus IP/Ethernet Ports supporting FC-BB-6 mappings.

Physical Port: The physical entity that supports a Logical Port.

6.2.1   Overview

The Enhanced Fabric Configuration Server provides a way for a management application to discover Fibre Channel Fabric topology and attributes.

Requests for the Enhanced Fabric Configuration Server are carried over the Common Transport (see clause 4).

The Enhanced Fabric Configuration Server is intended to be distributed among Switches, making the Enhanced Fabric Configuration Server immediately available to an Nx_Port once it has successfully completed Fabric Login. However, the Enhanced Fabric Configuration Server is not restricted or required to be part of a Fabric, and may be located in any Nx_Port.

6.2.2   Protocol

6.2.2.1 Overview

Enhanced Fabric Configuration Server registration, deregistration, and queries are managed through protocols containing a set of Request CT_IUs and Response CT_IUs supported by the Enhanced Fabric Configuration Server.

For a Enhanced Fabric Configuration Server request, the payload shall be transported from the requestor to the Enhanced Fabric Configuration Server using a Request CT_IU. The corresponding Enhanced Fabric Configuration Server response is transported from the Enhanced Fabric Configuration Server to the requestor, in the Exchange established by the requestor, using a Response CT_IU.

The action of the Enhanced Fabric Configuration Server is unaffected by server sessions.

6.2.2.2 CT_IU preamble values

The following values shall be set in the CT_IU preamble for Fabric Configuration Server request and their responses; fields not specified here shall be set as defined in 4.3.2:

   a) GS_Subtype: as indicated in table 98; and

   Editor's Note: Need to update table 98 with Enhanced Fabric Configuration Server with value 08.

b) Command Code: see table 100 for Request command codes.

Table 100 – Enhanced Fabric Configuration Server - Request Command Codes

Code (hex)	Mnem.	Description	Attribute(s) in Request CT_IU	Attribute(s) in Accept CT_IU
0100	GIEL	Get Interconnect Element List (see 6.2.3.6).	none	List of Interconnect Element Object Name Attributes (see 6.2.3.2.3.4)
0101	GIEAB	Get Interconnect Element Object Attribute Block (see 6.2.3.7).	Interconnect Element Name attribute (see 6.2.3.2.3.4).	Interconnect Element Object Attribute Block (see 6.2.3.2.2).
0102	GIEPL	Get Interconnect Element Port List (see 6.2.3.8).	Interconnect Element Object Name attribute (see 6.2.3.2.3.4).	List of Logical Port Object Name attributes (see 6.2.3.4.3.3).
0110	GPOAB	Get Physical Object Attribute Block (see 6.2.3.9).	Physical Object Correlatable Identifier attribute(see 6.2.3.3.3.2).	Physical Object Attribute Block (see 6.2.3.3.2).
0111	GPOPL	Get Physical Object Port List (see 6.2.3.10).	Physical Object Correlatable Identifier attribute (see 6.2.3.3.3.2).	List of Physical Port Object Correlatable Identifiers (see 6.2.3.5.3.2).
0130	GLPAB	Get Logical Port Attribute Block (see 6.2.3.11).	List of Logical Port Object Name attributes (see 6.2.3.4.3.3).	Logical Port Object Attribute Block (see 6.2.3.4.2).
0131	GAPL	Get Attached Port List (see 6.2.3.12).	Logical Port Object Name Attribute (see 6.2.3.4.3.3).	List of Logical Port Object Name attributes (see 6.2.3.4.3.3).
0140	GPPAB	Get Physical Port Object Attribute Block (see 6.2.3.13).	Physical Port Object Correlatable Identifier Attribute (see 6.2.3.5.3.2).	Physical Port Object Attribute Block (see 6.2.3.5.2).
0200	REINL	Register Interconnect element Logical Name (see 6.2.3.14).	Interconnect Element Object Name attribute (see 6.2.3.2.3.4), Interconnect Element Object Logical Name attribute (see 6.2.3.2.3.8).	None
Other		Reserved		

6.2.2.3 Registration

The registration requests defined for the Enhanced Fabric Configuration Server are summarized in table 100. Some attributes do not have a corresponding registration request; this standard does not define the registration of those attributes.

The Enhanced Fabric Configuration Server may reject registrations due to Enhanced Fabric Configuration Server resource limitations. However, the Enhanced Fabric Configuration Server shall support registration of all attributes, once registration of a single attribute has been accepted.

The Enhanced Fabric Configuration Server may reject any registration requests for reasons not specified in this document.

If overlapping registrations for the same attribute are performed, then the Enhanced Fabric Configuration Server shall, when all registrations have completed, leave the attribute as one of the registered attribute values. However, it is indeterminate which of the overlapping registration requests take precedence.

6.2.2.4 Queries

The Enhanced Fabric Configuration Server may reject any query request for reasons not specified in this document. The queries defined for the Enhanced Fabric Configuration Server are summarized in table 100.

6.2.3 Enhanced Fabric Configuration Server Objects and Attributes

6.2.3.1 Overview

Figure 5 illustrates the logical Fabric, consisting of one or more Interconnect Elements, that each have some number of Logical Ports (Vx_Ports). These Logical Ports are connected to other Logical Ports.
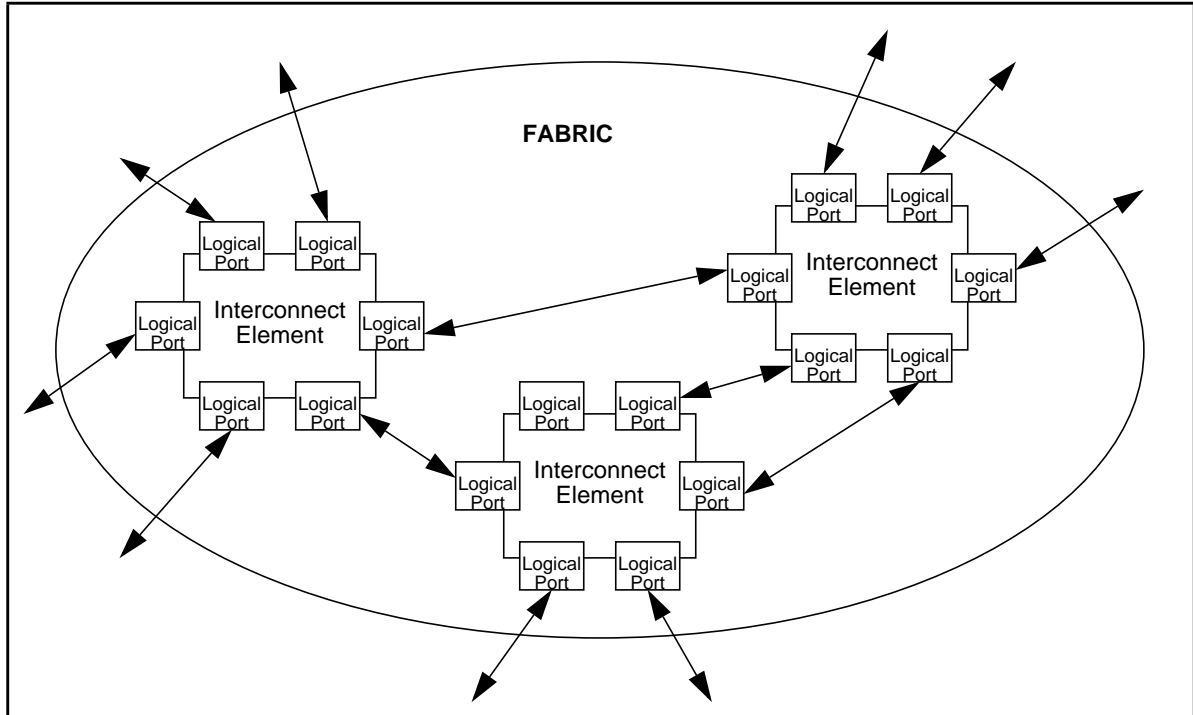

Figure 5 – Logical Fabric illustration

The Enhanced Fabric Configuration Server object model is shown in figure 6.
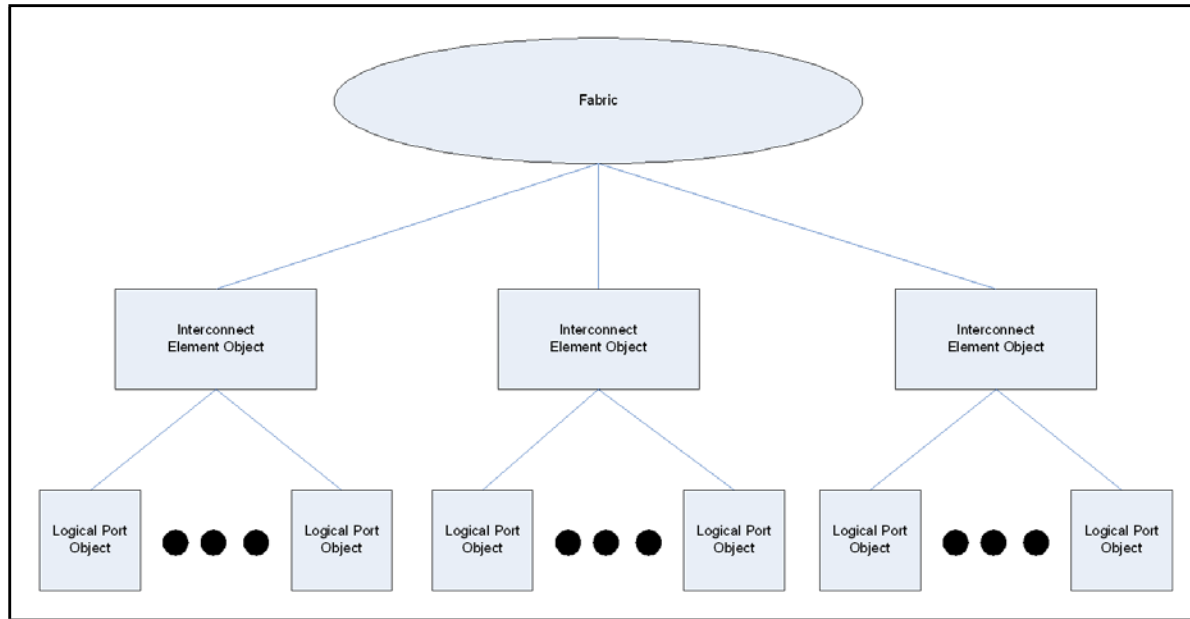

Figure 6 – Enhanced Fabric Configuration Server Objects Logical Model

The base object class managed by the Enhanced Fabric Configuration Server is the Interconnect Element object. Interconnect Element objects have one or more associated Port objects and one or more Interconnect Element objects belong to a fabric identified by the objects Fabric Name attribute. One or more Interconnect Element objects can be associated to a Physical object as shown in figure 6. One or more Logical Port objects can be associated to a Physical Port object as shown in figure 7.
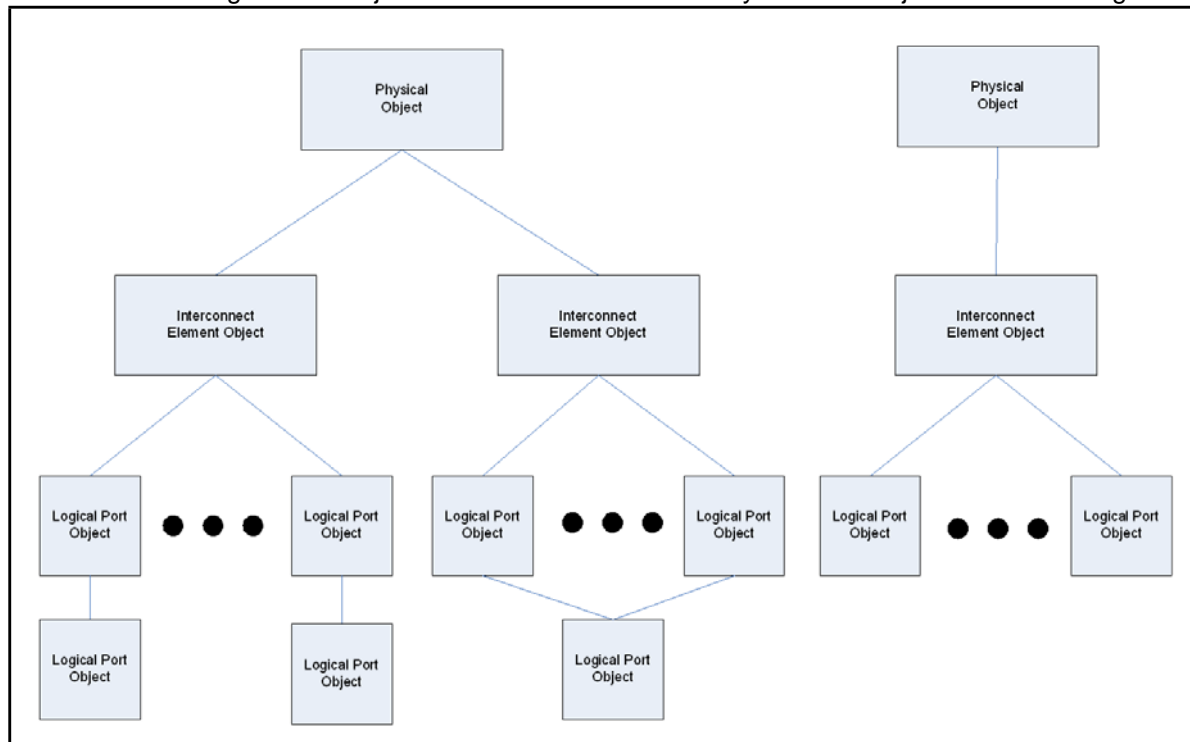
Figure 7 – Enhanced Fabric Configuration Server Objects Logical to Physical Relationship Model

Interconnect Element objects and Port objects may have attributes associated with them, as shown in figure 8. and figure 9.

Figure 8 – Interconnect Element Object and Physical Object attributes

Figure 9 – Logical Port Object and Physical Port Object attributes

Editor's Note: Firmware version belong to Interconnect Element or stay in Physical Object?

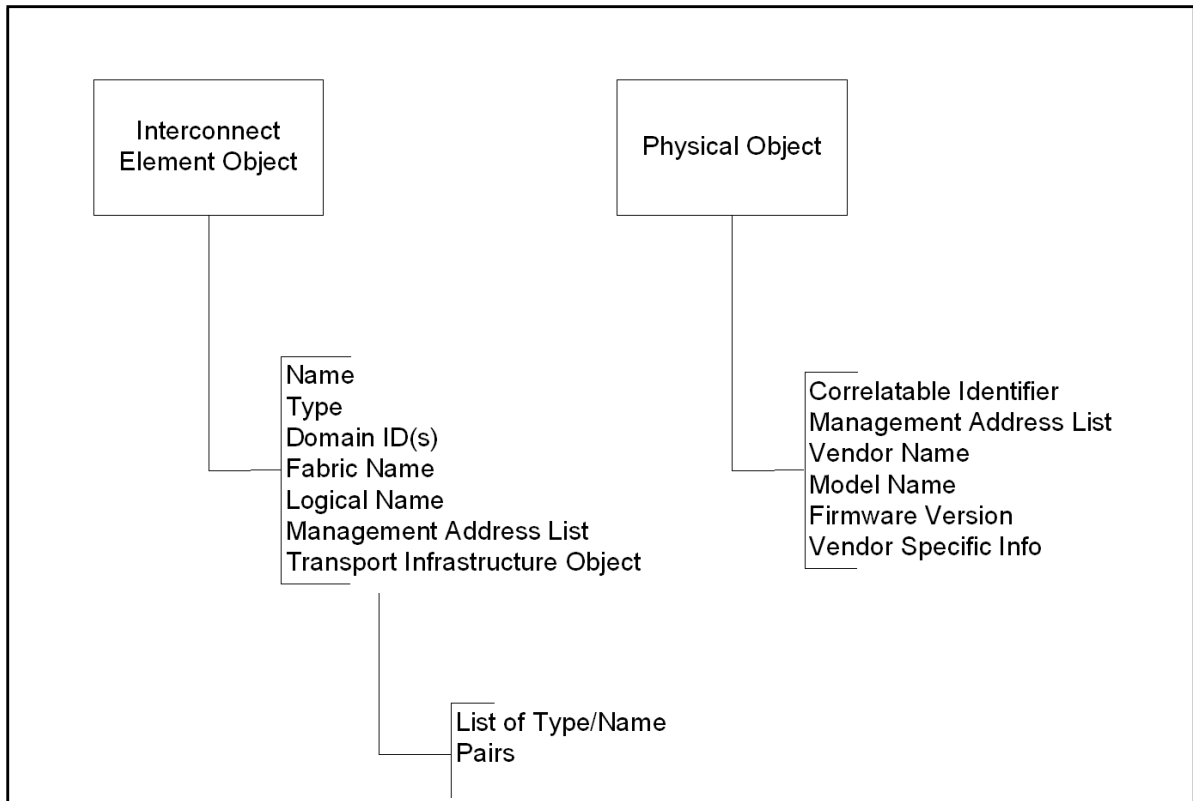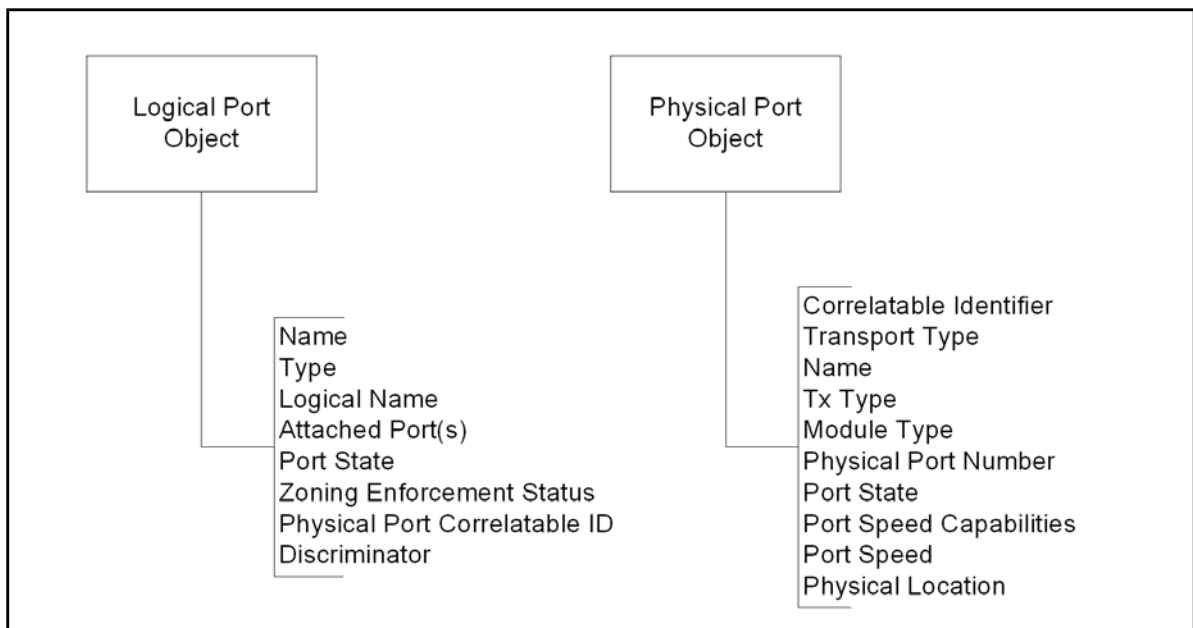**Editor's Note:** Physical Location is the labeled external port identification whereas physical port number if the p in d,p zoning.

6.2.3.1.1 Enhanced Configuration Server Attribute Entry Format

6.2.3.1.1.1 Overview

The Enhanced Fabric Configuration Server defines a general format to be used for attributes associated with Platform objects. The general format of the Attribute Entry is depicted in table 101.

Table 101 – Enhanced Fabric Configuration Server Attribute Entry Format

Item	Size (Bytes)
Enhanced Fabric Configuration Server Attribute Entry Type	2
Enhanced Fabric Configuration Server Attribute Entry Length (n)	2
Enhanced Fabric Configuration Server Attribute Entry Value	(see table 103, table 107, table 109, and table 117)

6.2.3.1.1.2 Enhanced Fabric Configuration Server Attribute Entry Type

This field indicates the Attribute Entry Type. Valid Enhanced Fabric Configuration Server Attribute Types are specific to the object to which they are associated. The Type codes are defined in table 103, table 107, table 109, and table 117.

6.2.3.1.1.3 Enhanced Configuration Server Attribute Entry Length

This field indicates the total length of the Attribute Entry. The total length in bytes shall be a multiple of four and includes the Attribute Entry Type, Attribute Entry Length, and Attribute Value fields.

6.2.3.1.1.4 Enhanced Fabric Configuration Server Entry Value

This field specifies the Enhanced Fabric Configuration Attribute Entry Value. Enhanced Fabric Configuration Server Attribute Entry Values shall be at least four bytes in length and the length shall be a multiple of four. For variable length Attribute Value fields, fill bytes are added as necessary to the end of the actual value in order to ensure that the length of the value field is a multiple of four. Fill bytes shall be 00h. Attribute Entry types are defined in table 103, table 107, and table 109.

6.2.3.2 Interconnect Element Object

6.2.3.2.1 Overview

6.2.3.2.2 Interconnect Element Object Attribute Block

6.2.3.2.2.1 Overview

The Interconnect Element Object Attribute Block is a variable length structure that contains attributes registered for the specified Interconnect Element Object. The format of the Interconnect Element Object Attribute Block is depicted in table 102.

Editor's Note: Is Number of Interconnect Elements needed given TLV
Editor's Note: Change w,x,y,and z to see ref.

Table 102 – Interconnect Element Object Attribute Block

Item	Size (Bytes)
Number of Interconnect Element Object Attribute Entries (n)	4
Enhanced Fabric Configuration Server Attribute Entry 1	w
Enhanced Fabric Configuration Server Attribute Entry 2	x
...	
Enhanced Fabric Configuration Server Attribute Entry n-1	y
Enhanced Fabric Configuration Server Attribute Entry n	z

6.2.3.2.2.2 Number of Interconnect Element Object Attribute Entries

This field specifies the number of Interconnect Element Object Attribute Entries contained in the Interconnect Element Object Attribute Block. This value shall be greater than or equal to one.

6.2.3.2.2.3 Interconnect Element Object Attribute Entry

An Interconnect Element Object Attribute Entry specifies a particular attribute registered with a Interconnect Element Object.

6.2.3.2.3 Interconnect Element Object attributes

6.2.3.2.3.1 Overview

The Interconnect Element Object Attribute Entry Types and their associated qualifiers are depicted in table 103.

Table 103 – Interconnect Element Object Attribute Entry Types and their associated qualifiers

Type Code (hex)	Value				
	Interconnect Element Object Attribute	Length (Bytes)	Data Type	Required	Multiples allowed[a]
0001	Name	8	Binary	Yes	No
0002	Type	1	Binary	Yes	No
0003	Domain ID	1	Binary	Yes[b]	Yes
0004	Fabric Name	8	Binary	Yes	No
0005	Logical Name	1 to 255	ASCII	No	No
0006	Management Address	1 to 255	ASCII	No	Yes
0007	Transport Infrastructure Object	1 to 255	Binary or ASCII[c]	No	Yes
other values	Reserved				

a   If an Interconnect Element Object Attribute Block contains multiple types for a type that does not allow multiples the command shall be rejected with a reason code of 'Unable to perform command request' and a Reason Code Explanation of "Interconnect Element Object Attribute Block Contains Multiple Attributes of the Same Type"

b   If an Interconnect Element Object Attribute Type is Switch, then the TLV entry with Interconnect Element Object Attribute Domain ID is required. If the Interconnect Element Object Attribute Type is not Switch, then there shall be no TLV entry with Interconnect Element Object Attribute Domain ID.

c   See 6.2.3.2.3.10

6.2.3.2.3.4 Interconnect Element Object Name attribute

The format of the Interconnect Element Object Name attribute, as used by the Enhanced Fabric Configuration Server, shall be identical to the Name_Identifier format defined in FC-FS-4. If the Interconnect Element is a Switch (see FC-SW-6), the Interconnect Element Object Name attribute shall be the Switch_Name of the Switch.

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server.

Editor's Note: Add variable FC-FS and FC-SW.

6.2.3.2.3.5 Interconnect Element Object Type attribute

The format of the Interconnect Element Object Type attribute, shall be as shown in table 104.

Table 104 – Interconnect Element Type- encoding

Encoded value (hex)	Description
00	Unknown
01	Switch
02	Hub
03	Bridge
04	Virtual Domain Supervisor
05	FCDF
all others	Reserved

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The null Interconnect Element Type attribute value is set to 'Unknown'.

> **Editor's Note:** Need to define Virtual Domain Supervisor as the FC Switching Element of the Controling Switching model that owns the Virtual Domain (see FC-SW-6)

6.2.3.2.3.6 Interconnect Element Object Domain Identifier attribute

The format of the Interconnect Element Domain Identifier attribute, as used by the Enhanced Fabric Configuration Server, shall be identical to the Domain Identifier format defined in FC-SW-6.

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server.

6.2.3.2.3.7 Interconnect Element Object Fabric Name attribute

The format of the Interconnect Element Fabric Name attribute, as used by the Enhanced Fabric Configuration Server, shall be identical to the Name_Identifier format defined in FC-FS-3. The value of the Interconnect Element Fabric Name shall be the same as the Fabric_Name value in the Fabric Login ELS Accept payload.

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. There shall be no null value.

6.2.3.2.3.8 Interconnect Element Object Logical Name attribute

The format of the Interconnect Element Logical Name attribute, as used by the Enhanced Fabric Configuration Server, shall be as shown in table 103. The contents of these bytes are not defined and shall not be restricted by the Enhanced Fabric Configuration Server.

This attribute may be registered using the protocol described in . The null value for the Interconnect Element Logical Name attribute is a zero-length Interconnect Element Logical Name.

6.2.3.2.3.9 Interconnect Element Management Address attribute

The format of the Interconnect Element Management Address attribute, as used by the Enhanced Fabric Configuration Server, shall be as shown in table 103. Zero or more Management Address attributes shall be associated with an Interconnect Element object

The format of the Management Address shall use the format of the Uniform Resource Locator (URL) as defined in RFC3986, RFC4248 and RFC4266. The scheme field shall be as registered at http://www.iana.org/assignments/uri-schemes (see RFC3986). A null management address entry is specified as a Management Address length value of zero followed by 255 reserved bytes.

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The contents of the Management Address shall not be restricted by the Enhanced Fabric Configuration Server.

6.2.3.2.3.10 Interconnect Element Object Transport Infrastructure Object

The format of the Transport Infrastructure Object shall be shown as in table 105.

Table 105 – Transport Infrastructure Object Format

Item	Size (Bytes)
Transport Infrastructure Object Type	1
Transport Infrastructure Object Object	
Reserved	2

The Transport Infrastructure Object Type contains either 1 to indicate the Transport Infrastructure Object Object references a Interconnect Element Object (Interconnect Element Object Name) or a 2 to indicate it references a Physical Object (Physical Object Correlatable Identifier).

Editor's Note: Need to determine how to use a TLV with two different types (Binary and String) require one or the other but not both and add type table.

6.2.3.3 Physical Object

6.2.3.3.1 Physical Object Overview

Configuration management information of physical hardware that contains one or more Interconnect Elements.

6.2.3.3.2 Physical Object Attribute Block

6.2.3.3.2.1 Overview

The Physical Object Attribute Block is a variable length structure that contains attributes registered for the specified Physical Object. The format of the Physical Attribute Block is depicted in table 106. A Physical Object is the hardware container for an Interconnect Element (e.g. Switch).

Table 106 – Physical Object Attribute Block

Item	Size (Bytes)
Number of Physical Object Attribute Entries (n)	4
Enhanced Configuration Server Attribute Entry 1	w
Enhanced Configuration Server Attribute Entry 2	x
...	
Enhanced Configuration Server Attribute Entry n-1	y
Enhanced Configuration Server Attribute Entry n	z

6.2.3.3.2.2 Number of Physical Object Attribute Entries

This field specifies the number of Physical Attribute Entries contained in the Physical Attribute Block. This value shall be greater than or equal to one.

6.2.3.3.2.3 Physical Object Attribute Entry

An Physical Object Attribute Entry specifies a particular attribute registered with a Interconnect Element Object.

6.2.3.3.3 Physical Object Attributes

6.2.3.3.3.1 Overview

Physical Object Attributes are depicted in table 107.

Table 107 – Physical Object Attribute Entry Types and their associated Values

Type (hex)	Value				
	Description	Length (Bytes)	Type	Required	Multiples allowed[a]
0001	Correlatable Identifier	8	Binary	Yes	No
0002	Management Address	1 to 255	ASCII	No	Yes
0003	Vendor Name	1 to 255	Binary	Yes	Yes
0004	Model Name	1 to 255	ASCII	No	No
0005	Firmware Version	1 to 255	ASCII	No	Yes
0006	Vendor Specific Information	1 to 255	ASCII	No	No
other values	Reserved				

[a] If a Physical Object Attribute Block contains multiple types for a type that does not allow multiples, then the command shall be rejected with a reason code of 'Unable to perform command request' and a Reason Code Explanation of "Platform Attribute Block Contains Multiple Attributes of the Same Type".

6.2.3.3.3.2 Physical Object Correlatable Identifier attribute

A printable ASCII string, terminated with a null (00h), that uniquely identifies the Physical Object.

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The contents of the Correlatable Identifier shall not be restricted by the Enhanced Fabric Configuration Server.

6.2.3.3.3.3 Physical Object Management Address attribute

A printable ASCII string, terminated with a null (00h), that specifies the model name of the Physical Object.

The format of the Management Address shall use the format of the Uniform Resource Locator (URL) as defined in RFC3986, RFC4248 and RFC4266. The scheme field shall be as registered at http://www.iana.org/assignments/uri-schemes (see RFC3986). A null management address entry is specified as a Management Address length value of zero followed by 255 reserved bytes.

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The contents of the Management Address shall not be restricted by the Enhanced Fabric Configuration Server.

6.2.3.3.3.4 Physical Object Vendor Name attribute

A printable ASCII character string, terminated with a null (00h), that specifies the vendor name of the Physical Object.

6.2.3.3.3.5 Physical Object Model Name attribute

A printable ASCII character string, terminated with a null (00h), that specifies the user friendly name of the Physical Object.

6.2.3.3.3.6 Physical Object Firmware Version attribute

A printable ASCII character string, terminated with a null (00h), that specifies the version of the firmware of the Physical Object.

6.2.3.3.3.7 Physical Object Vendor Specific Information attribute

One or more printable ASCII character strings, each terminated with a null (00h), that contain other vendor-specific information regarding the designated Interconnect Element.

6.2.3.4 Logical Port Object

6.2.3.4.1 Overview

6.2.3.4.2 Logical Port Object Attribute Block

The Logical Port Object Attribute Block is a variable length structure that contains attributes registered for the specified Logical Port Object. The format of the Logical Port Attribute Block is depicted in table 106.

Table 108 – Logical Port Object Attribute Block

Item	Size (Bytes)
Number of Logical Port Object Attribute Entries (n)	4
Logical Port Object Attribute Entry 1	w
Logical Port Object Attribute Entry 2	x
...	
Logical Port Object Attribute Entry n-1	y
Logical Port Object Attribute Entry n	z

6.2.3.4.2.1 Number of Logical Port Object Attribute Entries

This field specifies the number of Logical Port Object Attribute Entries contained in the Logical Port Object Attribute Block. This value shall be greater than or equal to one.

6.2.3.4.2.2 Logical Port Object Attribute Entry

A Logical Port Object Attribute Entry specifies a particular attribute registered with the Enhanced Configuration Server.

6.2.3.4.3 Logical Port Object Attribute Entry Types

6.2.3.4.3.1 Overview

The Logical Port Attributes are depicted in table 109.

Table 109 – Logical Port Object Attribute Entry Types and their associated Values

Type (hex)	Value				
	Description	Length (Bytes)	Type	Required	Multiples allowed[a]
0001	Name	8	Binary	Yes	No
0002	Type	1	Binary	Yes	No
0003	Logical Name	1-255	Binary	No	No
0004	Attached Port	8	Binary	Yes[b]	Yes
0005	Port State	1 - 255	ASCII	No	No
0006	Zoning Enforcement Status	1 - 255	ASCII	No	Yes
0007	Physical Port Correlatable Identifier		ASCII	No	No
0008	Discriminator	1	Binary		
other values	Reserved				

[a] If a Logical Port Attribute Block contains multiple types for a type that does not allow multiples the command shall be rejected with a reason code of 'Unable to perform command request' and a Reason Code Explanation of "Platform Attribute Block Contains Multiple Attributes of the Same Type".
[b] Attached Port is required if Port State is Online

6.2.3.4.3.3 Logical Port Object Name attribute

The format of the Logical Port Name attribute, as used by the Enhanced Fabric Configuration Server, shall be identical to the Name_Identifier format defined in FC-FS-3. The value of the Name attribute shall be the same as the value Port_Name in the Fabric Login ELS Accept payload.

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The null value for the Port Name attribute is 00 00 00 00 00 00 00 00h.

Editor's Note: Add Logical Name set at the end of the doc

6.2.3.4.3.4 Logical Port Object Port Type attribute

The format of the Port Type attribute, shall be as shown in table 110.

Table 110 – Port Type encoding

Encoded value (hex)	Description
00	Unidentified
01	N_Port
02	NL_Port
03	F/NL_Port
7F	Nx_Port
81	F_Port
82	FL_Port
84	E_Port
85	B_Port
C0-FF	Vendor Specific
all others	Reserved

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The null Port Type attribute value is set to 'Unknown'.

6.2.3.4.3.5 Logical Port Object Logical Name attribute

The format of the Logical Port Object Logical Name attribute, as used by the Enhanced Fabric Configuration Server, shall be as shown in table 109. The contents of these bytes are not defined and shall not be restricted by the Enhanced Fabric Configuration Server.

This attribute may be registered using the protocol described in . The null value for the Logical Port Object Logical Name attribute is a zero-length Logical Port Logical Name.

6.2.3.4.3.6 Logical Port Object Attached Port Name attribute

The format of the Attached Port Name attribute, as used by the Enhanced Fabric Configuration Server, shall be as shown in table 111. Zero or more Attached Port Name attributes may be associated with a Port object.

Table 111 – Attached Port Name Format

Item	Size (Bytes)
Port Name	8
Reserved	2
Port Flags	1
Port Type	1

Port Name: As defined in 6.2.3.3.1.

Port Flags: As shown in table 112. .

Table 112 – Port Flags field bits

Bit Position	Description
7-2	Reserved
1	A value of one indicates that the Port supports the Get Topology Information Extended (GTIN) Link Service. A value of zero indicates that the Port does not support this ELS.
0	Obsolete

Port Type: As defined in .

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. A Port object with a Port Type attribute value of "N_Port" or "NL_Port" shall have a null Attached Port Name List. The null value for the Attached Port Name List attribute shall be a zero length Attached Port Name List.

6.2.3.4.3.7 Logical Port Object Port State attribute

The format of the Logical Port Object Port State attribute, shall be as shown in table 113.

Table 113 – Port State encoding

Encoded value (hex)	Description
00	Unknown
01	Online - a frame may be passed through the FC_Port
02	Offline - a frame is not able to be passed through the FC_Port
03	Testing - FC_Port is in a test state
04	Fault - FC_Port is not operational
E0-FF	Vendor specific
all others	Reserved

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The null Port State attribute value is set to 'Unknown'.

6.2.3.4.3.8 Logical Port Object Zoning Enforcement Status Object attribute

The format of the Zoning Enforcement Status Object is depicted in table 114.

Table 114 – Zoning Enforcement Status Object

Item	Size (Bytes)
F_Port_Name	8
Port enforcement status	4

F_Port_Name: This field contains the F_Port_Name of the Fx_Port that the enforcement status object is referencing.

Port Enforcement Status: This is a 32 bit wide bit field that reports the actual enforcement status of the named Fx_Port. The defined bits are depicted in table 115.

Table 115 – Port Enforcement Status Bit Definitions

Bit	Interpretation
0	1 = Soft Zoning Enforcement on 0 = Soft Zoning Enforcement off
1	1 = Hard Zoning Enforcement on 0 = Hard Zoning Enforcement off
2	1 = Broadcast Zoning Enforcement on 0 = Broadcast Zoning Enforcement off
all others	Reserved

6.2.3.4.3.9 Logical Port Object Physical Port Correlatable Identifier attribute

6.2.3.4.3.10 Logical Port Object Discriminator attribute

The format of the Logical Port Object Discriminator attribute, shall be as shown in table 116.

Table 116 – Discriminator encoding

Encoded value (hex)	Description
00	Unknown
01	Native FC
02	FCoE
03	VFT
04	FCIP
all others	Reserved

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The null Discriminator attribute value is set to 'Unknown'.

6.2.3.5 Physical Port Object

6.2.3.5.1 Overview

6.2.3.5.2 Physical Port Object Attribute Block

The Physical Port Object Attribute Block is a variable length structure that contains attributes registered for the specified Logical Port Object. The format of the Physical Attribute Block is depicted in table 106.

Table 117 – Physical **Port Object Attribute Block**

Item	Size (Bytes)
Number of Physical Port Object Attribute Entries (n)	4
Physical Port Object Attribute Entry 1	w
Physical Port Object Attribute Entry 2	x
...	
Physical Port Object Attribute Entry n-1	y
Physical Port Object Attribute Entry n	z

6.2.3.5.2.1 Number of Physical Port Object Attribute Entries

This field specifies the number of Logical Port Object Attribute Entries contained in the Logical Port Object Attribute Block. This value shall be greater than or equal to one.

6.2.3.5.2.2 Physical Port Object Attribute Entry

A Logical Port Object Attribute Entry specifies a particular attribute registered with the Enhanced Configuration Server.

6.2.3.5.3 Physical Port Object Attribute Entry Types

6.2.3.5.3.1 Overview

6.2.3.5.3.2 Physical Port Object Attributes

The Physical Port Object Attributes are depicted in table 118.

Table 118 – Physical Port Object Attribute Entry Types and their associated Values

Type (hex)	Value				
	Description	Length (Bytes)	Type	Required	Multiples allowed[a]
0001	Correlatable Identifier	1-255	ASCII	Yes	No
0002	Transport Type	1-255	Binary	Yes	No
0003	Name	1-255	ASCII	No	Yes
0004	Tx Type	8	Binary	Yes	No
0005	Module Type	1 - 255	Binary	No	No
0006	Physical Port Number	1 - 255	Binary	No	Yes
0007	Port State	2	Binary	Yes	No
0008	Port Speed Capabilities	2	Binary		No
0009	Port Speed	2	Binary	Yes	No
0010	Physical Location				
other values	Reserved				

a   If a Physical Port Attribute Block contains multiple types for a type that does not allow multiples the command shall be rejected with a reason code of 'Unable to perform command request' and a Reason Code Explanation of "Platform Attribute Block Contains Multiple Attributes of the Same Type".

6.2.3.5.3.2 Physical Port Object Correlatable Identifier attribute

A printable ASCII string, terminated with a null (00h), that uniquely identifies the Physical Object.

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The contents of the Correlatable Identifier shall not be restricted by the Enhanced Fabric Configuration Server.

6.2.3.5.3.3 Physical Port Object Transport Type attribute

Editor's Note: Need to add the following to a table: FC, Ethernet, and IP

6.2.3.5.3.4 Physical Port Object Name attribute

The format of the Name attribute, as used by the Enhanced Fabric Configuration Server, shall be identical to the Name_Identifier format defined in FC-FS-3. The value of the Port Name attribute shall be the same as the value Port_Name in the Fabric Login ELS Accept payload.

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The null value for the Port Name attribute is 00 00 00 00 00 00 00 00h.

6.2.3.5.3.5 Physical Port Object TX Type attribute

The format of the TX Type attribute, shall be as shown in table 119.

Table 119 – TX Type encoding

Encoded value (hex)	Description
01	Unknown
02	Long wave laser - LL (1 550 nm)
03	Short wave laser - SN (850 nm)
04	Long wave laser cost reduced - LC (1 310 nm)
05	Electrical - EL
06	10GBASE-SR 850nm laser[a]
07	10GBASE-LR 1310nm laser[a]
08	10GBASE-ER 1550nm laser[a]
09	10GBASE-LX4 WWDM 1300nm laser[a]
0A	10GBASE-SW 850nm laser[a]
0B	10GBASE-LW 1310nm laser[a]
0C	10GBASE-EW 1550nm laser[a]
0D	10GBASE-CX4[a]
0F	Long wave laser - LZ (1490 nm)
all others	Reserved
[a] See IEEE 802.3-2005.	

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The null TX Type attribute value is set to 'Unknown'.

6.2.3.5.3.2 Physical Port Object Module Type attribute

The format of the Physical Port Module Type attribute, shall be as shown in table 120.

Table 120 – Module Type encoding

Encoded value (hex)	Description
01	Unknown
02	Other
03	Obsolete
04	Embedded
05	GLM
06	GBIC with serial ID
07	GBIC without serial ID
08	SFP with Serial ID
09	SFP without Serial ID
0A	XFP
0B	X2 Short
0C	X2 Medium
0D	X2 Tall
0E	XPAK Short
0F	XPAK Medium
10	XPAK Tall
11	XENPAK
12	SFP-DWDM
13	QSFP
14	X2-DWDM
all others	Reserved

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The null Port Module Type attribute value is set to 'Unknown'.

6.2.3.5.3.3 Physical Port Object Physical Port Number attribute

The format of the Physical Port Object Physical Port Number attribute, as used by the Enhanced Fabric Configuration Server, shall be as shown in table 121. The contents of this field are not defined and shall not be restricted by the Enhanced Fabric Configuration Server, due to vendor specific methods for numbering physical ports.

Table 121 – Physical Port Number Format

Item	Size (Bytes)
Physical Port Number	4

This standard does not define how this attribute is registered with the Enhanced Fabric Configuration Server. The null value for the Physical Port Number attribute is 00 00 00 00h.

6.2.3.5.3.4 Physical Port Object Port State attribute

Need to create a table with the following: Online - a frame may be passed through the FC_Port. Offline - a frame is not able to be passed through the FC_Port. Testing - FC_Port is in a test state. Fault - FC_Port is not operational.

6.2.3.5.3.5 Physical Port Object Port Speed Capabilities attribute

The Port Speed Capabilities field identifies the data transfer rate capabilities of the LCF within the FC_Port. The format of the Port Speed Capabilities attribute shall be as shown in table 122.

Table 122 – Port Speed Capabilities Format

Item	Size (Bytes)
Port Speed Capabilities	2
Reserved	2

All the LCF's potential data transfer speed operating points are indicated by setting the appropriate bit to one. More than one bit may be set at a time. Valid bits are as shown in table 123.

Table 123 – Port Speed Capabilities field bits

Bit Position	Description
15	1 Gb/s capable
14	2 Gb/s capable
13	4 Gb/s capable
12	10 Gb/s capable
11	8 Gb/s capable
10	16 Gb/s capable
9	20 Gb/s capable
8	32 Gb/s capable
7	40 Gb/s capable
6-1	Reserved
0	Unknown

6.2.3.5.3.6 Physical Port Object Port Operating Speed attribute

The Port Operating Speed field identifies the current operating data transfer rate of the LCF within an FC_Port. The format of the Port Operating Speed attribute shall be as in table 124.

Table 124 – Port Operating Speed Format

Item	Size (Bytes)
Reserved	2
Port Operating Speed	2

When a bit is set to one, it indicates the LCF is operating at the designated speed. Only one bit shall be set at a time. If the operating speed has not been established, then the "Speed not established" bit

is set to one. If the LCF's operating speed isn't identifiable, then the "Unknown" bit is set to one. Valid bits are as shown in table 125.

Table 125 – Port Operating Speed field bits

Bit Position	Description
15	1 Gb/s operation
14	2 Gb/s operation
13	4 Gb/s operation
12	10 Gb/s operation
11	8 Gb/s operation
10	16 Gb/s operation
9	20 Gb/s operation
8	32 Gb/s operation
7	40 Gb/s operation
6-2	Reserved
1	Unknown
0	Speed not established

6.2.3.6 Query - Get Interconnect Element List (GIEL)

The Enhanced Fabric Configuration Server shall, when it receives a GIEL request, return all Interconnect Element Names in the Fabric. The format of the GIEL Request CT_IU is shown in table 126.

Table 126 – GIEL Request CT_IU

Item	Size (Bytes)
CT_IU preamble	see 4.3

If the GIEL request is not supported a CT_Reject should be returned and the reason code should be Command Not Supported, no further explanation.

The format of the Accept CT_IU to a GIEL request is shown in table 127.

Table 127 – Accept CT_IU to GIEL Request

Item	Size (Bytes)
CT_IU preamble	see 4.3
Number of Interconnect Element entries (n)	4
Interconnect Element Name #1	8
Interconnect Element Name #2	8
...	
Interconnect Element Name #n	8

One or more Interconnect Element entries are returned, and the Interconnect Element entries may be returned in any order, and the order may be different for every request even if the same Interconnect Element entries are returned and the requestor is the same.

6.2.3.7 Query - Get Interconnect Element Attribute Block (GIEAB)

The Enhanced Fabric Configuration Server shall, when it receives a GIEAB request, return the Interconnect Element Attribute Block for the specified Interconnect Element. The format of the GIEAB Request CT_IU is shown in table 128.

Table 128 – GIEL Request CT_IU

Item	Size (Bytes)
CT_IU preamble	see 4.3
Interconnect Element Name Attribute	8

If the GIEAB request is not supported a CT_Reject should be returned and the reason code should be Command Not Supported, no further explanation.

The format of the Accept CT_IU to a GIEAB request is shown in table 129.

Table 129 – Accept CT_IU to GIEAB Request

Item	Size (Bytes)
CT_IU preamble	see 4.3
Interconnect Element Object Attribute Block	see 6.2.3.2.2

One or more Interconnect Element entries are returned, and the Interconnect Element entries may be returned in any order, and the order may be different for every request even if the same Interconnect Element entries are returned and the requestor is the same.

6.2.3.8 Query - Get Interconnect Element Port List (GIEPL)

The Enhanced Fabric Configuration Server shall, when it receives a GIEPL request, return all Port Names and their associated Port Types, Port TX Types, and Port Module Types, for the specified Interconnect Element Name. The format of the GPL Request CT_IU is shown in table 130.

Table 130 – GIEPL Request CT_IU

Item	Size (Bytes)
CT_IU preamble	see 4.3
Interconnect Element Object Name Attribute	8

If the GPL request is not supported a CT_Reject should be returned and the reason code should be Command Not Supported, no further explanation.

The format of the Accept CT_IU to a GPL request is shown in table 131.

Table 131 – Accept CT_IU to GIEPL Request

Item	Size (Bytes)
CT_IU preamble	see 4.3
Number of Logical Port Name entries (n)	4
Logical Port Name #1	8
Logical Port Name #2	8
...	
Logical Port Name #n	8

One or more Logical Port Names are returned, and the Logical Port Names may be returned in any order, and the order may be different for every request even if the same Logical Port Names are returned and the requestor is the same.

6.2.3.9 Query - Get Physical Object Attribute Block (GPOAB)

The Enhanced Fabric Configuration Server shall, when it receives a **GPOAB** request, return all Port Names and their associated Port Types, Port TX Types, and Port Module Types, for the specified Interconnect Element Name. The format of the GPL Request CT_IU is shown in table 132.

Table 132 – GPL Request CT_IU

Item	Size (Bytes)
CT_IU preamble	see 4.3
Interconnect Element Name Attribute	8

If the GPL request is not supported a CT_Reject should be returned and the reason code should be Command Not Supported, no further explanation.

The format of the Accept CT_IU to a GPOAB request is shown in table 133.

Table 133 – Accept CT_IU to GPOAB Request

Item	Size (Bytes)
CT_IU preamble	see 4.3
Interconnect Element Object Attribute Block	see 6.2.3.2.2

One or more Interconnect Element entries are returned, and the Interconnect Element entries may be returned in any order, and the order may be different for every request even if the same Interconnect Element entries are returned and the requestor is the same.

6.2.3.10 Query - Get Physical Object Port List (GPOPL)

The Enhanced Fabric Configuration Server shall, when it receives a GPOPL request, return all Port Names and their associated Port Types, Port TX Types, and Port Module Types, for the specified Interconnect Element Name. The format of the GPL Request CT_IU is shown in table 134.

Table 134 – GPL Request CT_IU

Item	Size (Bytes)
CT_IU preamble	see 4.3
Interconnect Element Name Attribute	8

If the GPL request is not supported a CT_Reject should be returned and the reason code should be Command Not Supported, no further explanation.

The format of the Accept CT_IU to a GPOPL request is shown in table 135.

Table 135 – Accept CT_IU to GPOPL Request

Item	Size (Bytes)
CT_IU preamble	see 4.3
Interconnect Element Object Attribute Block	see 6.2.3.2.2

One or more Interconnect Element entries are returned, and the Interconnect Element entries may be returned in any order, and the order may be different for every request even if the same Interconnect Element entries are returned and the requestor is the same.

6.2.3.11 Query - Get Logical Port Attribute Block (GLPAB)

The Enhanced Fabric Configuration Server shall, when it receives a GLPAB request, return all Port Names and their associated Port Types, Port TX Types, and Port Module Types, for the specified Interconnect Element Name. The format of the GPL Request CT_IU is shown in table 136.

Table 136 – GPL Request CT_IU

Item	Size (Bytes)
CT_IU preamble	see 4.3
Interconnect Element Name Attribute	8

If the GPL request is not supported a CT_Reject should be returned and the reason code should be Command Not Supported, no further explanation.

The format of the Accept CT_IU to a **GLPAB** request is shown in table 137.

Table 137 – Accept CT_IU to GLPAB Request

Item	Size (Bytes)
CT_IU preamble	see 4.3
Logical Port Attribute Block	See Table 108

One or more Interconnect Element entries are returned, and the Interconnect Element entries may be returned in any order, and the order may be different for every request even if the same Interconnect Element entries are returned and the requestor is the same.

6.2.3.12 Query - Get Attached Port List (GAPL)

The Enhanced Fabric Configuration Server shall, when it receives a GAPL request, return all Port Names and their associated Port Types, Port TX Types, and Port Module Types, for the specified Interconnect Element Name. The format of the GPL Request CT_IU is shown in table 138.

Table 138 – GPL Request CT_IU

Item	Size (Bytes)
CT_IU preamble	see 4.3
Interconnect Element Name Attribute	8

If the GPL request is not supported a CT_Reject should be returned and the reason code should be Command Not Supported, no further explanation.

The format of the Accept CT_IU to a GAPL request is shown in table 139.

Table 139 – Accept CT_IU to GAPL Request

Item	Size (Bytes)
CT_IU preamble	see 4.3
Interconnect Element Object Attribute Block	See Table 102

One or more Interconnect Element entries are returned, and the Interconnect Element entries may be returned in any order, and the order may be different for every request even if the same Interconnect Element entries are returned and the requestor is the same.

6.2.3.13 Query - Get Physical Port Object Attribute Block (GPPAB)

The Enhanced Fabric Configuration Server shall, when it receives a GPOAB request, return all Port Names and their associated Port Types, Port TX Types, and Port Module Types, for the specified Interconnect Element Name. The format of the GPL Request CT_IU is shown in table 140.

Table 140 – GPL Request CT_IU

Item	Size (Bytes)
CT_IU preamble	see 4.3
Physical Port Object Attribute Block	See Table 117

If the GPL request is not supported a CT_Reject should be returned and the reason code should be Command Not Supported, no further explanation.

The format of the Accept CT_IU to a GPPAB request is shown in table 141.

Table 141 – Accept CT_IU to GPPAB Request

Item	Size (Bytes)
CT_IU preamble	see 4.3
Physical Port Object Attribute Block	see 6.2.3.2.2

One or more Physical Port Object entries are returned, and the Physical Port Object entries may be returned in any order, and the order may be different for every request even if the same Physical Port Object Element entries are returned and the requestor is the same.

6.2.3.14 Register Interconnect Element Logical Name (RIELN)

The RIELN Enhanced Fabric Configuration Server request shall be used to associate a Logical Name with a given Interconnect Element Object.

The Enhanced Fabric Configuration Server shall not attempt validation of the Logical Name attribute. This means that any Logical Name value shall be accepted.

Deregistration may be accomplished by registering a null Logical Name (see).

If the RIELN request is not supported a CT_Reject should be returned and the reason code should be Command Not Supported, no further explanation.

The format of the RIELN Request CT_IU is shown in table 142.

Table 142 – RIELN Request CT_IU

Item	Size (Bytes)
CT_IU preamble	see 4.3
Interconnect Element Object Name	8
Logical Name	256

The format of the RIELN Accept CT_IU is shown in table 143. Reason code explanations

Table 143 – RIELN Accept CT_IU

Item	Size (Bytes)
CT_IU preamble	see 4.3

A Reject CT_IU (see 4.4.4) shall notify the requestor that the request has been unsuccessfully completed. The first error condition encountered shall be the error reported by the Reject CT_IU.

If a valid Enhanced Fabric Configuration Server request is not received, the request is rejected with a Reason Code of "Invalid Command code" and a Reason Code Explanation of "No additional explanation".

If a Enhanced Fabric Configuration Server request is rejected with a reason code of 'Unable to perform command request', then one of the reason code explanations, shown in table 144, are returned.

Table 144 – Reject CT_IU Reason code explanations

Encoded value (hex)	Description
00	No additional explanation
01	Invalid Name_Identifier for Interconnect Element or Port
10	Interconnect Element List not available
30	Port List not available
34	Attached Port Name List not available
36	Port State not available
50	Unable To register Interconnect Element Logical Name
64 - 6F	Vendor Specific
Others	Reserved

If a Enhanced Fabric Configuration Server Query request other than GIEL and GPL is rejected by the Enhanced Fabric Configuration Server because the attribute specified in the request is not found in the Enhanced Fabric Configuration Server data base, then the Reject CT_IU reason code shall be 'Unable to perform command request', with a reason code explanation that indicates the specified attribute is not available.