

Specification for

ControlNet —

Part 8: Electronic data sheet

ICS 25.040.40; 35.100.70

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This Draft for Development, having been prepared under the direction of the Advanced Manufacturing Technology Assembly, was published under the authority of the Standards Board and comes into effect on 15 November 1997

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The following BSI reference relates to the work on this publication:
Committee reference AMT/7

ISBN 0 580 28684 3

Amendments issued since publication

Amd. No.	Date	Comments

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Foreword

The DD 241 specification was developed by the Allen-Bradley Company, Inc. as “ControlNet”. Allen-Bradley has granted BSI a right to publish the specification as an open communications standard for digital communications networks in industrial control applications.

This part of DD 241 describes the General Description of the deterministic control network.

This publication consists of the following parts:

- *Part 1: General description;*
- *Part 2: Physical layer and media;*
- *Part 3: Data link layer;*
- *Part 4: Network and transport layer;*
- *Part 5: Data management;*
- *Part 6: Object model;*
- *Part 7: Device profiles;*
- *Part 8: Electronic data sheet;*
- *Part 9: Station management;*
- *Part 10: Object library.*

This Draft for Development is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature because the subject matter is still under development requiring wider exposure. It should be applied on this provisional basis so that information and experience of its practical application may be obtained.

A review of this Draft for Development will be carried out not later than 2 years after its publication. Notification of the start of the review period, with a request for the submission of comments from users of this Draft for Development, will be made in an announcement in *Update Standards*.

According to the replies received the responsible BSI Committee will judge whether the Draft for Development can be converted into a British Standard or what other action should be taken.

Observations which it is felt should receive attention before the official call for comments will be welcomed.

These should be sent to the Secretary of BSI Technical Committee AMT/7 at BSI, 389 Chiswick High Road, London, W4 4AL, giving the document reference and clause number and proposing, where possible, an appropriate revision of the text.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 32 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

One of the most difficult aspects of dealing with devices on a multi-vendor network is device configuration. Dealing with many devices physically separated by distance is not only time consuming, but often frustrating. This part of the standard solves these issues by introducing and defining the Electronic Data Sheet, or EDS.

The EDS provides a mechanism whereby devices can be configured and monitored remotely using the network they are attached to.

The EDS allows a configuration tool to automate the device configuration process. The EDS specification provides an open standard for device configuration and compatibility among all devices.

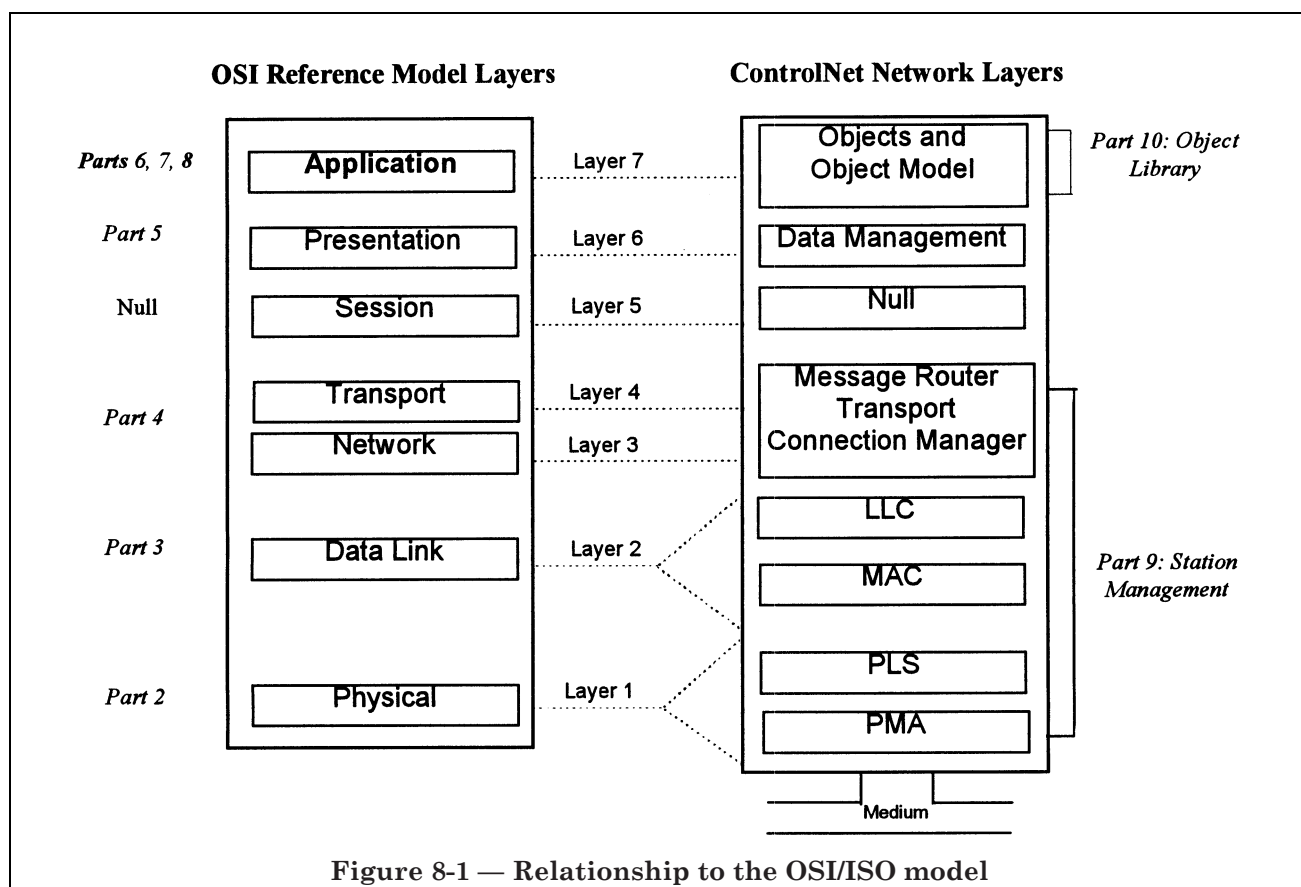
1 Scope

This part specifies requirements for the options of remote device configuration across the network and for embedding configuration parameters in devices. Using these features, implementers can select and modify device configuration settings for use in a particular application.

This part provides:

- standardised methods for device configuration;
- the structure and requirements of an Electronic Data Sheet (EDS);
- requirements and informative notes for product implementers and configuration tool designers.

The Electronic Data Sheet corresponds to the definition of Layer 7 of the seven layer OSI model in accordance with ISO 7498. Figure 8-1 shows the location of this part within the OSI model.

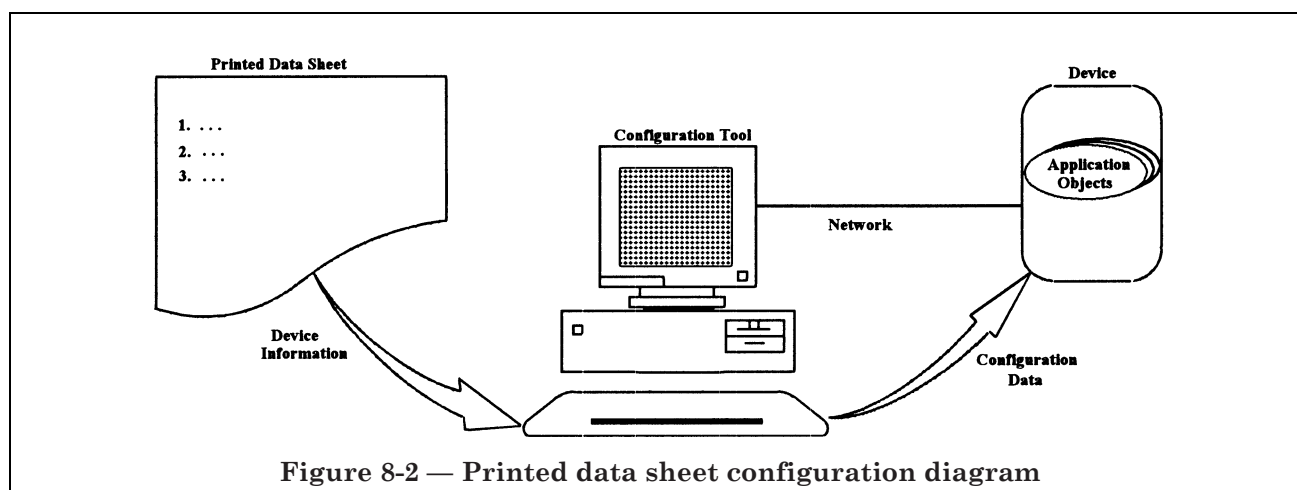


2 Configuration options, data sources and methods (informative)

2.1 General overview

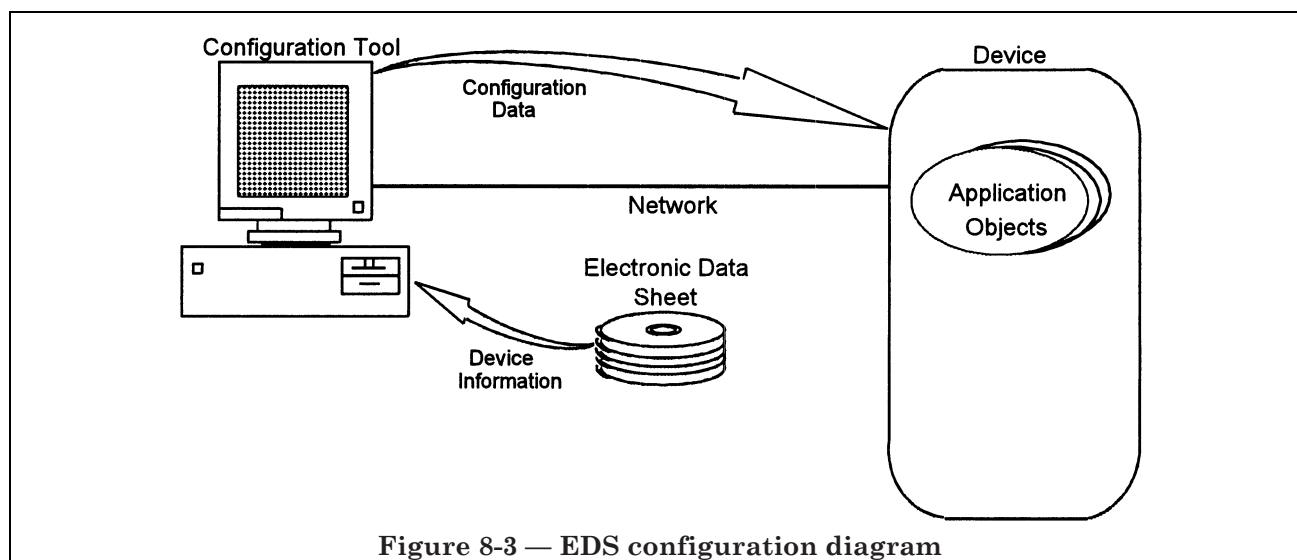
This part of the standard describes options for storing and accessing device configuration data across the network. The device user can access or store device configuration data by:

- a printed data sheet – (paper);
- an Electronic Data Sheet (EDS), i.e. computer-readable media such as floppy disk;
- Parameter objects and Parameter object stubs, i.e. object(s) within the device;
- a combination of an EDS and Parameter object stubs;
- a Configuration Assembly and any of the above methods.



Implementers who choose not to supply an Electronic Data Sheet, or EDS, on computer readable media can provide a printed listing of their EDS, thus enabling the creation of a computer readable EDS using a text editor as shown in Figure 8-2. When using configuration information collected on a printed data sheet, configuration tools can only provide prompts for service, class, instance, and attribute data and relay this data to a device. A configuration tool of this type cannot determine the context, content, or format of the data.

Figure 8-3 shows device configuration by a configuration tool that supports an EDS. The application objects in the device represent the destination addresses for configuration data. These addresses are encoded in the EDS file.



The Electronic Data Sheet (EDS) option for device configuration support is a specially formatted ASCII file that provides information about the following device configuration data

- context;
- content;
- connections;
- format.

The information in an EDS allows configuration tools to provide informative screens that guide a user through the steps necessary to configure a device. An EDS provides all of the information necessary to access and alter the configurable parameters of a device.

2.2 Configuration support using Parameter Objects and Parameter Object Stubs

2.2.1 Types of parameter objects

The device's public *Parameter Object*, which is an optional data structure in a device, provides another option for accessing the configuration data of a device. When a device uses Parameter objects, there is one instance of the Parameter object class for each supported configuration parameter. Each instance is linked to a configurable parameter that can be an attribute of one of the device's other objects. Changing the Parameter Value attribute of a Parameter object causes a corresponding change in the attribute value, as indicated by the Link Path attribute.

A *Full Parameter Object* contains all of the information necessary for device configuration including user prompts, limit testing, and descriptive text that guides a user through the configuration.

A partially defined Parameter object, called a *Parameter Object Stub*, contains the portion of configuration information needed to perform configuration that excludes user prompts, limit testing, and descriptive text that guides a user through the configuration.

The Object Library in part 10 of this standard contains a complete definition of the Parameter object.

2.2.2 Using full Parameter Objects

Parameter objects embed all of the needed configuration information within the device. Parameter objects provide

- a known public interface to a device's configuration data values;
- descriptive text;
- data limits, default, minimum, and maximum values.

When a device contains full Parameter objects, a configuration tool can derive all of the needed configuration information directly from the device. Using this information read from the device, a configuration tool could generate the EDS file.

Figure 8-4 shows the configuration of a device by a configuration tool that supports full Parameter objects.

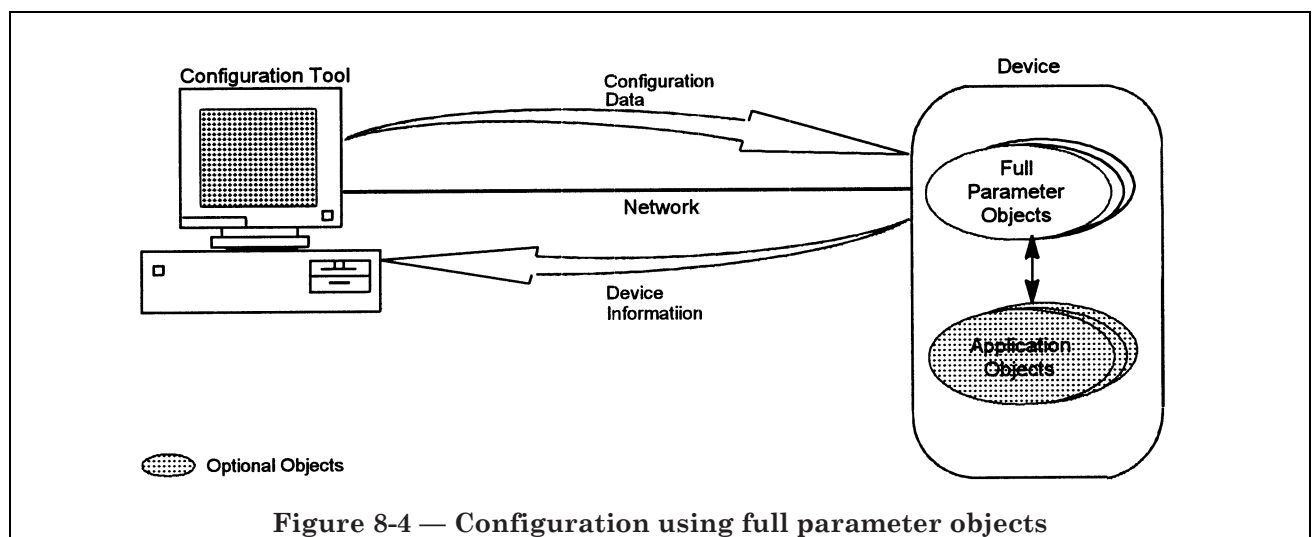


Figure 8-4 — Configuration using full parameter objects

2.2.3 Using Parameter Object Stubs

Parameter object stubs provide an established address to a device's configuration data values without requiring specification of descriptive text, data limits, and other parameter properties. When a device contains Parameter object stubs, a configuration tool may obtain additional configuration information from an EDS or provide only a minimal interface to a parameter for modification.

2.3 Configuration using an EDS and Parameter Object Stubs

A configuration tool may obtain information from partial Parameter objects or Parameter object stubs embedded in a device that provides a companion EDS. The EDS supplies additional parameter information needed by a configuration tool. The Parameter object stubs can provide a known public interface to a device's parameter data values, in which case the EDS supplies descriptive text, data limits, and other parameter properties such as the

- data type and size for data validation;
- default data selections;
- descriptive user prompts;
- descriptive help text;
- descriptive parameter names.

Figure 8-5 shows the configuration of a device by a configuration tool that supports Parameter object stubs with electronic data sheets.

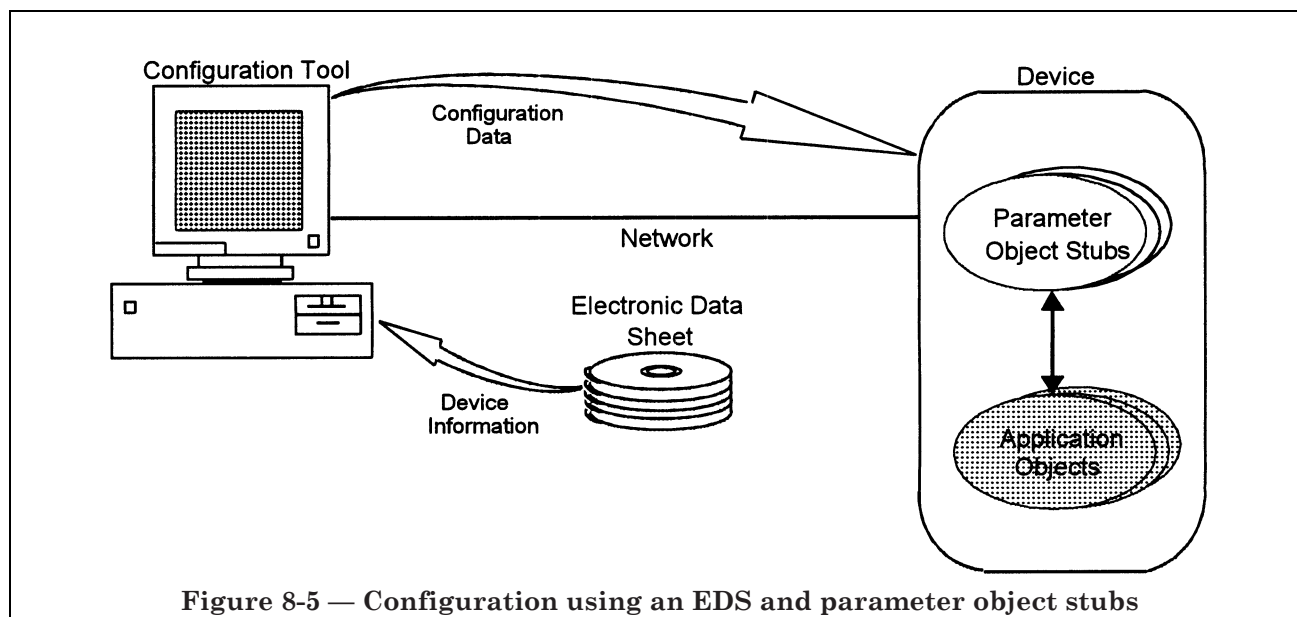


Figure 8-5 — Configuration using an EDS and parameter object stubs

2.4 Configuration using a configuration assembly

An instance of the Configuration Assembly is an option that allows bulk upload and download of configuration data. A Configuration Assembly is an instance of the Assembly Object being used to carry configuration information. Part 7, Device Profiles, contains more information concerning the use of Assembly objects and Configuration Assemblies.

If this method for device configuration is used, the following is documented:

- the format of the configuration data blocks;
- the address mapping for each configurable attribute.

When documenting the data attribute of the Configuration Assembly, the data components are listed

- in the order given by the attribute block;
- where larger than one byte starting with the low order byte;
- where smaller than one byte justified to the right within a byte, starting with bit 0.

The format of the data blocks is shown in Table 8-1.

Table 8-1 — Data blocks

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Operate Mode
o								
o								
o								
n-1	Output Ranges							
n	Input Ranges							

In addition to specifying the device Configuration Assembly's data format, the individual configuration data components are mapped to their associated objects by specifying the path for each data component. This is essentially the same as specifying the Member_List attribute of the Assembly Object.

Table 8-2 shows an example mapping of Configuration Assembly data attribute components.

Table 8-2 — Data attribute mapping example

Data component name	Class		Instant number	Attribute		Data type
	Name	Number		Name	Number	
Operate Mode	Presence Sensing	0×0E	1	Operate Mode	8	BOOL
o						
Output Range	Analogue Output Point	0×0B	1	Output Range	7	USINT
Input Range	Analogue Input Point	0×0A	1	Input Range	7	USINT

2.5 The Electronic Data Sheet (EDS) model and terms

Electronic data sheets follow a product data sheet metaphor.

Typically, a product data sheet provides a user with information needed to determine the product's features and the range of user assigned values that may be selected for these features. The data sheet conveys information from the product manufacturer to the product user. The product user interprets the manufacturer's data sheet, decides which settings shall be set to non-default values, and performs the necessary actions to get the information from the data sheet into the device. A configuration tool that uses an EDS and parameter object stubs follows this same sequence, using an electronic form of the data sheet. To perform the configuration, a configuration tool uses the messaging specified in this standard to perform the changes in the device. The textual information in an EDS is ASCII-representable characters.

The EDS

- describes each device parameter, including its legal and default values;
- provides the user with a selection of choices for each configurable parameter in a device;
- describes the number and type of connections the device supports.

An EDS is also able to contain vendor-specific information.

Figure 8-6 illustrates a block diagram of the structure of an electronic data sheet.

Electronic Data Sheet

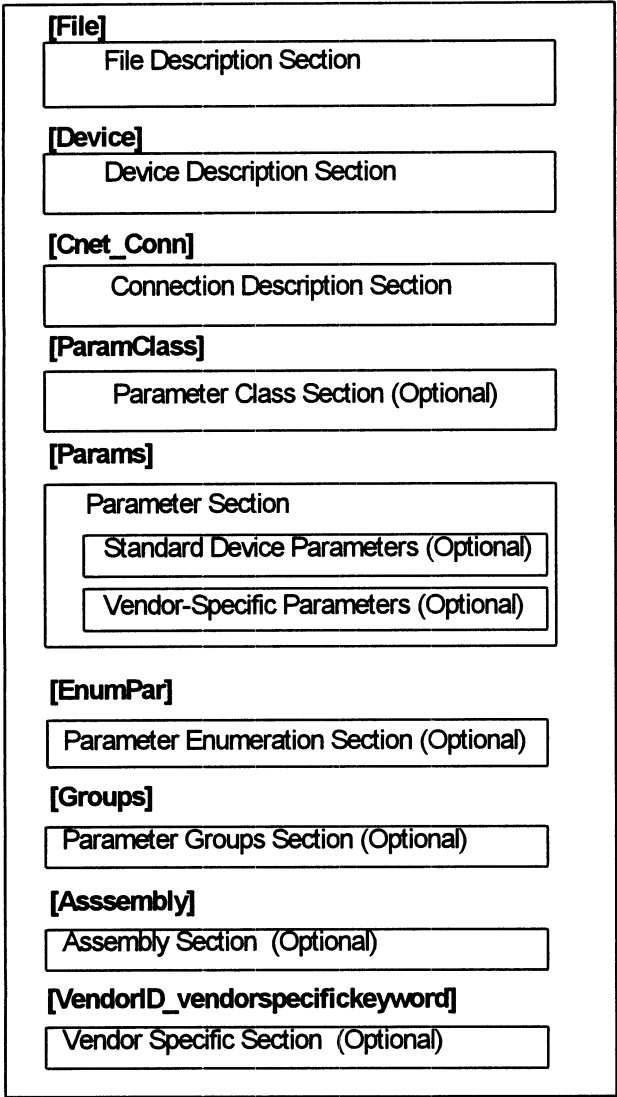


Figure 8-6 — EDS content illustration