Chapter 16
Simple Transportation Management Framework

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ABSTRACT

The Simple Transportation Management Framework (STMF) specifies a set of rules and protocols which can be used to organize, describe, and exchange transportation management information between transportation management applications and equipments. The STMF framework consists of four elements, including Management Information Base (MIB), Structure and Identification of Management Information (SMI), Simple Network Management Protocol (SNMP), and Simple Transportation Management Protocol (STMP). MIB is a collection of management objects written in ASN.1 notation. SMI is the definition of how to create management objects and a hierarchical definition of nodes where management objects will be attached for unique identification. SNMP is a communications protocol for configuring and monitoring of network devices. STMP is a variation of SNMP to address low-bandwidth communication links and real-time device monitoring.

INTRODUCTION

The STMF specifies a set of rules and protocols which can be used to organize, describe and exchange transportation management information between transportation management applications and equipments. STMP is based on the Internet-standard Network Management Framework and its purpose is to provide a high-level compatibility, inter-operability, and maintenance of STMF. The STMF framework consists of the following four elements. The brief definitions of these elements are listed below and the detailed descriptions and relationships of these elements will be given in the following sections.

- **Management information base (MIB) (Perkins et al., 1997):** A collection of management objects written in ASN.1 (Abstract Syntax Notation One) (Steedman et al.,

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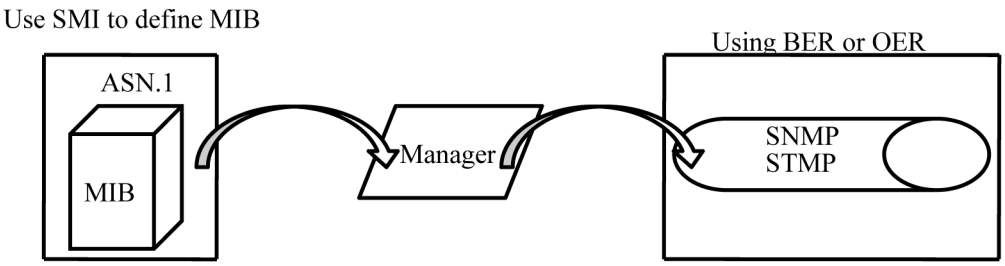
Figure 1. Relationships of SMI, MIB, and ASN.1



1993; ITU-T X.680-X.690, 1994) notation, which is a standard and flexible notation that describes data structures for representing, encoding, transmitting, and decoding data.

- **Structure and identification of management information (SMI):** The definition of how to create management objects and a hierarchical definition of nodes where management objects will be attached for unique identification.
- **Simple network management protocol (SNMP) (Stallings et al., 1993; Stallings et al., 1996; Feit et al., 1995):** A communications protocol developed by the IETF for configuring and monitoring of network devices.
- **Simple transportation management protocol (STMP):** A variation of SNMP developed by NEMA to address low-bandwidth communication links and real-time device monitoring. NEMA is the trade association of choice for the electrical manufacturing industry, and it provides a forum for the development of technical standards

Relationships of SMI, MIB, and ASN.1

SMI describes the common structures and identification schemes for the definition of management information. ASN.1 is used to specify SMI and it can be compiled by MIB compilers. To do so, SMI definitions (ASN.1 specifications) are included in a MIB module. As shown in Figure 1, the difference is made because SMI defines how to create managed objects and how to utilize ASN.1 in order to create and identify management information (MIB objects) within a tree-like structure. Management center uses Structure and Identification of Management Information to define MIB, then using BER or OER encoding scheme to generate SNMP or STMP.

SMI

Managed objects would be accessed via MIB and objects in the MIB would be defined using ASN.1 which should be in conformance with IAB STD 16 (RFC 1212). Each object type would have a name, syntax, and an encoding. The OBJECT IDENTIFIER would represent a unique name. An OBJECT IDENTIFIER should be administratively assigned a name. The administrative policies discussed in RFC 1212 would be used for assigning names and identifiers. When transmitted on the network, the encoding of an object type determines how its instances are represented.

Names

Names are used to identify managed objects. This sub-clause specifies names that should be hierarchical in nature. The OBJECT IDENTIFIER concept is used to model this notion. OBJECT IDENTIFIERs can be used to identify objects,

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