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Re:	This contribution is in response to the call for contributions in 802.16i-06/012.
Abstract	This contribution addresses the requirement in the document scope (and project PAR) that requires “protocol neutral methodologies” and multiple solution sets. It proposes a new informative annex where examples are given showing how the ASN1 based MIBs may be a basis for management using other paradigms than SNMP, e.g., Web Services or CORBA based management.
Purpose	Discuss proposed approach and agree.
Notice	
Release	
Patent Policy and Procedures	

Contribution in Support of Comment Related to the Scope of 802.16i

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Introduction

This contribution addresses the requirement in the document scope (and project PAR) that requires "protocol neutral methodologies" and multiple solution sets. It proposes a new informative annex where examples are given showing how the ASN1 based MIBs may be a basis for management using other paradigms than SNMP, e.g., Web Services or CORBA based management.

After text related to IRPs was removed from the document, the document became easier to integrate and more consistent with 802.16f, but the removal left a hole in the scope. The sentence in the scope: "It uses protocol neutral methodologies for network management to specify resource models and related solution sets for the management of devices in a multi-vendor 802.16 mobile network" seems to be written with the Integration Reference Points (IRP) methodology in mind, leaving little room for any other approach. However, we believe that by providing examples and guidelines for managing 802.16 entities using alternate technologies to SNMP, the scope is adequately addressed.

Technologies used for management systems

Today there are several technologies including SNMP used for managing networks and network entities:

SNMP
CMIP
CORBA
Web Services (WS)

Some of these technologies (e.g., SNMP, CMIP) are more oriented towards "on the wire interactions" than to the programmatic interface aspects. They specify a limited set of messages that may be exchanged between a well defined set of players/roles (Agents, Manager). Other technologies (CORBA, Web Services) are more oriented towards ease of programming, distribution, multiple language bindings, portability, scalability, etc., and are used in many different types of applications. There has been a general trend in the computing and communications industry towards use of these so-called Distributed Object Techniques (DOTs). There have also been activities aiming at bridging the traditional management technologies CMIP/SNMP and the DOTs. X-open Joint Inter-domain Management working group is addressing the interworking between the different technologies.

Studies have been undertaken to compare the efficiency between SNMP, WS and CORBA in terms of response time, traffic load, and memory footprint, which show that SNMP is more efficient when WS and CORBA given certain translations from SNMP to WS/CORBA. However, the true benefits of WS and CORBA are their flexibility, which allows for the development of applications that scale better. For instance, messages may be specified for requesting/transferring complex, aggregate chunks of information, rather than sending multiple "primitive" requests.

Web Services (WS)

Web Services are a standard means for interoperating between different software applications. A WS is implemented by an Agent and may be provided to a requester. The WS Description (WSD) is a machine process able description written in WSD Language (WSDL). Roughly speaking, WSDL is to WS what ASN.1 is to SNMP and a solution set for WS would be a WSDL specification. The protocol for transferring data is SOAP/HTTP/TCP. There is no known standard translation from an SNMP MIB to WSDL.

Common Object Request Broker Architecture (CORBA)

A CORBA based solution set would be a set of Interface Description Language specification. The protocol most likely to be used for transferring data is CORBA Internet inter-ORB protocol (IIOP) although there are other inter-ORB protocols. XoJIDM addresses the translation between the SNMP MIB and the CORBA IDLs. However, this translation is not used much in practice. The translation needs to be semantic, rather than generic/syntactic based which means it should be either optimized through manual intervention, or through more complex rules and mappings utilizing significant amounts of scrutiny and processing.

Proposed approach in 802.16i

Rather than providing solution sets for WS and CORBA in 802.16i, which would be very time consuming to develop and maintain, we suggest that efforts be concentrated on refining the current ASN.1 MIBs and to leave the developments of IDLs or WSDL to vendors and operators. The ASN.1 MIBs provide the basis and capability information for such alternate solution sets, whether they are derived manually or generated by some tool. As shown in the proposed informative annex, the exact interface between a product encapsulating an 802.16 entity and an external entity is outside the scope of 802.16 standards.

Proposed Text Changes

[Remove section 9.3.1]

[Insert new sections 9.4 and 9.4.1 as indicated:]

9.4 Management Protocols

The protocols used for management purposes between an external entity and an 802.16 entity are not in the scope of 802.16. Refer to Annex G for example deployments of management frameworks. Whichever framework is deployed, the ASN.1 MIBs serve the purpose of a protocol neutral reference model of the management operations that may be performed on an 802.16 entity.

9.4.1 SNMP

SNMP is a protocol to access the managed objects in a BS and SS. BSs and SSs implementing SNMP management protocol are assumed to comply with the following requirements. ~~The support of SNMP is optional for SS.~~ The support of SNMP ~~in this standard~~ is compliant to SNMPv2, but is backward compatible to SNMPv1 through appropriate translation. The SNMP agent optionally supports for SNMPv3 ~~is optional~~. ~~In case of~~ If an agent ~~that~~ implements SNMPv3, it is ~~required~~ assumed to implement at least all the mandatory groups of the standard MIBs required for SNMPv3: RFC3410, RFC3411, RFC3412, RFC3413, RFC3414 and RFC3415 as well as the MIB defining coexistence between SNMPv1, v2 and v3 in RFC 2576. The SNMPv3 framework may be considered as a mechanism to flexibly control access to this MIB module, and mitigate security vulnerbility. ~~.~~ The SNMP agent ~~shall~~ is assumed to support RFC3418.

[Insert new Annex G as indicated:]

Annex G Example Encapsulation of an 802.16 Entity

1. Introduction

Figure 1 in section 1.3 of the IEEE Std. 802.16 shows the 802.16 Entity Reference Model.

The Network Control and Management System (NCMS) is not part of the 802.16 standards and is treated as a "black box". It may be distributed with parts residing on different nodes in a network. Part of the NCMS may be physically collocated with the 802.16 entity. In this Annex, this part is referred to as NCMS-E. The remaining part of the NCMS may be physically distributed across one or more other network entities. This part of the NCMS is referred to as NCMS-N. Figure 2 shows the partition of .the NCMS into NCMS-E and NCMS-N.

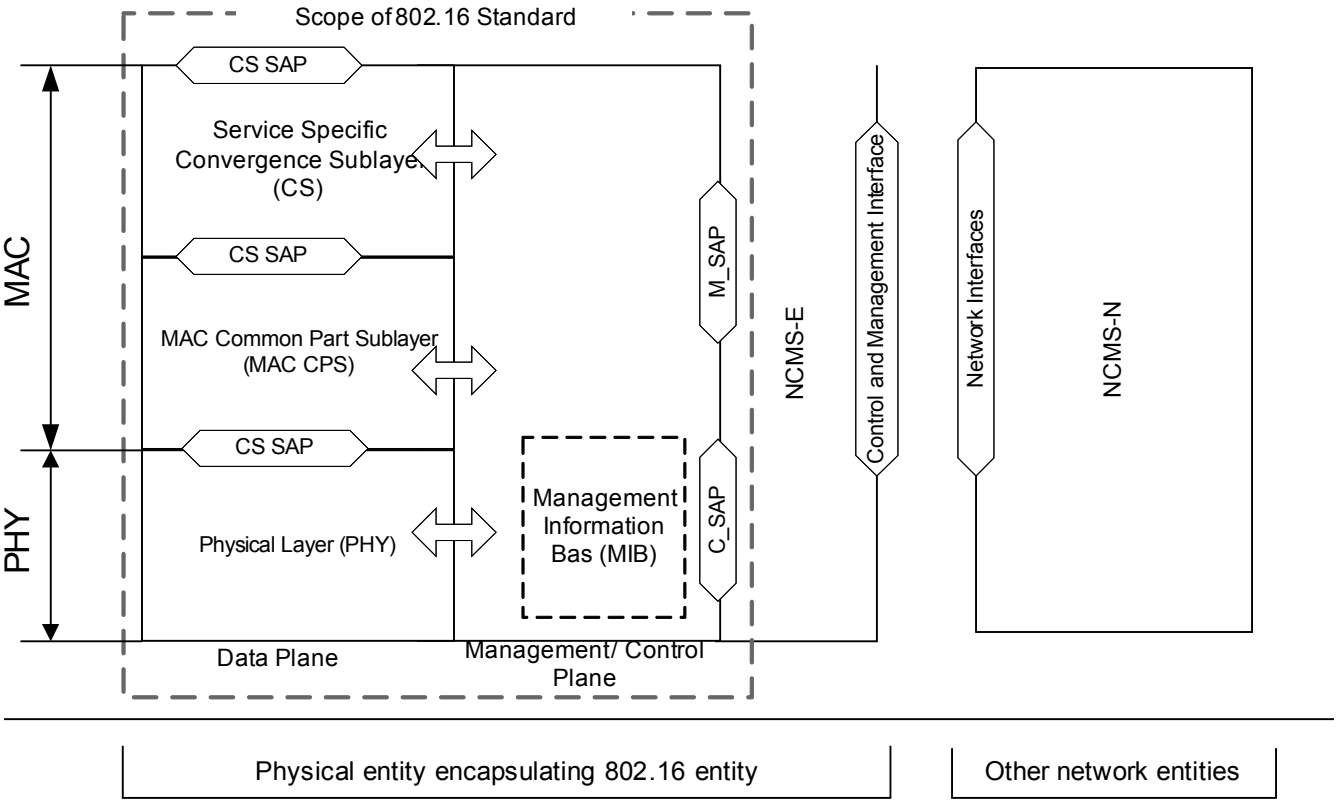

Figure 2 – Possible distribution of the NCMS

The NCMS-E may have its own software platform and network protocol implementation allowing it to communicate with external entities in the NCMS-N.

1.1 SNMP Agent

NCMS-E may provide an SNMP Agent compliant to RFC3418 and the SNMP/TCP/IP protocol stack to allow

for interactions with an SNMP manager. Sub clause 9.4.1 provides some specific requirements for BSs and SSs implementing the SNMP protocol.

1.2 CORBA

The NCMS-E may provide an Object Request Broker (ORB) and implement a communications protocol stack such as IIOP/TCP/IP allowing it to interact with components on other network entities within NCMS-N based on the CORBA architecture. The messages available to a manager in the NCMS-N are specified using Interface Description Language (IDL). These messages encapsulate the interactions with the MIB.

1.3 Web Services

The 802.16 entity could be managed through Web Services. In this case the NCMS-E may support the SOAP/HTTP/TCP/IP protocol stack, which would be used between a manager in the NCMS and the NCMS-E to exchange XML-based messages. The WSs, which encapsulate access to the MIB, may be described using WS Description Language (WSDL).