IoUT를 위한 경량 u-MIB 구현 지침

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Guidelines of Implementing Lightweight u-MIB for the IoUT

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Abstract

Smart technological integrations are able to proceed devices and services discovery based on constrained environment. Efficiency on the natural resources usability is important to human civilization. Especially, water is one of the candidate natural resources, in terms of essential the life. Water has been growing science and technology area quickly in the last decade when the water resources are increasing economically and sustainably. Water is the branch of candidate constrained environment in the network communication also. The evolution from heterogonous underwater networks and devices are accelerating further with the extension of a new technological trend which is contained Internet of Underwater Things (IoUT). The main purpose of IoUT establishes on the network of cognitive underwater devices, is expected to enable different practical underwater applications, such as environmental monitoring, harbor security, resource exploration, and fish farming etc. The major focus on underwater applications based on the management system, and we provide comprehensive research on the management system possible for the underwater environment. Underwater management components provide the underwater management information base (u-MIB) that is a candidate structure of management techniques for the underwater environment. In this paper, we mainly focus on the proceeding of the implementation u-MIB and integration real management environment.

1. Introduction

The underwater communication is a candidate instance of the constrained environment that communicates the facility of various underwater objects. The managing the underwater devices via networks provide comprehensive research in natural resources[1]. In reality, the underwater acoustic communication candidate management system to cover all the devices and networks, but it cannot still exist. Especially, the Underwater - Network Management System (U-NMS) is an expectant structure of the management techniques for the underwater environment which was previously unfeasible in the IoUT. In contrast, the underwater is an unstable and high bit error rate, high noises and fading signals. Indeed, different types noises ambient, intermediate, biological. Several literature reviews are concerning based on comprehensive research on the IoUT in deploying U-NMS mechanism [2] for managing underwater network; the processing of important operations of the u-SNMP. Simply architectural model is illustrated Fig. 1 and some of the key elements are included; the manager-console is a person (administrator), who is controlling most of the management system; the manager is the system with a high-level performance server computer; the master-agent is a small piece of software for exchanging management data between sub-agents and the manager; the sub-agent is a small piece of

software install to the underwater devices. The u-MIB is a database in a management system source which consists of a managed object (MO) and object ID (OID); the structural architecture is organizing a hierarchy tree or structural components. The u-MIB provides several key types of working with the various underwater management system[3].

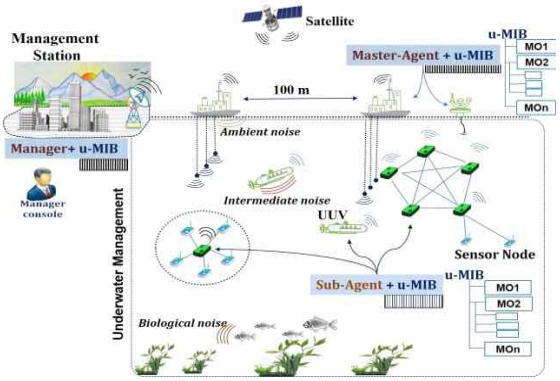

Fig. 1. The U-NMS purposed architecture on the IoUT

Underwater nodes and management-station computers are constituting the current underwater acoustic internet architectures. The next leaps in the underwater internet connectivity and architectural structure. There is an evolving connection of the surface gateway and underwater devices to the real-data object values. The underwater acoustic communication could be used in various categories, are renewing with the assist of underwater internet. IANA PEN already existing unique number which has been using the enterprise u-MIB included (U-NMS: .50582.) [4]. The management information communicated important operations of the underwater SNMP (u-SNMP) are represented according to the subset of the Abstract Notation One (ASN.1) language [5]; that is specified for the definition of non-aggregate types in the Structure of Management Information (SMI) v2. The main part of the paper guideline to defines more detail information and structural design. Indeed, step of the implementation depends on regarding requirement for the lightweight u-MIB. In addition, the OMA LwM2M concentration in the device management also for the constrained device. The paper represents more detail information design and implementation process.

2. Guidlines of the lightweight u-MIB components and requirements

A. The u-MIB unique number and integration process

The management system relies on several key components for managing underwater devices. Especially, those components provide u-MIB, MO, and Object ID (OID). Objects in the u-MIB are defined using ASN.1; object here is an underwater element and using dependable value; commonly object has name, ID, type and encoding system. For instance of the OID parameters (U-NMS) is shown below:

U-NMS OBJECT IDENTIFIER ::={ 1.3.6.1.4.1.50582}

The U-NMS uniqueness number is a gate of the lightweight u-MIB. The parent components are standard MIB root using a unique number of the combination and getting number for private. Fig. 2 represents the position of the uniqueness and accessing point from IANA PEN. Especially, this (.50582.) assists to integrate root the u-MIB to standard MIB. The lightweight mechanism provides components the u-MIB elements. There are two major IoUT and UWASN components.

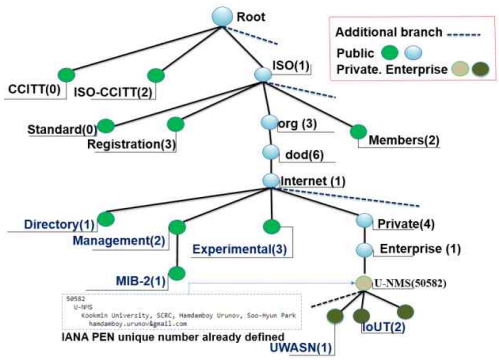

Fig. 2. Unique number for U-NMS

There is a way of a number on its unique .1.50582.1. Indeed, each the object needs specific value and 1.3.6.1.4.1.50582.1.0. ASN.1 can support INTEGER and OCTET STRING types as well. The management system allocated MO and connect to object. OID is a unique identifier of the managed object and including MIB.

B. Requirements for implementing lightweight u-MIB

The major requirement of the design and implementing lightweight u-MIB are shown below:

1. Analysis of the specified object.
2. Type of the MO and grouping progress
3. Register unique number from IANA PEN
4. Modules integrate into the system
5. Framework and platform
6. Integration source code
7. Management application coding
8. Tools of the implementing MO-based on ASN.1 etc.

When the developers are writing the lightweight

u-MIB that would be well advised to run it through the parser and eliminate all improper constructs, before using or publishing it. All public MIBs undergo such are testing before being published and tested tools online or application constructions by fostering a simple SMI, the minimal number of constraints are imposed on future potential approaches. Indeed, the u-MIB is foresting extensible SMIv2, and the maximal number of potential approaches are available for experimentations. Fig. 3 represented the design steps of the uMIB. The unique number of u-MIB and other related components rely on the important elements of management information such as ASN.1, SMI, and MO, OID etc.

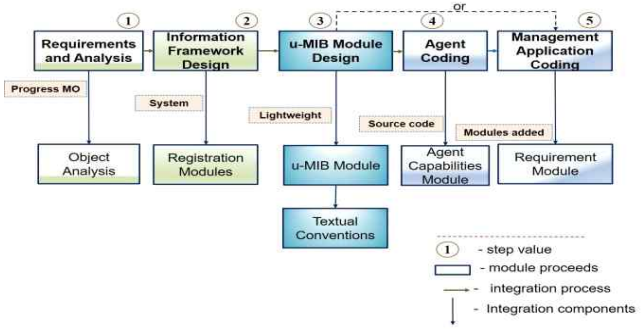

Fig. 3. Design steps of the u-MIB

Managed objects provide integration via a virtual data stored, in terms of the u-MIB aggregate all managed objects. Basically, objects in the u-MIB are defined and designed ASN.1. The device represents several objects which are an underwater element and using dependable value. In addition, the first step is an important analysis object requirement as device and possibilities of the underwater network. The second is information regarding the framework for each module (local manager module, converting module [6], functional integration modules etc.). The third is lightweight u-MIB making progress via BER. Indeed, the fourth step is agent code which capabilities modules with u-MIB. Last is the management application code which integrates all modules source and managed objects. In addition, the module does not contain definitions of the managed object that has been called as the Information module.

3. Implementation steps

A. Measurement and Evaluation

The componential elements of the u-MIB consist of scalar and tabular elements. The u-MIB is a lightweight version of the MIB as foregoing and following keywords are used to define the u-MIB object. There is Syntax, Access, and Description. Fig. 4 depicts the managed object structure. Such kind of modules may contain definitions for only the following items:

1. Object Registrations to system
2. Share the textual conventions
3. Implementation requirement for u-MIB
4. Implementation profile
5. Notification of the proceeding cancelation (trap, or any type of notice)

On the other hand, the u-MIB module may contain any these items, in addition to the definitions of the managed object. The key here is that the sub-module separate the large module.

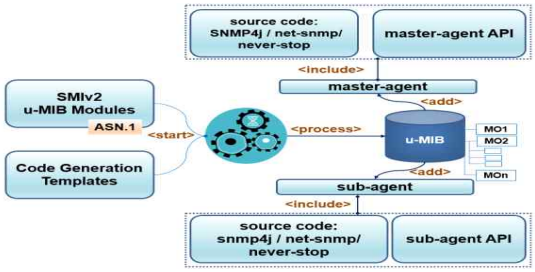

Fig. 4. Mechanism of the implementations

It typically contains information of the sort that would be communicated in any ASN.1 commentary annotations associated with the object. There is creating the MO, ASN.1 script which creates the u-MIB (all included the MOs) files written in ANS.1. The U-NMS relies on to develop the private-enterprise, the u-MIB is already assigned a number on it (50582). In addition, the important tool is integrating in represent of the u-MIB. Indeed, the popular tool in the world is iReasoning which shown below in Fig. 5. The management software designers and implementers generally benefit if they understand the [7] conceptual model behind the u-MIB module.

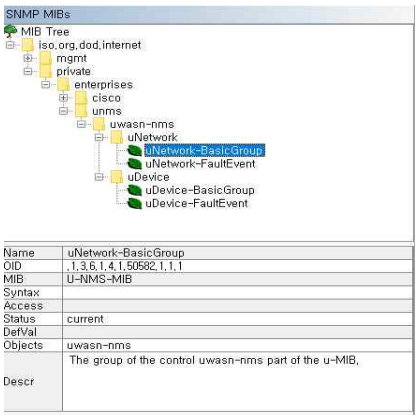

Fig. 5. Mechanism of the implementations

The u-MIB unique number and design perspectives; as

explained before, u-MIB contains a unique number as the UNMS (.50582.) and that has sibling UWASN and IoUT components. Especially more detailed designing perspective is illustrated in Fig. 6. That related to each the u-MIB variables contain several attributes, such as a data type, the access type, and an object identifier. ASN.1 is a language used to define these attributes in the u-SNMP. Hence, the uMIB described in Fig. 5 and defines two main parts; especially a uNetwork and uDevice, in case of uNetwork (.50582.1) and uDevice (.50582.2) unique number included.

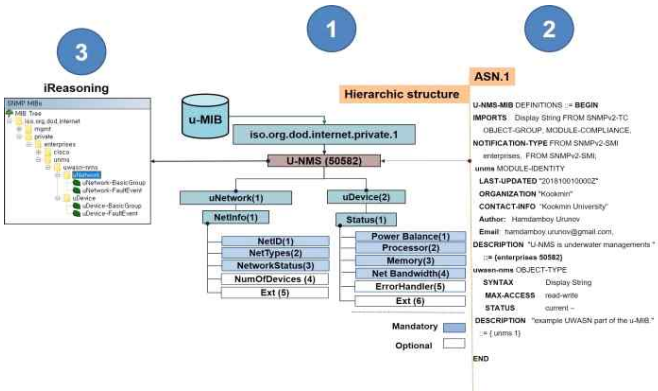

Fig. 6. Implementation integrations with Software

The main implementation represents Fig. 6 and steps are included. Especially, there is three highlight number on it. The first is mainly managed objects which related to devices and networks foregoing uNetwork and uDevice. The second number is the ASN.1 script description and compiling SMIv2 based on different tools (SNMPB, web application etc.). After that, the third step is iReasoning testing tools or Command line (in Raspbian OS for Raspberry Pi.

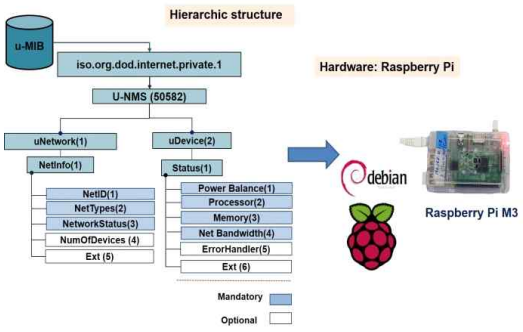

Fig. 7. Implementation integrations with Hardware

Especially, in the academic testing process is included Raspberry Pi board and dynamically control device condition via network possibility. Fig. 7 illustrated implementation integrations with hardware.

4. Conclusion

Summarize of the paper, there are main three steps, are included and contributed to the design of the u-MIB. The initial point of this step is a survey and access international system for getting management system uniqueness for the processing of IANA PEN, and the guideline mechanism of the u-MIB requirements integrating important key-elements; those processes are for integrating U-NMS platform in the IoUT. The second step is those components interworking procurers; manager and agent source code are using the uMIB efficiently. In the final step, the u-MIB hierarchic structure and ASN.1 define architecture. More bluntly, in researching and future work related to efficiently using underwater management system is in the real environment.

5. Acknowledgement

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