Network Working Group
Internet-Draft
Intended status: Experimental
Expires: April 21, 2014

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October 21, 2013

An information model atchitecture of network device
draft-jxf-i2rs-im-architecture-01

Abstract

Currently, network equipment already has some Northbound Interfaces, such as SNMP, NETCONF, TL1; and some languages are also provided to describe the data model, such as MIB, SCHEMA and even YANG. While till now, there is not a clear defined information model. In NETCONF domain, some standards are being defined. In order to reduce the cost of NMS integration in customer side, a clear defined information model is necessary, just like the SID in TMF.

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

Status of This Memo

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1. Introduction

Currently, network equipment already has some Northbound Interfaces, such as SNMP, NETCONF, TL1; and some languages are also provided to describe the data model, such as MIB, SCHEMA and even YANG. While till now, there is not a clear defined information model. In NETCONF domain, some standards are being defined. In order to reduce the cost of NMS integration in customer side, a clear defined information

model is necessary, just like the SID in TMF.

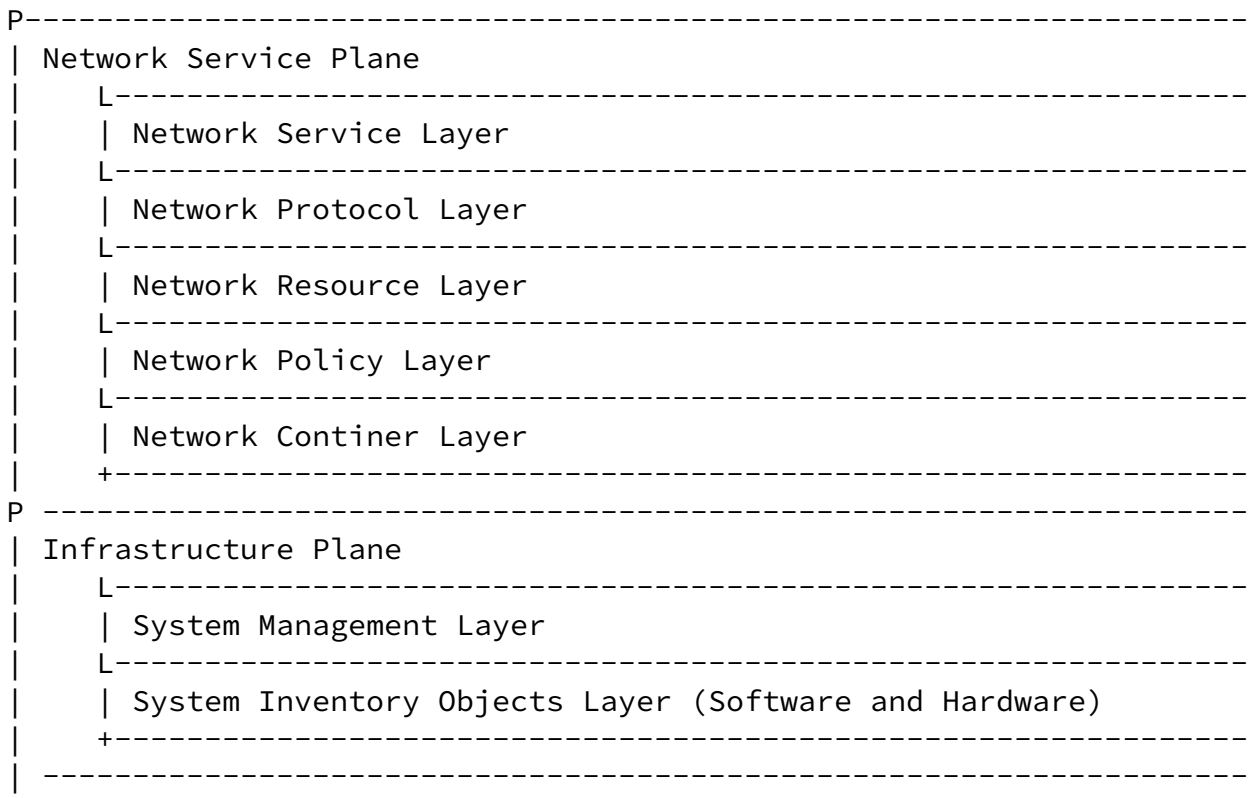
In order to understand the difference between information model and data model, please refer to the RFC3444.

This document will introduce a set of information models. We hope this model could help the engineer define the model of network service described by SCHEMA or YANG.

2. The overview of information model of network equipment

This information model is very important. All interfaces design and implementation will use this model, such as MIB, Schema and TL1, even RESTful API.

The following figure illustrates the architecture of this information model:



2.1. The infrastructure plane

The infrastructure plane provides a minimum set of functions to support the running system, And this plane can be deployed independently, which will not be affected by upper layer.

This plane also provides the API to operate the hardware and software, such as software installation, upgrade, and so on.

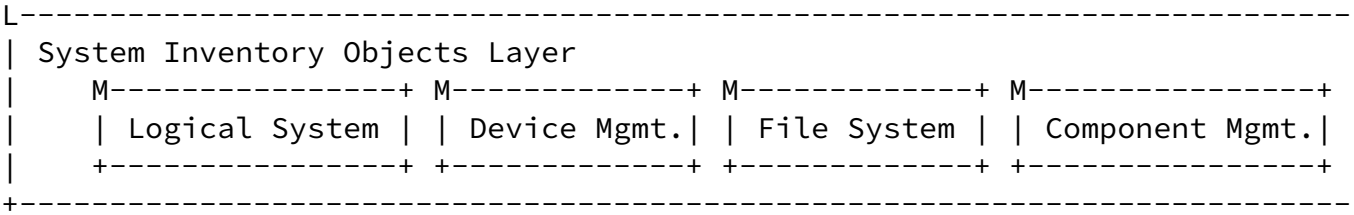
It has no relation with IP associated service and can be applied to other embedded system device.

2.2. The network service plane

The network service plane provides the model definition of all network communication services, which can be divided into five layers: Service Layer, Protocol Layer, Resource Layer, Policy Layer and Container Layer. Based on the interfaces provided by infrastructure plane, all network services can be distributed on some deployment units that can be main board, I/O board or one CPU of multiple CPUs system.

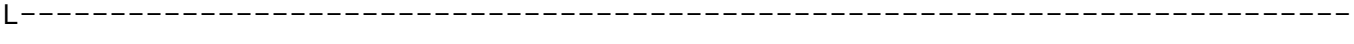
3. The layer

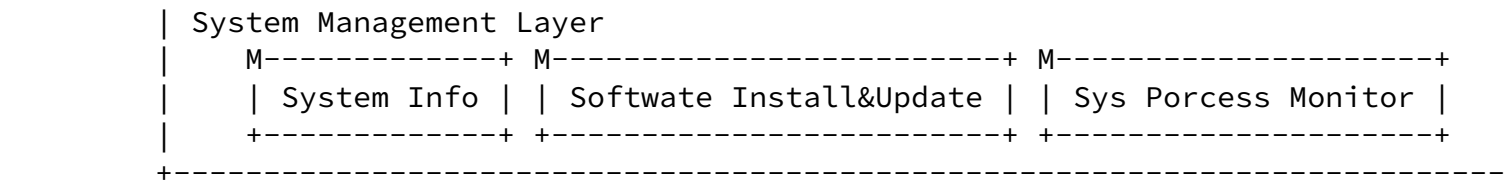
3.1. System Inventory Objects Layer



The system inventory Layer provides the model definition to manage all hardware, logical device or virtual system, it include device management, file management, the system component management.

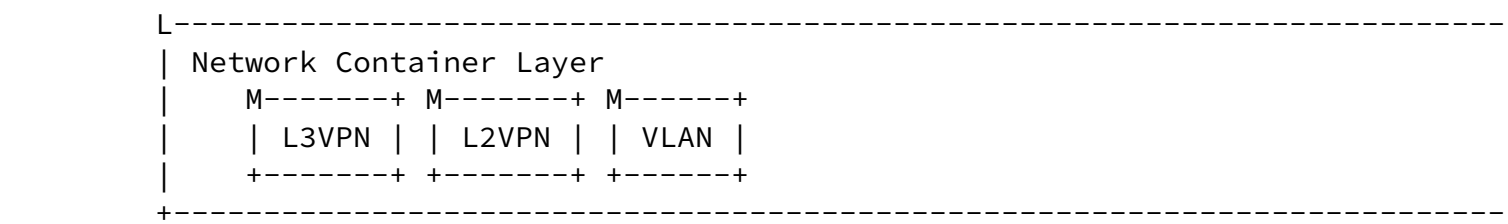
3.2. The System Management Layer





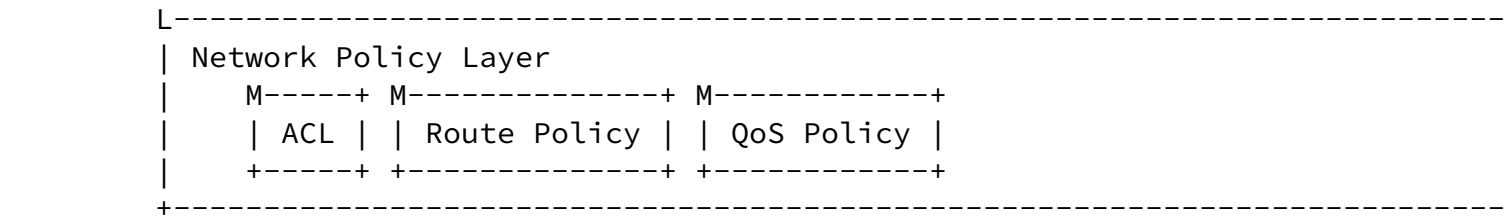
This layer provides the model of OS, like software installation, upgrade, like the monitor of system process. The function of some basic MIB will be placed here, such as the system MIB of RFC1213.

3.3. The network container layer



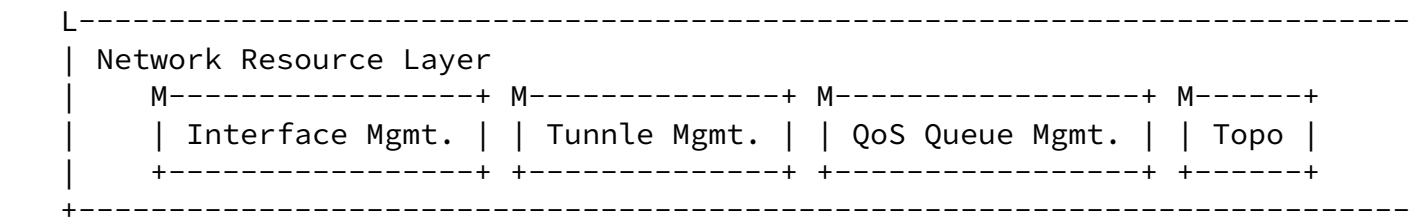
The container layer is defined to support some network level object and provides the key of network, or virtual network, and some top level attribute, such as ID, NAME, TYPE, and so on.

3.4. The network policy layer



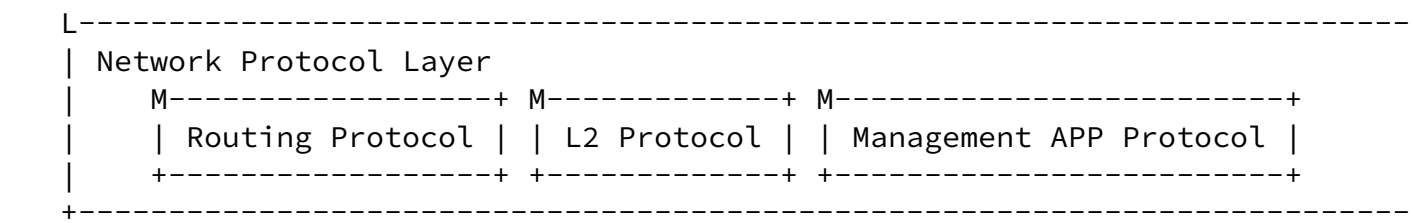
This layer defines the network security, Quality of Service, Route policy.

3.5. The network resource layer



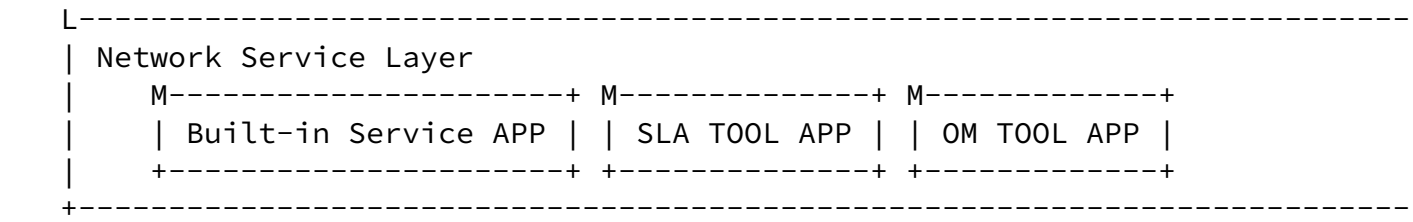
The network resource layer manages the resource, such as interface, tunnel, and topology.

3.6. The network protocol layer



This layer includes the model of almost all functions supported by current network device, like the routing protocol, L2 protocol, MPLS and associated protocol, even all management protocol, like SNMP, Telnet.

3.7. The network service layer



The network service layer includes the model of service or application level, like SLA tools application, this application face the requirement of the end user, not the network protocol. Normally, this layer is not distributed in the network device, but sometimes, there are some built-in applications, like NQA.

The module in this layer cannot depend each other and can only depend on the bottom layer.

4. Security Considerations

NA

5. IANA Considerations

NA

6. Acknowledgements

NA

7. Normative References

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