

Common Hardware Reference Platform for Smart Networks : Network Function Board

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Abstract—This paper describes the reference design architecture and the network function board of the network common hardware platform which supports diverse and flexible network services. As the SDN (Software Defined Network) and NFV (Network Functions Virtualization) technologies develop, there is a need for low-cost general purpose hardware systems instead of the expensive ones. Therefore we provide a common hardware reference platform with goals to rapidly develop high quality network service solutions and ensure its compatibility with local network devices. This paper describes a framework of common hardware platform and hardware specifications of network function board such as mechanical size, shelf hardware management and power consumption.

Keywords— Common Hardware Platform, Reference Design Architecture, Network Function Board, SDN (Software Defined Network), NFV (Network Functions Virtualization)

I. INTRODUCTION

This paper describes a reference framework of common hardware platform and the network function board in the common platform which support diverse and flexible network services and systems. The goal of the paper is to introduce an open structure of components in the hardware common platform which helps to develop and deploy network solutions rapidly. This paper explains the mechanical specifications and board appearance of the network function board as well as its shelf hardware management. For mechanical specifications and board appearances, we deal with physical items such as shape, size and depth. For the shelf hardware management we describe functions and roles of the network function board via the control interface. This paper may be applied and referenced to support and build open networking and collaboration ecosystem where network function boards can easily be developed by third parties. It may also be recommended to support the interoperability of network function boards based on open networking environments.

II. FRAMEWORK

We developed the reference framework of common hardware platform which includes the network function board. As depicted in figure 1, this framework supports two types of service line boards. The left service line board provides physical interfaces which communicate with several I/O devices. The right service line board carries out intel-x86 server based network functions and provides various network services including load balancing, traffic control, DPI, and video caching. The right service line board consists of forwarding interface board which interfaces with backplane and network function board which is marked in red in figure 1. This figure shows components of common platform and the connectivity between components.

In order to extend network functions of the service line board, we need to define design specifications and functional specifications of the network function board. In the next section we describe the shape and the mechanical specifications and the shelf hardware management.

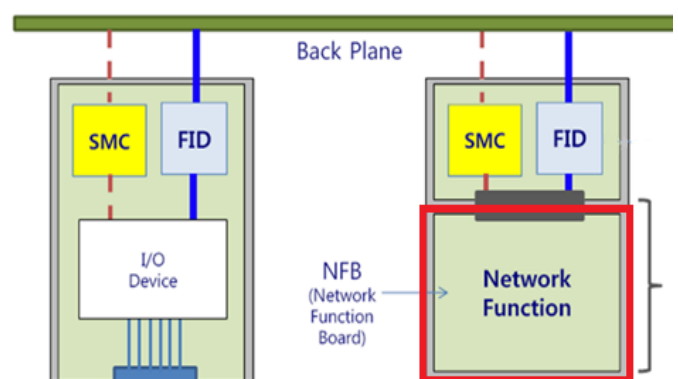


Figure 1. Reference framework of common platform

III. NETWORK FUNCTION BOARD

A. Mechanical specifications

The shape and mechanical specification of network function board is depicted in Figure 2. The shape is rectangular and the length, width and height are 360mm x 249mm x 22mm. The PCB (Printed Circuit Board) thickness should not exceed 2.2T - 2.6T. The upper limit of board height is 22mm and the lower limit is 3.5mm when the thickness is 2.6T. The front plate of this network function board provides the handles of both ends, safety ground pins, and fixing screws.

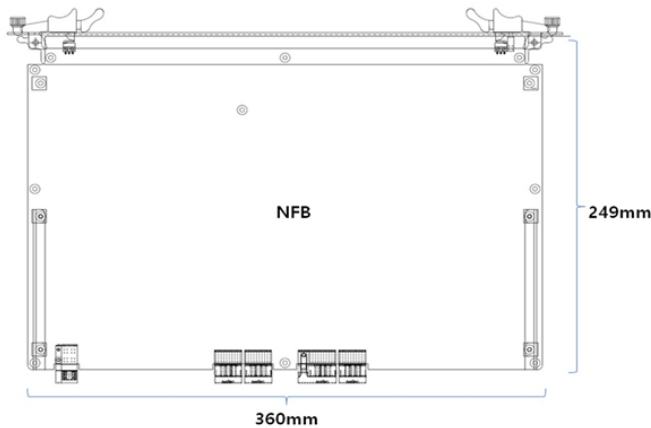


Figure 2. Shape of Network Function Board

B. Shelf Hardware Management

The basic level of shelf hardware management in the common platform is comprised of several components as shown in Figure 3.

The MMC (Main Management Controller) is a shelf system manager which is responsible for replying to requests from outside of MMC. The MESA (Managed Ethernet Switch Assembly) enables communication between the boards through the backplane of the shelf. The FIB (Forward Interface Board) allows for NFB (Network Function Board) to connect to the backplane and provides hardware abstraction that allows independence from the backplane.

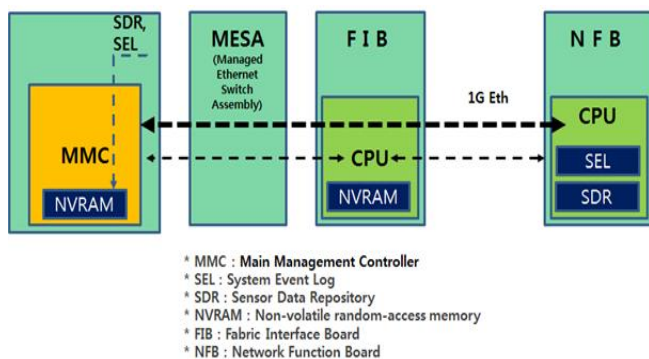


Figure 3. Block Diagram of Shelf Hardware Management

In figure 3, the thick dotted arrow shows the channel of communication for virtual control signalling. Using this channel the MMC gathers the SEL (Sensor Event Log) and SDR (Sensor Device Register) information in the network function board. Two thin dotted arrows indicate the channel of the communication to the physical link.

Hardware channel for communication between each components use 1000 Base-T Ethernet port. The roles of FIB and NFB are as follows:

- Components for communication with the MMC have FRU (Field Replacement Unit) repository.
- The FIB which communicates with the MMC performs software bridge.
- NFB can be mounted directly on the backplane.

For the data transmission we can use data interface, IPC interface, and control interface. The maximum performance of data interface used between NFB and FIB is up to 200Gbps. The IPC (Inter Process communication) is based on 1000 Base-T. The control interface is optional feature.

C. Power and Thermal

The maximum power consumption of the network function board is 400W and the average input of main power is +24V, the maximum is +30V and the minimum is +20V. The airflow direction for thermal management of NFB is designed to operate from the bottom up and support the cooling system to not exceed the maximum temperature.

IV. CONCLUSIONS

In this paper we focused on the reference framework and the specification of network function board for the common hardware platform. The specification of network function board includes shape, size, shelf hardware management, power, and thermal management. This paper may be applied in a timely manner to rapidly changing technology and by using this simple hardware common platform, it can be expected to create new services and improve the quality of domestic network technologies.

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networks.

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