【UEFI】Redfish

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摘要 This article elaborates on the application of Redfish in servers, including the physical layer through USB or PCIe connection, the network transmission of the protocol layer, the role of UEFI in BIOS, and the USB and PCIe network transmission implementation of BMC chips. The Redfish communication mechanism between BIOS and BMC is introduced in detail.

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summary

摘要：本文将介绍Redfish的硬件到软件实现原理

Spec:

Redfish Host Interface Specification
If the link is invalid, you can directly search the name above on Baidu (official website: https://www.dmtf.org/)

Overall architecture process

1. Physical layer:

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```
◦ A USB Network Connection between a Host and a Redfish Service
◦ A Host PCIe NIC that connects to a Manager NIC
◦ A Host PCIe NIC that connects to a management LAN that connects to a Redfish Service
```

In layman's terms, you can use USB or PCIE network card hardware.

2. Protocol layer:

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```
• Network HI -- Redfish HTTP requests/responses over a TCP/IP network connection between a Host and Redfish Service
```

In layman's terms, it is transmitted through the network protocol . If you use USB to transfer to the network, you need to do a lot of preliminary preparation.

Technical term explanation

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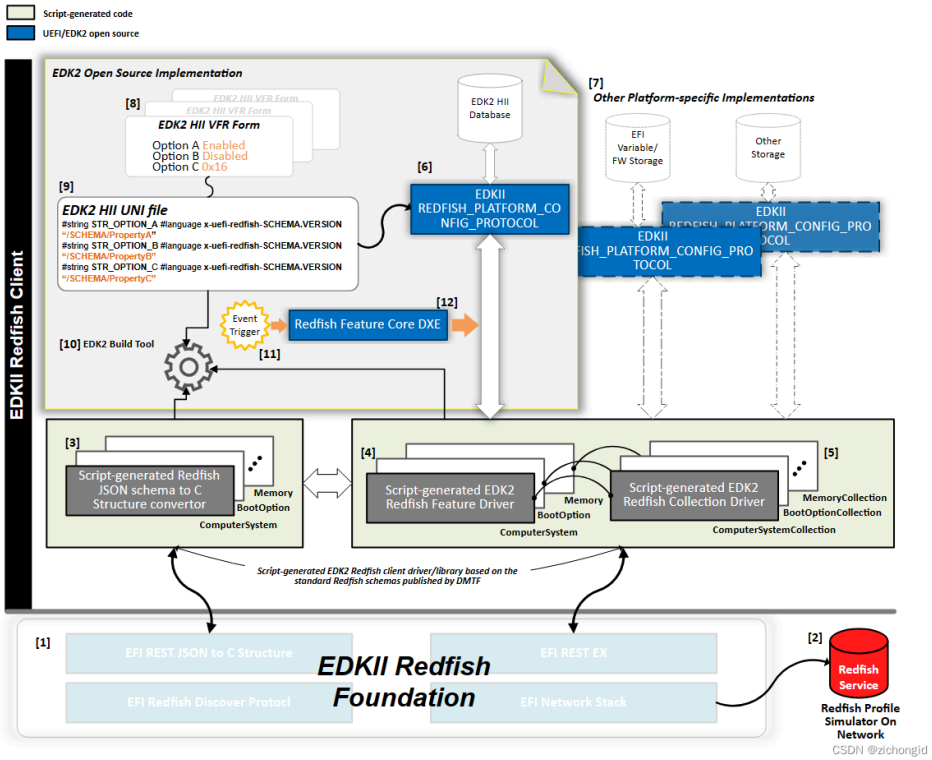
UEFI    Unified Extensible Firmware Interface. A modern firmware standard that defines the interfaces between hardware and Operating Systems in a Computer System. UEFI is supported on multiple processor architectures, including x86, x64, ia64, and AARCH64.
HI      Host Interface
```

3	HTTP	Hypertext Transfer Protocol
4	HTTPS	Hypertext Transfer Protocol over TLS
5	IP	Internet Protocol
6	IPMI	Intelligent Platform Management Interface
7	NIC	Network Interface Card
8	PCI	Peripheral Component Interconnect
9	PCIe	PCI Express
10	TCP	Transmission Control Protocol
11	UUID	Universally Unique Identifier

Technical Details

1. There is a basic Redfish module in EDKII

EDK2 Redfish Readme.md



1.1 Redfish Client is actually the BIOS client

The BIOS side will integrate: **Redfish Hi Driver** (this driver module plays a role in transmitting information from top to bottom, sending network requests to receive BMC data, and pushing BIOS asset information data, which is similar to using a browser to send an http request), **Redfish Collection Driver** (this driver module is used to collect BIOS asset information, and the implementation method varies from manufacturer to manufacturer), **Redfish JSON schema to C Strtcture convertor** (that is, converting the collected asset information data into JSON structured data).

2. This chapter explains some knowledge about BMC chips

BMC Introduction

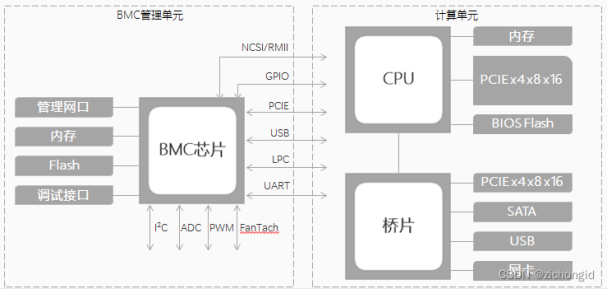


Image source: above.

3. How to achieve network transmission using USB ?

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```
首先BMC芯片的USB需要接到服务器主板上，当若没有则无法使用了。(BMC芯片的USB控制器)
其次，BIOS端识别到设备后在该设备上进行USB初始化、安装TCP/IP、REST、RNDIS、UNDI...等一堆网络协议。
当然这里讲的比较简单，实现起来会很复杂。采用USB的弊端比较多，bug也很多。
**采用PCIE网卡应该不会这么麻烦。**
```

3.1 What problems does USB bring?

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```
·开机过程BMC重启时，无法定位到USB设备，会导致异常宕机、无法传输资产信息、采用URL访问资源时请求失败等。
·BMC USB驱动异常时
·BMC  USB资源被占用时
·传输耗时、当数据量过大时触发宕机
```

4. How to achieve it when using PCIE?

Host to BMC is one method (others have not been involved, write Io (memory)).

5.How does BIOS-BMC communicate via Redfish?

5.1 There is a Redfish DXE Driver (Client) on the BIOS side

When the computer is powered on, the driver sends a network request, sorts the requested data (asset information), and matches the data with the currently collected data to see if it is consistent. For example, modifying certain properties of the BIOS through the BMC's Post/Patch request. A way for the BIOS to interact with the BMC.

5.2 BMC has Redfish host server (Host)

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```
该服务端本质是Linux 系统下的一个服务程序，管理一个数据库（Redis,存储着BIOS资产信息的数据)。
```

When the server is powered on, the BIOS client collects the asset information (after the Redfish DXE Driver requests the BMC data),
organizes it into JSON format, and then transmits it to the BMC through the network through Post/Patch and other methods.

summary

提示：Redfish被广泛用于服务器，大大增加了远程监控的能力，对于不同厂商其具体实现也有很多的区别

For example:

Huawei, AMI, Insyde, etc.