Agenda

• ACD Overview
• ACD Resource Overview and Map
• Examples
Redfish for Advanced Communication Devices

• Support released in Redfish 2016.3
• Advanced Communication Devices may include:
  • Ethernet NICs,
  • Fibre Channel HBAs,
  • Future possibility of supporting RDMA, Infiniband HCAs, and other communication components.

• Newly Defined Entities (Objects) for ACD
  • NetworkInterface & NetworkInterfaceCollection
  • NetworkAdapter & NetworkAdapterCollection
  • NetworkPort & NetworkPortCollection
  • NetworkDeviceFunction & NetworkDeviceFunctionCollection
Resource Overview

- **Network Interface**: System view of the adapter.
  - Links arrays to NetworkAdapter, NetworkPort, and NetworkDeviceFunction

- **Network Adapter**: Physical view of the adapter.
  - NetworkAdapter contains an array of controllers.
  - Each controller contains links to the NetworkDeviceFunction & NetworkPort.
  - The controller array is provided to handle modeling adapters that have multiple controllers
Resource Overview

- **Network Interface**: System view of the adapter.
  - Links arrays to NetworkAdapter, NetworkPort, and NetworkDeviceFunction
  - Different than Network Adapter because it may be just a part of the adapter in a composable system

- **Network Adapter**: Physical view of the adapter.
  - NetworkAdapter contains an array of controllers.
  - Each controller contains links to the NetworkDeviceFunction & NetworkPort.
  - The controller array is provided to handle modeling adapters that have multiple controllers
  - Each controller may contain a link to corresponding PCIeDevice instances.
Resource Overview

- **Network Port:** Often the physical port.
  - Represents the NetworkAdapter ports (often a physical port) including the configuration, capabilities and status.

- **Network Device Function:** Most of the device configuration (NIC, HBA, etc.)
  - The NetworkDeviceFunction provides a network adapter-centric view of a function allocated to a NetworkInterface and located on a NetworkAdapter.
  - The NetworkDeviceFunction exposes the capabilities, configuration, and status of a physical function.
  - The NetworkDeviceFunction may contain a link to a correlated PCIeFunction instance.
  - The NetworkDeviceFunction contains a link to a NetworkPort.
The set of NetworkPort and NetworkDeviceFunctions referenced by the collections referenced by NetworkAdapter may not be the same as the set referenced by NetworkInterface.
/redfish/v1/Systems
Collection of Systems

/redfish/v1/Systems/<id>
Server Information

/redfish/v1/Chassis/<id>
Server Chassis Information

/redfish/v1/Chassis
Collection of Chassis

../NetworkInterfaces
Collection of NetworkInterfaces
“Logical” view of the network adapter

../NetworkAdapters
Collection of NetworkAdapters
“Physical” view of the network adapter

../NetworkInterfaces/<id>
Logical Adapter Information

../NetworkAdapters/<id>
Physical Adapter Information

../NetworkDeviceFunctions
Collection of NetworkDeviceFunctions
PCIe Functions

../NetworkPorts
Collection of NetworkPorts
Network Ports

../NetworkDeviceFunctions
Collection of NetworkDeviceFunctions
PCIe Functions

../NetworkPorts
Collection of NetworkPorts
Network Ports

../NetworkPorts/<id>
Network Port Information

../NetworkDeviceFunctions/<id>
PCie Function Information

../PCleFunctions/<id>
PCie Function Information

../PCleDevices/<id>
PCIe Device Information

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Network Interface (in System)

{
    "@odata.id": "/redfish/v1/Systems/1/NetworkInterfaces/9fd725a1",
    "@odata.type": "#NetworkInterface.v1_0_0.NetworkInterface",
    "Id": "9fa725a1",
    "Name": "Network Device View",
    "NetworkPorts": {
        "@odata.id": "/redfish/v1/Systems/1/NetworkInterfaces/9fd725a1/NetworkPorts"
    },
    "NetworkDeviceFunctions": {
        "@odata.id": "/redfish/v1/Systems/1/NetworkInterfaces/9fd725a1/NetworkDeviceFunctions"
    },
    "Links": {
        "NetworkAdapter": {
            "@odata.id": "/redfish/v1/Chassis/1/NetworkAdapters/9fd725a1"
        }
    }
}

System
NetworkPorts

System
NetworkFunctions

Chassis
NetworkAdapter
Network Adapter (in Chassis)

```json
{
    "@odata.id": "/redfish/v1/Chassis/1/NetworkAdapters/9fd725a1",
    "@odata.type": "#NetworkAdapter.v1_0_0.NetworkAdapter",
    "NetworkPorts": {
        "@odata.id": "/redfish/v1/Chassis/1/NetworkAdapters/9fd725a1/NetworkPorts"
    },
    "NetworkDeviceFunctions": {
        "@odata.id": "/redfish/v1/Chassis/1/NetworkAdapters/9fd725a1/NetworkDeviceFunctions"
    },
    "Controllers": [
        {
            "FirmwarePackageVersion": "7.4.10",
            "Links": {
                "PCIeDevices": [
                    {
                        "@odata.id": "/redfish/v1/Chassis/1/PCIeDevices/NIC"
                    }
                ],
                "NetworkPorts": [
                    {
                        "@odata.id": "/redfish/v1/Chassis/1/NetworkAdapters/9fd725a1/NetworkPorts/1"
                    }
                ],
                "NetworkDeviceFunctions": [
                    {
                        "@odata.id": "/redfish/v1/Chassis/1/NetworkAdapters/9fd725a1/NetworkDeviceFunctions/1"
                    }
                ]
            }
        }
    ]
}
```

Chassis
NetworkPorts
Chassis
NetworkFunctions
Chassis
PCIe Info
Controller's
NetworkPorts &
Network Functions

Continued on next slide
Network Adapter (in Chassis) has Capabilities Structure

"ControllerCapabilities": {
  "NetworkPortCount": 2,
  "NetworkDeviceFunctionCount": 8,
  "DataCenterBridging": {"Capable": true },
  "VirtualizationOffload": {
    "VirtualFunction": {
      "DeviceMaxCount": 256,
      "NetworkPortMaxCount": 128,
      "MinAssignmentGroupSize": 4
    },
    "SRIOV": {
      "SRIOVVEPACapable": true
    }
  },
  "NPIV": {
    "MaxDeviceLogins": 4,
    "MaxPortLogins": 2
  }
},

"Actions": {
  "#NetworkAdapter.ResetSettingsToDefault": {
    "target": "/redfish/v1/Chassis/1/NetworkAdapters/9fd725a1/Actions/NetworkAdapter.Reset"
  }
}
## Network Device Function (in Chassis, referenced by System)

<table>
<thead>
<tr>
<th>Current Function Type, Enabled, Function Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;NetDevFuncType&quot;: &quot;Ethernet&quot;, &quot;DeviceEnabled&quot;: true, &quot;NetDevFuncCapabilities&quot;: [ &quot;Ethernet&quot;, &quot;FibreChannel&quot; ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Properties for Ethernet modes (snipped)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Ethernet&quot;: { &quot;MACAddress&quot;: &quot;00:0C:29:9A:98:ED&quot;, ... }</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>iSCSIBoot properties (snipped)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;iSCSIBoot&quot;: { &quot;IPAddressType&quot;: &quot;IPv4&quot;, ... }</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FC info (snipped)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;FibreChannel&quot;: { &quot;WWPN&quot;: &quot;10:00:B0:5A:DD:BB:74:E0&quot;, ... }</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Port Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;AssignablePhysicalPorts&quot;: [ {&quot;@odata.id&quot;: &quot;/redfish/v1/Chassis/1/NetworkAdapters/9fd725a1/NetworkPorts/1&quot;} ], &quot;PhysicalPortAssignment&quot;: { &quot;@odata.id&quot;: &quot;/redfish/v1/Chassis/1/NetworkAdapters/9fd725a1/NetworkPorts/1&quot; }, &quot;BootMode&quot;: &quot;Disabled&quot;, &quot;VirtualFunctionsEnabled&quot;: true, &quot;MaxVirtualFunctions&quot;: 16, &quot;Links&quot;: { &quot;PCIEFunction&quot;: {&quot;@odata.id&quot;: &quot;/redfish/v1/Chassis/1/PCIeDevices/NIC/Functions/1&quot;} }</td>
</tr>
</tbody>
</table>
Network Ports (in Chassis, referenced by System)

```
{
    "@odata.id": "/redfish/v1/Chassis/1/NetworkAdapters/9fd725a1/NetworkPorts/1",
    "@odata.type": ":NetworkPort.v1_0_0.NetworkPort",
    "Id": "1",
    "Name": "Network Port View",
    "PhysicalPortNumber": "1",
    "LinkStatus": "Up",
    "SupportedLinkCapabilities": [
        {"LinkNetworkTechnology": "Ethernet", "LinkSpeedMbps": 10000
        },
        "ActiveLinkTechnology": "Ethernet",
        "SupportedEthernetCapabilities": ["WakeOnLAN", "LLDP", "PoE", "EEE"
        ],
        "NetDevFuncMinBWAlloc": [ {"NetworkDeviceFunction": "/redfish/v1/Chassis/1/NetworkAdapters/9fd725a1/NDF/1"},
            "MinBWAllocPercent": 25
        },
        "NetDevFuncMaxBWAlloc": [ {"NetworkDeviceFunction": "/redfish/v1/Chassis/1/NetworkAdapters/9fd725a1/NDF/111111111100"},
            "MaxBWAllocPercent": 100
        },
        "AssociatedNetworkAddresses": ["00:0C:29:9A:98:ED", "00:0C:29:9A:98:EF"],
        "EEEEnabled": true,
        "WakeOnLANEnabled": true,
        "PortMaximumMTU": 1500,
        "FlowControlStatus": "None",
        "FlowControlConfiguration": "None",
        "SignalDetected": true
    }
}
```
Operations

• The majority of implementations are expected to have the Network Device Functions initially unassigned & un-configured.
  • For simplicity, many vendors will have some of the NetworkDeviceFunctions in an initial default state
    • This is to ensure some level of functionality “out of the box”
  • If the hardware supports X functions, those functions will always be there.
  • Note that physical hardware will have different capabilities that limit the combinations of NetworkDeviceFunctions configurations that can coexist on the same device
    • For example, if the Adapter only has one FC “logic block” per port in the silicon, then only one can be assigned and configured per port.
    • There may be additional affinities that are built into the hardware.
    • The current Redfish model does not expose these affinities & capabilities.
Thank you for watching!

- Redfish Standards
  - Schemas, Specs, Mockups, White Papers, FAQ, Educational Material & more
  - [http://www.dmtf.org/standards/redfish](http://www.dmtf.org/standards/redfish)

- Redfish Developer Hub
  - Redfish Interactive Explorer, Hosted Schema at Namespace & other links
  - [http://redfish.dmtf.org](http://redfish.dmtf.org)

- SPMF (WG that defines Redfish)
  - Companies involved, Upcoming Schedules & Future work, Charter, Information on joining.
  - [http://www.dmtf.org/standards/spmf](http://www.dmtf.org/standards/spmf)