开放数据中心委员会
Open Data Center Committee

[编号 ODCC-2022-03007]

数字孪生网络模型规范

开放数据中心标准推进委员会

2022-09 发布

版权声明

编制说明

本报告在撰写过程中得到了多家单位的大力支持，在此特别感谢以下参编单位：

参编单位（排名不分先后）：

华为、新华三(H3C)、锐捷网络、美团、中国信息通信研究院（云大所）

目录

一、数字孪生网络概述

在《数字孪生应用白皮书（2021 版）》中，将数字孪生定义为：它是一种数字化的理念和技术，这种理念和技术是以数据与模型的集成融合为基础与核心的。通过在数字空间实时构建物理对象的精准数字化映射，基于数据整合与分析预测来模拟、验证、预测、控制物理实体全生命周期过程，最终形成智能决策的优化闭环。数字孪生技术具有以下几个特点：1. 仿真，它是完全还原了物理实体的；2. 实时，它可以实时与其物理实体之间完成数据、感知等各种层面的交互动作；3. 共生，它的生命周期与其物理实体之间完全一致；4. 闭环优化，它能够在数字空间中采集、分析、模拟与预测其物理实体未来的动作，并对其物理实体的未来动作进行决策优化。

数字孪生网络是数字孪生技术的一种具体应用场景，是以数字化方式创建网络实体的虚拟孪生体，且与物理实体之间实时交互的网络系统，其核心要素为：数据、模型、交互、映射。通过建立数字孪生网络，可以对网络及其状态进行数字化映射反映网络的真实运行状态，理解网络各种运行状态的映射和内部关联依赖，通过分析这种关联依赖的变化提前预测网络的故障状态。

二、网络建模设计概述

如何提高大规模网络的稳定性、提高运维同学的人率不但是运维团队的主要工作，也是网络平台需要解决的问题，数字孪生技术是解决这些问题的关键技术，数字孪生是网络监控和自动化平台进构建智能化能力的基础能力。一方面模型和运行状态数据反映了网络真实状态，监控平台可以基于数字孪生网络进行多维度的分析和告警预测；另一方面，自动化平台可以基于数字孪生网络进行操作验证和仿真，通过提前发现不符合预期的网络操作防止网络故障，也能够对网络操作中的行为和当前的状态进行比较分析，及时发现问题并进行回滚止损，避免更大的网络故障发生。

数字孪生网络的基础能力是模型：配置模型、状态模型，硬件模型、软件模型。当前 Open Yang 模型是配置模型的最佳方案，但是业界还没有对硬件模

型和软件模型提出最佳方案。由于国内外互联网公司和数据中心的发展速度不同以及设备厂商的认知不同，当前不具备统一的规范化方案。

自动化平台就是通过配置模型构建网络自动化操作的能力：应用层为用户提供编排能力，可以实现不同的自动化流程场景；模型层使用 Open Yang 对各厂商的网络设备配置的差异进行屏蔽，统一了操作语言，提供统一的方法接口给用户，以完成指定的操作目的；转译层对设备的操作命令进行屏蔽构建了自动化操作的底座，直接与具体的设备通信，把接收到的命令转译成具体设备对应的指令进行处理，并把结果转成合适的方式传递给上层用户。但是后续的网络操作和状态验证、仿真能力需要硬件模型、软件模型和状态模型，但是当前还没有统一的模型可以直接使用。

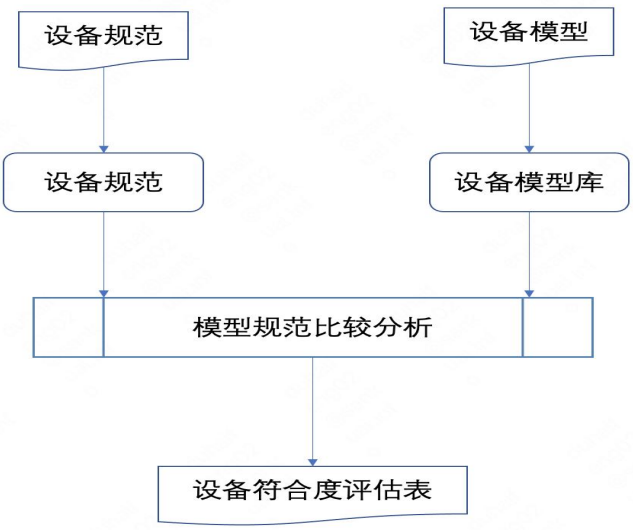
三、网络设备建模应用场景概述

网络设备建模是对网络设备进行数字化描述，通过模型规范将网络设备的能力和规格参数展示出来。传统的规格书是以文字描述的形式对网络设备的规格能力进行描述，这种规格书更适合人去阅读，不适合机器算法识别和理解。网络设备建模是面向机器的设备规范，这种格式化的格式适合机器识别和理解处理。

网络设备模型描述设备的主机及其部件的物理形态、运行条件和功能能力。在建模过程更关注如何让程序更好的识别设备的属性、能力和设备限制以及依赖关系，将设备的属性和能力从面向人的文档转成面向机器容易识别的模型定义。同时，设备建模也屏蔽不同厂商设备间的差异，在网络架构设计、网络建设部署、设备替换过程中实现更灵活的策略(如成本供应周期最优等)。设备模型的应用场景有：设备采购选型、网络架构设计、网络建设部署、网络变更和智能运维、设备替换、网络巡检、软件升级等。

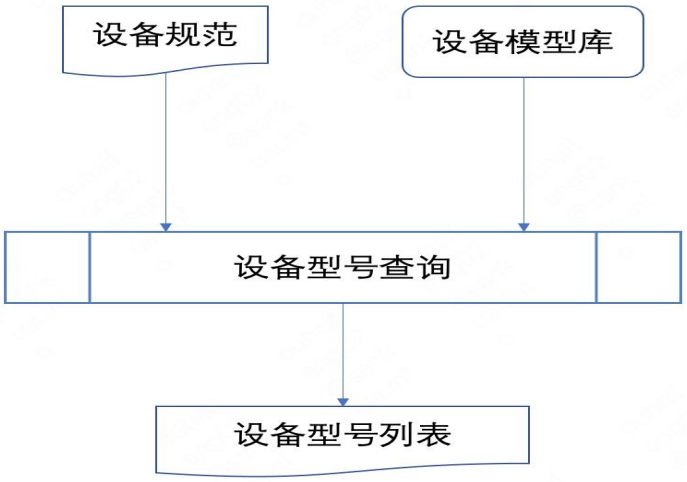
（一）设备选型场景

传统的设备采购选型需要人工对照硬件规格和软件规格书，由于数据中心网络的迭代速度快，一些性能和功能需求没有体现在规格说明书中，因此需要分别和多个厂商沟通一些性能和功能需求。当引入新设备的时候会涉及多个厂商的设备，从网络标准化需求的方面希望不同厂商的设备在一些能力上保持一致。运营团队同学将网络建设关注的设备属性和能力规范在平台上定义，将厂商提供新设备设备模型定义导入到平台后，平台根据设备模型定义执行判断设备是否满足网络建设和运维的需求并输出设备符合度评估表，运营团队同学使用评估表内容和厂商进行沟通确认。



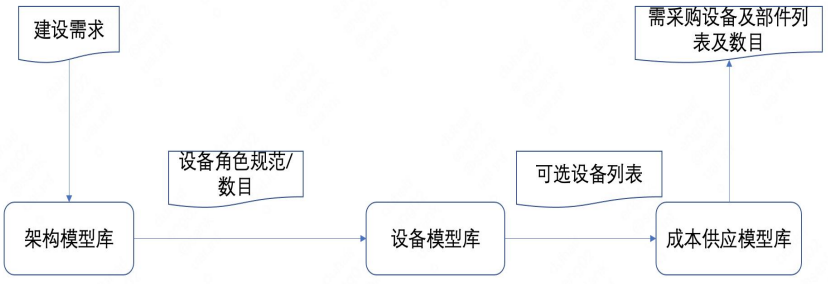
（二）网络架构设计

网络架构依赖设备的能力，设备的能力通过模型定义。网络架构中会定义多个设备角色，典型的角色有 T1、T2、T3 等。在不同版本网络架构中，这些角色的规范会不尽相同，需要多个厂商设备都支持这些角色的建设。架构师设计架构过程中会对设备角色进行规范定义，根据设备规范通过平台去查询满足这些角色的设备厂商和设备型号。如果现有设备不能满足角色规范要求，或满足的设备类型过少，架构师需要重新对架构进行设计。



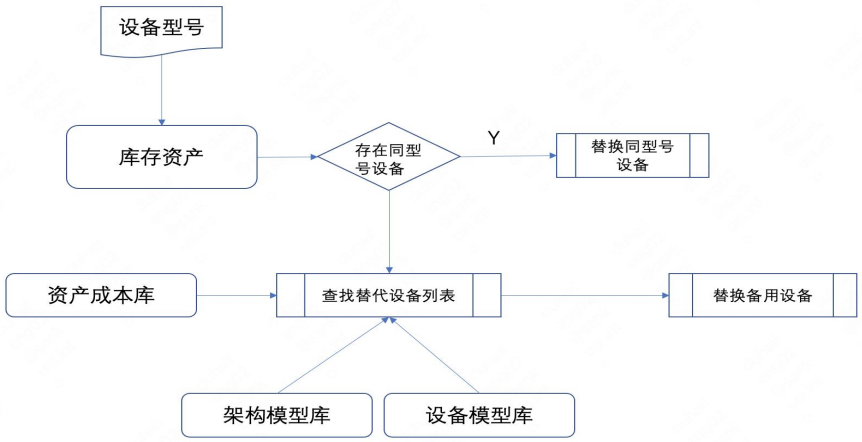
（三）网络建设资源规划

网络中存在多个架构版本，每个架构版本对设备有不同的硬件和软件要求。网络工程师在确定规模、网络版本、服务器接入速率、业务属性等信息后，根据架构模型生成拓扑模型，结合设备模型生成适合的网络设备和部件列表，采购和供应链根据网络设备和部件列表，结合价格、供应周期等信息形成采购策略。另外，在资源规划的时候也要考虑功耗、设备占用的机架空间、板卡的排列方式等，在设备选择以后也会根据这些信息生成机架规划和布线规划，进行规划验证和环境仿真。



（四）设备替换选型

网络设备需要替换的时候，如果库存中有相同型号的设备会优先使用，如果没有相同型号的设备，会根据架构版本中定义的设备角色规范、库存中的设备模型、设备模型库进行查询，找到可以替换的设备列表。



（五）网络巡检

根据设备模型定义对设备进行健康检查，从模型库中可以获得该型号包含的外设的数目、固件和软件版本信息，通过比较巡检获得的数字诊断信息和模型中的诊断方法进行异常定位。

（六）网络变更和运维

网络是大规模的分布式系统，每次网络变更都属于一次风险操作，尽量从更多的方面对变更操作产生的风险进行分析。网络模型已经对设备的硬件、固件和软件能力进行了描述，当进行更换版本、版本升级和配置变更的时候，可

以根据设备模型进行一次风险评估，如进行背板更换的时候，平台通过硬件模型分析会判断更换背板是否会影响设备的整体转发能力；进行软件升级的时候，更加软件模型可以判断是否是无损升级。

（七）设备软件版本升级

设备软件版本和功能相关，当厂商推出新的版本以后，根据软件模型和适配的硬件匹配，再结合网络版本模型、CMDB 就可以找出需要升级的网络设备。

四、网络设备模型设计方法

（一）建模思路

设备建模是为规划、建设选型、运维等场景服务的，从设备的属性可以将模型定位分为硬件模型、软件模型、固件模型。硬件模型包括主机硬件、部件硬件、模块硬件三类；软件模型描述设备可提供的功能和规范、以及相关的参数限制等；固件模型主要与 FPGA、CPLD 等相关，它们描述的是可编程部件所具有的功能能力等属性。

（二）设计原则

在网络建模中遵循的设计原则有：

① 模型中只包括系统中需要使用的字段；

② 设计模型和运行模型尽量相近，方便进行程序比较模型差异，对网络异常进行快速感知；

③ 重复字段尽量少，减少维护代价。例如，设备间的互联关系放在电路模型中，这种方案相比于将互联关系放在设备模型的物理接口中可以减少维护成本，修改互联关系不用在两个设备间进行同步。

五、网络设备模型

（一）通用库

通用库包括基础类型定义、设备通用属性定义两个部分。

1. 基础类型定义

```
module net-device-types {
    yang-version "1.1";

    namespace "http://openconfig.net/yang/net-device/types/yang";

    prefix "net-dev-type";

    description "common types definitions";

    identity STORAGE_TYPE {
        description "storage type";
    }

    identity NOR_FLASH {
        base STORAGE_TYPE;
    }

    identity NAND_FLASH {
identity RJ45 {
    base CAGE_TYPE;
}

identity SFP {
    base CAGE_TYPE;
}

identity SFP28 {
    base CAGE_TYPE;
}

identity DSFP {
    base CAGE_TYPE;
}

identity QSFP28 {
    base CAGE_TYPE;
}
```

```
    base STORAGE_TYPE;
}

identity EMMC_FLASH {
    base STORAGE_TYPE;
}

identity HDD {
    base STORAGE_TYPE;
}

identity SSD {
    base STORAGE_TYPE;
}

identity CAGE_TYPE {
    description "cage type";
}


identity QSFP56 {
    base CAGE_TYPE;
}

identity QSFPDD {
    base CAGE_TYPE;
}

identity QSFPDD112 {
    base CAGE_TYPE;
}

identity CPU_ARCH {
    description "cpu architecture";
}

identity MIPS32 {
    base CPU_ARCH;
}

identity MIPS64 {
    base CPU_ARCH;
}
```

```
identity ARM32 {
    base CPU_ARCH;
}

identity ARM64 {
    base CPU_ARCH;
}

identity X86_64 {
    base CPU_ARCH;
}

identity X86_32 {
    base CPU_ARCH;
}

identity PPC32 {
    base CPU_ARCH;
}

identity PPC64 {
    base CPU_ARCH;
}

identity FIRMWARE_TYPE {
    description "firmware base type";
}

identity BIOS {
    base FIRMWARE_TYPE;
}

identity BOOTLOADER {
    base FIRMWARE_TYPE;
}

identity PCB {
    base FIRMWARE_TYPE;
}

identity CPLD {
    base FIRMWARE_TYPE;
}
```

```
identity FPGA {
    base FIRMWARE_TYPE;
}

typedef date {
    type string {
        pattern '\d{4}-\d{2}-\d{2}';
    }
    description "YYYY-MM-DD";
}

typedef float {
  type decimal64 {
    fraction-digits 2;
  }
}

typedef asic-vendor {
  description "ASIC Vendor type";

  type enumeration {
    enum BROADCOM {
      value 1;
      description "broadcom";
    }
    enum MELLANOX {
      value 2;
      description "mellanox";
    }
  }
}

typedef position {
  type enumeration {
    enum "FRONT_PANEL" {
      value 1;
    }
    enum "BACK_PANEL" {
      value 2;
    }
  }
}

typedef port-speed {
```

```
    type enumeration {
      enum "100M" {
        value 1;
      }
      enum "1G" {
        value 2;
      }

      enum "10G" {
        value 3;
      }
      enum "25G" {
        value 4;
      }
      enum "40G" {
        value 5;
      }
      enum "50G" {
        value 6;
      }
      enum "100G" {
        value 7;
      }
      enum "200G" {
        value 8;
      }
      enum "400G" {
        value 9;
      }
    }
  }

  typedef cpu-arch {
    type enumeration {
      enum "x86-64" {
        value 1;
      }
      enum "arm64" {
        value 2;
      }
    }
  }

  typedef airflow-direction {
```

```
        type enumeration {
          enum "DIRECT_FRONT_TO_REAR" {
            value 1;
          }
          enum "DIRECT_REAR_TO_FRONT" {
            value 2;
          }
        }
      }

      typedef status {
        type enumeration {
          enum "normal" {
            value 1;
          }
          enum "abnormal" {
            value 2;
          }
        }
      }
    }
```

2. 通用属性定义

```
    module net-device-common {
        // namespace
        namespace "urn:device:params:xml:ns:yang:net-device-common";

        prefix "device-common";

        // import some basic types
        import net-device-types { prefix device-type; }

        // meta
        organization
            "Open Data Center Committee";

        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";

        description
            "This module contains the YANG definition for network
device common define.";
```

```
revision "2022-02-11" {
    description
        "Initial revision";
}

grouping slot-range-top {
    container slot-range {
        leaf min-slot-id {
            type uint16;
        }

        leaf max-slot-id {
            type uint16;
        }
        description "0 means a pizzabox";
    }
}

grouping subsystem {
   description
      "subsystem desciption";

    container infos {
        list cpu-info {
            key cpu-id;
            description
               "CPU information";
            leaf cpu-id {
              type uint32;
            }

            leaf vendor {
                type string;
                description
                    "CPU vendor";
            }

            leaf cpu-arch {
                type device-type:cpu-arch;
            }

            leaf cpu-model {
```

```
            type string;
            description
                "CPU model name";
        }

        leaf core-num {
            type uint16;
            description
                "number of cores";
        }

        leaf frequency {
            type uint32;
            units "MHZ";
            description
                "CPU dominant frequency";
        }
    }

    container mem-info {
        description
            "DRAM memory information";

        leaf vendor {
            type string;
            description
                "vendor name";
        }

        leaf type {
            description
                "DRAM type";

            type enumeration {
                enum DDR3;
                enum DDR4;
                enum DDR5;
            }
        }

        leaf total-size {
            type uint32;
            units "MB";
            description
```

```
                    "Total Memory, unit is MB";
                }
            }

            container storage-infos {
                description "storage information";

                list storage-info {
                    key index;

                    leaf index {
                        type uint16;
                    }

                    leaf vendor {
                        type string;
                        description
                            "flash vendor name";
                    }

                    leaf type {
                        type identityref {
                            base device-type:STORAGE_TYPE;
                        }
                    }

                    leaf storage-capacity {
                        type uint32;
                        units "MB";
                        description
                        "flash storage size";
                    }
                }
            }
        }
    }

    grouping device-performance {
        leaf packet-fwd-rate {
            type device-type:float;
            units "Mpps";
            description "maximum Mpps rate";
        }
```

```
        leaf device-capacity {
            type device-type:float;
            units "Tbps";
            description "device capacity";
        }
    }

    grouping device-asics {
      description "flash storage information";

        leaf number {
            type uint16;
            description
                "total number of chips";
        }

        list device-asic {
            description "single switching chip";

            key "unit-id";
            leaf unit-id {
                type uint16;
                description
                    "chip unit number";
            }

            leaf vendor {
                type device-type:asic-vendor;
                description "vendor name";
            }

            leaf model {
                type string;
                description
                    "chip model";
            }
            leaf buffer-size {
                type uint32;
                units "MB";
                description
                    "switching chip buffer size";
            }

            uses device-performance;
```

```
        }
    }

    grouping power-consumption {
        leaf typical-power-consumption {
            type uint32;
            units "W";
            description
                "typical power consumption";
        }

        leaf max-power-consumption {
            type uint32;
            units "W";
            description
                "Maximum power consumption";
        }
    }

    grouping temperature-limit {
        leaf upper-limit {
            type int16;
            units "C";

            description
                "maximum operating temperature";
        }

        leaf lower-limit {
            type int16;
            units "C";

            description
                "minimum operating temperature";
        }
    }

    // data definition satements

    // augment statements
}
```

（二）硬件模型定义

硬件模型包括业务卡、背板转发卡、电源、风扇、设备主机定义几个部分。

1. 电源模型

```
module net-device-psu {
    // namespace
    namespace "urn:device:params:xml:ns:yang:net-device-psu";

    prefix "device-psu";

    // import some basic types
    import net-device-types { prefix device-type; }

    // meta
    organization
        "Open Data Center Committee";

    contact
        "Tel: +86-010-62300095
         E-mail: odcc@odcc.org.cn";

    description
        "This module contains the YANG definition for network
device power-supply-unit.";

    revision "2022-02-11" {
        description
            "Initial revision";
    }

    grouping psu-supply-info {
        leaf min-input-voltage {
            description
                "minimum input voltage";
            type device-type:float;
            units "V";
        }

        leaf max-output-power {
            description "maximum output power";
            type device-type:float;
            units "W";
        }
```

```
        container rated-input-voltage-range {
            description "rated input voltage range";
            leaf min-voltage {
                type device-type:float;
                units "V";
            }

            leaf max-voltage {
                type device-type:float;
                units "V";
            }
        }

        leaf rated-output-voltage {
            description "rated output voltage";
            type device-type:float;
            units "V";
        }

        leaf rated-input-current {
            type device-type:float;
            description "rated input current";
            units "A";
        }

        leaf rated-output-current {
            type device-type:float;
            description "rated output current";
            units "A";
        }

        leaf rated-output-power {
            description "rated output power";
            type device-type:float;
            units "W";
        }
    }


    grouping psu-top {
        container psu {
            description "power supply unit";

            leaf psu-count {
```

```
                type uint16;
                description
                    "maximum number of psu";
            }

            leaf min-number {
                type uint16;
                description
                    "minimum number of psu";
            }

            leaf pluggable {
                type boolean;
            }

            leaf psu-model {
                type string;
                description "psu model";
            }

            container psu-supply-DC {
                description "DC";
                uses psu-supply-info;
            }

            container psu-supply-AC {
                description "AC";
                uses psu-supply-info;
            }
        }
    }
}
```


2. 风扇模型

```
module net-device-fan {
    // namespace
    namespace "urn:device:params:xml:ns:yang:net-device-fan";

    prefix "device-fan";

    // import some basic types
    import net-device-types { prefix device-type; }
```

```
        // meta
        organization
            "Open Data Center Committee";

        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";
        description
            "This module contains the YANG definition for network
device fan.";

        revision "2022-02-11" {
            description
                "Initial revision";
        }

        grouping fan-top {
            container fan {
                leaf max-number {
                    type uint16;
                    description
                        "maximum number of fans";
                }

                leaf min-number {
                    type uint16;
                    description
                        "minimum number of fans";
                }

                leaf pluggable {
                    type boolean;
                }

                leaf airflow-direction {
                    type device-type:airflow-direction;
                }

                leaf fan-model {
                    type string;
                    description "fan model";
                }
```

```
                leaf max-speed {
                    type uint32;
                    units "rpm";

                    description "maximum rpm";
                }

                leaf typical-noise-level {
                    description "typical noise";
                    type device-type:float;
                    units "dBA";
                }

                leaf fullspeed-noise-level {
                    description "maximum noise";
                    type device-type:float;
                    units "dBA";
                }
            }
        }

        // data definition statements

        // augment statements
    }
```

3. 转发卡模型

```
    module net-device-fabric-card {
        // namespace
        namespace "urn:device:params:xml:ns:yang:net-device-fabric-
card";

        prefix "device-fabric-card";

        // import some basic types
        import net-device-common { prefix device-common; }
        import net-device-types { prefix device-type; }

        // meta
        organization
            "Open Data Center Committee";

        contact
```

```
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";

        description
            "This module contains the YANG definition for network
device fabric cards.";

        revision "2022-02-11" {
            description
                "Initial revision";
        }

        grouping fabric-cards-top {
            container fabric-card {
                leaf max-number {
                    type uint16;
                    description
                        "Number of supported fabric cards";
                }

                leaf min-number {
                    type uint16;
                    description
                        "Minimum number of fabric cards";
                }

                uses device-common:slot-range-top;

                leaf weight {
                    type device-type:float;
                    units "kg";
                    description "gross weight of all fabric cards";
                }

                leaf dev-model {
                    type string;
                    description "FE-card model name";
                }

                container fe-subsystem {
                    description "FE-card cpu subsystem";
                    uses device-common:subsystem;
                }
```

```
                container fe-asics{
                    description "asic chips of FE-card";
                    uses device-common:device-asics;
                }

                container fe-power-consumption {
                    description "fe-card power consumption";
                    uses device-common:power-consumption;
                }
            }
        }
    }
```

4. 业务卡模型

```
    module net-device-linecard {
        // namespace
        namespace "urn:device:params:xml:ns:yang:net-device-lc";

        prefix "device-lc";

        // import some basic types
        import net-device-types { prefix device-type; }
        import net-device-common { prefix device-common; }

        // meta
        organization
            "Open Data Center Committee";

        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";

        description
            "This module contains the YANG definition for network
device linecards.";

        revision "2022-02-11" {
            description
                "Initial revision";
        }

        grouping linecards-top {
            container linecards {
```

```
            description
                "linecard compoment, logical compoment for box
device";
              leaf number {
                  type uint16;
                  description
                      "number of linecards";
                }

                  leaf weight {
                      type device-type:float;
                      units "kg";
                      description "weight of a card";
                  }

                   leaf dev-model {
                      type string;

                      description
                          "linecard model name";
              }

              list linecard {
                  key "slot-id";
                  leaf slot-id {
                      type uint16;

                      description
                          "linecard slot id";
                    }

                  container linecard-subsystem{
                      description
                      "linecard cpu subsystem";

                      uses device-common:subsystem;
                  }

                  container lc-asics {
                      description
                          "switching chips of linecard";

                      uses device-common:device-asics;
                  }
```

```
                container lc-power-consumption {
                    description
                        "power consumption of linecard";

                    uses device-common:power-consumption;
                }

                container ports {
                    description
                        "port compoment";

                    leaf count {
                        type uint16;

                        description
                            "port count";
                    }

                    list port {
                        key "speed";

                        leaf port-id-range {
                            type string;
                            description "multiple ranges are
separated by commma, the start and end port are separated by '-',
such as 1-48,50-52";
                        }

                        leaf speed {
                            type device-type:port-speed;
                        }

                        leaf cage-type {
                            type identityref {
                                base device-type:CAGE_TYPE;
                            }

                            description
                                "inteface cage type";
                        }
                    }
                }
            }
```

```
            }
        }

        // data definition statements

        // augment statements
    }
```

5. 网络设备模型

```
    module net-device {
        yang-version "1.1";

        // namespace
        namespace "urn:device:params:xml:ns:yang:net-device";

        prefix "net-device";

        // import some basic types
        import net-device-types { prefix device-type; }
        import net-device-common { prefix device-common; }
        import net-device-fabric-card { prefix device-fabric-card; }
        import net-device-fan { prefix device-fan; }
        import net-device-linecard { prefix device-linecard; }
        import net-device-psu { prefix device-psu; }

        // meta
        organization
            "Open Data Center Committee";

        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";

        description
            "This module contains the YANG definition for network
device.";

        revision "2022-02-11" {
            description
                "Initial revision";
        }

        container net-device {
```

```
container product-info {
    leaf vendor {
        type string;
        description
            "manufactor's name";
    }

    leaf dev-model {
        type string;
        description
            "device model";
    }

    container firmwares {
        leaf-list firmware {
            type identityref {
                base device-type:FIRMWARE_TYPE;
            }
        }
    }

    leaf purchase-date {
        type device-type:date;
        description
            "purchase date";
    }

    leaf dev-type {
        type enumeration {
             enum CHASSIS;
             enum BOX;
        }
        description
            "device type";
    }
}

container dimension {
    description
        "device dimension";

    leaf length {
        type uint16;
        units "mm";
```

```
                description
                    "device length, unit is mm";
            }

            leaf width {
                type uint16;
                units "mm";
                description
                    "device width, unit is mm";
            }

            leaf height {
                type uint16;
                units "mm";
                description
                    "device height, unit is mm";
            }
        }

        leaf weight {
            type device-type:float;
            units "kg";
            description "total weight of the deivce, excluding
line cards and fabric cards if device is a chassis";
        }

        container power-consumption {
            description "total power consumption of device,
excluding line cards if device is a chassis";
            uses device-common:power-consumption;
        }

        container work-temperature {
            description "working temperature";
            uses device-common:temperature-limit;
        }

        container storage-temperature {
            description "storage temperature";
            uses device-common:temperature-limit;
        }

        container altitude {
            description "working altitude";
```

```
                leaf upper-limit {
                    type int16;
                    units "m";

                    description "the maximum of working altitude,
units is meter";
                }

                leaf lower-limit {
                    type int16;
                    units "m";

                    description "the minimum of working altitude,
units is meter";
                }
            }

            container humidity {
                description "relative humidity of working
environment";

                leaf upper-limit {
                    type uint16;
                    units "%RH";
                    description "the maximum of relative humidity";
                }

                leaf lower-limit {
                    type uint16;
                    units "%RH";
                    description "the minimum of relative humidity";
                }
            }

            container device-performance {
                description
                    "device perormance";

                uses device-common:device-performance;
            }

            container control-engine {
                leaf number {
```

```
        type uint16;
        description "the number of control engine";
    }

    uses device-common:slot-range-top;

    container mgmt-port {
        leaf name {
            type string;
        }

        leaf max-speed {
          type device-type:port-speed;
        }

        leaf position {
            type device-type:position;
        }
    }
    container usb-port {
        leaf usb-number {
          type uint16;
          description "number of usb port";
        }

        leaf usb-version {
            type enumeration {
                enum USB_2_0;
                enum USB_3_0;
            }
            description "maximum version of USB";
        }
    }
    container console {
        leaf default-baudrate {
            type uint32;
        }

        leaf position {
            type device-type:position;
        }
    }

    leaf dev-model {
```

```
                type string;
                description "device model";
            }

            container engine-subsystem {
                description "engine subsystem";
                uses device-common:subsystem;
            }

            container bmc-subsystem {
                description "BMC subsystem";
                uses device-common:subsystem;
            }

            container ce-power-consumption {
                description "power consumption of control engine
card";
                uses device-common:power-consumption;
            }
        }

        uses device-fabric-card:fabric-cards-top;
        uses device-linecard:linecards-top;
        uses device-fan:fan-top;
        uses device-psu:psu-top;
    }
}
```

（三）固件模型

```
module net-device-firmware {
    // namespace
    namespace "urn:device:params:xml:ns:yang:net-device-firmware";

    prefix "device-dev-firmware";

    // import some basic types


    // meta
    organization
        "Open Data Center Committee";
```

```
        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";
        description
            "This module contains the YANG definition for network
device fan.";

        revision "2022-02-11" {
            description
                "Initial revision";
        }

        grouping firmware-top {
            container firmwares {
              leaf serial-number{
                 type string;
                description
                "device Serial Number";
                }

              list mac-address{
                key "name";

                leaf name {
                type string {
                  pattern '[0-9a-fA-F]{2}(:[0-9a-fA-F]{2}){5}';
                }
                description
                "device MAC address";
                }
              }

                list firmware {
                  key "name";

                    leaf  name{
                        type string;
                     description
                     "firmware name";
                    }

                    leaf type {
                        type enumeration {
                            enum CPLD;
```

```
                enum BIOS;
            }

            description
                "firmware type";
        }

        leaf version {
            type string;
            description
                "firmware version";
        }

    }

    list sensor{
        key number;
        leaf number{
            type int16;
            description
            "sensor number";
            }

        leaf name{
            type string;
            description
            "sensor name";
        }

        leaf upper-limit {
            type int16;
            units "C";
            description
            "the maximum of working temperature";
        }
        leaf lower-limit {
            type int16;
            units "C";
            description
            "the minimum of working temperature";
        }
        leaf temp-state {
            type int16;
            units "C";
```

```
                    description
                    "current temperature";
                }
            }
        }
    }
    // data definition statements
    uses firmware-top;

    // augment statements
}
```

（四）软件模型

在设备软件能力模型当前包括接口能力模型、二层能力模型、ACL 能力模型、BGP 能力模型、Telemetry 能力模型等，软件能力模型是和子功能相关的能力集合，根据需求可以不断添加新的能力模型。

1. 接口能力模型

（1）net-software-if-types.yang

```
module net-software-if-types {
    yang-version 1.1;
    namespace "urn:device:params:xml:ns:yang:net-software-if-
types";
    prefix "net-software-if-types";
    organization
        "Open Data Center Committee";

    contact
        "Tel: +86-010-62300095
         E-mail: odcc@odcc.org.cn";
    description
        "This module contains the YANG definition for network
software interface common types.";

    revision "2022-03-29" {
        description
            "Initial revision";
    }
    identity INTERFACE_TYPE {
        description
          "Base identity from which interface types are derived";
```

```
        }
        identity IF_ETHERNET {
            base INTERFACE_TYPE;
            description
                "Ethernet interfaces based on IEEE 802.3 standards,
as well as FlexEthernet";
            reference
                "IEEE 802.3-2015 - IEEE Standard for Ethernet OIF
Flex Ethernet Implementation Agreement 1.0";
        }
        identity IF_BAGG {
            base INTERFACE_TYPE;
            description
                "二层聚合口";
        }
        identity IF_RAGG {
            base INTERFACE_TYPE;
            description
                "三层聚合口";
        }
        identity IF_LOOPBACK {
            base INTERFACE_TYPE;
            description
                "A virtual interface designated as a loopback used
for
                 various management and operations tasks.";
        }

        identity IF_NULL {
            base INTERFACE_TYPE;
            description
                "A software-based logical interface, which is always
up.";
        }

        identity IF_VLAN {
            base INTERFACE_TYPE;
            description
              "A logical interface used for routing services on a
VLAN.
               Such interfaces are also known as switch virtual
interfaces
               (SVI) or integrated routing and bridging interfaces
(IRBs).";
```

```
        }
        identity IF_SONET {
            base INTERFACE_TYPE;
            description
              "SONET/SDH interface";
        }
        identity IF_TUNNEL_GRE4 {
            base INTERFACE_TYPE;
            description
                "A GRE tunnel over IPv4 transport.";
        }
        identity IF_TUNNEL_GRE6 {
            base INTERFACE_TYPE;
            description
                "A GRE tunnel over IPv6 transport.";
        }
    }
```

(2) net-software-if-phy.yang

```
    module net-software-if-phy {
        yang-version 1.1;
        namespace "urn:device:params:xml:ns:yang:net-software-if-phy";
        prefix "software-if-phy";
        import net-software-if-common { prefix software-if-common; }
        organization
            "Open Data Center Committee";
        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";
        description
            "This module contains the YANG definition for network
software physical port feature.";
        revision "2022-03-29" {
            description
                "Initial revision";
        }
        grouping if-phy-top {
            description "Top-level grouping for physical interface
feature";

            container if-phy {
                list physical-interface {
                    key if-type;
```

```
                    uses software-if-common:if-common-top;
                    leaf support-fec {
                        type boolean;
                        description "support fec";
                    }
                    leaf-list support-breakout-speed {
                        type enumeration {
                            enum IF_SPEED_40G;
                            enum IF_SPEED_100G;
                        }
                        description "the supported speed list when
the breakout function is supported";
                    }
                    leaf support-l2-l3-switch {
                        type boolean;
                        description "whether to support L2 and L3
port switching";
                    }
                }
                /* TODO: expand sub-features */
            }
        }
    }
```

（3）net-software-if-common.yang

```
    module net-software-if-common {
        yang-version 1.1;
        namespace "urn:device:params:xml:ns:yang:net-software-if-
common";
        prefix "software-if-common";
        import net-software-if-types { prefix software-if-types;}
        organization
            "Open Data Center Committee";
        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";
        description
            "This module contains the YANG definition for network
software interface common structure.";
        revision "2022-04-22" {
            description
                "Initial revision";
        }
```

```
        grouping if-common-top {
            description "Top-level grouping for common interface
struture";
            leaf if-type {
                type identityref {
                    base software-if-types:INTERFACE_TYPE;
                }
                description "interface types which can be supported";
            }
            leaf support-description {
                type boolean;
                description "Is support configure description";
            }
            leaf support-sub-if {
                type boolean;
                description
                    "sub-interface type which can be supported";
            }
            leaf support-admin-shutdown {
                type boolean;
                description
                    "support shutdown command";
            }
            leaf support-jumbo-frame {
                when "../if-type = 'software-if-types:IF_ETHERNET'
                      or ../if-type = 'software-if-types:IF_BAGG'
                      or ../if-type = 'software-if-types:IF_RAGG'" {
                    description "Only L2/L3 Ethernet & BAGG & RAGG
support jumbo frame";
                }
                type boolean;
                description "Is support jumbo frame";
            }
        }
    }
```


(4) net-software-if-logic.yang

```
    module net-software-if-logic {
        yang-version 1.1;
        namespace "urn:device:params:xml:ns:yang:net-software-if-
logic";
        prefix "software-if-logic";
        import net-software-common { prefix software-common; }
```

```
        import net-software-if-common { prefix software-if-common; }
        organization
            "Open Data Center Committee";
        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";

        description
            "This module contains the YANG definition for network
software logic interface feature.";
        revision "2022-03-29" {
            description
                "Initial revision";
        }
        grouping if-logic-top {
            description "Top-level grouping for interface feature";

            container if-logic {
                list logic-interface {
                  key if-type;
                  uses software-if-common:if-common-top;
                  uses software-common:spec-description;
                }
            }
        }
    }
```

(5) net-software-if-interface.yang

```
    module net-software-interface {
        yang-version 1.1;
        namespace "urn:device:params:xml:ns:yang:net-software-
interface";
        prefix "software-interface";
        import net-software-if-logic { prefix software-if-logic; }
        import net-software-if-phy { prefix software-if-phy; }
        organization
            "Open Data Center Committee";
        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";
        description
```

```
            "This module contains the YANG definition for network
software interface feature.";


        revision "2022-03-29" {
            description
                "Initial revision";
        }
        grouping interface-top {
            description "Top-level grouping for interface feature";
            container interface {
                uses software-if-logic:if-logic-top;
                uses software-if-phy:if-phy-top;
            }
        }
    }
```

2. 二层能力模型

(1) net-software-if-vlan.yang

```
    module net-software-vlan {
        yang-version 1.1;
        namespace "urn:device:params:xml:ns:yang:net-software-vlan";
        prefix "software-vlan";
        import net-software-common { prefix software-common; }
        organization
            "Open Data Center Committee";
        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";
        description
            "This module contains the YANG definition for network
software VLAN feature.";
        revision "2022-03-23" {
            description
                "Initial revision";
        }
        grouping vlan-description {
            leaf support-description {
                type boolean;
                description
                    "description ability";
            }
```

```
}
grouping port-vlan-description {
    container port-vlan {
        leaf-list support-link-types {
          type enumeration {
              enum TRUNK;
              enum ACCESS;
                enum HYBIRD;
                 enum DOT1Q_TUNNEL;
          }
        }
    }
}
grouping vlan-top {
    description "Top-level grouping for VLAN feature";

    container vlan {
        container stand-specs {
            description "standard protocol";

            container basic-vlan {
                uses software-common:spec-description;
                uses vlan-description;

                leaf support-configure-name {
                    type boolean;
                    description "configure name ablity";
                }

                leaf support-transparent-vlan {
                    type boolean;
                }

                container reserved-vlan {
                    description "reserved vlan specification";
                    uses software-common:spec-description;

                    leaf support-modify {
                        type boolean;
                        description
                            "modify reserved vlan ability";
                    }

                    leaf reboot-after-modify {
```

```
                        when "../support-modify = 'true'";
                        type boolean;
                        description
                            "reboot after modify reserved
vlan";
                    }
                }
            }

            container qinq {
                leaf support-basic-qinq {
                    type boolean;
                    description
                        "basic QinQ ablity";
                }

                leaf support-selective-qinq {
                    type boolean;
                    description
                        "selective QinQ ablity";
                }
                leaf support-configure-tpid {
                    type boolean;
                    description "modify TPID ability";
                }
            }
        }
        container applications {
            leaf-list application {
                type enumeration {
                    enum MAC_VLAN;
                    enum VOICE_VLAN;
                    enum SUPER_VLAN;
                    enum PROTO_VLAN;
                    enum PORT_VLAN;
                    enum MUX_VLAN;
                }
                description "scenarios list";
            }

            container description {
                /* scenarios description */
                uses port-vlan-description;
            }
```

```
                    /* TODO: expand sub-features */
                }
            }
        }
    }
```

（2）net-software-if-stp.yang

```
    module net-software-stp {
        yang-version 1.1;
        namespace "urn:device:params:xml:ns:yang:net-software-stp";
        prefix "software-stp";
        import net-software-if-types { prefix software-if-types; }

        organization
            "Open Data Center Committee";

        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";

        description
            "This module contains the YANG definition for network
software STP feature.";


        revision "2022-04-13" {
            description
                "Initial revision";
        }

        identity STP_TYPE {
            description "STP type";
        }

        identity STP {
            base STP_TYPE;
        }

        identity RSTP {
            base STP_TYPE;
            description "802.1D";
```

```
    }

    identity MSTP {
        base STP_TYPE;
        description "802.1Q";
    }

    grouping stp-top {
        description "Top-level grouping for STP feature";

        container stp {
            leaf-list stp-type {
                type identityref {
                    base STP_TYPE;
                }
            }

            leaf-list protect-type {
                type enumeration {
                    enum PROTECT_BPDU;
                    enum PROTECT_ROOT;
                    enum PROTECT_LOOP;
                    enum PROTECT_TC;
                }
                description "supported protection list";
            }

            leaf-list if-type {
                type identityref {
                    base software-if-types:INTERFACE_TYPE;
                }

                description "supported port type list";
            }
            /* TODO: to be extend */
        }
    }
}
```

(3) net-software-if-lacp.yang

```
module net-software-lacp {
    yang-version 1.1;
```

```
        namespace "urn:device:params:xml:ns:yang:net-software-lacp";

        prefix "software-lacp";

        import net-software-lacp-types { prefix software-lacp-types; }

        organization
            "Open Data Center Committee";

        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";

        description
            "This module contains the YANG definition for network
software LACP feature.";

        revision "2022-03-23" {
            description
                "Initial revision";
        }

        grouping lacp-group-description {
            leaf max-group {
                type uint32;
                description "maximum number of aggregation group";
            }

            leaf max-member-port {
                type uint32;
                description "maximum number of port in a group";
            }

            leaf max-selected-member-port {
                type uint32;
                description "maximum number of selected port";
            }
        }

        grouping lacp-priority-description {
            leaf default-priority {
                type uint32;
                description "default priority";
```

```
            }

            leaf min-priority {
                type uint32;
            }

            leaf max-priority {
                type uint32;
            }
        }

        grouping algorithm-hash {
            container hash {
                when "../../alg-type = 'software-lacp-types:HASH'";

                leaf-list hash-type {
                    type identityref {
                        base software-lacp-types:HASH_MODE;
                    }
                    description "hash mode, such as
resilient/symmetry";
                }

                leaf-list hash-factor {
                    type identityref {
                        base software-lacp-types:HASH_FACTOR;
                    }
                    description "hash factor";
                }
            }
        }

        grouping load-balance-algorithm {
            leaf alg-type {
                type identityref {
                    base software-lacp-types:LOAD_BALANCE_MODE;
                }
                description "load balance mode";
            }

            container enhanced-feature {
                uses algorithm-hash;
            }
        }
```

```
grouping lacp-top {
    description "Top-level grouping for LACP feature";

    container lacp {
        container lacp-period {
            description "expired time";

            leaf-list mode {
                type enumeration {
                    enum MODE_FAST;
                    enum MODE_SLOW;
                    enum MODE_USER_DEFINE;
                }
                description "supported periodic patterns";
            }
        }

        container lacp-priority {
            container system-priority {
                uses lacp-priority-description;
            }

            container port-priority {
                uses lacp-priority-description;
            }
        }

        container lacp-load-balance {
            list algorithm {
                key alg-type;
                uses load-balance-algorithm;
            }
        }

        leaf support-lacp-preempt {
            type boolean;
            description "lacp preempt ability";
        }

        leaf support-lacp-transparent {
            type boolean;
            description "lacp transparent ability";
        }
```

```
                container lacp-group {
                    uses lacp-group-description;

                    list group-pair {
                        key group-number;

                        leaf group-number {
                            type uint32;
                        }

                        leaf port-member-number {
                            type uint32;
                        }
                        description "Combinations of supported groups
and member ports, such as 256/32";
                    }

                    leaf support-static-group {
                        type boolean;
                        description "static group ability";
                    }

                    leaf support-dynamic-group {
                        type boolean;
                        description "dynamic group ability";
                    }

                    leaf support-link-delay {
                        type boolean;
                        description "link-delay ability";
                    }

                    leaf support-config-system-mac {
                        type boolean;
                    }

                    leaf support-config-max-selected-port {
                        type boolean;
                    }

                    leaf support-config-min-selected-port {
                        type boolean;
                    }
```

```
                }
                /* TODO: expand sub-features */
            }
        }
```

（4）net-software-if-lldp.yang

```
    module net-software-lldp {
        yang-version 1.1;

        namespace "urn:device:params:xml:ns:yang:net-software-lldp";

        prefix "software-lldp";

        organization
            "Open Data Center Committee";

        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";

        description
            "This module contains the YANG definition for network
software LLDP feature.";


        revision "2022-04-12" {
            description
                "Initial revision";
        }

        identity WORK_MODE {
            description "working mode";
        }

        identity RX {
            base WORK_MODE;
        }

        identity TXRX {
            base WORK_MODE;
        }
```

```
        identity TX {
            base WORK_MODE;
        }

        identity DISABLE {
            base WORK_MODE;
        }

        grouping lldp-top {
            description "Top-level grouping for LLDP feature";

            container lldp {
                leaf-list tlv-types {
                    type enumeration {
                        enum TLV_BASIC;
                        enum TLV_802_1;
                        enum TLV_802_3;
                        enum TLV_MED;
                    }
                    description "List of supported tlv";
                }

                leaf-list work-mode {
                    type identityref {
                        base WORK_MODE;
                    }
                }
                /* TODO: expand sub-features */
            }
        }
    }
```

(5) net-software-if-storm-suppression-types.yang

```
    module net-software-storm-suppression-types {
        yang-version 1.1;

        namespace "urn:device:params:xml:ns:yang:net-software-storm-
suppression-types";

        prefix "software-storm-suppression-types";

        organization
```

```
            "Open Data Center Committee";

        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";

        description
            "This module contains the YANG definition for network
software storm-suppression common types.";


        revision "2022-03-23" {
            description
                "Initial revision";
        }

        identity SUPPRESSION_WHITELIST {
            description "whitelist";
        }

        identity ARP_REQUEST {
            base SUPPRESSION_WHITELIST;
        }

        identity BPDU {
            base SUPPRESSION_WHITELIST;
        }

        identity DHCP {
            base SUPPRESSION_WHITELIST;
        }

        identity IGMP {
            base SUPPRESSION_WHITELIST;
        }

        identity SUPPRESSION_ACTION {
            description "action after threshold is exceed";
        }

        identity BLOCK {
            base SUPPRESSION_ACTION;
            description "block action";
        }
```

```
        identity SHUTDOWN {
            base SUPPRESSION_ACTION;
            description "shutdown action";
        }

        identity SUPPRESS {
            base SUPPRESSION_ACTION;
            description "suppression action";
        }


        identity SUPPRESSION_RULE {
            description "suppression policy";
        }

        identity BASE_ON_RATIO {
            base SUPPRESSION_RULE;
            description "suppress based on bandwith ratio";
        }

        identity BASE_ON_PPS {
            base SUPPRESSION_RULE;
            description "suppress based on pps";
        }

        identity BASE_ON_BPS {
            base SUPPRESSION_RULE;
            description "suppress based on bps";
        }
    }
```


(6) net-software-if-storm-suppression.yang

```
    module net-software-storm-suppression {
        yang-version 1.1;

        namespace "urn:device:params:xml:ns:yang:net-software-storm-
suppression";

        prefix "software-storm-suppression";
```

```
        import net-software-storm-suppression-types { prefix storm-
suppression-types; }

        organization
            "Open Data Center Committee";

        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";

        description
            "This module contains the YANG definition for network
software storm-suppression feature.";


        revision "2022-03-23" {
            description
                "Initial revision";
        }

        grouping storm-suppression-top {
            description "Top-level grouping for storm-suppression
feature";

            container storm-suppression {
                description "storm suppression";

                leaf-list whitelist {
                    description "whitelist only for CPU";
                    type identityref {
                        base storm-suppression-
types:SUPPRESSION_WHITELIST;
                    }
                }

                list suppressions {
                    key suppression-type;

                    leaf suppression-type {
                        description "suppression type";
                        type enumeration {
                            enum BROADCAST;
                            enum MULTICAST;
                            enum UNICAST;
```

```
                    }
                }

                leaf-list support-suppression-rule {
                    description "supported suppression rule";
                    type identityref {
                        base storm-suppression-
types:SUPPRESSION_RULE;
                    }
                }

                leaf-list support-suppression-action {
                    description "supported suppression action";
                    type identityref {
                        base storm-suppression-
types:SUPPRESSION_ACTION;
                    }
                }
            }
            /* TODO: expand sub-features */
        }
    }
}
```

3. ACL 能力模型

（1）net-software-acl-types.yang

```
module net-software-acl-types {
    yang-version 1.1;

    namespace "urn:device:params:xml:ns:yang:net-software-acl-
types";

    prefix "acl-types";

    organization
        "Open Data Center Committee";

    contact
        "Tel: +86-010-62300095
         E-mail: odcc@odcc.org.cn";
```

```
        description
            "This module contains the YANG definition for network
software acl types define.";


        revision "2022-03-15" {
            description
                "Initial revision";
        }

        identity ACL_MATCH_FIELD_TYPE {
            description
                "Base identity for defining acl match field type";
        }
        identity SOURCE_IP {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of source ip";
        }
        identity SOURCE_IPV6 {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of source ipv6";
        }
        identity DESTINATION_IP {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of destination ip";
        }
        identity DESTINATION_IPV6 {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of destination ip";
        }
        identity TCP_SOURCE_PORT {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of tcp source port
number";
        }
        identity TCP_DESTINATION_PORT {
            base ACL_MATCH_FIELD_TYPE;
            description
```

```
                "Define acl match field type of tcp destination port
number";
        }
        identity UDP_SOURCE_PORT {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of udp source port
number";
        }
        identity UDP_DESTINATION_PORT {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of udp destination port
number";
        }
        identity PROTOCOL {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of protocol";
        }
        identity DSCP {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of dscp value";
        }
        identity TOS {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of tos value";
        }
        identity IP_PRECEDENCE {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of ip precedence";
        }
        identity FRAGMENT_INFO {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of fragmentation
information";
        }
        identity ICMP_TYPE {
            base ACL_MATCH_FIELD_TYPE;
            description
```

```
                "Define acl match field type of icmp type";
        }
        identity ICMP6_TYPE {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of icmp ipv6 type";
        }
        identity ICMP_CODE {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of icmp ipv6 code";
        }
        identity TIME_RANGE {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of time range";
        }
        identity TTL_EXPIRED {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of ttl expired";
        }
        identity SOURCE_MAC {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of source mac address";
        }
        identity DESTINATION_MAC {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of source mac address";
        }
        identity ETH_FRAME_ENCAP_FORMAT {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of ethernet frame
encapsulation format";
        }
        identity VLAN {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of vlan id";
        }
        identity CVLAN {
```

```
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of c-vlan id";
        }
        identity PRIORITY_802.1P {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of 802.1p priority";
        }
        identity CVLAN_802.1P {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of 802.1p priority int
the C-VLAN tag";
        }
        identity PACKET_TYPE {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of packet type";
        }
        identity DOUBLE_TAG {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of double tags";
        }
        identity ARP_OPCODE {
            base ACL_MATCH_FIELD_TYPE;
            description
                "Define acl match field type of arp
opcode(request/reply)";
        }

        identity ACL_MATCH_FIELD_EXTEND_TYPE {
            description
                "Base identity for defining acl match field extend
function type";
        }
        identity MASK {
            base ACL_MATCH_FIELD_EXTEND_TYPE;
            description
                "Define acl match fields to support mask matching";
        }
        identity UNMASK {
            base ACL_MATCH_FIELD_EXTEND_TYPE;
```

```
            description
                "Define acl match fields to support UNMASK matching";
        }
        identity RANGE {
            base ACL_MATCH_FIELD_EXTEND_TYPE;
            description
                "Define acl match fields to support range matching";
        }

        identity UDF_MATCH_HEADER_TYPE {
            description
                "Base identity for defining acl user defined match
header type";
        }
        identity L2_HEADER {
            base UDF_MATCH_HEADER_TYPE;
            description
                "Define udf match header type of layer2 header";
        }
        identity IPV4_HEADER {
            base UDF_MATCH_HEADER_TYPE;
            description
                "Define udf match header type of ipv4 header";
        }
        identity L4_HEADER {
            base UDF_MATCH_HEADER_TYPE;
            description
                "Define udf match header type of layer4 header";
        }
        identity INNER_IPV4_HEADER {
            base UDF_MATCH_HEADER_TYPE;
            description
                "Define udf match header type of iner ipv4 header";
        }

        identity RULE_ORDER_TYPE {
            description
                "Base identity for defining acl rule order type";
        }
        identity CONFIG_ORDER {
            base RULE_ORDER_TYPE;
            description
                "Define rule order type of according to the order of
rule configuration";
```

```
        }

        identity ACL_BIND_DIRECTION_TYPE {
            description
                "Base identity for defining acl bind direction type";
        }
        identity INGRESS {
            base ACL_BIND_DIRECTION_TYPE;
            description
                "Define acl bind direction type of ingress";
        }
        identity EGRESS {
            base ACL_BIND_DIRECTION_TYPE;
            description
                "Define acl bind direction type of egress";
        }

        identity ACL_BIND_TYPE {
            description
                "Base identity for defining acl bind type";
        }
        identity L2_PHY_INTF {
            base ACL_BIND_TYPE;
            description
                "Define acl bind type of layer 2 phyical interface
type";
        }
        identity L2_PHY_SUB_INTF {
            base ACL_BIND_TYPE;
            description
                "Define acl bind type of layer 2 phyical sub
interface type";
        }
        identity L3_PHY_INTF {
            base ACL_BIND_TYPE;
            description
                "Define acl bind type of layer 3 phyical interface
type";
        }
        identity L3_PHY_SUB_INTF {
            base ACL_BIND_TYPE;
            description
```

```
                "Define acl bind type of layer 3 phyical sub
interface type";
        }
        identity VLAN_INTF {
            base ACL_BIND_TYPE;
            description
                "Define acl bind type of vlan interface type";
        }
        identity LACP_AGGREGATE_PORT {
            base ACL_BIND_TYPE;
            description
                "Define acl bind type of lacp aggregate port type";
        }
        identity LACP_MEMBER_PORT {
            base ACL_BIND_TYPE;
            description
                "Define acl bind type of lacp member port type";
        }
        identity GLOBAL {
            base ACL_BIND_TYPE;
            description
                "Define acl bind type of global type";
        }


        identity ACL_COUNTER_CAPABILITY_TYPE {
            description
                "Base identity for system to indicate how it is able
to report counters";
        }
        identity INTERFACE_ONLY {
            base ACL_COUNTER_CAPABILITY_TYPE;
            description
                "ACL counters are available and reported only per
interface";
        }
        identity AGGREGATE_ONLY {
            base ACL_COUNTER_CAPABILITY_TYPE;
            description
                "ACL counters are aggregated over all interfaces, and
reported only per ACL entry";
        }
        identity INTERFACE_AGGREGATE {
            base ACL_COUNTER_CAPABILITY_TYPE;
```

```
            description
                "ACL counters are reported per interface, and also
aggregated and reported per ACL entry.";
        }


        identity ACL_LOG_ACTION_TYPE {
            description
                "Base identity for defining logging actions";
        }
        identity LOG_SYSLOG {
            base ACL_LOG_ACTION_TYPE;
            description
                "Log the packet in Syslog";
        }
        identity LOG_NONE {
            base ACL_LOG_ACTION_TYPE;
            description
                "No logging";
        }


        identity ACL_FORWARDING_ACTION_TYPE {
            description
                "Base identity for actions in the forwarding
category";
        }
        identity ACCEPT {
            base ACL_FORWARDING_ACTION_TYPE;
            description
                "Accept the packet";
        }
        identity DROP {
            base ACL_FORWARDING_ACTION_TYPE;
            description
                "Drop packet without sending any ICMP error message";
        }
        identity REJECT {
            base ACL_FORWARDING_ACTION_TYPE;
            description
                "Drop the packet and send an ICMP error message to
the source";
        }
    }
```

（2）net-software-acl.yang

```
module net-software-acl {
    yang-version 1.1;

    namespace "urn:device:params:xml:ns:yang:net-software-acl";

    prefix "software-acl";

    import net-software-common { prefix software-common; }
    import net-software-acl-types { prefix acl-types; }

    organization
        "Open Data Center Committee";

    contact
        "Tel: +86-010-62300095
         E-mail: odcc@odcc.org.cn";

    description
        "This module contains the YANG definition for network
software acl define.";


    revision "2022-03-09" {
        description
            "Initial revision";
    }

    grouping acl-feature-description {
        container number {
            leaf max-number {
                type uint16;
                mandatory true;
            }
            leaf min-number {
                type uint16;
                mandatory true;
            }
        }
        list match-field-list {
            key field-name;
```

```
                leaf field-name {
                    mandatory true;
                    type identityref {
                        base acl-types:ACL_MATCH_FIELD_TYPE;
                    }
                }
                leaf-list match-extend-capability {
                    type identityref {
                        base acl-types:ACL_MATCH_FIELD_EXTEND_TYPE;
                    }
                    description
                        "Extended functionality for match fields, for
example: source ip supports mask match, tcp supports range matching";
                }
            }
            leaf support-name-acl {
                type boolean;
                description
                    "Whether support to use name string to represent
acl";
                mandatory true;
            }
            container acl-bind-capability {
                leaf-list acl-bind-direction {
                    type identityref {
                        base acl-types:ACL_BIND_DIRECTION_TYPE;
                    }
                }
                leaf-list acl-bind-type {
                    type identityref {
                        base acl-types:ACL_BIND_TYPE;
                    }
                }
            }
            container rule-spec {
                container ingress-rule-spec {
                    uses software-common:spec-description;
                }
                container egress-rule-spec {
                    uses software-common:spec-description;
                }
                description
                    "The number of rules for per acl";
            }
```

```
}

grouping udf-acl-feature-description {
    container number {
        description
            "Describe the number range of acl";
        leaf max-number {
            type uint16;
        }
        leaf min-number {
            type uint16;
        }
    }
    leaf-list match-header {
        type identityref {
            base acl-types:UDF_MATCH_HEADER_TYPE;
        }
        description
            "Based on the offset beginning from match-header";
    }
    leaf max-match-length {
        type uint32;
        units "bytes";
        description
            "Supports maximum match length from match header";
    }
}

grouping acl-top {
    container acl {
        container acl-feature {
            container base-acl-ipv4 {
                uses acl-feature-description;
            }
            container advanced-acl-ipv4 {
                uses acl-feature-description;
            }
            container base-acl-ipv6 {
                uses acl-feature-description;
            }
            container advanced-acl-ipv6 {
                uses acl-feature-description;
            }
            container layer2-acl {
```

```
                    uses acl-feature-description;
                }
                container arp-acl {
                    uses acl-feature-description;
                }
                container udf-acl {
                    description
                        "User defined acl feature";
                    uses udf-acl-feature-description;
                }
            }
            container acl-rule {
                container acl-rule-description {
                    leaf support-rule-description {
                        type boolean;
                    description
                        "whether support to config acl rule
description information";
                    }
                    leaf max-description-length {
                        when "../support-rule-description =
'true'";
                        type uint32;
                        units "bytes";
                    }
                }
                container acl-rule-order {
                    leaf-list rule-order-capability {
                        type identityref {
                            base acl-types:RULE_ORDER_TYPE;
                        }
                    }
                }
                container acl-rule-step {
                    leaf support-rule-step {
                        type boolean;
                        description
                            "whether support to config acl rule
step";
                    }
                }
                leaf support-atomic-update {
                    type boolean;
                    description
```

```
                        "Adding or deleting rules in existing
ACLs and other rules will not be reissued";
                    }
                }
                container acl-action {
                    container log-action {
                        leaf-list log-action-capability {
                            type identityref {
                                base acl-types:ACL_LOG_ACTION_TYPE;
                            }
                            description
                                "Specifies the log action for matched
packets";
                        }
                    }
                    container forwarding-action {
                        leaf-list forwarding-action-capability {
                            type identityref {
                                base acl-
types:ACL_FORWARDING_ACTION_TYPE;
                            }
                            description
                                "Specifies the forwarding action";
                        }
                    }
                    container mirror-action {
                        leaf support-mirror-action {
                            type boolean;
                        }
                    }
                }
                container acl-global-capability {
                    container time-range-acl {
                        leaf support-periodic-time-range {
                            type boolean;
                            description
                                "The time range can be a periodic
time range expressed in week day + hour + minute";
                        }
                        leaf support-absolute-time-range {
                            type boolean;
                            description
                                "The time range can be an absolute
time range expressed in hour + minute + date";
```

```
                    }
                    container time-range-temp-spec {
                        uses software-common:spec-description;
                    }
                }
                container acl-description {
                    leaf support-acl-description {
                        type boolean;
                        description
                            "Whether support to config acl
description information";
                    }
                    leaf max-description-length {
                        when "../support-acl-description =
'true'";
                        type uint32;
                        units "bytes";
                    }
                }
                container acl-counters {
                    leaf support-acl-counters {
                        type boolean;
                        description
                            "Whether to support counting the
number of packets matched by acl";
                    }
                    leaf counter-capability {
                        when "../support-acl-counters = 'true'";
                        type identityref {
                            base acl-
types:ACL_COUNTER_CAPABILITY_TYPE;
                        }
                        description
                            "System reported indication of how
ACL counters are reported by the target";
                    }
                }
                leaf support-resource-save-mode {
                    type boolean;
                    description
                        "The same rule is delivered to different
interfaces, only one ACL resource is occupied";
                }
            }
```

```
            }
        }
    }
```

4. BGP 能力模型

（1）net-software-bgp-common.yang

```
    module net-software-bgp-common {
        // namespace
        namespace "urn:device:params:xml:ns:yang:net-software-bgp-
common";

        prefix "software-bgp-common";

        // import some basic types
        // meta
        organization
          "Open Data Center Committee";

        contact
          "Tel: +86-010-62300095
           E-mail: odcc@odcc.org.cn";
        description
          "This module contains the YANG definition for network
software bgp define.";

        revision "2022-03-24" {
            description
              "Initial revision";
        }
        grouping bgp-common-neighbor-group-timers {
            description
              "spec related to timers associated with the BGP
               peer";

            leaf maximum-connect-retry {
                type decimal64 {
                    fraction-digits 2;
                }
                units "second";
```

```
                description
                  "the maxTime interval in seconds between attempts
to establish a
                   session with the peer.";
            }

            leaf minimum-hold-time {
                type decimal64 {
                    fraction-digits 2;
                }
                units "second";
                description
                  "The minimum time interval in seconds that a BGP
session will be
                   considered active in the absence of keepalive or
other
                   messages from the peer.  The hold-time is
typically
                   set to 3x the keepalive-interval.";
                reference
                  "RFC 4271 - A Border Gateway Protocol 4, Sec. 10";
            }

            leaf minimum-keepalive-interval {
                type decimal64 {
                    fraction-digits 2;
                }
                units "second";
                description
                  "The minimum time interval in seconds between
transmission of keepalive
                   messages to the neighbor.  Typically set to 1/3
the
                   hold-time.";
            }

            leaf minimum-advertisement-interval {
                type decimal64 {
                    fraction-digits 2;
                }
                units "second";
                description
```

```
                    "The minimum time which must elapse between
subsequent UPDATE
                     messages relating to a common set of NLRI being
transmitted
                     to a peer. This timer is referred to as
                     MinRouteAdvertisementIntervalTimer by RFC 4721 and
serves to
                     reduce the number of UPDATE messages transmitted
when a
                     particular set of NLRI exhibit instability.";
                  reference
                    "RFC 4271 - A Border Gateway Protocol 4, Sec
9.2.1.1";
              }

              leaf restart-max-time {
                  type decimal64 {
                      fraction-digits 2;
                  }
                  units "seconds";
                  description
                    "Time interval in seconds after which the BGP
session is
                     re-established after being torn down due to
exceeding any
                     configured max prefix-limit.";
              }
          }

    // data definition statements
    // augment statements
    }

    net-software-bgp-types.yang
    module net-software-bgp-types {
    // namespace
        namespace "urn:device:params:xml:ns:yang:net-software-bgp-
types";

        prefix "software-bgp-types";

    // import some basic types
    // meta
        organization
```

```
          "Open Data Center Committee";

        contact
          "Tel: +86-010-62300095
           E-mail: odcc@odcc.org.cn";
        description
          "This module contains the YANG definition for network
software bgp define.";

        revision "2022-03-24" {
            description
              "Initial revision";
        }

    // data definition statements
        identity BGP_CAPABILITY {
            description
              "Base identity for a BGP capability";
        }

        identity MPBGP {
            base BGP_CAPABILITY;
            description
              "Multi-protocol extensions to BGP";
            reference
              "RFC2858";
        }

        identity ROUTE_REFRESH {
            base BGP_CAPABILITY;
            description
              "The BGP route-refresh functionality";
            reference
              "RFC2918";
        }

        identity ASN32 {
            base BGP_CAPABILITY;
            description
              "4-byte (32-bit) AS number functionality";
            reference
              "RFC6793";
        }
```

```
identity GRACEFUL_RESTART {
    base BGP_CAPABILITY;
    description
      "Graceful restart functionality";
    reference
      "RFC4724";
}

identity ADD_PATHS {
    base BGP_CAPABILITY;
    description
      "BGP add-paths";
    reference
      "draft-ietf-idr-add-paths";
}

identity EXTENDED_NEXTHOP_ENCODING {
    base BGP_CAPABILITY;
    description
      "BGP Extended Next Hop Encoding functionality";
    reference
      "RFC5549";
}

identity AFI_SAFI_TYPE {
    description
      "Base identity type for AFI,SAFI tuples for BGP-4";
    reference
      "RFC4760 - multiprotocol extensions for BGP-4";
}

identity IPV4_UNICAST {
    base AFI_SAFI_TYPE;
    description
      "IPv4 unicast (AFI,SAFI = 1,1)";
    reference
      "RFC4760";
}

identity IPV6_UNICAST {
    base AFI_SAFI_TYPE;
    description
      "IPv6 unicast (AFI,SAFI = 2,1)";
    reference
```

```
      "RFC4760";
  }

  identity IPV4_LABELED_UNICAST {
      base AFI_SAFI_TYPE;
      description
        "Labeled IPv4 unicast (AFI,SAFI = 1,4)";
      reference
        "RFC3107";
  }

  identity IPV6_LABELED_UNICAST {
      base AFI_SAFI_TYPE;
      description
        "Labeled IPv6 unicast (AFI,SAFI = 2,4)";
      reference
        "RFC3107";
  }

  identity L3VPN_IPV4_UNICAST {
      base AFI_SAFI_TYPE;
      description
        "Unicast IPv4 MPLS L3VPN (AFI,SAFI = 1,128)";
      reference
        "RFC4364";
  }

  identity L3VPN_IPV6_UNICAST {
      base AFI_SAFI_TYPE;
      description
        "Unicast IPv6 MPLS L3VPN (AFI,SAFI = 2,128)";
      reference
        "RFC4659";
  }

  identity L3VPN_IPV4_MULTICAST {
      base AFI_SAFI_TYPE;
      description
        "Multicast IPv4 MPLS L3VPN (AFI,SAFI = 1,129)";
      reference
        "RFC6514";
  }

  identity L3VPN_IPV6_MULTICAST {
```

```
    base AFI_SAFI_TYPE;
    description
      "Multicast IPv6 MPLS L3VPN (AFI,SAFI = 2,129)";
    reference
      "RFC6514";
}

identity L2VPN_VPLS {
    base AFI_SAFI_TYPE;
    description
      "BGP-signalled VPLS (AFI,SAFI = 25,65)";
    reference
      "RFC4761";
}

identity L2VPN_EVPN {
    base AFI_SAFI_TYPE;
    description
      "BGP MPLS Based Ethernet VPN (AFI,SAFI = 25,70)";
}

identity SRTE_POLICY_IPV4 {
    base AFI_SAFI_TYPE;
    description
      "Segment Routing Traffic Engineering (SRTE) Policy
       for IPv4 (AFI,SAFI = 1,73)";
}

identity SRTE_POLICY_IPV6 {
    base AFI_SAFI_TYPE;
    description
      "Segment Routing Traffic Engineering (SRTE) Policy
       for IPv6 (AFI,SAFI = 2,73)";
}

identity IPV4_FLOWSPEC {
    base AFI_SAFI_TYPE;
    description
      "IPv4 dissemination of flow specification rules
       (AFI,SAFI = 1,133)";
    reference
      "RFC5575";
}
```

```
        identity VPNV4_FLOWSPEC {
            base AFI_SAFI_TYPE;
            description
              "IPv4 dissemination of flow specification rules
               (AFI,SAFI = 1,134)";
            reference
              "RFC5575";
        }

        identity LINKSTATE {
            base AFI_SAFI_TYPE;
            description
              "BGP-LS (AFI,SAFI = 16388,71)";
            reference
              "RFC7752";
        }

        identity LINKSTATE_VPN {
            base AFI_SAFI_TYPE;
            description
              "BGP-LS-VPN (AFI,SAFI = 16388,72)";
            reference
              "RFC7752";
        }

        identity LINKSTATE_SPF {
            base AFI_SAFI_TYPE;
            description
              "BGP-LS SPF (AFI,SAFI = 16388,TBD)";
            reference
              "draft-ietf-lsvr-bgp-spf";
        }

        identity REMOVE_PRIVATE_AS_OPTION {
            description
              "Base identity for options for removing private
autonomous
               system numbers from the AS_PATH attribute";
        }

        identity PRIVATE_AS_REMOVE_ALL {
            base REMOVE_PRIVATE_AS_OPTION;
            description
```

```
                "Strip all private autonmous system numbers from the
AS_PATH.
                 This action is performed regardless of the other
content of the
                 AS_PATH attribute, and for all instances of private AS
numbers
                 within that attribute.";
        }

        identity PRIVATE_AS_REPLACE_ALL {
            base REMOVE_PRIVATE_AS_OPTION;
            description
              "Replace all instances of private autonomous system
numbers in
               the AS_PATH with the local BGP speaker's autonomous
system
               number. This action is performed regardless of the
other
               content of the AS_PATH attribute, and for all
instances of
               private AS number within that attribute.";
        }

        typedef remove-private-as-options {
            type identityref {
                base REMOVE_PRIVATE_AS_OPTION;
            }
            description
              "Set of options for configuring how private AS path
numbers
               are removed from advertisements";
        }

        typedef bgp-next-hop-types {
            type enumeration {
                enum SELF {
                    description
                      "special designation for local router's own
                       address, i.e., next-hop-self";
                }
                enum DEFINE {
                    description
                      "redirect to next-hop";
                }
```

```
                enum UNCHANGE {
                    description
                      "dont change nexthop";
                }
            }

            description
              "type definition for specifying next-hop in policy
actions";
        }

        typedef bgp-set-as-path-action {
            type enumeration {
                enum PREPEND {
                    description
                      "add the specified as-path to the existing
                       as-path attribute";
                }
                enum REPLACE {
                    description
                      "replace the existing as-path attribute with
                       the specified as-path. ";
                }
            }

            description
              "type definition for specifying next-hop in policy
actions";
        }

        typedef bgp-set-community-option-types {
            type enumeration {
                enum ADD {
                    description
                      "add the specified communities to the existing
                       community attribute";
                }
                enum REMOVE {
                    description
                      "remove the specified communities from the
                       existing community attribute";
                }
                enum REPLACE {
                    description
```

```
                    "replace the existing community attribute with
                     the specified communities. If an empty set is
                     specified, this removes the community
attribute
                     from the route.";
                }
            }
            description
              "Type definition for options when setting the community
               attribute in a policy action";
        }
        identity BGP_AUTHENCATION_TYPE {
            description
              "supported authentication types between BGP peers or
group.";
        }
        identity MD5_AUTHENCATION {
            description
              "MD5 authentication";
        }
        identity KEY_CHAIN_AUTHENCATION {
            description
              "keychain authentication";
        }
        identity ECMP_FIELD_TYPES {
            description
              "Base identity for options for emmp filed types";
        }
        identity SRC_IP {
            description
              "SRC_IP";
            base ECMP_FIELD_TYPES;
        }
        identity DST_IP {
            description
              "DST_IP";
            base ECMP_FIELD_TYPES;
        }

        identity L4_SRC_PORT {
            description
              "L4_SRC_PORT";
            base ECMP_FIELD_TYPES;
        }
```

```
        identity L4_DST_PORT {
            description
              "L4_DST_PORT";
            base ECMP_FIELD_TYPES;
        }
        identity PROTOCOL {
            description
              "PROTOCOL";
            base ECMP_FIELD_TYPES;
        }

        typedef route-selection-options {
            description
              "Set of configuration options that govern best
               path selection.";
            type enumeration{
                enum support-always-compare-med {
                    description
                      "Compare multi-exit discriminator (MED) value
from
                       different ASes when selecting the best route.
The
                       default behavior is to only compare MEDs for
paths
                       received from the same AS.";
                }

                enum support-ignore-as-path-length {
                    description
                      "Ignore the AS path length when selecting the
best path.
                       The default is to use the AS path length and
prefer paths
                       with shorter length.";
                }

                enum support-external-compare-router-id {
                    description
                      "When comparing similar routes received from
external
                       BGP peers, use the router-id as a criterion to
select
                       the active path.";
                }
```

```
                enum support-advertise-inactive-routes {
                    description
                      "Advertise inactive routes to external peers.
The
                       default is to only advertise active routes.";
                }

                enum support-enable-aigp {
                    description
                      "Flag to enable sending / receiving accumulated
IGP
                       attribute in routing updates";
                }

                enum support-ignore-next-hop-igp-metric {
                    description
                      "Ignore the IGP metric to the next-hop when
calculating
                       BGP best-path. The default is to select the
route for
                       which the metric to the next-hop is lowest";
                }
            }
        }
    // augment statements
    }

    net-software-bgp.yang
    module net-software-bgp {
    // namespace
        namespace "urn:device:params:xml:ns:yang:net-software-bgp";

        prefix "software-bgp";

    // import some basic types
        import net-software-bgp-types {
            prefix bgp-types;
        }
        import net-software-bgp-common {
            prefix bgp-common;
        }

    // meta
```

```
        organization
          "Open Data Center Committee";

        contact
          "Tel: +86-010-62300095
           E-mail: odcc@odcc.org.cn";
        description
          "This module contains the YANG definition for network
software bgp define.";

        revision "2022-03-24" {
            description
              "Initial revision";
        }

        grouping bgp-top {
            description
              "Top-level grouping for BGP  specification and
capability model data";

            container bgp {
                description
                  "Top-level BGP capability";
                container global {
                    description
                      "Global capability set for the BGP router";

                    container startup-update-delay {
                        description
                          "The device delay advertising routing
information when startup";

                        leaf support-startup-update-delay {
                            type boolean;
                            description
                              "Whether support delay advertisement of
route when the device startup ";
                        }
                        leaf maximum-time {
                            when "../support-startup-update-delay  =
'true'";
                            type uint16;
                        }
                    }
```

```
                container startup-maximum-med {
                    description
                      "The device send max med routing
information when startup";

                    leaf support-startup-maximum-med {
                        type boolean;
                        description
                          "Whether support send max med route
when the device startup ";
                    }
                    leaf maximum-time {
                        when "../support-startup-maximum-med  =
'true'";

                        type uint16;
                    }
                }
                container route-selection-options {
                    description
                      "Parameters relating to options for route
selection";
                    leaf-list route-selection-option {
                        type bgp-types:route-selection-options;
                        description
                          "ability relating to route selection
                           options";
                    }
                }
                container support-afi-safis {

                    leaf-list afi-safi-name {
                        type identityref {
                            base bgp-types:AFI_SAFI_TYPE;
                        }
                        description
                          "ability used for all BGP AFI-SAFIs";
                    }
                }
                container support-capabilities {
                    leaf-list support-capabilitiy {
                        type identityref {
                            base bgp-types:BGP_CAPABILITY;
                        }
```

```
                        description
                          "BGP capabilities negotiated as
supported with the peer";
                        }
                    }

                    container multiple-paths-spec {
                        description
                          "Generic options relating to use of
multiple
                           paths for a referenced AFI-SAFI, group or
neighbor";
                        leaf support-multiple-path {
                            type boolean;
                            description
                              "Whether the use of multiple paths for
the same NLRI is
                               enabled for the neighbor. This value
is overridden by
                               any more specific configuration
value.";
                        }

                        leaf remove-private-as {
                            type bgp-types:remove-private-as-options;
                            description
                              "Remove private AS numbers from updates
sent to peers - when
                               this leaf is not specified, the
AS_PATH attribute should be
                               sent to the peer unchanged";
                        }
                    }
                    container bfd {
                        description
                          "Parameters relating to support BFD.";

                        leaf support-bfd {
                            type boolean;
                            description
                              "Whether support to  detect the
                               liveliness of the remote peer or next-
hop.";
                        }
```

```
                    }
                    container dynamic-neighbor-prefixes {

                        leaf support-dynamic-neighbor-prefixes {
                            type boolean;
                            description
                              "Whether support the establishment of
BGP neighbors by network
                               segment, and passively responds to BGP
neighbor
                               establishment requests.";
                        }
                    }
                }

                container bgp-spec {
                    description
                      "Top-level spec for the BGP router";
                    container bgp-rib-spec {
                        description
                          "RIB spec for the BGP router";

                        container adj-rib {

                            description
                              "Capability for Adj-RIB table";

                            leaf support-adj-rib-in-pre {
                                type boolean;
                                description
                                  "whether  support adj-rib-in-pre
table,
                                   Per-neighbor table containing the
NLRI updates
                                   received from the neighbor before
any local input
                                   policy rules or filters have been
applied.  This can
                                   be considered the 'raw' updates
from the neighbor.";
                            }

                            leaf support-adj-rib-in-post {
                                type boolean;
```

```
                    description
                      "whether  support adj-rib-in-post
table,
                       Per-neighbor table containing the
paths received from
                       the neighbor that are eligible for
best-path selection
                       after local input policy rules
have been applied.";
                }

                leaf support-adj-rib-out-pre {
                    type boolean;
                    description
                      "whether support adj-rib-out-pre
table,
                       Per-neighbor table containing
paths eligble for
                       sending (advertising) to the
neighbor before output
                       policy rules have been applied";
                }

                leaf support-adj-rib-out-post {
                    type boolean;
                    description
                      "whether support adj-rib-out-pos
table,
                       Per-neighbor table containing
paths eligble for
                       sending (advertising) to the
neighbor after output
                       policy rules have been applied";
                }
            }

            leaf maximum-ribs {
                type uint32;
                description
                  "Describe the maximum-number of RIB";
            }
        }
        leaf bgp-maximum-neighbor {
            description
```

```
                    "Describe the maximum-number of neighbor";
                type uint32;
            }
            container bgp-fib-spec {
                description
                  "FIB spec for the BGP router";

                leaf maximum-fib {
                    type uint32;
                    description
                      "Describe the maximu-number of FIB ";
                }
            }
            container bgp-multiple-path {
                description
                  "Whether support multipath";

                leaf maximum-paths {
                    type uint32;
                }
                container ecmp-template-fields {
                    leaf-list ecmp-template-field {
                        type identityref {
                            base bgp-types:ECMP_FIELD_TYPES;
                        }
                        description
                          "Optional ECMP configuration
template";
                    }
                }
            }
            container bgp-instance {
                leaf support-bgp-multi-instance {
                    type boolean;
                    description
                      "whether  support BGP multiple
instances";
                }
                leaf maximum-bgp-instances {
                    when "../support-bgp-multi-instance =
'true'";
                    type uint16;
                }
            }
```

```
                container bgp-timers {
                    description
                      "Configuration parameters relating to
timers used for the
                       BGP neighbor";
                    uses bgp-common:bgp-common-neighbor-group-
timers;
                }
                container bgp-bfd-timer {
                    leaf desired-minimum-tx-interval {
                        type uint32;
                        units microseconds;
                        description
                          "The Configurable minimum interval
between transmission of BFD control
                           packets that the operator desires.";
                    }

                    leaf required-minimum-receive {
                        type uint32;
                        units microseconds;
                        description
                          "The Configurable minimum interval
between received BFD control packets that
                           this system should support. ";
                    }

                    // rjs: Could have required-minimum-echo-
receive here, but this is
                    // generally not configurable.
                    leaf detection-minimum-multiplier {
                        type uint8;
                        description
                          "The Configurable minimum number of
packets that must be missed to declare this
                           session as down. ";
                    }
                }
            }
            container bgp-feature {
                description
                  "BGP features   related to  the
bfd/vrf/routing-policy/dual-stack,etc.";
```

```
                container bgp-policy {
                    container bgp-actions {
                        description
                          "Top-level container for BGP-specific
actions";

                        leaf-list support-set-next-hop {
                            type bgp-types:bgp-next-hop-types;
                            description
                              "set the next-hop attribute in the
route update";
                        }

                        leaf-list support-set-community-action {
                            type bgp-types:bgp-set-community-
option-types;

                            description
                              "Options for modifying the
community attribute with

                               the specified values.  These
options apply to both

                               methods of setting the community
attribute.";
                        }

                        leaf-list support-set-as-path-action {
                            type bgp-types:bgp-set-as-path-action;
                            description
                              "set the as-path attribute in the
route update";
                        }
                    }
                }
                container bgp-dual-stack {
                    description
                      "dual stack related";

                    container ipv6-link-local-neighbor {
                        leaf LLA-neighbor {
                            type boolean;
                            description
                              "Whether support  using IPv6 LLA
address to establish BGP neighbor";
```

```
                                reference
                                  "RFC4007";
                            }

                            leaf LLA-interface-neighbor {
                                when "../LLA-neighbor = 'true'";
                                type boolean;
                                description
                                  "Support to automatically obtain
the LLA address of the peer end through RA,
                                   and only need to specify the
outgoing port number of the local end
                                   when configuring BGP peer, thus
supporting automation";
                            }

                            leaf single-stack-neighbor-dual-stack-
routing {
                                description
                                  "Pass IPv4 and v6 dual-stack
routing through IPv6 BGP update messages";
                                type boolean;
                                reference
                                  "RFC5549";
                            }
                        }
                    }

                    leaf prefix-independent-convergence {
                        description
                          "Support to generate next-hop separation
index according to
                           unreachable AS and Router-ID on different
paths to speed up
                           the convergence speed under large-scale
routing";
                        type boolean;
                    }

                    container router-exceeded-action {

                        leaf prefix-limit-exceeded-prevent-teardown {
                            type boolean;
                            default false;
```

```
                        description
                          "weather to support prevent tear down
the BGP session when the maximum
                           prefix limit is exceeded, but rather
only log a
                           warning. The default of this leaf is
false,such
                           that when it is not supported, the
session is torn
                           down .";
                    }

                    leaf-list new-route-action {
                        when "../prefix-limit-exceeded-prevent-
teardown = 'true'";
                        type enumeration {
                            enum REPLACE;
                            enum DROP;
                        }
                    }
                    leaf total-exceeded-prevent-teardown {
                        type boolean;
                        default false;
                        description
                          "weather to support prevent tear down
the BGP session when the maximum
                           where total memory is exceeded, but
rather only log a
                           warning. The default of this leaf is
false,such
                           that when it is not specified, the
session is torn
                           down.";
                    }
                }

                container bgp-security {
                    container bgp-authentication {
                        leaf-list bgp_authencation-type {
                            type identityref {
                                base bgp-
types:BGP_AUTHENCATION_TYPE;
                            }
                            description
```

```
                                "supported authentication types
between BGP peers or group.";
                            }
                        }
                        container soft-protect-machine {
                            leaf support-GTSM {
                                type boolean;
                                description
                                  "wheather to support The
Generalized TTL Security Mechanism (GTSM) protects
                                   a BGP session by comparing the TTL
value in the IP header of incoming BGP
                                    packets against a valid TTL
range.";
                            }
                        }
                    }
                }
            }
        }
    // data definition statements
        uses bgp-top;
    // augment statements
    }
```

5. Telemetry 能力模型

（1）net-software-telemetry-types.yang

```
    module net-software-telemetry-types {
        yang-version 1.1;

        namespace "urn:device:params:xml:ns:yang:net-software-
telemetry-types";

        prefix "telemetry-types";

        organization
            "Open Data Center Committee";

        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";
```

```
        description
            "This module contains the YANG definition for network
software telemetry types define.";


        revision "2022-03-15" {
            description
                "Initial revision";
        }

        identity FILTER_MECHANISM_TYPE {
            description
              "define telemetry data filter mechanism type";
        }
        identity THRESHOLD_FILTER {
            base FILTER_MECHANISM_TYPE;
            description
                "threshold filter type according to threshold value
to filter";
        }
        identity CONDITION_FILTER {
            base FILTER_MECHANISM_TYPE;
            description
                "conditon filter type according to condition key to
filter";
        }
        identity REDUNDANCY_SUPPRESSION {
            base FILTER_MECHANISM_TYPE;
            description
                "redundancy suppression reduces redundant data's
report";
        }

        identity DESTINATION_OBJECT_TYPE {
            description
              "define telemetry destination object type";
        }
        identity IP_ADDRESS {
            base DESTINATION_OBJECT_TYPE;
            description
                "ip address is supported for each destination
object.";
```

```
        }
        identity PORT_NUMBER {
            base DESTINATION_OBJECT_TYPE;
            description
                "port number is supported for each destination
object.";
        }
        identity VPN_INSTANCE {
            base DESTINATION_OBJECT_TYPE;
            description
                "vpn instance is supported for each destination
object.";
        }


        identity DESTINATION_PROTOCOL_TYPE {
            description
              "define telemetry destination object support protocol
type";
        }
        identity GRPC {
            base DESTINATION_PROTOCOL_TYPE;
            description
                "connection protocol grpc can be configured for each
destination object";
        }
        identity NO_TLS {
            base DESTINATION_PROTOCOL_TYPE;
            description
                "security connection no-tls can be configured for
each destination object";
        }
    }
```


（2）net-software-telemetry.yang

```
    module net-software-telemetry {
        yang-version 1.1;

        namespace "urn:device:params:xml:ns:yang:net-software-
telemetry";

        prefix "software-telemetry";
```

```
        import net-software-common { prefix software-common; }
        import net-software-telemetry-types { prefix telemetry-
types; }

        organization
            "Open Data Center Committee";

        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";

        description
            "This module contains the YANG definition for network
software telemetry define.";


        revision "2022-03-09" {
            description
                "Initial revision";
        }

        grouping telemetry-capacbility-description {
            container telemetry-capacbility {
                container report {
                    leaf support-periodical-report {
                        type boolean;
                    }
                    leaf support-client {
                        description
                            "functioning as a client and sending data
to a collector";
                        type boolean;
                    }
                    leaf support-server {
                        description
                            "functioning as a server and receiving
dynamic subscription requests from a collector";
                        type boolean;
                    }
                }
                container control {
                    leaf support-license-control {
                        type boolean;
                    }
```

```
                    leaf support-global-enable-control {
                        type boolean;
                    }
                }
                container message {
                    leaf support-version-number {
                        type boolean;
                    }
                }
                container filter {
                    leaf-list filter-mechanism {
                        type identityref {
                            base telemetry-
types:FILTER_MECHANISM_TYPE;
                        }
                    }
                }
                container static-configuration {
                    container destination-configuration {
                        leaf-list destination-object {
                            description
                                "support type of destination object";
                            type identityref {
                                base telemetry-
types:DESTINATION_OBJECT_TYPE;
                            }
                        }
                        leaf-list protocol {
                            description
                                "support protocol of destination
object";
                            type identityref {
                                base telemetry-
types:DESTINATION_PROTOCOL_TYPE;
                            }
                        }
                    }
                    leaf support-restore-configuration {
                        description
                            "Static configuration supports
configuration restoration.
                            After the system is restarted, the
sampling task can be restored.";
                        type boolean;
```

```
                    }
                }
            }
        }

        grouping telemetry-spec-description {
            container telemetry-spec {
                container static-configuration-spec {
                    container subscription-spec {
                        container subscription-group-spec {
                            description
                                "telemetry static configuration
supports specification of subscription group";
                            uses software-common:spec-description;
                        }
                        container sensor-spec {
                            container sensor-group-spec {
                                description
                                    "telemetry static configuration
supports specification of sensor group";
                                uses software-common:spec-description;
                            }
                            container path-spec {
                                description
                                    "specification of sampling paths
for each sensor group";
                                uses software-common:spec-description;
                            }
                        }
                        container destination-spec {
                            container destination-group-spec {
                                description
                                    "telemetry static configuration
supports specification of destination group";
                                uses software-common:spec-description;
                            }
                            container address-spec {
                                description
                                    "specification of ip address for
each destionation group";
                                uses software-common:spec-description;
                            }
                        }
                    }
```

```
            }
        }
    }

    grouping telemetry-top {
        container telemetry {
            uses telemetry-capacbility-description;
            uses telemetry-spec-description;
        }
    }
}
```

6. 设备软件能力模型

（1）net-software-common.yang

```
module net-software-common {
    yang-version 1.1;

    namespace "urn:device:params:xml:ns:yang:net-software-common";

    prefix "software-common";

    organization
        "Open Data Center Committee";

    contact
        "Tel: +86-010-62300095
         E-mail: odcc@odcc.org.cn";

    description
        "This module contains the YANG definition for network
software common define.";


    revision "2022-03-08" {
        description
            "Initial revision";
    }

    grouping spec-description {
        leaf spec {
```

```
                type uint32;
            }
            leaf min-spec {
                type uint32;
            }
            leaf max-spec {
                type uint32;
            }
            leaf condition {
                type string;
            }
            leaf unit {
                type string;
            }
            leaf description {
                type string;
            }
        }
    }
```

(2) net-software.yang

```
    module net-software {
        yang-version 1.1;

        namespace "urn:device:params:xml:ns:yang:net-software";

        prefix "net-software";

        import net-software-acl { prefix software-acl; }
        import net-software-telemetry { prefix software-telemetry; }
        import net-software-vlan { prefix software-vlan; }
        import net-software-lacp { prefix software-lacp; }
        import net-software-storm-suppression { prefix software-
storm-suppression; }
        import net-software-interface { prefix software-interface; }
        import net-software-stp { prefix software-stp; }
        import net-software-lldp { prefix software-lldp; }
        import net-software-bgp { prefix software-bgp; }

        organization
            "Open Data Center Committee";
```

```
        contact
            "Tel: +86-010-62300095
             E-mail: odcc@odcc.org.cn";

        description
            "This module contains the YANG definition for network
software define.";

        revision "2022-04-01" {
            description
                "Add VLAN/storm-suppression/LACP/interface feature";
        }

        revision "2022-03-08" {
            description
                "Initial revision";
        }

        container net-software {
            leaf software-version {
                type string;
                description
                    "software version of device";
            }
            uses software-acl:acl-top;
            uses software-telemetry:telemetry-top;
            uses software-vlan:vlan-top;
            uses software-lacp:lacp-top;
            uses software-storm-suppression:storm-suppression-top;
            uses software-interface:interface-top;
            uses software-stp:stp-top;
            uses software-lldp:lldp-top;
            uses software-bgp:bgp-top;
        }
    }
```

六、模型实例

（一）华为设备模型

1. 6865-48S8CQ-EI 硬件模型

```
    <net-device>
        <product-info>
            <vendor>huawei</vendor>
```

```
            <dev-model>6865-48S8CQ-EI</dev-model>
            <firmwares>
                <firmware>CPLD</firmware>
            </firmwares>
            <purchase-date>2022-04-21</purchase-date>
            <dev-type>BOX</dev-type>
        </product-info>
        <dimension>
            <length>442</length>
            <width>420</width>
            <height>44</height>
        </dimension>
        <weight>8.80</weight>
        <power-consumption>
            <typical-power-consumption>259</typical-power-
consumption>
            <max-power-consumption>420</max-power-consumption>
        </power-consumption>
        <work-temperature>
            <upper-limit>40</upper-limit>
            <lower-limit>0</lower-limit>
        </work-temperature>
        <storage-temperature>
            <upper-limit>70</upper-limit>
            <lower-limit>-40</lower-limit>
        </storage-temperature>
        <altitude>
            <upper-limit>5000</upper-limit>
            <lower-limit></lower-limit>
        </altitude>
        <humidity>
            <upper-limit>95</upper-limit>
            <lower-limit>5</lower-limit>
        </humidity>
        <device-performance>
            <packet-fwd-rate>2000.0</packet-fwd-rate>
            <device-capacity>4.0</device-capacity>
        </device-performance>
        <control-engine>
            <number>1</number>
            <slot-range>
                <min-slot-id>0</min-slot-id>
                <max-slot-id>0</max-slot-id>
            </slot-range>
```

```
<mgmt-port>
    <name>eth_mgmt_port</name>
    <max-speed>1000M</max-speed>
    <position>FRONT_PANEL</position>
</mgmt-port>
<usb-port>
    <usb-number>1</usb-number>
    <usb-version></usb-version>
</usb-port>
<console>
    <default-baudrate>9600</default-baudrate>
    <position>FRONT_PANEL</position>
</console>
<dev-model></dev-model>
<engine-subsystem>
    <infos>
        <cpu-info>
            <cpu-id>0</cpu-id>
            <vendor></vendor>
            <cpu-arch>arm64</cpu-arch>
            <cpu-model></cpu-model>
            <core-num>8</core-num>
            <frequency>1500</frequency>
        </cpu-info>
        <mem-info>
            <vendor></vendor>
            <type></type>
            <total-size>4000</total-size>
        </mem-info>
        <storage-infos>
            <storage-info>
                <index>1</index>
                <vender></vender>
                <type>NOR_FLASH</type>
                <storage-capacity>32</storage-capacity>
            </storage-info>
            <storage-info>
                <index>2</index>
                <vender></vender>
                <type>NAND_FLASH</type>
                <storage-capacity>4000</storage-capacity>
            </storage-info>
        </storage-infos>
    </infos>
```

```
            </engine-subsystem>
            <bmc-subsystem>
                <infos>
                    <cpu-info>
                        <cpu-id></cpu-id>
                        <vendor></vendor>
                        <cpu-arch></cpu-arch>
                        <cpu-model></cpu-model>
                        <core-num></core-num>
                        <frequency></frequency>
                    </cpu-info>
                    <mem-info>
                        <vendor></vendor>
                        <type></type>
                        <total-size></total-size>
                    </mem-info>
                    <storage-infos>
                        <index></index>
                        <vendor></vendor>
                        <type></type>
                        <storage-capacity></storage-capacity>
                    </storage-infos>
                </infos>
            </bmc-subsystem>
            <ce-power-consumption>
                <typical-power-consumption></typical-power-
consumption>
                <max-power-consumption></max-power-consumption>
            </ce-power-consumption>
        </control-engine>
        <fabric-card>
            <max_number></max_number>
            <min_number></min_number>
            <slot-range>
                <min-slot-id></min-slot-id>
                <max-slot-id></max-slot-id>
            </slot-range>
            <weight></weight>
            <dev-model></dev-model>
            <fe-subsystem>
                <infos>
                    <cpu-info>
                        <cpu-id></cpu-id>
                        <vendor></vendor>
```

```
                    <cpu-arch></cpu-arch>
                    <cpu-model></cpu-model>
                    <core-num></core-num>
                    <frequency></frequency>
                </cpu-info>
                <mem-info>
                    <vendor></vendor>
                    <type></type>
                    <total-size></total-size>
                </mem-info>
                <storage-infos>
                    <index></index>
                    <vendor></vendor>
                    <type></type>
                    <storage-capacity></storage-capacity>
                </storage-infos>
            </infos>
        </fe-subsystem>
        <fe-asics>
            <number></number>
            <device-asic>
                <unit-id></unit-id>
                <vendor></vendor>
                <model></model>
                <buffer-size></buffer-size>
                <packet-fwd-rate></packet-fwd-rate>
                <device-capacity></device-capacity>
            </device-asic>
        </fe-asics>
        <fe-power-consumption>
            <typical-power-consumption></typical-power-
consumption>
            <max-power-consumption></max-power-consumption>
        </fe-power-consumption>
    </fabric-card>
    <linecards>
        <number>0</number>
        <linecard>
            <slot-id>0</slot-id>
            <weight></weight>
            <dev-model></dev-model>
            <linecard-subsystem>
                <infos>
                    <cpu-info>
```

```
                        <cpu-id></cpu-id>
                        <vendor></vendor>
                        <cpu-arch></cpu-arch>
                        <cpu-model></cpu-model>
                        <core-num></core-num>
                        <frequency></frequency>
                    </cpu-info>
                    <mem-info>
                        <vendor></vendor>
                        <type></type>
                        <total-size></total-size>
                    </mem-info>
                    <storage-infos>
                        <index></index>
                        <vendor></vendor>
                        <type></type>
                        <storage-capacity></storage-capacity>
                    </storage-infos>
                </infos>
            </linecard-cpu-subsystem>
            <lc-asics>
                <number>1</number>
                <device-asic>
                    <unit-id>0</unit-id>
                    <vendor>BROADCOM</vendor>
                    <model>trident3-BCM56873</model>
                    <buffer-size></buffer-size>
                    <packet-fwd-rate></packet-fwd-rate>
                    <device-capacity>4.0</device-capacity>
                </device-asic>
            </lc-asics>
            <lc-power-consumption>
                <typical-power-consumption></typical-power-
consumption>
                <max-power-consumption></max-power-consumption>
            </lc-power-consumption>
            <ports>
                <count>56</count>
                <port>
                    <port-id-range>1-48</port-id-range>
                    <speed>25G</speed>
                    <cage-type>SFP28</cage-type>
                </port>
                <port>
```

```
                        <port-id-range>1-8</port-id-range>
                        <speed>100G</speed>
                        <cage-type>QSFP28</cage-type>
                    </port>
                </ports>
            </linecard>
        </linecards>
        <fan>
            <max_number>2</max_number>
            <min_number>1</min_number>
            <pluggable>true</pluggable>

<airflow_direction>DIRECT_FRONT_TO_REAR</airflow_direction>
            <fan-model>FAN-40HA-F</fan-model>
            <max-speed>19000</max-speed>
            <typical-noise-level></typical-noise-level>
            <fullspeed-noise-level>65</fullspeed-noise-level>
        </fan>
        <psu>
            <psu-count>2</psu-count>
            <min-number>1</min-number>
            <pluggable>true</pluggable>
            <psu-model>PDC-350WA-F</psu-model>
            <power-supply-type>DC</power-supply-type>
            <psu-supply-DC>
                <min-input-voltage>-38.4</min-input-voltage>
                <max-output-power></max-output-power>
                <rated-input-voltage-range>
                    <min-voltage>-48</min-voltage>
                    <max-voltage>-60</max-voltage>
                </rated-input-voltage-range>
                <rated-output-voltage>12</rated-output-voltage>
                <rated-input-current>11.0</rated-input-current>
                <rated-output-current>29.17</rated-output-current>
                <rated-output-power>350</rated-output-power>
            </psu-supply-DC>
            <psu-supply-AC>
                <min-input-voltage></min-input-voltage>
                <max-output-power></max-output-power>
                <rated-input-voltage-range>
                    <min-voltage></min-voltage>
                    <max-voltage></max-voltage>
                </rated-input-voltage-range>
                <rated-output-voltage></rated-output-voltage>
```

```
                <rated-input-current></rated-input-current>
                <rated-output-current></rated-output-current>
                <rated-output-power></rated-output-power>
            </psu-supply-AC>
        </psu>
    </net-device>
```

2. 6865-48S8CQ-EI 软件模型

```
    <net-software>
        <software-version>V200R005C00</software-version>
        <acl>
            <acl-feature>
                <base-acl-ipv4>
                    <number>
                        <max-number>2999</max-number>
                        <min-number>2000</min-number>
                    </number>
                    <match-field-list>
                        <field-name>SOURCE_IP</field-name>
                        <match-extend-capability>MASK</match-extend-
capability>
                    </match-field-list>
                     <match-field-list>
                        <field-name>FRAGMENT_INFO</field-name>
                    </match-field-list>
                    <match-field-list>
                        <field-name>TIME_RANGE</field-name>
                    </match-field-list>
                    <support-name-acl>true</support-name-acl>
                    <acl-bind-capability>
                        <acl-bind-direction>INGRESS</acl-bind-
direction>
                        <acl-bind-direction>EGRESS</acl-bind-
direction>
                        <acl-bind-type>L3_PHY_INTF</acl-bind-type>
                    </acl-bind-capability>
                    <rule-spec>
                        <ingress-rule-spec>
                            <spec>2048</spec>
                            <description>The number of configurable
ingress rules in each ACL</description>
```

```
                    </ingress-rule-spec>
                    <egress-rule-spec>
                        <spec>1024</spec>
                        <description>The number of configurable
egress rules in each ACL</description>
                    </egress-rule-spec>
                </rule-spec>
            </base-acl-ipv4>
            <advanced-acl-ipv4>
                <number>
                    <max-number>3999</max-number>
                    <min-number>3000</min-number>
                </number>
                <match-field-list>
                    <field-name>SOURCE_IP</field-name>
                    <match-extend-capability>MASK</match-extend-
capability>
                </match-field-list>
                <match-field-list>
                    <field-name>DESTINATION_IP</field-name>
                    <match-extend-capability>MASK</match-extend-
capability>
                </match-field-list>
                <match-field-list>
                    <field-name>TCP_SOURCE_PORT</field-name>
                    <match-extend-capability>RANGE</match-extend-
capability>
                </match-field-list>
                <match-field-list>
                    <field-name>TCP_DESTINATION_PORT</field-name>
                    <match-extend-capability>RANGE</match-extend-
capability>
                </match-field-list>
                <match-field-list>
                    <field-name>UDP_SOURCE_PORT</field-name>
                    <match-extend-capability>RANGE</match-extend-
capability>
                </match-field-list>
                <match-field-list>
                    <field-name>UDP_DESTINATION_PORT</field-name>
                    <match-extend-capability>RANGE</match-extend-
capability>
                </match-field-list>
                <match-field-list>
```

```
                    <field-name>PROTOCOL</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>DSCP</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>TOS</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>IP_PRECEDENCE</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>FRAGMENT_INFO</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>ICMP_TYPE</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>ICMP_CODE</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>TIME_RANGE</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>TTL_EXPIRED</field-name>
                </match-field-list>
                <support-name-acl>true</support-name-acl>
                <acl-bind-capability>
                    <acl-bind-direction>INGRESS</acl-bind-
direction>
                    <acl-bind-direction>EGRESS</acl-bind-
direction>
                    <acl-bind-type>L3_PHY_INTF</acl-bind-type>
                </acl-bind-capability>
                <rule-spec>
                    <ingress-rule-spec>
                        <spec>2048</spec>
                        <description>The number of configurable
ingress rules in each ACL</description>
                    </ingress-rule-spec>
                    <egress-rule-spec>
                        <spec>1024</spec>
                        <description>The number of configurable
egress rules in each ACL</description>
```

```
                    </egress-rule-spec>
                </rule-spec>
            </advanced-acl-ipv4>
            <base-acl-ipv6>
                <number>
                    <max-number>2999</max-number>
                    <min-number>2000</min-number>
                </number>
                <match-field-list>
                    <field-name>SOURCE_IPV6</field-name>
                </match-field-list>
                 <match-field-list>
                    <field-name>FRAGMENT_INFO</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>TIME_RANGE</field-name>
                </match-field-list>
                <support-name-acl>true</support-name-acl>
                <acl-bind-capability>
                    <acl-bind-direction>INGRESS</acl-bind-
direction>
                    <acl-bind-direction>EGRESS</acl-bind-
direction>
                    <acl-bind-type>L3_PHY_INTF</acl-bind-type>
                </acl-bind-capability>
                <rule-spec>
                    <ingress-rule-spec>
                        <spec>2048</spec>
                        <description>The number of configurable
ingress rules in each ACL</description>
                    </ingress-rule-spec>
                    <egress-rule-spec>
                        <spec>1024</spec>
                        <description>The number of configurable
egress rules in each ACL</description>
                    </egress-rule-spec>
                </rule-spec>
            </base-acl-ipv6>
            <advanced-acl-ipv6>
                <number>
                    <max-number>3999</max-number>
                    <min-number>3000</min-number>
                </number>
                <match-field-list>
```

```
                    <field-name>SOURCE_IPV6</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>DESTINATION_IPV6</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>TCP_SOURCE_PORT</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>TCP_DESTINATION_PORT</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>UDP_SOURCE_PORT</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>UDP_DESTINATION_PORT</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>PROTOCOL</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>DSCP</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>FRAGMENT_INFO</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>ICMP6_TYPE</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>ICMP6_CODE</field-name>
                </match-field-list>
                <match-field-list>
                    <field-name>TIME_RANGE</field-name>
                </match-field-list>
                <support-name-acl>true</support-name-acl>
                <acl-bind-capability>
                    <acl-bind-direction>INGRESS</acl-bind-
direction>
                    <acl-bind-direction>EGRESS</acl-bind-
direction>
                    <acl-bind-type>L3_PHY_INTF</acl-bind-type>
                </acl-bind-capability>
                <rule-spec>
```

```
                        <ingress-rule-spec>
                            <spec>2048</spec>
                            <description>The number of configurable
ingress rules in each ACL</description>
                        </ingress-rule-spec>
                        <egress-rule-spec>
                            <spec>1024</spec>
                            <description>The number of configurable
egress rules in each ACL</description>
                        </egress-rule-spec>
                    </rule-spec>
                </advanced-acl-ipv6>
                <layer2-acl>
                    <number>
                        <max-number>4999</max-number>
                        <min-number>4000</min-number>
                    </number>
                    <match-field-list>
                        <field-name>SOURCE_MAC</field-name>
                        <match-extend-capability>MASK</match-extend-
capability>
                    </match-field-list>
                     <match-field-list>
                        <field-name>DESTINATION_MAC</field-name>
                        <match-extend-capability>MASK</match-extend-
capability>
                    </match-field-list>
                    <match-field-list>
                        <field-name>ETH_FRAME_ENCAP_FORMAT</field-
name>
                    </match-field-list>
                    <match-field-list>
                        <field-name>VLAN</field-name>
                        <match-extend-capability>MASK</match-extend-
capability>
                    </match-field-list>
                    <match-field-list>
                        <field-name>CVLAN</field-name>
                        <match-extend-capability>MASK</match-extend-
capability>
                    </match-field-list>
                    <match-field-list>
                        <field-name>PRIORITY_802.1P</field-name>
                    </match-field-list>
```

```
                    <match-field-list>
                        <field-name>CVLAN_802.1P</field-name>
                    </match-field-list>
                    <match-field-list>
                        <field-name>PACKET_TYPE</field-name>
                        <match-extend-capability>MASK</match-extend-
capability>
                    </match-field-list>
                    <match-field-list>
                        <field-name>DOUBLE_TAG</field-name>
                    </match-field-list>
                    <match-field-list>
                        <field-name>TIME_RANGE</field-name>
                    </match-field-list>
                    <support-name-acl>true</support-name-acl>
                    <acl-bind-capability>
                        <acl-bind-direction>INGRESS</acl-bind-
direction>
                        <acl-bind-direction>EGRESS</acl-bind-
direction>
                        <acl-bind-type>L2_PHY_INTF</acl-bind-type>
                        <acl-bind-type>L2_PHY_SUB_INTF</acl-bind-
type>
                    </acl-bind-capability>
                    <rule-spec>
                        <ingress-rule-spec>
                            <spec></spec>
                            <description>The number of configurable
ingress rules in each ACL</description>
                        </ingress-rule-spec>
                        <egress-rule-spec>
                            <spec></spec>
                            <description>The number of configurable
egress rules in each ACL</description>
                        </egress-rule-spec>
                    </rule-spec>
                </layer2-acl>
                <arp-acl>
                    <number>
                        <max-number>23999</max-number>
                        <min-number>23000</min-number>
                    </number>
                    <match-field-list>
                        <field-name>ARP_OPCODE</field-name>
```

```
                    </match-field-list>
                    <match-field-list>
                        <field-name>SOURCE_IP</field-name>
                        <match-extend-capability>MASK</match-extend-
capability>
                    </match-field-list>
                    <match-field-list>
                        <field-name>DESTINATION_IP</field-name>
                        <match-extend-capability>MASK</match-extend-
capability>
                    </match-field-list>
                    <match-field-list>
                        <field-name>SOURCE_MAC</field-name>
                        <match-extend-capability>MASK</match-extend-
capability>
                    </match-field-list>
                    <match-field-list>
                        <field-name>DESTINATION_MAC</field-name>
                        <match-extend-capability>MASK</match-extend-
capability>
                    </match-field-list>
                    <match-field-list>
                        <field-name>TIME_RANGE</field-name>
                    </match-field-list>
                    <support-name-acl>true</support-name-acl>
                    <acl-bind-capability>
                        <acl-bind-direction>INGRESS</acl-bind-
direction>
                        <acl-bind-direction>EGRESS</acl-bind-
direction>
                        <acl-bind-type>L3_PHY_INTF</acl-bind-type>
                    </acl-bind-capability>
                    <rule-spec>
                        <ingress-rule-spec>
                            <spec>2048</spec>
                            <description>The number of configurable
ingress rules in each ACL</description>
                        </ingress-rule-spec>
                        <egress-rule-spec>
                            <spec>1024</spec>
                            <description>The number of configurable
egress rules in each ACL</description>
                        </egress-rule-spec>
                    </rule-spec>
```

```
                </arp-acl>
                <udf-acl>
                    <number>
                        <max-number>5999</max-number>
                        <min-number>5000</min-number>
                    </number>
                    <match-header>L2_HEADER</match-header>
                    <match-header>IPV4_HEADER</match-header>
                    <match-header>L4_HEADER</match-header>
                    <match-header>INNER_IPV4_HEADER</match-header>
                    <max-match-length>4</max-match-length>
                </udf-acl>
            </acl-feature>
            <acl-rule>
                <acl-rule-description>
                    <support-rule-description>true</support-rule-
description>
                    <max-description-length>127</max-description-
length>
                </acl-rule-description>
                <acl-rule-order>
                    <rule-order-capability>CONFIG_ORDER</rule-order-
capability>
                </acl-rule-order>
                <acl-rule-step>
                    <support-rule-step>true</support-rule-step>
                </acl-rule-step>
                <support-atomic-update></support-atomic-update>
            </acl-rule>
            <acl-action>
                <log-action>
                    <log-action-capability>ACL_LOG_ACTION_TYPE</log-
action-capability>
                    <log-action-capability>LOG_NONE</log-action-
capability>
                </log-action>
                <forwarding-action>
                    <forwarding-action-capability>ACCEPT</forwarding-
action-capability>
                    <forwarding-action-capability>DROP</forwarding-
action-capability>
                    <forwarding-action-capability>REJECT</forwarding-
action-capability>
                </forwarding-action>
```

```
                <mirror-action>
                    <support-mirror-action>true</support-mirror-
action>
                </mirror-action>
            </acl-action>
            <acl-global-capability>
                <time-range-acl>
                    <support-periodic-time-range>true</support-
periodic-time-range>
                    <support-absolute-time-range>true</support-
absolute-time-range>
                    <time-range-temp-spec>
                        <spec>256</spec>
                    </time-range-temp-spec>
                </time-range-acl>
                <acl-description>
                    <support-acl-description>true</support-acl-
description>
                    <max-description-length>127</max-description-
length>
                </acl-description>
                <acl-counters>
                    <support-acl-counters>true</support-acl-counters>
                    <counter-
capability>ACL_COUNTER_CAPABILITY_TYPE</counter-capability>
                </acl-counters>
                <support-resource-save-mode></support-resource-save-
mode>
            </acl-global-capability>
        </acl>
        <telemetry>
            <telemetry-capacbility>
                <report>
                    <support-periodical-report>true</support-
periodical-report>
                    <support-client>true</support-client>
                    <support-server>true</support-server>
                </report>
                <control>
                    <support-license-control>true</support-license-
control>
                    <support-global-enable-control>true</support-
global-enable-control>
                </control>
```

```
                <message>
                    <support-version-number>true</support-version-
number>
                </message>
                <filter>
                    <filter-mechanism>THRESHOLD_FILTER</filter-
mechanism>
                    <filter-mechanism>CONDITION_FILTER</filter-
mechanism>
                    <filter-mechanism>REDUNDANCY_SUPPRESSION</filter-
mechanism>
                </filter>
                <static-configuration>
                    <destination-configuration>
                        <destination-object>IP_ADDRESS</destination-
object>
                        <destination-object>PORT_NUMBER</destination-
object>
                        <destination-
object>VPN_INSTANCE</destination-object>
                        <protocol>GRPC</protocol>
                        <protocol>NO_TLS</protocol>
                        <support-restore-configuration>true</support-
restore-configuration>
                    </destination-configuration>
                </static-configuration>
            </telemetry-capacbility>
            <telemetry-spec>
                <static-configuration-spec>
                    <subscription-spec>
                        <subscription-group-spec>
                            <spec>25</spec>
                        </subscription-group-spec>
                        <sensor-spec>
                            <sensor-group-spec>
                                <spec>25</spec>
                                <description>A maximum of 25 sensor
groups can be configured for each subscription</description>
                            </sensor-group-spec>
                            <path-spec>
                                <spec>5</spec>
                                <description>Specification of
sampling paths for each sensor group</description>
                            </path-spec>
```

```
                        </sensor-spec>
                        <destination-spec>
                            <destination-group-spec>
                                <spec>5</spec>
                                <description>A maximum of 5
destination groups can be configured for each
subscription</description>
                            </destination-group-spec>
                            <address-spec>
                                <spec>5</spec>
                                <description>Specification of ip
address for each destionation group</description>
                            </address-spec>
                        </destination-spec>
                    </subscription-spec>
                </static-configuration-spec>
            </telemetry-spec>
        </telemetry>
        <vlan>
            <stand-specs>
                <basic-vlan>
                    <spec>4063</spec>
                    <support-description></support-description>
                    <support-configure-name>true</support-configure-
name>
                    <support-transparent-vlan>true</support-
transparent-vlan>
                    <reserved-vlan>
                        <spec>31</spec>
                        <support-modify>true</support-modify>
                        <reboot-after-modify>true</reboot-after-
modify>
                    </reserved-vlan>
                </basic-vlan>
                <qinq>
                    <support-basic-qinq>true</support-basic-qinq>
                    <support-selective-qinq>true</support-selective-
qinq>
                    <support-configure-tpid>true</support-configure-
tpid>
                </qinq>
            </stand-specs>
            <applications>
                <application>MAC_VLAN</application>
```

```
                <application>VOICE_VLAN</application>
                <application>SUPER_VLAN</application>
                <application>PROTO_VLAN</application>
                <application>PORT_VLAN</application>
                <application>MUX_VLAN</application>
                <description>
                    <port-vlan>
                        <support-link-types>ACCESS</support-link-
types>
                        <support-link-types>TRUNK</support-link-
types>
                        <support-link-types>HYBIRD</support-link-
types>
                        <support-link-types>DOT1Q_TUNNEL</support-
link-types>
                    </port-vlan>
                </description>
            </applications>
        </vlan>
        <lacp>
            <lacp-period>
                <mode>MODE_FAST</mode>
                <mode>MODE_SLOW</mode>
                <mode>MODE_USER_DEFINE</mode>
            </lacp-period>
            <lacp-priority>
                <system-priority>
                    <default-priority>32768</default-priority>
                    <min-priority>0</min-priority>
                    <max-priority>65535</max-priority>
                </system-priority>
                <port-priority>
                    <default-priority>32768</default-priority>
                    <min-priority>0</min-priority>
                    <max-priority>65535</max-priority>
                </port-priority>
            </lacp-priority>
            <lacp-load-balance>
                <algorithm>
                    <alg-type>HASH</alg-type>
                    <enhanced-feature>
                        <hash>
                            <hash-type>RESILIENT</hash-type>
                            <hash-type>SYMMETRY</hash-type>
```

```
                    </hash>
                    <hash-factor>DEST_IP</hash-factor>
                    <hash-factor>DEST_MAC</hash-factor>
                    <hash-factor>DEST_PORT</hash-factor>
                    <hash-factor>SOURCE_IP</hash-factor>
                    <hash-factor>SOURCE_MAC</hash-factor>
                    <hash-factor>SOURCE_PORT</hash-factor>
                    <hash-factor>IP_PROTOCOL</hash-factor>
                    <hash-factor>VLAN_ID</hash-factor>
                </enhanced-feature>
            </algorithm>
            <algorithm>
                <alg-type>RANDOM</alg-type>
            </algorithm>
            <algorithm>
                <alg-type>ROUND_ROBIN</alg-type>
            </algorithm>
        </lacp-load-balance>
        <support-lacp-preempt>true</support-lacp-preempt>
        <support-lacp-transparent></support-lacp-transparent>
        <lacp-group>
            <max-group>1024</max-group>
            <max-member-port>32</max-member-port>
            <max-selected-member-port>3</max-selected-member-
port>
            <group-pair>
                <group-number>1024</group-number>
                <port-member-number>2</port-member-number>
            </group-pair>
            <group-pair>
                <group-number>512</group-number>
                <port-member-number>4</port-member-number>
            </group-pair>
            <group-pair>
                <group-number>256</group-number>
                <port-member-number>8</port-member-number>
            </group-pair>
            <group-pair>
                <group-number>128</group-number>
                <port-member-number>16</port-member-number>
            </group-pair>
            <group-pair>
                <group-number>64</group-number>
                <port-member-number>32</port-member-number>
```

```
                </group-pair>
                <support-static-group>true</support-static-group>
                <support-dynamic-group>true</support-dynamic-group>
                <support-link-delay></support-link-delay>
                <support-config-system-mac>true</support-config-
system-mac>
                <support-config-max-selected-port>true</support-
config-max-selected-port>
                <support-config-min-selected-port>true</support-
config-min-selected-port>
            </lacp-group>
        </lacp>
        <storm-suppression>
            <whitelist></whitelist>
            <suppressions>
                <suppression-type>BROADCAST</suppression-type>
                <support-suppression-rule>BASE_ON_RATIO</support-
suppression-rule>
                <support-suppression-rule>BASE_ON_PPS</support-
suppression-rule>
                <support-suppression-rule>BASE_ON_BPS</support-
suppression-rule>
                <support-suppression-action>BLOCK</support-
suppression-action>
                <support-suppression-action>SHUTDOWN</support-
suppression-action>
                <support-suppression-action>SUPPRESS</support-
suppression-action>
            </suppressions>
            <suppressions>
                <suppression-type>MULTICAST</suppression-type>
                <support-suppression-rule>BASE_ON_PORT</support-
suppression-rule>
                <support-suppression-rule>BASE_ON_RADIO</support-
suppression-rule>
                <support-suppression-rule>BASE_ON_PPS</support-
suppression-rule>
                <support-suppression-rule>BASE_ON_KPS</support-
suppression-rule>
                <support-suppression-action>BLOCK</support-
suppression-action>
                <support-suppression-action>SHUTDOWN</support-
suppression-action>
```

```
                <support-suppression-action>SUPPRESS</support-
suppression-action>
            </suppressions>
            <suppressions>
                <suppression-type>UNICAST</suppression-type>
                <support-suppression-rule>BASE_ON_PORT</support-
suppression-rule>
                <support-suppression-rule>BASE_ON_RADIO</support-
suppression-rule>
                <support-suppression-rule>BASE_ON_PPS</support-
suppression-rule>
                <support-suppression-rule>BASE_ON_KPS</support-
suppression-rule>
                <support-suppression-action>BLOCK</support-
suppression-action>
                <support-suppression-action>SHUTDOWN</support-
suppression-action>
                <support-suppression-action>SUPPRESS</support-
suppression-action>
            </suppressions>
        </storm-suppression>
        <interface>
            <if-logic>
                <logic-interface>
                    <if-type>IF_BAGG</if-type>
                    <support-description>true</support-description>
                    <support-sub-if>true</support-sub-if>
                    <support-admin-shutdown>true</support-admin-
shutdown>
                    <support-jumbo-frame>true</support-jumbo-frame>
                    <spec></spec>
                </logic-interface>
                <logic-interface>
                    <if-type>IF_RAGG</if-type>
                    <support-description>true</support-description>
                    <support-sub-if>true</support-sub-if>
                    <support-admin-shutdown>true</support-admin-
shutdown>
                    <support-jumbo-frame>true</support-jumbo-frame>
                    <spec></spec>
                </logic-interface>
                <logic-interface>
                    <if-type>IF_LOOPBACK</if-type>
                    <support-description>true</support-description>
```

```
                    <support-sub-if>false</support-sub-if>
                    <support-admin-shutdown>false</support-admin-
shutdown>
                    <spec></spec>
                </logic-interface>
                <logic-interface>
                    <if-type>IF_NULL</if-type>
                    <support-description>true</support-description>
                    <support-sub-if>false</support-sub-if>
                    <support-admin-shutdown>false</support-admin-
shutdown>
                    <spec></spec>
                </logic-interface>
                <logic-interface>
                    <if-type>IF_VLAN</if-type>
                    <support-description>true</support-description>
                    <support-sub-if>false</support-sub-if>
                    <support-admin-shutdown>true</support-admin-
shutdown>
                    <spec></spec>
                </logic-interface>
                <logic-interface>
                    <if-type>IF_TUNNEL_GRE4</if-type>
                    <support-description>true</support-description>
                    <support-sub-if>false</support-sub-if>
                    <support-admin-shutdown>true</support-admin-
shutdown>
                    <spec></spec>
                </logic-interface>
                <logic-interface>
                    <if-type>IF_TUNNEL_GRE6</if-type>
                    <support-description>true</support-description>
                    <support-sub-if>false</support-sub-if>
                    <support-admin-shutdown>true</support-admin-
shutdown>
                    <spec></spec>
                </logic-interface>
            </if-logic>
            <if-phy>
                <physical-interface>
                    <if-type>IF_ETHERNET</if-type>
                    <support-description>true</support-description>
                    <support-sub-if>true</support-sub-if>
```

```
                    <support-admin-shutdown>true</support-admin-
shutdown>
                    <support-jumbo-frame>true</support-jumbo-frame>
                    <support-fec>true</support-fec>
                    <ssupport-breakout-speed>IF_SPEED_40G</support-
breakout-speed>
                    <ssupport-breakout-speed>IF_SPEED_100G</support-
breakout-speed>
                    <support-l2-l3-switch>true</support-l2-l3-switch>
                </physical-interface>
            </if-phy>
        </interface>
        <stp>
            <stp-type>STP</stp-type>
            <stp-type>RSTP</stp-type>
            <stp-type>MSTP</stp-type>
            <protect-type>PROTECT_BPDU</protect-type>
            <protect-type>PROTECT_ROOT</protect-type>
            <protect-type>PROTECT_LOOP</protect-type>
            <protect-type>PROTECT_TC</protect-type>
            <if-type>IF_ETHERNET</if-type>
            <if-type>IF_BAGG</if-type>
        </stp>
        <lldp>
            <tlv-types>TLV_BASIC</tlv-types>
            <tlv-types>TLV_802_1</tlv-types>
            <tlv-types>TLV_802_3</tlv-types>
            <work-mode>RX</work-mode>
            <work-mode>TX</work-mode>
            <work-mode>TXRX</work-mode>
        </lldp>
        <bgp>
            <global>
                <startup-update-delay>
                    <support-startup-update-delay></support-startup-
update-delay>
                    <maximum-time></maximum-time>
                </startup-update-delay>
                <startup-maximum-med>
                    <support-startup-maximum-med></support-startup-
maximum-med>
                    <maximum-time></maximum-time>
                </startup-maximum-med>
                <route-selection-options>
```

```
                    <route-selection-option>support-always-compare-
med</route-selection-option>
                    <route-selection-option>support-ignore-as-path-
length</route-selection-option>
                    <route-selection-option>support-external-compare-
router-id</route-selection-option>
                    <route-selection-option>support-advertise-
inactive-routes</route-selection-option>
                    <route-selection-option>support-enable-
aigp</route-selection-option>
                    <route-selection-option>support-ignore-next-hop-
igp-metric</route-selection-option>
                </route-selection-options>
                <support-afi-safis>
                    <afi-safi-name>IPV4_UNICAST</afi-safi-name>
                    <afi-safi-name>IPV6_UNICAST</afi-safi-name>
                    <afi-safi-name>IPV6_UNICAST</afi-safi-name>
                </support-afi-safis>
                <support-capabilities>
                    <supported-capability>MPBGP</supported-
capability>
                    <supported-capability>ROUTE_REFRESH</supported-
capability>
                    <supported-capability>ASN32</supported-
capabilitys>
                    <supported-
capability>GRACEFUL_RESTART</supported-capability>
                    <supported-capability>ADD_PATHS</supported-
capability>
                </support-capabilities>
                <timers>
                    <maxmum-connect-retry>65535</maxmum-connect-
retry>
                    <minimum-hold-time>20</minimum-hold-time>
                    <minimum-keepalive-interval>0</minimum-keepalive-
interval>
                    <minimum-advertisement-interval></minimum-
advertisement-interval>
                    <restart-time>3600</restart-time>
                <timers>
                <multiple-paths-spec>
                    <support-multiple-path>true</support-multiple-
path>
                    <remove-private-as></remove-private-as>
```

```
                </multiple-paths-spec>
                <support-bfd>
                    <supported>true</supported>
                </support-bfd>
                <dynamic-neighbor-prefixes></dynamic-neighbor-
prefixes>
            </global>
            <bgp-spec>
                <bgp-rib-spec>
                    <adj-rib>
                        <adj-rib-in-pre></adj-rib-in-pre>
                        <adj-rib-in-post></adj-rib-in-post>
                        <adj-rib-out-pre></adj-rib-out-pre>
                        <adj-rib-out-post></adj-rib-out-post>
                    </adj-rib>
                    <maximum-ribs></maximum-ribs>
                </bgp-rib-spec>
                <bgp-maximum-neighbor></bgp-maximum-neighbor>
                <bgp-fib-spec>
                    <maximum-fib></maximum-fib>
                <bgp-fib-spec>
                <bgp-multiple-path>
                    <maximum-paths>32</maximum-paths>
                    <ecmp-template-fields>
                        <ecmp-template-field></ecmp-template-field>
                    </ecmp-template-fields>
                </bgp-multiple-path>
                <bgp-instance>
                    <support-bgp-multi-instance>false</support-bgp-
multi-instance>
                </bgp-instance>
                <bgp-timers>
                    <maxmum-connect-retry>65535</maxmum-connect-
retry>
                    <minimum-hold-time>20</minimum-hold-time>
                    <minimum-keepalive-interval>0</minimum-keepalive-
interval>
                    <minimum-advertisement-interval></minimum-
advertisement-interval>
                    <restart-max-time>3600</restart-max-time>
                <bgp-timers>
                <bgp-bfd-timer>
                    <desired-minimum-tx-interval>3</desired-minimum-
tx-interval>
```

```
                    <required-minimum-receive>3</required-minimum-
receive>
                    <detection-multiplier>3</detection-multiplier>
                </bgp-bfd-timer>
            </bgp-spec>
            <bgp-feature>
                <bgp-policy>
                    <bgp-actions>
                        <support-set-next-hop>SELF</support-set-next-
hop>
                        <support-set-next-hop>UNCHANGE</support-set-
next-hop>
                        <support-set-community-action>ADD</support-
set-community-action>
                        <support-set-community-
action>REMOVE</support-set-community-action>
                        <support-set-community-
action>REPLACE</support-set-community-action>
                        <support-set-as-path-action>PREPEND</support-
set-as-path-action>
                        <support-set-as-path-action>REPLACE</support-
set-as-path-action>
                    </bgp-actions>
                </bgp-policy>
                <bgp-dual-stack>
                    <ipv6-link-local-neighbor>
                        <LLA-neighbor></LLA-neighbor>
                        <LLA-interface-neighbor></LLA-interface-
neighbor>
                        <single-stack-neighbor-dual-stack-
routing></single-stack-neighbor-dual-stack-routing>
                    </ipv6-link-local-neighbor>
                </bgp-dual-stack>
                <prefix-independent-convergence></prefix-independent-
convergence>
                <router-exceeded-action>
                    <prefix-limit-exceeded-prevent-teardown></prefix-
limit-exceeded-prevent-teardown>
                    <new-route-action></new-route-action>
                    <total-exceeded-prevent-teardown></total-
exceeded-prevent-teardown>
                </router-exceeded-action>
                <bgp-security>
                    <bgp-neighbor-auth>
```

```
                        <support-bgp-auth-md5>true</support-bgp-auth-
md5>
                    </bgp-neighbor-auth>
                </bgp-security>
            </bgp-feature>
        </bgp>
    </net-software>
```

（二）6.2、锐捷设备模型

1. N18006-X 硬件模型

```
    <net-device xmlns="urn:device:params:xml:ns:yang:net-device">
      <product-info>
        <vendor>RUIJIE</vendor>
        <dev-model>RG-N18006-X</dev-model>
        <firmwares>
          <firmware xmlns:device-
type="http://openconfig.net/yang/net-device/types/yang">device-
type:BOOTLOADER</firmware>
          <firmware xmlns:device-
type="http://openconfig.net/yang/net-device/types/yang">device-
type:CPLD</firmware>
          <firmware xmlns:device-
type="http://openconfig.net/yang/net-device/types/yang">device-
type:FPGA</firmware>
        </firmwares>
        <purchase-date>2022-04-01</purchase-date>
        <dev-type>CHASSIS</dev-type>
      </product-info>
      <dimension>
        <length>893</length>
        <width>442</width>
        <height>308.4</height>
      </dimension>
      <weight>114.60</weight>
      <power-consumption>
        <typical-power-consumption>1706</typical-power-consumption>
        <max-power-consumption>1770</max-power-consumption>
      </power-consumption>
      <work-temperature>
        <upper-limit>45</upper-limit>
        <lower-limit>0</lower-limit>
```

```
</work-temperature>
<storage-temperature>
  <upper-limit>70</upper-limit>
  <lower-limit>-40</lower-limit>
</storage-temperature>
<altitude>
  <upper-limit>5000</upper-limit>
  <lower-limit>-500</lower-limit>
</altitude>
<humidity>
  <upper-limit>90%</upper-limit>
  <lower-limit>10%</lower-limit>
</humidity>

<device-performance>
  <packet-fwd-rate>21600M</packet-fwd-rate>
  <device-capacity>14.4</device-capacity>
</device-performance>
<control-engines>
  <number>2</number>
  <control-engine>
    <slot-id>1</slot-id>
    <mgmt-port>
      <name>Mgmt 0</name>
      <max-speed>1000M</max-speed>
      <position>FRONT_PANEL</position>
    </mgmt-port>
    <console>
      <default-baudrate>9600</default-baudrate>
      <position>FRONT_PANEL</position>
    </console>
    <usb-port>
      <usb-number>1</usb-number>
      <usb-version>USB_2_0</usb-version>
    </usb-port>
    <dev-model>M18006X-CM II</dev-model>
    <engine-subsystem>
      <infos>
        <cpu-info>
          <cpu-id>1</cpu-id>
          <vendor>cavium</vendor>
          <cpu-arch>MIPS</cpu-arch>
          <cpu-model>CN7360</cpu-model>
          <core-num>16</core-num>
```

```
            <frequency>1.5G</frequency>
          </cpu-info>
          <mem-info>
            <vendor>Hynix</vendor>
            <type>DDR4</type>
            <total-size>16000</total-size>
          </mem-info>
          <storage-infos>
            <storage-info>
              <index>1</index>
              <vendor>SPANSION</vendor>
              <type>NANDFLASH</type>
              <storage-capacity>8G</storage-capacity>
            </storage-info>
          </storage-infos>
        </infos>
      </engine-subsystem>
      <ce-power-consumption>
        <typical-power-consumption>65</typical-power-consumption>
        <max-power-consumption>65</max-power-consumption>
      </ce-power-consumption>
    </control-engine>
  </control-engines>
  <fabric-cards>
    <max-number>6</max-number>
    <min-number>5</min-number>
    <fabric-card>
      <slot-id>1</slot-id>
      <dev-model>M18006X-FE-C I</dev-model>
      <fe-subsystem>
        <infos>
          <cpu-info>
            <cpu-id>1</cpu-id>
            <vendor>cavium</vendor>
            <cpu-arch>arm64</cpu-arch>
            <cpu-model>CN6130</cpu-model>
            <core-num>4</core-num>
            <frequency>1.0G</frequency>
          </cpu-info>
          <mem-info>
            <vendor>Hynix</vendor>
            <type>DDR3</type>
            <total-size>2G</total-size>
          </mem-info>
```

```
            <storage-infos>
              <storage-info>
                <index>1</index>
                <vendor>SPANSION</vendor>
                <type>NANDFLASH</type>
                <storage-capacity>1G</storage-capacity>
              </storage-info>
            </storage-infos>
          </infos>
        </fe-subsystem>
        <fe-asics>
          <number>1</number>
          <device-asic>
            <unit-id>1</unit-id>
            <vendor>BROADCOM</vendor>
            <model>BCM88775</model>
            <buffer-size>0</buffer-size>
          </device-asic>
        </fe-asics>
        <fe-power-consumption>
          <typical-power-consumption>140W</typical-power-
consumption>
          <max-power-consumption>150W</max-power-consumption>
        </fe-power-consumption>
      </fabric-card>
    </fabric-cards>
    <linecards>
      <number>4</number>
      <linecard>
        <slot-id>1</slot-id>
        <dev-model>M18000X-36CQ-CB</dev-model>
        <linecard-subsystem>
          <infos>
            <cpu-info>
              <cpu-id>1</cpu-id>
              <vendor>cavium</vendor>
              <cpu-arch>arm64</cpu-arch>
              <cpu-model>CN7360</cpu-model>
              <core-num>16</core-num>
              <frequency>1.5G</frequency>
            </cpu-info>
            <mem-info>
              <vendor>Hynix</vendor>
              <type>DDR4</type>
```

```
            <total-size>8G</total-size>
          </mem-info>
          <storage-infos>
            <storage-info>
              <index>1</index>
              <vendor>SPANSION</vendor>
              <type>NANDFLASH</type>
              <storage-capacity>8G</storage-capacity>
            </storage-info>
          </storage-infos>
        </infos>
      </linecard-cpu-subsystem>
      <lc-asics>
        <number>6</number>
        <device-asic>
          <unit-id>1</unit-id>
          <vendor>BROADCOM</vendor>
          <model>BCM88675</model>
          <buffer-size>4G</buffer-size>
          <packet-fwd-rate>720MPPS</packet-fwd-rate>
          <device-capacity>720Gbps</device-capacity>
        </device-asic>
      </lc-asics>
      <lc-power-consumption>
        <typical-power-consumption>903</typical-power-
consumption>
        <max-power-consumption>903</max-power-consumption>
      </lc-power-consumption>
      <ports>
        <count>36</count>
        <port>
          <port-id-range>1-36</port-id-range>
          <speed>100G</speed>
          <cage-type>QSFP28</cage-type>
        </port>
      </ports>
    </linecard>
  </linecards>
  <fans>
    <max-number>3</max-number>
    <min-number>2</min-number>
    <pluggable>true</pluggable>
    <airflow-direction>DIRECT_FRONT_TO_REAR</airflow-direction>
    <fan>
```

```
        <slot-id>1</slot-id>
        <fan-model>M18006X-FAN</fan-model>
        <typical-noise-level>62db</typical-noise-level>
        <fullspeed-noise-level>93db</fullspeed-noise-level>
      </fan>
    </fans>
    <psus>
      <psu-count>4</psu-count>
      <min-number>2</min-number>
      <pluggable>true</pluggable>
      <psu>
        <slot-id>1</slot-id>
        <psu-model>RG-PA3000I-F</psu-model>
        <psu-supply-AC>
          <min-input-voltage>90</min-input-voltage>
          <max-output-power>3000</max-output-power>
          <rated-input-voltage-range>
            <min-voltage>100</min-voltage>
            <max-voltage>240</max-voltage>
          </rated-input-voltage-range>
          <rated-output-voltage>54</rated-output-voltage>
          <rated-output-current>55.6</rated-output-current>
          <rated-output-power>3000</rated-output-power>
        </psu-supply-AC>
      </psu>
    </psus>
  </net-device>
```

2. S6510-X 软件能力模型

```
  <net-software xmlns="urn:device:params:xml:ns:yang:net-software">
    <software-version>11.0(5)b9p124</software-version>
    <acl>
      <acl-feature>
        <base-acl-ipv4>
          <number>
            <max-number>1999</max-number>
            <min-number>1</min-number>
          </number>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:DESTINATION_IP</field-name>
```

```
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:SOURCE_IP</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:TCP_DESTINATION_PORT</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:TCP_SOURCE_PORT</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:IP_PRECEDENCE</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <support-name-acl>true</support-name-acl>
          <acl-bind-capability>
            <acl-bind-direction xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:INGRESS</acl-bind-direction>
            <acl-bind-direction xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:EGRESS</acl-bind-direction>
            <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:VLAN_INTF</acl-bind-type>
            <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:L2_PHY_INTF</acl-bind-type>
            <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:L3_PHY_INTF</acl-bind-type>
```

```
            <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:LACP_AGGREGATE_PORT</acl-bind-type>
            <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:GLOBAL</acl-bind-type>
          </acl-bind-capability>
          <rule-spec>
            <spec>4500</spec>
            <description>The number of rules for per
acl</description>
          </rule-spec>
        </base-acl-ipv4>
        <advanced-acl-ipv4>
          <number>
            <max-number>2699</max-number>
            <min-number>100</min-number>
          </number>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:ARP_OPCODE</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:DESTINATION_IP</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:DESTINATION_MAC</field-name>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:IP_PRECEDENCE</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
```

```
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:SOURCE_IP</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:SOURCE_MAC</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:TCP_DESTINATION_PORT</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:TCP_SOURCE_PORT</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:TIME_RANGE</field-name>
            <support-match-feature>string</support-match-feature>
          </match-field-list>
          <support-name-acl>true</support-name-acl>
          <acl-bind-capability>
            <acl-bind-direction xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:INGRESS</acl-bind-direction>
            <acl-bind-direction xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:EGRESS</acl-bind-direction>
            <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:VLAN_INTF</acl-bind-type>
            <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:L2_PHY_INTF</acl-bind-type>
```

```
            <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:L3_PHY_INTF</acl-bind-type>
            <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:LACP_AGGREGATE_PORT</acl-bind-type>
            <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:GLOBAL</acl-bind-type>
          </acl-bind-capability>
          <rule-spec>
            <spec>4500</spec>
            <description>The number of rules for per
acl</description>
          </rule-spec>
        </advanced-acl-ipv4>
        <base-acl-ipv6>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:DESTINATION_IPV6</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:ICMP6_TYPE</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:SOURCE_IPV6</field-name>
            <support-match-feature>mask</support-match-feature>
          </match-field-list>
          <match-field-list>
            <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:TIME_RANGE</field-name>
            <support-match-feature>string</support-match-feature>
          </match-field-list>
          <match-field-list>
```

```
              <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:DSCP</field-name>
              <support-match-feature>string</support-match-feature>
            </match-field-list>
            <support-name-acl>true</support-name-acl>
            <acl-bind-capability>
              <acl-bind-direction xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:INGRESS</acl-bind-direction>
              <acl-bind-direction xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:EGRESS</acl-bind-direction>
              <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:VLAN_INTF</acl-bind-type>
              <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:L2_PHY_INTF</acl-bind-type>
              <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:L3_PHY_INTF</acl-bind-type>
              <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:LACP_AGGREGATE_PORT</acl-bind-type>
              <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:GLOBAL</acl-bind-type>
            </acl-bind-capability>
            <rule-spec>
              <spec>4500</spec>
              <description>The number of rules for per ipv6
acl</description>
            </rule-spec>
          </base-acl-ipv6>
          <layer2-acl>
            <number>
              <max-number/>
            </number>
            <match-field-list>
              <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:DESTINATION_MAC</field-name>
              <support-match-feature>mask</support-match-feature>
```

```
            </match-field-list>
            <match-field-list>
              <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:SOURCE_MAC</field-name>
              <support-match-feature>mask</support-match-feature>
            </match-field-list>
            <match-field-list>
              <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:FRAGMENT_INFO</field-name>
              <support-match-feature>mask</support-match-feature>
            </match-field-list>
            <match-field-list>
              <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:TOS</field-name>
              <support-match-feature>string</support-match-feature>
            </match-field-list>
            <match-field-list>
              <field-name xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:VLAN</field-name>
              <support-match-feature>string</support-match-feature>
            </match-field-list>
            <support-name-acl>true</support-name-acl>
            <acl-bind-capability>
              <acl-bind-direction xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:INGRESS</acl-bind-direction>
              <acl-bind-direction xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:EGRESS</acl-bind-direction>
              <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:VLAN_INTF</acl-bind-type>
              <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:L2_PHY_INTF</acl-bind-type>
              <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:L3_PHY_INTF</acl-bind-type>
```

```
            <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:LACP_AGGREGATE_PORT</acl-bind-type>
            <acl-bind-type xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:GLOBAL</acl-bind-type>
          </acl-bind-capability>
          <rule-spec>
            <spec>4500</spec>
            <description>The number of rules for per mac
acl</description>
          </rule-spec>
        </layer2-acl>
        <udf-acl>
          <number>
            <max-number/>
          </number>
          <match-header xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:L2_HEADER</match-header>
          <match-header xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:IPV4_HEADER</match-header>
          <match-header xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:L4_HEADER</match-header>
          <match-header xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:INNER_IPV4_HEADER</match-header>
          <max-match-length>128</max-match-length>
        </udf-acl>
      </acl-feature>
      <acl-rule>
        <acl-rule-description>
          <support-rule-description>true</support-rule-description>
          <max-description-length>100</max-description-length>
        </acl-rule-description>
        <acl-rule-order>
          <rule-order-capability xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:CONFIG_ORDER</rule-order-capability>
        </acl-rule-order>
        <acl-rule-step>
          <support-rule-step>true</support-rule-step>
```

```
          </acl-rule-step>
          <support-atomic-update>true</support-atomic-update>
        </acl-rule>
        <acl-action>
          <log-action>
            <log-action-capability xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:LOG_NONE</log-action-capability>
          </log-action>
          <forwarding-action>
            <forwarding-action-capability xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:ACCEPT</forwarding-action-capability>
            <forwarding-action-capability xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:DROP</forwarding-action-capability>
          </forwarding-action>
          <mirror-action>
            <support-mirror-action>true</support-mirror-action>
          </mirror-action>
        </acl-action>
        <acl-global-capability>
          <time-range-acl>
            <support-periodic-time-range>true</support-periodic-time-
range>
            <support-absolute-time-range>true</support-absolute-time-
range>
            <time-range-temp-spec>
              <spec>0000</spec>
            </time-range-temp-spec>
          </time-range-acl>
          <acl-description>
            <support-acl-description>true</support-acl-description>
            <max-description-length>100</max-description-length>
          </acl-description>
          <acl-counters>
            <support-acl-counters>true</support-acl-counters>
            <counter-capability xmlns:acl-
types="urn:device:params:xml:ns:yang:net-software-acl-types">acl-
types:INTERFACE_AGGREGATE</counter-capability>
          </acl-counters>
          <support-resource-save-mode>true</support-resource-save-
mode>
        </acl-global-capability>
```

```
      </acl>
      <telemetry>
        <telemetry-capacbility>
          <report>
            <support-periodical-report>true</support-periodical-
report>
            <support-client>true</support-client>
            <support-server>true</support-server>
          </report>
          <control>
            <support-license-control>false</support-license-control>
            <support-global-enable-control>true</support-global-
enable-control>
          </control>
          <message>
            <support-version-number>false</support-version-number>
          </message>
          <static-configuration>
            <destination-configuration>
              <destination-object xmlns:telemetry-
types="urn:device:params:xml:ns:yang:net-software-telemetry-
types">telemetry-types:PORT_NUMBER</destination-object>
              <protocol xmlns:telemetry-
types="urn:device:params:xml:ns:yang:net-software-telemetry-
types">telemetry-types:GRPC</protocol>
            </destination-configuration>
            <support-restore-configuration>true</support-restore-
configuration>
          </static-configuration>
        </telemetry-capacbility>
        <telemetry-spec>
          <static-configuration-spec>
            <sensor-spec>
              <sensor-group-spec>
                <spec>128</spec>
              </sensor-group-spec>
              <path-spec>
                <spec>16384</spec>
              </path-spec>
            </sensor-spec>
            <destination-spec>
              <destination-group-spec>
                <spec>30</spec>
              </destination-group-spec>
```

```
            <address-spec>
              <spec>30</spec>
            </address-spec>
          </destination-spec>
          <subscription-spec>
            <subscription-group-spec>
              <spec>128</spec>
            </subscription-group-spec>
            <sensor-group-spec>
              <spec>128</spec>
            </sensor-group-spec>
            <destination-group-spec>
              <spec>30</spec>
            </destination-group-spec>
          </subscription-spec>
        </static-configuration-spec>
      </telemetry-spec>
    </telemetry>
    <vlan>
      <stand-specs>
        <basic-vlan>
          <spec>4094</spec>
          <min-spec>1</min-spec>
          <max-spec>4094</max-spec>
          <condition/>
          <description>vlanID</description>
          <support-description>true</support-description>
          <support-configure-name>true</support-configure-name>
          <support-transparent-vlan>true</support-transparent-vlan>
        </basic-vlan>
        <qinq>
          <support-basic-qinq>true</support-basic-qinq>
          <support-selective-qinq>true</support-selective-qinq>
          <support-configure-tpid>true</support-configure-tpid>
        </qinq>
      </stand-specs>
      <applications>
        <application>PORT_VLAN</application>
        <description>
          <port-vlan>
            <support-link-types>HYBIRD</support-link-types>
          </port-vlan>
        </description>
      </applications>
```

```
      </vlan>
      <lacp>
        <lacp-period>
          <mode>MODE_SLOW</mode>
          <mode>MODE_FAST</mode>
        </lacp-period>
        <lacp-priority>
          <system-priority>
            <default-priority>32768</default-priority>
            <min-priority>0</min-priority>
            <max-priority>65535</max-priority>
          </system-priority>
          <port-priority>
            <default-priority>32768</default-priority>
            <min-priority>0</min-priority>
            <max-priority>65535</max-priority>
          </port-priority>
        </lacp-priority>
        <lacp-load-balance>
          <algorithm>
            <alg-type xmlns:software-lacp-
types="urn:device:params:xml:ns:yang:net-software-lacp-
types">software-lacp-types:HASH</alg-type>
            <enhanced-feature>
              <hash>
                <hash-type xmlns:software-lacp-
types="urn:device:params:xml:ns:yang:net-software-lacp-
types">software-lacp-types:RESILIENT</hash-type>
                <hash-type xmlns:software-lacp-
types="urn:device:params:xml:ns:yang:net-software-lacp-
types">software-lacp-types:SYMMETRY</hash-type>
                <hash-factor xmlns:software-lacp-
types="urn:device:params:xml:ns:yang:net-software-lacp-
types">software-lacp-types:DEST_MAC</hash-factor>
                <hash-factor xmlns:software-lacp-
types="urn:device:params:xml:ns:yang:net-software-lacp-
types">software-lacp-types:DEST_IP</hash-factor>
                <hash-factor xmlns:software-lacp-
types="urn:device:params:xml:ns:yang:net-software-lacp-
types">software-lacp-types:DEST_PORT</hash-factor>
                <hash-factor xmlns:software-lacp-
types="urn:device:params:xml:ns:yang:net-software-lacp-
types">software-lacp-types:SOURCE_IP</hash-factor>
```

```
                <hash-factor xmlns:software-lacp-
types="urn:device:params:xml:ns:yang:net-software-lacp-
types">software-lacp-types:SOURCE_MAC</hash-factor>
                <hash-factor xmlns:software-lacp-
types="urn:device:params:xml:ns:yang:net-software-lacp-
types">software-lacp-types:SOURCE_PORT</hash-factor>
                <hash-factor xmlns:software-lacp-
types="urn:device:params:xml:ns:yang:net-software-lacp-
types">software-lacp-types:IP_PROTOCOL</hash-factor>
              </hash>
            </enhanced-feature>
          </algorithm>
        </lacp-load-balance>
        <support-lacp-preempt>false</support-lacp-preempt>
        <support-lacp-transparent>true</support-lacp-transparent>
        <lacp-group>
          <max-group>255</max-group>
          <max-member-port>128</max-member-port>
          <max-selected-member-port>128</max-selected-member-port>
          <group-pair>
            <group-number>255</group-number>
            <port-member-number>16</port-member-number>
          </group-pair>
          <group-pair>
            <group-number>127</group-number>
            <port-member-number>32</port-member-number>
          </group-pair>
          <group-pair>
            <group-number>31</group-number>
            <port-member-number>127</port-member-number>
          </group-pair>
          <group-pair>
            <group-number>63</group-number>
            <port-member-number>64</port-member-number>
          </group-pair>
          <support-static-group>true</support-static-group>
          <support-dynamic-group>true</support-dynamic-group>
          <support-link-delay>true</support-link-delay>
          <support-config-system-mac>false</support-config-system-
mac>
          <support-config-max-selected-port>false</support-config-
max-selected-port>
          <support-config-min-selected-port>true</support-config-min-
selected-port>
```

```
        </lacp-group>
      </lacp>
      <storm-suppression>
        <whitelist>software-storm-suppression-
types:ARP_REQUEST</whitelist>    <!--TODO 转发没有白名单，送 CPU 会有
白名单，限制收到 CPP 的控制；-->
        <suppressions>
          <suppression-type>BROADCAST</suppression-type>
          <support-suppression-rule>software-storm-suppression-
types:BASE_ON_RATIO</support-suppression-rule>
          <support-suppression-rule>software-storm-suppression-
types:BASE_ON_PPS</support-suppression-rule>
          <support-suppression-rule>software-storm-suppression-
types:BASE_ON_BPS</support-suppression-rule>
          <support-suppression-action>software-storm-suppression-
types:BLOCK</support-suppression-action>
          <support-suppression-action>software-storm-suppression-
types:SHUTDOWN</support-suppression-action>
        </suppressions>
        <suppressions>
          <suppression-type>MULTICAST</suppression-type>
          <support-suppression-rule>software-storm-suppression-
types:BASE_ON_RATIO</support-suppression-rule>
          <support-suppression-rule>software-storm-suppression-
types:BASE_ON_PPS</support-suppression-rule>
          <support-suppression-rule>software-storm-suppression-
types:BASE_ON_BPS</support-suppression-rule>
          <support-suppression-action>software-storm-suppression-
types:BLOCK</support-suppression-action>
          <support-suppression-action>software-storm-suppression-
types:SHUTDOWN</support-suppression-action>
        </suppressions>
        <suppressions>
          <suppression-type>UNICAST</suppression-type>
          <support-suppression-rule>software-storm-suppression-
types:BASE_ON_RATIO</support-suppression-rule>
          <support-suppression-rule>software-storm-suppression-
types:BASE_ON_PPS</support-suppression-rule>
          <support-suppression-rule>software-storm-suppression-
types:BASE_ON_BPS</support-suppression-rule>
          <support-suppression-action>software-storm-suppression-
types:BLOCK</support-suppression-action>
          <support-suppression-action>software-storm-suppression-
types:SHUTDOWN</support-suppression-action>
```

```
    </suppressions>
  </storm-suppression>
  <interface>
    <if-logic>
      <logic-interface>
        <if-type>net-software-if-types:IF_BAGG</if-type>
        <support-description>true</support-description>
        <support-sub-if>true</support-sub-if>
        <support-admin-shutdown>true</support-admin-shutdown>
        <support-jumbo-frame>true</support-jumbo-frame>
        <spec>255</spec>
      </logic-interface>
      <logic-interface>
        <if-type>net-software-if-types:IF_RAGG</if-type>
        <support-description>true</support-description>
        <support-sub-if>true</support-sub-if>
        <support-admin-shutdown>true</support-admin-shutdown>
        <support-jumbo-frame>true</support-jumbo-frame>
        <spec/>
      </logic-interface>
      <logic-interface>
        <if-type>net-software-if-types:IF_TUNNEL_GRE4</if-type>
        <support-description>true</support-description>
        <support-sub-if>false</support-sub-if>
        <support-admin-shutdown>true</support-admin-shutdown>
        <support-jumbo-frame>true</support-jumbo-frame>
        <spec>2000</spec>
      </logic-interface>
      <logic-interface>
        <if-type>net-software-if-types:IF_VLAN</if-type>
        <support-description>true</support-description>
        <support-sub-if>true</support-sub-if>
        <support-admin-shutdown>true</support-admin-shutdown>
        <support-jumbo-frame>true</support-jumbo-frame>
        <spec>2000</spec>
      </logic-interface>
    </if-logic>
    <if-phy>
      <physical-interface>
        <if-type>net-software-if-types:IF_ETHERNET</if-type>
        <support-description>true</support-description>
        <support-sub-if>true</support-sub-if>
        <support-admin-shutdown>true</support-admin-shutdown>
        <support-jumbo-frame>true</support-jumbo-frame>
```

```
            <support-fec>true</support-fec>
            <support-breakout-speed>IF_SPEED_100G</support-breakout-
speed>
            <support-l2-l3-switch>true</support-l2-l3-switch>
          </physical-interface>
        </if-phy>
      </interface>
      <stp>
        <stp-type xmlns:software-
stp="urn:device:params:xml:ns:yang:net-software-stp">software-
stp:STP</stp-type>
        <stp-type xmlns:software-
stp="urn:device:params:xml:ns:yang:net-software-stp">software-
stp:RSTP</stp-type>
        <stp-type xmlns:software-
stp="urn:device:params:xml:ns:yang:net-software-stp">software-
stp:MSTP</stp-type>
        <protect-type>PROTECT_BPDU</protect-type>
        <protect-type>PROTECT_ROOT</protect-type>
        <protect-type>PROTECT_LOOP</protect-type>
        <protect-type>PROTECT_TC</protect-type>
        <if-type>net-software-if-types:IF_BAGG</if-type>
        <if-type>net-software-if-types:IF_ETHERNET</if-type>
      </stp>
      <lldp>
        <tlv-types>TLV_BASIC</tlv-types>
        <tlv-types>TLV_802_1</tlv-types>
        <tlv-types>TLV_802_3</tlv-types>
        <work-mode xmlns:software-
lldp="urn:device:params:xml:ns:yang:net-software-lldp">software-
lldp:TX</work-mode>
        <work-mode xmlns:software-
lldp="urn:device:params:xml:ns:yang:net-software-lldp">software-
lldp:RX</work-mode>
        <work-mode xmlns:software-
lldp="urn:device:params:xml:ns:yang:net-software-lldp">software-
lldp:TXRX</work-mode>
      </lldp>
      <bgp>
        <global>
          <startup-update-delay>
            <support-startup-update-delay>true</support-startup-
update-delay>
            <maximum-time>1800</maximum-time>
```

```
          </startup-update-delay>
          <startup-maximum-med>
            <support-startup-maximum-med>true</support-startup-
maximum-med>
            <maximum-time>65535</maximum-time>
          </startup-maximum-med>
          <route-selection-options>
            <route-selection-option>support-always-compare-
med</route-selection-option>
            <route-selection-option>support-ignore-as-path-
length</route-selection-option>
            <route-selection-option>support-external-compare-router-
id</route-selection-option>
            <route-selection-option>support-advertise-inactive-
routes</route-selection-option>
            <route-selection-option>support-enable-aigp</route-
selection-option>
            <route-selection-option>support-ignore-next-hop-igp-
metric</route-selection-option>
          </route-selection-options>
          <support-afi-safis>
            <afi-safi-name xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:IPV4_UNICAST</afi-safi-name>
            <afi-safi-name xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:IPV6_UNICAST</afi-safi-name>
            <afi-safi-name xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:L3VPN_IPV4_UNICAST</afi-safi-name>
            <afi-safi-name xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:L3VPN_IPV6_UNICAST</afi-safi-name>
          </support-afi-safis>
          <support-capabilities>
            <support-capabilitiy xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:MPBGP</support-capabilitiy>
            <support-capabilitiy xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:ROUTE_REFRESH</support-capabilitiy>
            <support-capabilitiy xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:ASN32</support-capabilitiy>
```

```
            <support-capabilitiy xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:GRACEFUL_RESTART</support-capabilitiy>
            <support-capabilitiy xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:ADD_PATHS</support-capabilitiy>
          </support-capabilities>
          <multiple-paths-spec>
            <support-multiple-path>true</support-multiple-path>
            <remove-private-as xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:PRIVATE_AS_REMOVE_ALL</remove-private-as>
          </multiple-paths-spec>
          <bfd>
            <support-bfd>true</support-bfd>
          </bfd>
          <dynamic-neighbor-prefixes>
            <support-dynamic-neighbor-prefixes>true</support-dynamic-
neighbor-prefixes>
          </dynamic-neighbor-prefixes>
        </global>
        <bgp-spec>
          <bgp-rib-spec>
            <adj-rib>
              <support-adj-rib-in-pre>true</support-adj-rib-in-pre>
              <support-adj-rib-in-post>true</support-adj-rib-in-post>
              <support-adj-rib-out-pre>false</support-adj-rib-out-
pre>
              <support-adj-rib-out-post>false</support-adj-rib-out-
post>
            </adj-rib>
            <maximum-ribs>128000</maximum-ribs>
          </bgp-rib-spec>
          <bgp-maximum-neighbor>1000</bgp-maximum-neighbor>
          <bgp-fib-spec>
            <maximum-fib>128000</maximum-fib>
          </bgp-fib-spec>
          <bgp-multiple-path>
            <maximum-paths>32</maximum-paths>
            <ecmp-template-fields>
              <ecmp-template-field xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:SRC_IP</ecmp-template-field>
```

```
            <ecmp-template-field xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:DST_IP</ecmp-template-field>
            <ecmp-template-field xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:L4_SRC_PORT</ecmp-template-field>
            <ecmp-template-field xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:L4_DST_PORT</ecmp-template-field>
            <ecmp-template-field xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:PROTOCOL</ecmp-template-field>
          </ecmp-template-fields>
        </bgp-multiple-path>
        <bgp-instance>
          <support-bgp-multi-instance>true</support-bgp-multi-
instance>
          <maximum-bgp-instances>2</maximum-bgp-instances>
        </bgp-instance>
        <bgp-timers>
          <maximum-connect-retry>15</maximum-connect-retry>
          <minimum-hold-time>180</minimum-hold-time>
          <minimum-keepalive-interval>60</minimum-keepalive-
interval>
          <minimum-advertisement-interval>0</minimum-advertisement-
interval>
          <restart-max-time>65535</restart-max-time>
        </bgp-timers>
        <bgp-bfd-timer>
          <desired-minimum-tx-interval>200</desired-minimum-tx-
interval>
          <required-minimum-receive>200</required-minimum-receive>
          <detection-multiplier>3</detection-multiplier>
        </bgp-bfd-timer>
      </bgp-spec>
      <bgp-feature>
        <bgp-policy>
          <bgp-actions>
            <support-set-next-hop>SELF</support-set-next-hop>
            <support-set-next-hop>DEFINE</support-set-next-hop>
            <support-set-community-action>ADD</support-set-
community-action>
            <support-set-community-action>REMOVE</support-set-
community-action>
```

```
              <support-set-as-path-action>PREPEND</support-set-as-
path-action>
              <support-set-as-path-action>REPLACE</support-set-as-
path-action>
            </bgp-actions>
          </bgp-policy>
          <bgp-dual-stack>
            <ipv6-link-local-neighbor>
              <LLA-neighbor>true</LLA-neighbor>
              <LLA-interface-neighbor>true</LLA-interface-neighbor>
              <single-stack-neighbor-dual-stack-routing>true</single-
stack-neighbor-dual-stack-routing>
            </ipv6-link-local-neighbor>
          </bgp-dual-stack>
          <prefix-independent-convergence>true</prefix-independent-
convergence>
          <router-exceeded-action>
            <prefix-limit-exceeded-prevent-teardown>true</prefix-
limit-exceeded-prevent-teardown>
            <new-route-action>DROP</new-route-action>
            <total-exceeded-prevent-teardown>true</total-exceeded-
prevent-teardown>
          </router-exceeded-action>
          <bgp-security>
            <bgp-authentication >
              <bgp_authencation-type xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:MD5_AUTHENCATION</bgp_authencation-type>
              <bgp_authencation-type xmlns:software-bgp-
types="urn:device:params:xml:ns:yang:net-software-bgp-
types">software-bgp-types:KEY_CHAIN_AUTHENCATION</bgp_authencation-
type>
            </bgp-authentication>
            <soft-protect-machine>
            <support-GTSM>false</support-GTSM>
            </soft-protect-machine>
          </bgp-security>
        </bgp-feature>
      </bgp>
    </net-software>
```

（三）6.3、新华三设备模型

1. S12508X-AF 硬件能力模型

```
<?xml version='1.0' encoding='UTF-8'?>
<data xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
  <net-device xmlns="urn:device:params:xml:ns:yang:net-device">
    <product-info>
      <vendor>H3C</vendor>
      <dev-model>S12508X-AF</dev-model>
      <firmwares>
        <firmware>PCB</firmware>
        <firmware>CPLD</firmware>
        <firmware>FPGA</firmware>
        <firmware>BOOTLOADER</firmware>
      </firmwares>
      <purchase-date>2019-07-22</purchase-date>
      <dev-type>CHASSIS</dev-type>
    </product-info>
    <dimension>
      <length>857</length>
      <width>440</width>
      <height>531</height>
    </dimension>
    <weight>47.0</weight>
    <power-consumption>
      <typical-power-consumption>144</typical-power-consumption>
<!-- TODO: 只包含主控和风扇 -->
      <max-power-consumption>1686</max-power-consumption>
    </power-consumption>
    <work-temperature>
      <upper-limit>40</upper-limit>
      <lower-limit>0</lower-limit>
    </work-temperature>
    <storage-temperature>
      <upper-limit>70</upper-limit>
      <lower-limit>-40</lower-limit>
    </storage-temperature>
    <altitude>
      <upper-limit/>
      <lower-limit/>
    </altitude>
    <humidity>
      <upper-limit>95</upper-limit>
      <lower-limit>5</lower-limit>
    </humidity>
```

```
<device-performance>
  <packet-fwd-rate/>
  <device-capacity/>
</device-performance>
<control-engine>
  <number>2</number>
  <slot-range>
    <min-slot-id>0</min-slot-id>
    <max-slot-id>1</max-slot-id>
  </slot-range>
  <mgmt-port>
    <name>MGE0/0/0</name>
    <max-speed>1G</max-speed>
    <position>FRONT_PANEL</positin>
  </mgmt-port>
  <usb-port>
    <usb-number>1</usb-number>
    <usb-version>USB_2_0</usb-version>
  </usb-port>
  <console>
    <default-baudrate>9600</default-baudrate>
    <position>FRONT_PANEL</position>
  </console>
  <dev-model/>
  <engine-subsystem>
    <infos>
      <cpu-info>
        <cpu-id>0</cpu-id>
        <vendor>broadcom</vendor>
        <cpu-arch>MIPS64</cpu-arch>
        <cpu-model>XLP308</cpu-model>
        <core-num>4</core-num>
        <frequency>1200</frequency>
      </cpu-info>
      <mem-info>
        <vendor/>
        <type>DDR3</type>
        <total-size>8192</total-size>
      </mem-info>
      <storage-infos>
        <storage-info>
          <index>0</index>
          <vendor/>
          <type>NAND_FLASH</type>
```

```
            <storage-capacity>1024</storage-capacity>
          </storage-info>
        </storage-infos>
      </infos>
    </engine-subsystem>
   <bmc-subsystem/>
   <ce-power-consumption>
      <typical-power-consumption>39</typical-power-consumption>
      <max-power-consumption>50</max-power-consumption>
    </ce-power-consumption>
  </control-engine>
  <fabric-card>
    <max-number>6</max-number>
    <min-number>1</min-number>
    <slot-range>
      <min-slot-id>10</min-slot-id>
      <max-slot-id>15</min-slot-id>
    </slot-range>
    <weight>31.2</weight> <!-- 5.2 * 6 -->
    <dev-model>LSXM1SFH08E1</dev-model>
    <fe-subsystem>
      <infos>
        <cpu-info>
          <cpu-id/>
          <vendor>broadcom</vendor>
          <cpu-arch>MIPS64</cpu-arch>
          <cpu-model>XLP208</cpu-model>
          <core-num>8</core-num>
          <frequency>800</frequency>
        </cpu-info>
        <mem-info>
          <vendor/>
          <type>DDR3</type>
          <total-size>4096</total-size>
        </mem-info>
        <storage-infos/>
      </infos>
    </fe-subsystem>
    <fe-asics>
      <number>1</number>
      <device-asic>
        <unit-id>0</unit-id>
        <vendor>broadcom</vendor>
        <model>BCM88776_A1</model>
```

```
            <buffer-size/>
            <packet-fwd-rate/>
            <device-capacity/>
          </device-asic>
        </fe-asics>
        <fe-power-consumption>
          <typical-power-consumption>267</typical-power-
consumption>
          <max-power-consumption>328</max-power-consumption>
        </fe-power-consumption>
      </fabric-card>
      <linecards>
        <number>1</number>
        <linecard>
          <slot-id>2</slot-id>
          <weight>11.1</weight>
          <dev-model>LSXM1CGQ36HB1</dev-model>
          <linecard-subsystem>
            <infos>
              <cpu-info>
                <cpu-id>0</cpu-id>
                <vendor>broadcom</vendor>
                <cpu-arch>MIPS64</cpu-arch>
                <cpu-model>XLP308</cpu-model>
                <core-num>8</core-num>
                <frequency>1200</frequency>
              </cpu-info>
              <mem-info>
                <vendor/>
                <type>DDR3</type>
                <total-size>16384</total-size>
              </mem-info>
              <storage-infos/>
            </infos>
          </linecard-subsystem>
          <lc-asics>
            <number>2</number>
            <device-asic>
              <unit-id>0</unit-id>
              <vendor>broadcom</vendor>
              <model>BCM88675_B0</model>
              <buffer-size/>
              <packet-fwd-rate>1488000</packet-fwd-rate>
              <device-capacity>1.44</device-capacity>
```

```
            </device-asic>
            <device-asic>
              <unit-id>1</unit-id>
              <vendor>broadcom</vendor>
              <model>BCM88675_B0</model>
              <buffer-size/>
              <packet-fwd-rate>1488000</packet-fwd-rate>
              <device-capacity>1.44</device-capacity>
            </device-asic>
          </lc-asics>
          <lc-power-consumption>
            <typical-power-consumption>608</typical-power-
consumption>
            <max-power-consumption>1070</max-power-consumption>
          </lc-power-consumption>
          <ports>
            <count>36</count>
            <port>
              <speed>100G</speed>
              <port-id-range>1-36</port-id-range>
              <cage-type>QSFP28</cage-type>
            </port>
          </ports>
        </linecard>
      </linecards>
      <fan>
        <max-number>6</max-number>
        <min-number>3</min-number>
        <pluggable>true</pluggable>
        <airflow-direction>DIRECT_FRONT_TO_REAR</airflow-direction>
        <fan-model>LSXM108XFANH</fan-model>
        <max-speed>13600</max-speed>
        <typical-noise-level>71.5</typical-noise-level>
        <fullspeed-noise-level>95.4</fullspeed-noise-level>
      </fan>
      <psu>
        <psu-count>8</psu-count>
        <min-number>2</min-number>
        <pluggable>true</pluggable>
        <psu-model>PSR3000-54A</type>
        <psu-supply-DC>
          <min-input-voltage>100</min-input-voltage>
          <max-output-power>3000</max-output-power>
          <rated-input-voltage-range>
```

```
            <min-voltage>100</min-voltage>
            <max-voltage>240</max-voltage>
          </rated-input-voltage-range>
          <rated-output-voltage>54</rated-output-voltage>
          <rated-input-current>16</rated-input-current>
          <rated-output-current>55.6</rated-output-current>
          <rated-output-power>3000</rated-output-power>
        </psu-supply-DC>
        <psu-supply-AC/>
      </psu>
    </net-device>
</data>
```

ODCC服务号

ODCC订阅号