

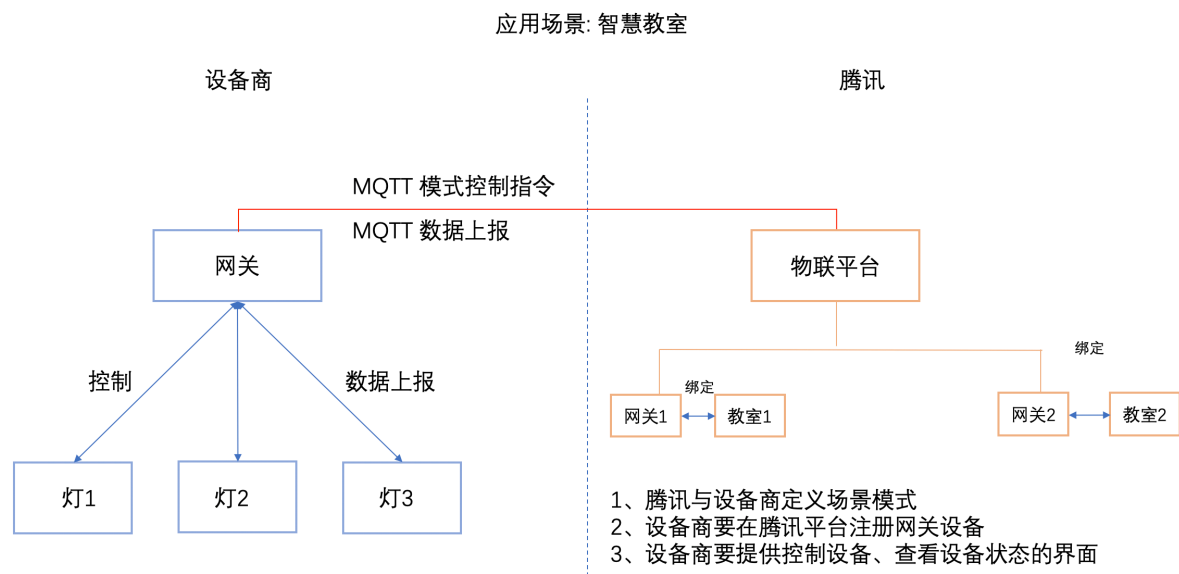
智启云控 - 设备接入文档

流程

- 确定设备对接模式
- 接入腾讯云iothub
- 确定控制协议与设备类型
- 数据上报
- 逐个设备类型联调
- 上线

对接模式

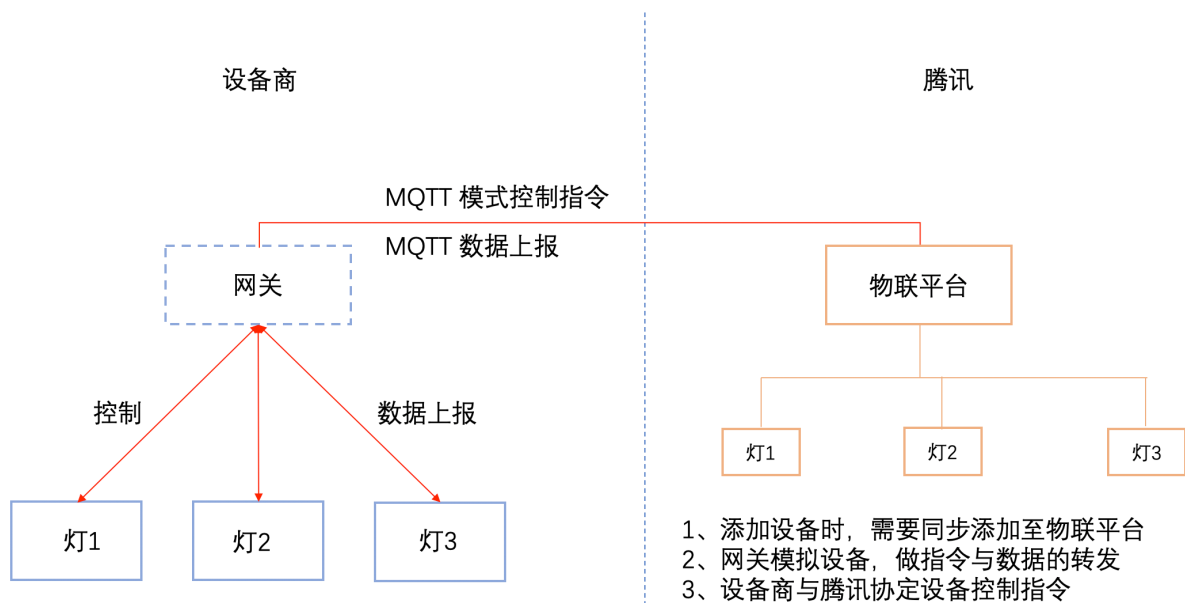
1. 网关控制模式



该模式的特点是，对于腾讯物联网平台，不感知教室内的设备，只感知网关/中控。腾讯物联网平台下发的指令是"上课模式"，需要由设备商把教室内的所有设备调节至上课模式。

2. 设备直连模式

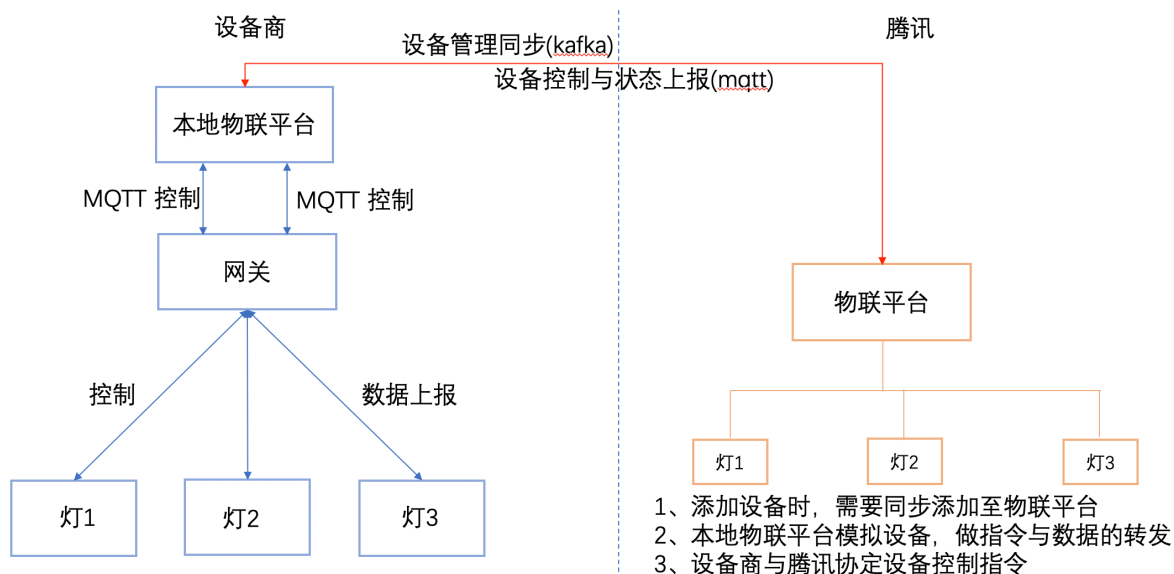
应用场景: 编程教学, 控制单个设备



该模式的特点是, 对于腾讯物联平台, 设备相当于直连, 设备的管理是在腾讯侧操作。

3. 物联平台对接

应用场景: 本地已有物联网系统, 要实现区域管理



该模式的特点是, 设备的管理是由设备商的平台完成, 需要将设备信息同步至腾讯侧。

以上3种对接模式, 采用模式2的方案居多。

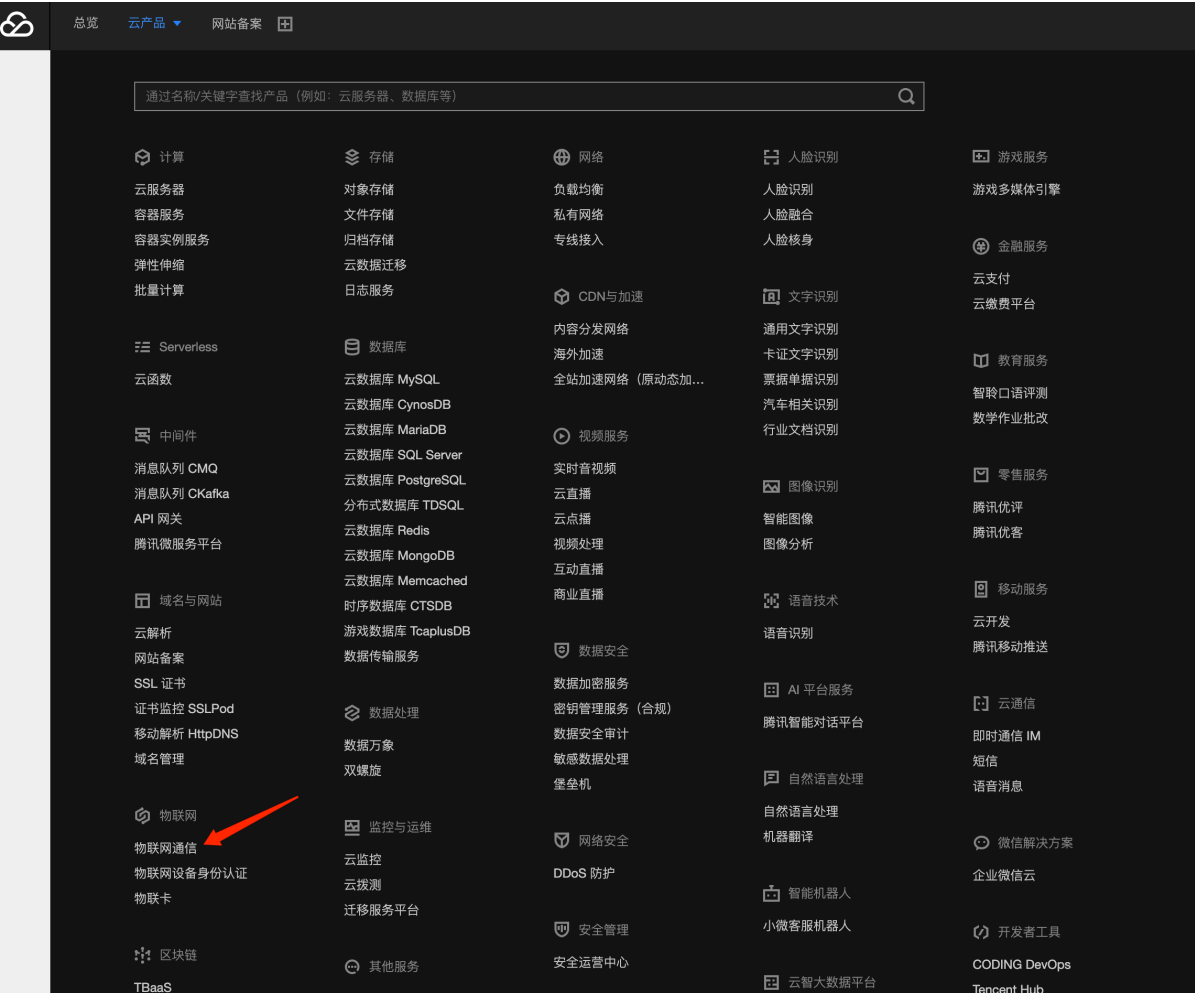
接入腾讯云iothub(物联网通信)

确定完设备接入模式以后, 就尽快把设备接入腾讯云iothub。该步骤的目的是快速验证设备是否具备接入腾讯云物联网的能力, 如果有设备兼容性问题, 在此阶段及时解决。

接入步骤:

1. 腾讯云账号, 开通iothub(物联网通信)

为了方便日后进行更多项目的合作，建议设备厂商自行申请腾讯云账号，并且开通iothub。



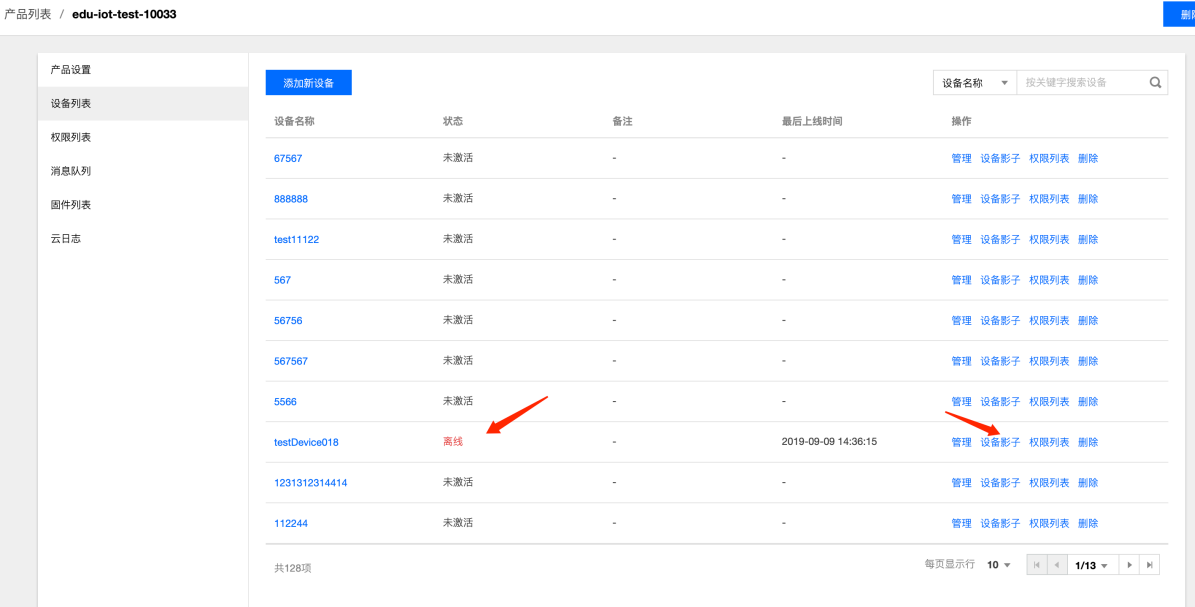
2. 仔细阅读文档

<https://cloud.tencent.com/document/product/634>，重点关注以下内容:

- 1、《MQTT.fx 接入指南》，介绍如何接入iothub
- 2、《设备影子》，设备控制是通过设备影子实现

3. 创建设备自测

设备商自行创建设备，获取tls key等数据进行自测。



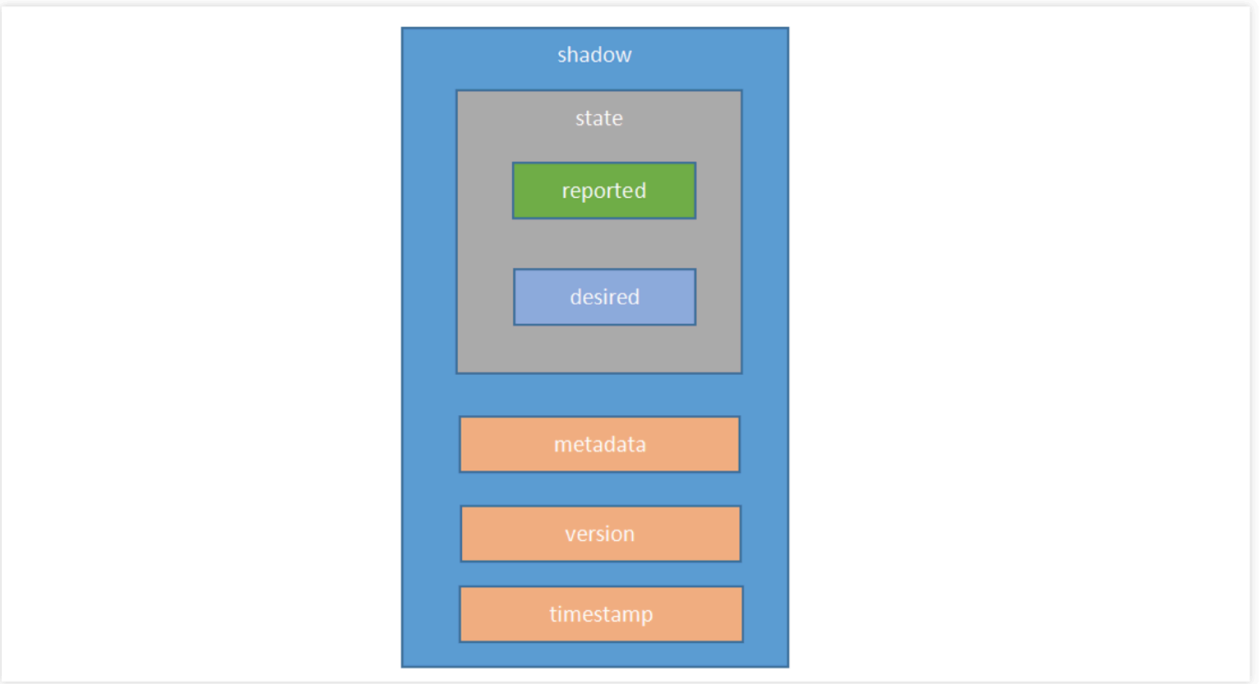
自测通过的标准是，设备的在线/离线与iothub平台保持一致，并且可以通过设备影子上报或者下发数据, 以及设备端需要做网络自动重连功能、设备定期上报设备状态。需要特别提醒的是，设备影子必须按照[腾讯云iothub规范实现](#)。

完成了此阶段的测试后，在后续的使用场景，设备上不需要自行对接腾讯云iothub，将由智启云控提供设备管理、获取tls key、设备控制等操作页面以及接口。

控制协议与设备类型

智启云控的设备控制协议是基于设备影子实现的

设备影子文档是服务器端为设备缓存的一份状态和配置数据。它以 JSON 文本形式存储，由以下部分组成：



state

- **reported**
设备自身上报的状态。设备可以向本文档部分写入数据，以报告其新状态。应用程序可以读取本文档部分，以获取设备的状态。
- **desired**
设备预期的状态。应用程序通过 HTTP RESTful API 向本文档写入数据更新设备状态，设备 SDK 通过注册相关属性和回调，设备影子服务同步影子数据到设备。

metadata

设备影子的元数据信息，包括 state 部分每个属性项的最后更新时间等。

version

设备影子文档的版本号，每次设备影子文档更新之后，版本号都会递增。版本号由腾讯云后台维护，这可以确保设备的数据与设备影子的数据保持一致。

timestamp

设备影子文档的最后一次更新时间。

控制指令通过desired下发，会有三个固定字段。

cookie，设备不需要理解也不需要长期存储，只需要在下一次report携带上即可。

mode, 用来定义设备当前处于什么模式，固定约定值。

error，设备需要定期上报，描述运行状态。

powerSwitch：表示当前设备是否处于启动状态

如果指令中包含什么字段，就要执行相应的指令。

照明设备

Error 定义

StatusUnknown: 状态未知 StatusNormal: 运行正常

StatusOffline: 设备离线

开

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "mode": 10001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "mode": 10001,
  "error": ""
}
```

关

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 10001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 10001,
  "error": ""
}
```

亮度

desired:

```
{
  "cookie": "xxxxxx",
  "lightBrightness": 50,
  "powerSwitch": "off",
  "mode": 10002
}
```

report:

```
{
  "cookie": "xxxxxx",
  "lightBrightness": 50,
  "powerSwitch": "off",
  "mode": 10002,
  "error": ""
}
```

多彩

desired

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "color": {
    "red": 10, // 0~255
    "blue": 10,
    "gree": 10,
    "transparent": 10 // 0~100
  },
  "mode": 10004
}
```

report

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "color": {
    "red": 10, // 0~255
    "blue": 10,
    "gree": 10,
    "transparent": 10 // 0~100
  },
  "mode": 10004,
  "error": ""
}
```

空调设备

开

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "mode": 60001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "mode": 60001
  "error": ""
}
```

关

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 60001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 60001,
  "error": ""
}
```

投影设备

开

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "projectorSwitch": "on",
  "mode": 40001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "projectorSwitch": "on",
  "mode": 40001,
  "error": ""
}
```

关

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "projectorSwitch": "off",
  "mode": 40001
}
```

report:


```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "projectorSwitch": "off",
  "mode": 40001,
  "error": ""
}
```

电脑/显示屏

开

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "mode": 50001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "mode": 50001,
  "error": ""
}
```

关

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 50001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 50001,
  "error": ""
}
```

幕布

开

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "mode": 100001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "mode": 100001,
  "error": ""
}
```

关

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 100001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 100001,
  "error": ""
}
```

窗帘

开

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "mode": 110001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "mode": 110001,
  "error": ""
}
```

关

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 110001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 110001,
  "error": ""
}
```

智慧黑板

开/信号切换

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "signalSwitch": "vga"
  "mode": 140001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "signalSwitch": "vga"
  "mode": 140001,
  "error": ""
}
```

关

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "signalSwitch": "vga"
  "mode": 140001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 140001,
  "error": ""
}
```

电子白板

开/信号切换

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "signalSwitch": "vga"
  "mode": 120001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "signalSwitch": "vga"
  "mode": 120001,
  "error": ""
}
```

关

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "signalSwitch": "vga"
  "mode": 120001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 120001,
  "error": ""
}
```

大屏一体机

开/信号切换

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "signalSwitch": "vga"
  "mode": 130001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "signalSwitch": "vga"
  "mode": 130001,
  "error": ""
}
```

关

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "signalSwitch": "vga"
  "mode": 130001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 130001,
  "error": ""
}
```

显示屏

开/信号切换

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "signalSwitch": "vga"
  "mode": 150001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "signalSwitch": "vga"
  "mode": 150001,
  "error": ""
}
```

关

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "signalSwitch": "vga"
  "mode": 150001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 150001,
  "error": ""
}
```

扩音系统

开

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "mode": 160001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "mode": 160001,
  "error": ""
}
```

关

desired:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 160001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "off",
  "mode": 160001,
  "error": ""
}
```

中控模式控制

模式切换

desired:


```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "scenes": 1, // 1: 上课模式 2: 下课模式
  "mode": 30001
}
```

report:

```
{
  "cookie": "xxxxxx",
  "powerSwitch": "on",
  "scenes": 1,
  "mode": 30001,
  "error": ""
}
```

数据上报

通过设备对应的ReportTopic 上报数据，ReportTopic 在下面的TLS接口提供。

电表数据格式:

```
{
  "BulkData": [ //一次上报多条
    {
      "Meta": { //数据描述
        "Timestamp": 1569206974,
        "Type": "powerconsumption", //电量消耗, 必填
        "Compus": "xxx 校区", // 必填
        "Building": "1 号教学楼", // 必填
        "Room": "101室", // 必填
        "Reporter": "xxx电表" // 设备名称或者设备id, 选填
      },
      "Data": {
        "Value": "0.0001", //
        "Unit": "kwh" // 千瓦时
      }
    }
  ]
}
```

温度数据格式

```
{
  "BulkData": [ //一次上报多条
    {
      "Meta": { //数据描述
        "Timestamp": 1569206974,
        "Type": "temprature", //温度, 必填
        "Compus": "xxx 校区", // 必填
        "Building": "1 号教学楼", // 必填
        "Room": "101室", // 必填
        "Reporter": "xxx温度计" // 设备名称或者设备id, 选填
      },
      "Data": {
        "Value": "25.3", //
        "Unit": "Celsius" //摄氏度
      }
    }
  ]
}
```

空气质量

```
{
  "BulkData": [ //一次上报多条
    {
      "Meta": { //数据描述
        "Timestamp": 1569206974,
        "Type": "airquality", //空气质量, 必填
        "Compus": "xxx 校区", // 必填
        "Building": "1 号教学楼", // 必填
        "Room": "101室", // 必填
        "Reporter": "xxx传感器" // 设备名称或者设备id, 选填
      },
      "Data": {
        "Value": "19", //
        "Unit": "PM2.5/h" //
      }
    }
  ]
}
```

设备联调

对接好控制协议以后，就可以进行设备联调整了。

在此阶段，设备的添加删除都在智启云控的平台进行，拉取设备认证的tls key 使用智启云控的接口

获取TLS key

https://ocp.learn.tencent.com/v1/device/login/get_tls_key

其中开发环境是<https://ocpdev.learn.tencent.com>，测试环境是<https://ocptest.learn.tencent.com>

Req:

```
{
  "AppId": "1",
  "Device": "xxxxx",
}
```

AppId 由腾讯分配，每个学校固定。

Rsp:

```
{
  "ErrorInfo": {
    "Code": "",
    "Message": ""
  },
  "Response": {
    "RequestId": "xxxxxxx",
    "TLSKey": "1233312",
    "TLSCert": "1231312313",
    "CA": "sdfsdfs",
    "ReportTopic": "xxxxxxx",
    "ControlTopic": "xxxxxxx",
    "ShadowTopic": "xxxxxxxx",
    "ShadowResultTopic": "xxxxxxx",
    "UserName": "xxxx",
    "ClientId": "xxxx",
  }
}
```

交互流程

