

WebAccess MQTT

Design Specification for Device

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Enabling an Intelligent Planet

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1. Connect to MQTT Broker of WebAccess Cloud

Devices which want to connect to WebAccess Cloud must go with MQTT.

1.1 Connection Parameter

1.1.1 Host Name & Port

Host Name: **Domain name** or **IP address** with **"/WaMQTT/"** of MQTT broker

Ex: wacloud.appcloud.net/WaMQTT/

Port: Port of MQTT broker. Default port of **WS**(WebSocket), **WSS**(Secure WebSocket) and **TCP** are **80, 443, 1883**. It is strongly recommended devices go with **MQTT over WSS** for security.

1.1.2 Client ID

Client ID must be unique for each device and the format is:

d:group_id:type_id:dev_id

1.1.2.1 d

It means devices.

1.1.2.2 group_id

group_id is composed by WebAccess Cloud **project name** and **SCADA name**. It is separated by a under line, for example: MyProject_MySCADA.

The maximum length of **group_id** is **65**, and each of project name and SCADA name is **32**.

1.1.2.3 type_id

It means device type.

type_id	Device Type
0	Default or Unknow
1	WebAccess/SCADA
2	WebAccess/HMI
3	WISE4000
4	ADAM3600
5	B+B Wzzard

1.1.2.4 dev_id

It means device ID. The maximum length is 32. **dev_id** must be unique under same **group_id**.

1.1.3 QoS

The quality of service (QoS) level is an agreement between sender and receiver of a message regarding the guarantees of delivering a message.

1.1.3.1 QoS0

At most once.

1.1.3.2 QoS1

At least once. (**QoS1 is default suggestion**)

1.1.3.3 QoS2

Exactly once. (not support yet)

1.1.4 Username / Password

User name and password for MQTT broker

Each of maximum length is 32.

1.1.5 SSL/TLS

WebAccess Cloud MQTT broker is support SSL/TLS for **WSS** only.

1.1.6 Conclusion

With those connection parameters for WebAccess Cloud MQTT broker, there must be some UI for user to input relative information on the devices.

1.2 Topic Define

There are several MQTT topic as the following:

1.2.1 Data

iot-2/evt/wadata/fmt/group_id

This topic is for devices sending their real-time data.

1.2.2 File

iot-2/evt/wafile/fmt/group_id

This topic is for devices sending their file.

1.2.2 Configuration

iot-2/evt/wacfg/fmt/group_id

This topic is for devices sending their configuration.

1.2.3 Command

iot-2/evt/wacmd/fmt/group_id

iot-2/evt/wacmd/fmt/group_id/dev_id

This two topics are for devices receiving command from cloud.

1.2.4 Connection**iot-2/evt/wacomm/fmt/group_id**

This topic is for devices sending their connection status.

1.3 Root Json Format

There are only two property in root json format.

Format:

```
{
  "d": {

  },
  "ts": "2015-04-04T23:26:10+08:00"
}
```

Property:

Name	Limitation	Description
d	Json Format	User define data
ts		UTC Time stamp, support format as the following: <ol style="list-style-type: none"> 2016-05-13T02:52:51Z (seconds) 2016-05-13T02:52:51.742Z (milliseconds) 2016-05-13T10:52:51+08:00 (seconds with time zone) 2016-05-13T10:52:51.742+08:00 (milliseconds with time zone)

2. MQTT Communication Format

In this chapter, it will define json format of data, file, configuration, command and connection topics.

There are several representation styles as the following:

- **Red** means primary key
- **Green** means necessary
- **Blue** means optional but nice to have
- **Black** means optional
- **...** means user define config space

It is **case sensitive** for all json property.

2.1 Data Format

Devices publish real-time data to this topic:

`iot-2/evt/wadata/fmt/group_id`

2.1.1 Tag Value

It is important for saving bandwidth that devices should publish real-time data **which the tag values are changed**. It is recommended to have **deadband** setting for each tag when difference between current and last published value is over some percentage.

Format:

```
{
  "unique string": {
    "Val": {
      "unique string1": number,
      "unique string2": "string",
      "unique string3": {
        "0": number,
        "1": number,
        "2": number,
        ...
      }
    }
  },
  ...
}
```

Property:

Name	Limitation	Description
unique string	31	Device ID (unique under same group_id)
unique string1~3	21	<p>Tag ID, must be unique under same WebAccess project and can not be "(", "&", ",", ":", ".", "%", "=", "# and space.</p> <p>(Tag ID is mapping to WebAccess Tag Name and Tag Address)</p> <p>Tag Value can be number, string or array (index from 0). One single "*" is for bad value. The value should be bad when devices or I/O can not be reached.</p>

*The maximum length of WebAccess Tag Name is limited to 21 bytes.

Example for normal value:

```

{
  "d": {
    "WISE4010-7F28A7": {
      "Val": {
        "W4010-28A7_Fz1Volt": 1213.48,
        "W4010-28A7_Fz1Temp": 63.81,
        "W4010-28A7_Fz1Desc": "Freezer 1",
      }
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}

```

Example for array value:

```
{
  "d": {
    "WISE4010-7F28A7": {
      "Val": {
        "W4010-28A7_Fz1Volt": {
          "0": 963.56,
          "3": 1147.38,
          "4": 1038.84
        }
      }
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

Example for bad value:

```
{
  "d": {
    "WISE4010-7F28A7": {
      "Val": {
        "W4010-28A7_Fz1Volt": "*",
        "W4010-28A7_Fz1Temp": "*",
        "W4010-28A7_Fz1Desc": "*"
      }
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

2.1.2 The Rules of Device Data Communication

It supports primary and backup devices mechanism on WebAccess Cloud. The backup devices is switched to data communication with cloud when the primary devices are lost. And it will switch back to primary when the primary devices is come back.

For saving network bandwidth([2.1.1](#)):

- All devices publish real-time data to cloud when value of tags is changed.

For primary and backup devices([2.3.2](#)):

- All devices can not publish real-time data at the start.

For command of data on([2.4.4](#)) and data off([2.4.5](#)):

- The devices should publish real-time data when receiving command of data on, and publish all values only at first time.
- The devices should stop publishing real-time data when receiving command of data off.

2.1.3 Data Recovery

Cloud sides can collect data from devices and record those to database for query or analytics usage. However, it gets data lost when devices is offline unexpectedly. Therefore, It will be necessary to recover the lost data as the following when devices found that they didn't publish some period of data successfully.

Format:

```
{
  "unique string": {
    "DRec": {
      "From": number,
      "Tags": {
        "unique string1": {
          "offset1": number,
          "offset2": number,
          ...
        },
        "unique string2": {
          "offset1": "string",
          "offset2": "string",
          ...
        }
      }
    }
  },
}
```

Property:

Name	Limitation	Description
unique string	31	Device ID (unique under same group_id)
DRec		Data Recovery
From		Seconds since 00:00 hours, Jan 1, 1970 UTC
unique string1~N	21	<p>Tag ID, must be unique under same WebAccess project and can not be "(", "&", ",", ":", ".", "%", "=", "# and space.</p> <p>(Tag ID is mapping to WebAccess Tag Name and Tag Address)</p> <p>Tag Value can be number, string or array (index from 0). One single "*" is for bad value. The value should be bad when devices or I/O can not be reached.</p>
offset 1~N		Time Offset with "From" in seconds. Value can be number, string or array (index from 0)

Example:

```

{
  "d": {
    "WISE4010-7F28A7": {
      "DRec": {
        "From": 1460129890,
        "Tags": {
          "W4010-28A7_Fz1Volt": {
            "3": 147.32,
            "18": 149.18,
            "87": 148.93
          },
          "W4010-28A7_Fz2Volt ": {
            "0": 73.83,
            "118": 84.49,
            "124": 68.17
          }
        }
      }
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}

```


2.2 File Format

Devices publish file to this topic:

`iot-2/evt/wafile/fmt/group_id`

2.2.1 File Upload

Upload file from devices to cloud

Format:

```
{
  "unique string": {
    "FPut": {
      "Name": "string",
      "Ind": number,
      "Type": number,
      "Size": number,
      "Bin": binary
    }
  },
  ...
}
```

Property:

Name	Limitation	Description
unique string	31	Device ID (unique under same group_id)
FPut		File Upload to Cloud
Name	256	{File Path}/{File Name}
Ind	0 or 1	Is Individual for Root Path: 0: ...\\WebAccess\\Node\\mqtt\ 1: ...\\WebAccess\\Node\\config\\{ group_id }\\
Type	0 ~ 2	0: ASCII 1: UTF-8 2: Binary
Size	<=256MB	File Size In Bytes (Up to 4GB)
Bin		File Content

Example for file upload:

```

{
  "d": {
    "WISE4010-7F28A7": {
      "FPut": {
        "Name": "W4010-28A7/image.bin",
        "Ind": 1,
        "Type": 2,
        "Size": 3576,
        "Bin": "content..."
      }
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}

```

2.2.2 File Download

Download file from cloud to device

Format:

```

{
  "unique string": {
    "FGet": {
      "Name": "string",
      "Ind": number
    }
  },
  ...
}

```

Property:

Name	Limitation	Description
unique string	31	Device ID (unique under same group_id)
FGet		File Download from Cloud
Name	256	{File Path}/{File Name}
Ind	0 or 1	Is Individual for Root Path: 0: ...\ WebAccess \Node\mqtt\ 1: ...\ WebAccess \Node\config\{ group_id \}

Example for file download:

```
{
  "d": {
    "WISE4010-7F28A7": {
      "FGet": {
        "Name": "W4010-28A7/image.bin",
        "Ind": 1
      }
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

(file download response from command "Fdl" at [2.4.8](#))

2.3 Configuration Format

Devices publish configuration to this topic:

`iot-2/evt/wacfg/fmt/group_id`

2.3.1 Introduction

On WebAccess Cloud, it has hierarchy configuration as the following:

+Project

 +SCADA

 +Port

 +Device

 +Tag

It can be configured automatically on WebAccess Cloud if devices publish sufficient configuration information. Devices should keep a last uploaded configuration profile, and sending differential part to cloud every time by "UTg" or "DTg". In this way, devices can add, modify or delete tag configuration on WebAccess Cloud.

2.3.2 Device

Format:

```
{
  "unique string": {
    "TID": number,
    "Dsc": "string",
    "Hbt": number,
    "BID": "string",
    "UTg": {tag format},
    "DTg": {tag format},
    "Del": 1,
    ...
  }
}
```

Property:

Name	Limitation	Description
unique string	31	Device ID (unique under same group_id)
TID	1~5	Device Type 1: WebAccess/SCADA 2: WebAccess/HMI 3: WISE4000 4: ADAM3600 5. B+B Wzzard
Dsc	64	Description
Hbt	1~65535	Interval of Heartbeat (2.5.4), Suggest 5 or 10 Seconds Should be Good
BID	31	Backup Device ID left backup device ID if the device is backup
UTg		Add or Update Tag
DTg		Delete Tag
Del	1	Delete Device and All Tags on Cloud

PS: Command order is "Del" → "DTg" → "UTg" if they show at same time

2.3.3 Tag Common Part

Format:

```
"unique string": {
  "TID": number,
  "Dsc": "string",
  "Ary": number,
  "RO": number,
  ...
}
```

Property:

Name	Limitation	Description	Default
unique string	21	Tag ID, must be unique under same WebAccess project and can not be "(", "&", ",", ":", ".", "%", "=", "# and space. (Tag ID is mapping to WebAccess Tag Name and Tag Address)	
TID	1~3	Tag Type 1: Analog, 2: Digit, 3: Text	
Dsc	64	Description	
Ary	0~32767	Array Size	0
RO	0 or 1	Read Only (0:false, 1:true)	0

*The maximum length of WebAccess Tag Name is limited to 21 bytes.

2.3.3.1 Tag ID

It is recommend to use abbreviation because the length is limitation. WebAccess Cloud is tag based architecture so it is suggested that using the format as the following will be good:

{Device Unique Abbreviation}_{Tag Abbreviation}

For example, there is a WISE4012E with partial MAC address A924 and one of analog input channel can be show:

W4012-A924_AI0

Notice that devices should keep Tag ID to be unique under the same WebAccess project.

2.3.4 Analog Tag Advance Part

Format:

```
{  
  "Log": number,  
  "SH": number,  
  "SL": number,  
  "EU": "string",  
  "DSF": "string",  
  "Alm": number,  
  "HHP": number,  
  "HHA": number,  
  "HiP": number,  
  "HiA": number,  
  "LoP": number,  
  "LoA": number,  
  "LLP": number,  
  "LLA": number,  
  ...  
}
```

Property:

Name	Limitation	Description	Default
Log	0 or 1	Log Data to RTDB (0:disabled, 1:enabled), RTDB means WebAccess Real-time Database	0
SH	double	Span High	1000
SL	double	Span Low	0
EU	10	Engineer Unit	
DSF	xx.xx	Display Format (Integer.Fraction) (xx: 0~15)	4.2
Alm	0 or 1	Alarm Enabled (0:false, 1:true)	0
HHP	0~99	HH Priority (0:disabled)	0
HHA	double	HH Alarm Limit	
HiP	0~99	High Priority (0:disabled)	0
HiA	double	High Alarm Limit	
LoP	0~99	Low Priority (0:disabled)	0
LoA	double	Low Alarm Limit	
LLP	0~99	LL Priority (0:disabled)	0
LLA	double	LL Alarm Limit	

Note1: HHP >= HiP, LLP >= LoP

Note2: Alm must be taken at same time when some relative alarm setting is updated

2.3.5 Digit Tag Advance Part

Format:

```
{  
  "Log": number,  
  "S0": "string",  
  "S1": "string",  
  "S2": "string",  
  "S3": "string",  
  "S4": "string",  
  "S5": "string",  
  "S6": "string",  
  "S7": "string",  
  "Alm": number,  
  "S0L": number,  
  "S1L": number,  
  "S2L": number,  
  "S3L": number,  
  "S4L": number,  
  "S5L": number,  
  "S6L": number,  
  "S7L": number,  
  ...  
}
```

Property:

Name	Limitation	Description	Default
Log	0 or 1	Log Data	0
S0	12	State 0	0
S1	12	State 1	1
S2	12	State 2	NotUsed
S3	12	State 3	NotUsed
S4	12	State 4	NotUsed
S5	12	State 5	NotUsed
S6	12	State 6	NotUsed
S7	12	State 7	NotUsed
Alm	0 or 1	Alarm Enabled (0:false, 1:true)	0
S0P	0~99	State 0 Alarm Priority	0
S1P	0~99	State 1 Alarm Priority	0
S2P	0~99	State 2 Alarm Priority	0
S3P	0~99	State 3 Alarm Priority	0
S4P	0~99	State 4 Alarm Priority	0
S5P	0~99	State 5 Alarm Priority	0
S6P	0~99	State 6 Alarm Priority	0
S7P	0~99	State 7 Alarm Priority	0

2.3.6 Configuration Download

Devices should keep a up-to-date configuration profile. If devices miss or mess up the profile, it can be restored by this request command. For example: device replacement, the new one need to fill up the device ID of the broken one, then using this request command to get back up-to-date configuration profile from cloud.

Format:

```
{
  "unique string": {
    "Cdl": 1
  }
}
```

Property:

Name	Limitation	Description
unique string	31	Device ID (unique under same group_id)
Cdl	1	Config Download

It will return configuration from [2.4.2](#) after cloud receive this request commnad.

Example:

```
{
  "d": {
    "WISE4010-7F28A7": {
      "Cdl": 1
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

2.3.7 Add Tag Example

```

{
  "d": {
    "WISE4010-7F28A7": {
      "TID": 3,
      "Dsc": "Factory A",
      "Hbt": 5,
      "PRI": "",
      "UTg": {
        "W4010-28A7_Fz1Volt": {
          "TID": 1,
          "Dsc": "Freezer1 Voltage",
          "RO": 1,
          "Log": 1,
          "SH": 2500,
          "SL": 0,
          "EU": "V",
          "DSF": "4.2",
          "Alm": 1,
          "HHP": 0,
          "HHA": 0,
          "HiP": 1,
          "HiA": 1800,
          "LoP": 1,
          "LoA": 500,
          "LLP": 0,
          "LLA": 0
        },
        "W4010-28A7_Fz2Volt": {
          "TID": 1,
          "Dsc": "Freezer2 Voltage",
          "RO": 1,
          "Log": 1,
          "SH": 2500,
          "SL": 0,
          "EU": "V",
          "DSF": "4.2",

```

```
"Alm": 1,  
"HHP": 0,  
"HHA": 0,  
"HiP": 1,  
"HiA": 1800,  
"LoP": 1,  
"LoA": 500,  
"LLP": 0,  
"LLA": 0  
},  
"W4010-28A7_Fz1Temp": {  
  "TID": 1,  
  "Dsc": "Freezer1 Temperature",  
  "RO": 1,  
  "Log": 1,  
  "SH": 150,  
  "SL": -50,  
  "EU": "°C",  
  "DSF": "3.2",  
  "Alm": 1,  
  "HHP": 0,  
  "HHA": 0,  
  "HiP": 1,  
  "HiA": 90,  
  "LoP": 1,  
  "LoA": -10,  
  "LLP": 0,  
  "LLA": 0  
},  
"W4010-28A7_Fz2Temp": {  
  "TID": 1,  
  "Dsc": "Freezer2 Temperature",  
  "RO": 1,  
  "Log": 1,  
  "SH": 150,  
  "SL": -50,  
  "EU": "°C",
```

```

        "DSF": "3.2",
        "Alm": 1,
        "HHP": 0,
        "HHA": 0,
        "HiP": 1,
        "HiA": 90,
        "LoP": 1,
        "LoA": -10,
        "LLP": 0,
        "LLA": 0
    },
    "W4010-28A7_Fz1Switch": {
        "TID": 2,
        "Dsc": "Freezer1 Switch",
        "RO": 0,
        "Log": 1,
        "S0": "On",
        "S1": "Off",
        "S2": "",
        "S3": "",
        "S4": "",
        "S5": "",
        "S6": "",
        "S7": "",
    },
    "W4010-28A7_Fz1Mode": {
        "TID": 2,
        "Dsc": "Freezer1 Mode Switch",
        "RO": 0,
        "Log": 1,
        "S0": "Save",
        "S1": "Safe",
        "S2": "Lv1",
        "S3": "Lv2",
        "S4": "Lv3",
        "S5": "Manual",
        "S6": "",
    }

```



```

        "S7": ""
    },
    "W4010-28A7_Fz2Switch": {
        "TID": 2,
        "Dsc": "Freezer2 Switch",
        "RO": 0,
        "Log": 1,
        "S0": "On",
        "S1": "Off",
        "S2": "",
        "S3": "",
        "S4": "",
        "S5": "",
        "S6": "",
        "S7": ""
    },
    "W4010-28A7_Fz2Mode": {
        "TID": 2,
        "Dsc": "Freezer2 Mode Switch",
        "RO": 0,
        "Log": 1,
        "S0": "Save",
        "S1": "Safe",
        "S2": "Lv1",
        "S3": "Lv2",
        "S4": "Lv3",
        "S5": "Manual",
        "S6": "",
        "S7": ""
    },
    }
}
},
"ts": "2015-04-17T10:19:51+08:00"
}

```

2.3.8 Update Tag Example

```
{
  "d": {
    "WISE4010-7F28A7": {
      "TID": 3,
      "Dsc": "Factory A",
      "Hbt": 5,
      "PRI": "",
      "UTg": {
        "W4010-28A7_Fz1Volt": {
          "SH": 5000,
          "SL": 500,
        },
        "W4010-28A7_Fz2Volt": {
          "SH": 7500,
          "SL": 2000,
        }
      }
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

2.3.9 Delete Tag Example

```
{
  "d": {
    "WISE4010-7F28A7": {
      "TID": 3,
      "Dsc": "Factory A",
      "Hbt": 5,
      "PRI": "",
      "DTg": {
        "W4010-28A7_Fz2Temp": 1,
        "W4010-28A7_Fz2Switch": 1
      }
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

2.3.10 Devices Plug and Play Mechanism

It still need to setup project, SCADA, ports , devices and tags because there is also a WebAccess software on cloud side. To reduce this configuration effort, auto-configuration from each device is a must feature, as we call "Plug and Play". Devices have control right to add, modify and delete configuration of WebAccess on cloud side.

- Devices must support these two way for Plug and Play:
 1. **Add full configuration:** through the way like [2.3.7](#). Usually, it is used in scenario as the following:
 - connect to the [group_id](#) at first time
 - device configuration was deleted by cloud side
 2. **Partial update or delete configuration:** through the way like [2.3.8](#) and [2.3.9](#). Devices should keep a up-to-date configuration profile, and update or delete configuration based on this profile.

- Device replacement scenario:

Assume A is broken device, and B is new one.

 1. Find A and ready to replace with B.
 2. Set device ID of A to B
 3. Let B connect to cloud and get back up-to-date configuration profile through the way at [2.3.6](#). B should setup well according to this profile.
 4. Start to publish real-time data through way at [2.1.1](#) when B all gets ready.

2.4 Command Format

Devices should subscribe these two topics to receive commands from cloud:

`iot-2/evt/wacmd/fmt/group_id`

`iot-2/evt/wacmd/fmt/group_id/dev_id`

2.4.1 Write Value

Write values from cloud to the device

`iot-2/evt/wacmd/fmt/group_id/dev_id`

Format:

```

{
  "Cmd": "WV",
  "Val": {
    "unique string1": number,
    "unique string2": "string"
    "unique string3": {
      "0": number,
      "1": number,
      "2": number,
      ...
    }
  }
}

```

Property:

Name	Limitation	Description
unique string1~3	21	Tag ID, must be unique under same WebAccess project and can not be "(", "&", ",", ":", ".", "%", "=", "# and space. (Tag ID is mapping to WebAccess Tag Name and Tag Address)

Example:

```
{
  "d": {
    "Cmd": "WV",
    "Val": {
      "W4010-28A7_Fz1Volt": 1213.48,
      "W4010-28A7_Fz1Temp": 63.81
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

2.4.2 Write Config

Write configuration from cloud to the device

[iot-2/evt/wacmd/fmt/group_id/dev_id](#)

Format:

```
{  
  "Cmd": "WC",  
  "UTg": {  
  
  },  
  "DTg": {  
  
  },  
  "Del": 1  
}
```

Property:

Name	Limitation	Description
UTg		Add or Update Tags
DTg		Delete Tags
Del	1	Delete All Tags

Example: (modify tag span high and span low, and delete tag)

```
{
  "d": {
    "Cmd": "WC",
    "UTg": {
      "W4010-28A7_Fz2Volt": {
        "SH": 2000,
        "SL": 200
      },
      "W4010-28A7_Fz2Temp": {
        "SH": 150,
        "SL": -20
      }
    },
    "DTg": {
      "W4010-28A7_Fz1Volt": 1,
      "W4010-28A7_Fz1Temp": 1
    },
  },
  "ts": "2015-04-17T11:58:07+08:00"
}
```


2.4.3 Data On

Indicate devices to start publishing real-time data

`iot-2/evt/wacmd/fmt/group_id`

`iot-2/evt/wacmd/fmt/group_id/dev_id`

Format:

```
{  
  "Cmd": "DOn"  
}
```

Property:

Cmd Name	Limitation	Description
DOn		start sending real-time data. publish all tag value at first time, then just publish values with changed.

Example:

```
{  
  "d": {  
    "Cmd": "DOn"  
  },  
  "ts": "2015-04-17T13:33:29+08:00"  
}
```

2.4.4 Data Off

Indicate devices to stop publishing real-time data

`iot-2/evt/wacmd/fmt/group_id`

`iot-2/evt/wacmd/fmt/group_id/dev_id`

Format:

```
{  
  "Cmd": "DOf"  
}
```

Property:

Cmd Name	Limitation	Description
DOf		stop sending real-time data.

Example:

```
{  
  "d": {  
    "Cmd": "DOf"  
  },  
  "ts": "2015-04-17T13:33:29+08:00"  
}
```

2.4.5 Backup Configuration

Indicate the device to backup the current device configuration file to cloud

`iot-2/evt/wacmd/fmt/group_id/dev_id`

Format:

```
{  
  "Cmd": "BkC"  
}
```

Property:

Cmd Name	Limitation	Description
BkC		backup device configuration file

Example:

```
{  
  "d": {  
    "Cmd": "BkC"  
  },  
  "ts": "2015-04-17T13:33:29+08:00"  
}
```

2.4.6 Restore Configuration

Indicate the device to restore the current device configuration file from cloud

`iot-2/evt/wacmd/fmt/group_id/dev_id`

Format:

```
{  
  "Cmd": "RsC",  
}
```

Property:

Cmd Name	Limitation	Description
RsC		resotre device configuration file

Example:

```
{  
  "d": {  
    "Cmd": "RsC",  
  },  
  "ts": "2015-04-17T13:33:29+08:00"  
}
```

2.4.7 Firmware Upgrade

Indicate the device to upgrade firmware from cloud

`iot-2/evt/wacmd/fmt/group_id/dev_id`

Format:

```
{  
  "Cmd": "FwU"  
}
```

Property:

Cmd Name	Limitation	Description
FwU		命令設備更新韌體

Example:

```
{  
  "d": {  
    "Cmd": "FwU",  
    "URL": "http://wavm.cloudapp.net/firmware/WISE4010.bin"  
  },  
  "ts": "2015-04-17T13:33:29+08:00"  
}
```

2.4.8 File Download

Receive download file from cloud

`iot-2/evt/wacmd/fmt/group_id/dev_id`

Format:

```
{  
  "Cmd": "Fdl",  
  "Name": "string",  
  "Type": number,  
  "Size": number,  
  "Bin": binary  
}
```

Property:

Name	Limitation	Description
Fdl		Files Get from Cloud
Name	256	File Name
Type	0 ~ 2	0: ASCII 1: UTF-8 2: Binary
Size	<=256MB	File Byte Size (Up to 4GB)
Bin		File Content

Example:

```
{
  "d": {
    "Cmd": "Fdl",
    "File": {
      "Name": "image.bin",
      "Type": 2,
      "Size": 3576,
      "Bin": "content..."
    }
  },
  "ts": "2015-04-17T13:33:29+08:00"
}
```

(reference request command "FGet" at [2.2.2](#))

2.4.9 Time Synchronization

Receive time synchronization from cloud

`iot-2/evt/wacmd/fmt/group_id/dev_id`

Format:

```
{  
  "Cmd": "TSyn",  
  "UTC": number  
}
```

Property:

Name	Limitation	Description
TSyn		Time Synchronization
UTC		UTC Time from Cloud

Example:

```
{  
  "d": {  
    "Cmd": "TSyn",  
    "UTC": 1460129890  
  },  
  "ts": "2015-04-17T13:33:29+08:00"  
}
```

(reference request command "TSyn" at [2.5.5](#))

2.4.10 Command List

Cmd	Property	Description
WV	Val	Write Value
WC	Cfg	Write Config
DOn		Data On
DOF		Data Off
BkC		Backup Config
RsC		Restore Config
FwU		Firmware Upgrade
Fdl	File	File Download
TSyn	UTC	Time Synchronization

2.5 Connection Format

Devices publish connection status to this topic:

`iot-2/evt/waconn/fmt/group_id`

2.5.1 Connect

Notify cloud side after connecting successfully.

Format:

```
{
  "unique string": {
    "Con": 1
  }
}
```

Property:

Name	Limitation	Description
unique string	31	Device ID (unique under same group_id)
Con	1	Connect

Example:

```
{
  "d": {
    "WISE4010-7F28A7": {
      "Con": 1
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

2.5.2 Disconnect

Notify cloud side after disconnecting successfully.

Format:

```
{
  "unique string": {
    "DsC": 1
  }
}
```

Property:

Name	Limitation	Description
unique string	31	Device ID (unique under same group_id)
DsC	1	Disconnect

Example:

```
{
  "d": {
    "WISE4010-7F28A7": {
      "DsC": 1
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

2.5.3 Unexpected Disconnect

Implement with **MQTT Last Will** mechanism to notify cloud side after unexpected disconnection happening.

Format:

```
{
  "unique string": {
    "UeD": 1
  }
}
```

Property:

Name	Limitation	Description
unique string	31	Device ID (unique under same group_id)
UeD	1	Unexpected Disconnect

Example:

```
{
  "d": {
    "WISE4010-7F28A7": {
      "UeD": 1
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

2.5.4 Heartbeat

Notify cloud side that the device is alive.

Format:

```
{
  "unique string": {
    "Hbt": 1
  }
}
```

Property:

Name	Limitation	Description
unique string	31	Device ID (unique under same group_id)
Hbt	1	Heartbeat for Keep Alive

Example:

```
{
  "d": {
    "WISE4010-7F28A7": {
      "Hbt": 1
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

2.5.5 Time Synchronization

Synchronize time from cloud side

Format:

```
{
  "unique string": {
    "TSyn": 1
  }
}
```

Property:

Name	Limitation	Description
unique string	31	Device ID (unique under same group_id)
TSyn	1	Time Synchronization

Example:

```
{
  "d": {
    "WISE4010-7F28A7": {
      "TSyn": 1
    }
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

(reference response command "UTC" at [2.4.9](#))

2.6 Action Format

Devices publish action to this topic for cloud:

`iot-2/evt/waactc/fmt/group_id/dev_id`

Devices should subscribe these two topics to receive action from cloud:

`iot-2/evt/waactd/fmt/group_id`

`iot-2/evt/waactd/fmt/group_id/dev_id`

Devices should log these action to help for problem tracking and analyzing.

2.6.1 Connect

Receive the action after connected to cloud successfully ([2.5.1](#)).

`iot-2/evt/waactd/fmt/group_id/dev_id` ("Con": 1)

`iot-2/evt/waactd/fmt/group_id` ("Con": 2)

Format:

```
{
  "Con": 1
}
```

Property:

Name	Limitation	Description
Con	1	Device Connect Successfully
	2	Cloud Agent Connect Successfully

Example:

```
{
  "d": {
    "Con": 1
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```

2.6.2 Unexpected Disconnect

Receive the action after cloud agent is offline unexpectedly.

`iot-2/evt/waactd/fmt/group_id`

Format:

```
{  
  "UeD": 1  
}
```

Property:

Name	Limitation	Description
UeD	1	Cloud Agent is Offline Unexpectedly

Example:

```
{  
  "d": {  
    "UeD": 1  
  },  
  "ts": "2015-04-17T10:19:51+08:00"  
}
```


2.6.3 Config

Receive the action after updated config to cloud successfully ([2.5.1](#)).

`iot-2/evt/waactd/fmt/group_id/dev_id`

Notify cloud after updated config from cloud successfully ([2.4.2](#))

`iot-2/evt/waactc/fmt/group_id/dev_id`

Format:

```
{  
  "Cfg": 1  
}
```

Property:

Name	Limitation	Description
Cfg	1	Updated Config Successfully
	2	Failed to Updated Config

Example:

```
{  
  "d": {  
    "Cfg": 1  
  },  
  "ts": "2015-04-17T10:19:51+08:00"  
}
```

2.6.4 File

Receive the action after uploaded file handling to cloud successfully ([2.2.1](#)).

`iot-2/evt/waactd/fmt/group_id/dev_id`

Notify cloud after downloaded file handling from cloud successfully ([2.4.8](#))

`iot-2/evt/waactc/fmt/group_id/dev_id`

Format:

```
{
  "File": 1
}
```

Property:

Name	Limitation	Description
File	1	File Handling is Successfully
	2	Failed to Handle File

Example:

```
{
  "d": {
    "File": 1
  },
  "ts": "2015-04-17T10:19:51+08:00"
}
```