afero

Tech Note

Cloud Notification Queue and Notify Messages

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1. Introduction

Afero cloud-to-cloud integration options include the ability for a Partner's Cloud to receive a stream of all messages generated by their devices. By working with a number of partners, Afero has developed a system and method for performing this task that overcomes the two key challenges of cloud-to-cloud integration:

- **Scaling** - As device numbers grow to hundreds, thousands, and beyond, the number of messages per second can rise very high. Afero infrastructure is designed to handle very high volumes, but Partners should not be forced to build huge load-balancing server front ends to receive the messages.
- **Reliability** - Partners should not have to maintain 100% uptime to avoid loss of data. For example, Partners should be able to stop their server for maintenance and then restart without data loss.

Afero Notify supports pushing events to Microsoft Azure Event Hubs, Amazon SQS (Simple Queue Service) Queues, and Google (GCP) via Google PubSub topics.

2. Approach

Afero will place a copy of messages from edge devices into a queue or topic. This queue is dedicated to the Partner and set up for them by Afero. Partners, in turn, can continuously monitor this queue for new incoming messages using the client libraries of their choice (Java, Python, C#, and many others). Messages in the partner queue are ready for consumption typically between 150 and 400 milliseconds after the event is handled on the Afero Cloud.

The benefits of this approach include:

- Easy to scale up to nearly an unlimited amount of messages; a great solution for Partners that expect a relatively large amount of messages.
- The solution is highly durable; in the event the Partner software has downtime and cannot retrieve messages from the queue in a timely manner, the messages are not lost.
- Messages are automatically timestamped.
- Client libraries for SQS, Event Hub, and PubSub are well documented and easy to use, plus Afero can provide sample code and assistance with creating a consumer of these messages.
- Message queues are distributed among several distinct geographical locations, providing a hedge against downtime at any particular datacenter.

3. Message Format Reference

The messages delivered in (near) real time to the queue come in five (5) different "event types": ATTRIBUTE, ASSOCIATE, DISASSOCIATE, AVAILABLE, UNAVAILABLE. Each of these messages share certain properties, while others may have custom properties only specific to that message.

Rather than send a different message format for each **event type**, the same format is used for each type. Fields that are not necessarily appropriate for a specific event type are set to NULL in cases where they are not appropriate. When processing records, clients should switch on the **eventType** field to understand the fields they should expect for that event type. Refer to the documentation below for message payloads and field definitions.

3.1 Common Fields for Every Event Type

These fields are valid for each of the five (5) message types. Message-specific fields are defined under each message subheading.

FIELD NAME	FIELD DEFINITION
Id	(String) The id field is a String that can be used to uniquely identify a particular message. This is an auto-generated ID generated by the Afero Cloud, and can safely be used as a primary key in partner systems to identify a specific event occurring on the Afero Platform. For example: **1c3d6d5-fj35-4d0e-a8ss-6bwwa529kk6f-66990c43bceabd79ab8196895199b083-0**
deviceId	(String) The deviceId is the unique alphanumeric string assigned to every Afero device. For example: **01231732d62ca571**
utcTimestamp	(Long) The UTC timestamp is a long value, in milliseconds, indicating the time in UTC that the message was processed by the Afero Cloud.
eventType	(String) One of the following values, indicating the type of event that occurred: ATTRIBUTE, ASSOCIATE, DISASSOCIATE, AVAILABLE, or UNAVAILABLE.
friendlyName	(String) If available, the name of the device as defined by an end user using an Afero supported client.
deviceTypeId	(String) A unique UUID value that maps to a specific Device Type (thermostat, washing machine, camera, etc). DeviceTypeId values are unique across the platform.
deviceTypeName	(String) The name given to a device type using the APE authoring tool. For example, "Water Heater Thermostat" or “Home Security Camera”.
deviceTags	(String) An array of device tags added to this device. These are rarely used and most consumers can safely ignore this field.
extendedData	(Map<String,String>) A map of key-value pairs referring to meta-data specific to the device. This information is rarely used and most consumers can safely ignore this field.
timestampFromDevice	(Boolean) Indicates whether a timestamp indicated in this message originated from an Afero device MCU, rather than the Afero Cloud. **This is an exceedingly rare setup, and for most partners will always be 'false'.**
deviceTimestamp	(Long) A long value, in milliseconds, indicating the time in UTC that the message was processed by an Afero device MCU. **This is an exceedingly rare setup, and for most partners will always mirror the utcTimestamp field.**

3.2 Attribute Message

The **Attribute** message is the most frequently-generated message, and occurs when an end-user toggles any attribute on the device (Fan Speed, Mode, etc.).

Sample JSON Payload


```
{
   "id": "1c3d6d5-fj35-4d0e-a8ss-6bwwa529kk6f-66990c43bceabd79ab8196895199b083-0",
   "deviceId": "01232560d62ca571",
   "friendlyName": "Livingroom Fan",
   "extendedData": {
       "sso": "123456ABCDEFG"
   },
   "utcTimestamp": 1479163660279,
   "attributeId": 1024,
   "attributeData": "0000",
   "attributeDataConverted": "0",
   "attributeDataType": "SINT16",
   "eventType": "ATTRIBUTE",
   "attributeLabel": "Fan Speed",
   "attributeValueLabel": "Low",
   "requestId": 94,
   "deviceTypeId": "4f97e494-f39b-4a96-8c86-6a4d438423aa",
   "deviceTypeName": "Three Feature Table Fan"
}
```


Where:

All of the fields defined in Common Fields above, PLUS:

FIELD NAME	FIELD DEFINITION
attributeId	(Integer) The attributeId field defines the numbered attribute (as assigned by the Afero Profile Editor) for the attribute that was updated.
attributeData	(String) This value is a string containing the hexadecimal representation of the attribute value at the time it was updated.
attributeDataConverted	(String) For convenience, a string containing the result of converting the **attributeData** value based on the **attributeDataType**.
attributeDataType	(String) The datatype of the attribute, as defined in APE.
eventType	(String) Will always be ***ATTRIBUTE*** for this message type.
attributeLabel	(String) A friendly label for the **attribute** as defined in its presentation; that is, what is displayed to end users in the mobile app.
attributeValueLabel	(String) A friendly label for the **attribute value** as defined in its presentation; that is, what is displayed to end users in the mobile app.
requestId	(Integer) This is an Afero internal field that is, in some situations, necessary to include in partner messages for some applications. This field can be safely ignored.

3.3 Device Association Message

The **Device Association** message occurs when a device (air conditioner, washing machine, etc.) is "associated" with a user account. That is, this event is raised when the QR code of a device is scanned into the mobile application.

Sample JSON Payload

```
{
    "id": "75de0b31-2b87-4455-8a0a-e852953eba50-66990c43bceabd79ab8196895199b083-
11",
    "deviceId": "0123d3aba408b4e5",
    "extendedData": {
        "foo": "bar"
    },
    "utcTimestamp": 1501698160317,
    "eventType": "ASSOCIATE",
    "friendlyName": "",
    "deviceTypeId": "4f97e494-f39b-4a96-8c86-6a4d438423aa",
    "deviceTypeName": "Three Feature Table Fan"
}
```

Where:

All of the fields defined in Common Fields above, PLUS:

FIELD NAME	FIELD DEFINITION
eventType	(String) Will always be ***ASSOCIATE*** for this message type.

3.4 Device Disassociation Message

The **Device Disassociation** message occurs when a device (air conditioner, washing machine, etc.) is "disassociated" from a user account; that is; when a user removes this device from an account using the mobile application.

Sample JSON Payload


```
{
    "id": "bfedb530-c000-410e-8188-d464e22bdd14-66990c43bceabd79ab8196895199b083-11",
    "deviceId": "0123d3aba408b4e5",
    "extendedData": {
        "foo": "bar"
    },
    "utcTimestamp": 1501697357257,
    "eventType": "DISASSOCIATE",
    "friendlyName": "",
    "deviceTypeId": "4f97e494-f39b-4a96-8c86-6a4d438423aa",
    "deviceTypeName": "Three Feature Table Fan"
}
```


Where:

FIELD NAME	FIELD DEFINITION
eventType	(String) Will always be ***DISASSOCIATE*** for this message type.

3.5 Device Available Message

The **Device Available** message occurs when a device becomes "available". Availability in this context means the device is connected to the cloud and capable of sending and receiving data.

Sample JSON Payload


```
{
    "id": "cdd2729e-4d2a-4ddc-8676-d436e6786520-66990c43bceabd79ab8196895199b083-11",
    "deviceId": "0123d3aba408b4e5",
    "extendedData": {
        "foo": "bar"
    },
    "utcTimestamp": 1501697550120,
    "eventType": "AVAILABLE",
    "friendlyName": "",
    "deviceTypeId": "ecd5574c-9a77-4753-8b60-e37df8981abe",
    "deviceTypeName": "Three Feature Table Fan"
}
```


Where:

FIELD NAME	FIELD DEFINITION
eventType	(String) Will always be ***AVAILABLE*** for this message type.

3.6 Device Unavailable Message

The **Device Unavailable** message occurs when a device becomes “unavailable”. Availability in this context means the device is disconnected from the Cloud and is not currently capable of sending and receiving data (offline schedules excluded).

Sample JSON Payload


```
{
    "id": "aabac1bd-0078-43ab-9de8-35fe75b167fb-66990c43bceabd79ab8196895199b083-11",
    "deviceId": "0123d3aba408b4e5",
    "extendedData": {
        "foo": "bar"
    },
    "utcTimestamp": 1501697738417,
    "eventType": "UNAVAILABLE",
    "friendlyName": "",
    "deviceTypeId": "ecd5574c-9a77-4753-8b60-e37df8981abe",
    "deviceTypeName": "Three Feature Table Fan"
}
```


Where:

FIELD NAME	FIELD DEFINITION
eventType	(String) Will always be ***UNAVAILABLE*** for this message type.