**AMQP Project Charter**

1. Context

Weather data distribution consists of the timely distribution of both small (a few kilobytes) and large (several gigabytes) datasets. It is usually using the one-to-many data model.

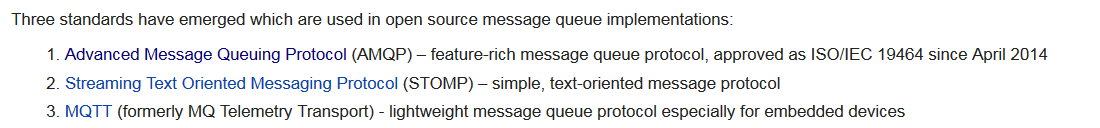
Since 1990s, the protocol used for data exchange between National Meteorological Services and other operators are, as defined by WMO, FTP and, more recently, SFTP. However, apart of the WMO GTS, some « non WMO Standard » such as http, https, ftp (pull mode) are being used, none of them proving to be an ideal solution.

The use of WMO FTP is however becoming an issue for data exchanges:

* Confidentiality : files are being without encryption
* Integrity : it is not possible to identify the data source as messages/files are not signed
* Availability : the protocol in itself does not provide mechanisms in case of telecom link failures
* Performance : when delivering many files especially over high latency networks, FTP is not efficient and does not make use of all available bandwidth

WMO FTP is used for data exchange and, in order to provide all GTS/WIS features, NMHSs have implemented AMSS (Automated Messages Switching Systems). Different manufacturers provide different implementations, bringing message routing, queuing and prioritizing on top of FTP. However, the recent emergence of Message Queueing protocols brings the opportunity to question their use for operational data exchange.

Source Wikipedia:



In 2018 several tests using MQTT have been performed in the frame of the OpenWIS Association. As shown in the demonstration during TECO 2018, MQTT is a very simple and efficient way to publish messages to devices (including smartphones)

In 2017, Eurocontrol, the European Organisation for the Safety of Air Navigation has issued SWIM Technical Infrastructure Yellow Profile Specification, which defines AMQP as a « Service Interface Binding »for aeronautical data exchanges. Weather data transferred to Eurocontrol member states will transit on AMQP interfaces with target implementation date in 2020.

The following questions are raised:

* can new message queue protocols such as AMQP, MQTT & STOMP address weather data dissemination issues ?
* in particular, is AMQP (Eurocontrol’s choice) the ideal candidate for other weather wata exchanges
* would this be a long term solution?
* how could Message Queue protocol coexist with existing FTP based WIS?

The following table summarizes compares several protocols and AMQP with regards to the challenges raised by operational data exchanges.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Requirement / Constraint** | **(S)FTP push** | **(S)FTP get** | **HTTP(S) get** | **AMQP p** |
| **Confidentiality** | Yes (with SFTP) | Yes (with SFTP) | Yes (with HTTPS) | Yes (with TLS) |
| **Integrity** | No (not builtin) | No (not builtin) | No (not builtin) | Yes |
| **Availability** | No (not builtin). But possible workarounds, | No (not builtin). But possible workarounds, | No (not builtin). But possible workarounds, | Yes (High Availability builtin features) |
| **Performance with small messages** | Poor (protocol delays especially over high latency networks) | Poor (big protocol overhead) | Poor (big protocol overhead) | Great Performance (especially with prefetch) |
| **Performance with big messages** | Average as parallel uploads sometime need to be setup. | Good, but continuous source scan is time consuming. | Good, but continuous source scan is time consuming. | Good. Can trigger (S)FTP or HTTP(S) and provide integrity checks. |
| **QoS** | Not builtin (need to be implemented outside the protocol) | Not builtin (need to be implemented outside the protocol) | No | Yes (priorities) |

1. Business case:

Offer the possibility for internet users to access WIS data cache using publish/subscribe mechanism.

1. Roles and Responsibilities:

| **Resource Name** | **Organization** | **Role** | **Responsibility** | **Time period resource needed for** |
| --- | --- | --- | --- | --- |
| David Podeur | Meteo-France | Project Manager | Responsible for Project Management | August 2018 – June 2019 |
| Xxx | Xxx | Xxx | Xxx |  |

1. Deliverables:

* Proof of concept covering:
  + Pub/sub on 24h cache data, providing data through FTP, getting data through AMQP
  + Pub/sub on French global model (Arpege) , getting link through AMQP (large files demonstration):
    - with direct AMQP dissemination
    - with AMQP “availability” dissemination providing the customers information that data is ready for downloading (possibly using “metalink” files)
  + Pub/sub over an AMQP Cluster (Several nodes in a single location to provide High Availability & High throughput)
  + Pub/sub over an AMQP Federation (Different clusters separated by possibly lossy and high latency WAN links)
* Study on
  + Security aspects (use of TLS, messages signatures, certificates)
  + Potential SLAs
  + Candidate architecture how AMQP could coexist with FTP/SFTP based data exchanges