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Achieving Interoperability for EFET´s electronic Settlement Matching (eSM) via OpenAPI

Introduction

In its meeting on Tuesday 14th January 2020, the EFET BPOC invited European eSM service providers to discuss the topic of **Interoperability** as part of the eSM standard. It was found and agreed eSM business process messages are not completely defined yet.[1] The implications are exemplified by Equias' statement, "*Standard is sufficient in terms of format and matching but there is no API setting, which leaves a gap in interoperability.*" In addition, Ponton, the integration arm of Equias, argued most implementations currently use adapters to close this gap. The discussion went on to highlight how ebXML is built to handle peer to peer communication specifically for eCM[2], and ebXML does not currently have the facilities to support service provider to service provider communication without additional effort. Equias went on to float the idea of reusing the aged ebXML[3] and rushing headlong into the market. Others in the room pointed to cost concerns and the level of effort required to maintain and expand the public/private key encryption model from eCM if ebXML is selected. A German energy trader on the BPOC expressed his company's concern by saying the following, "energy traders do not want to deal with this anymore", referring to key management of a peer-to-peer network. The immediate and vocal push back is motivated by the increased total cost of ownership of expanding the legacy key infrastructure. In addition, there is a need to have a neutral authority manage certificates. The January 14th working session highlighted gaps to be addressed. Fidectus is investing in EFET and the European energy trading community by providing the reference eSM OpenAPI implementation to EFET. OpenAPI ensures EFET remains neutral and in control of the process while not creating undo costs or burdens for EFET or its membership. With EFET's stewardship and control of the OpenAPI, standards evolve thru vendor contributions removing any need for third party reference models, interoperability becomes a non-issue and there is no need for a costly certification program.

The findings clearly show, EFET in its role of a neutral industry body is fully aware of the need to make a future-proof decision about if and how to handle the API and communication protocols in eSM. The main objectives to close the gap in eSM are:

1. EFET controlling the standard,
2. avoiding cost for EFET to govern and maintain the standard,
3. Interoperability without ambiguity, complexity and certification thru a human- and machine-readable reference model,
4. minimizing effort to switch service provider to allow for competition and innovation,
5. reducing total cost of ownership and time-to-market for service providers, EFET and each of its members,
6. and eliminating any potential discrimination in market access by existing technology.

We at Fidectus offered to build the specification & testbed and deliver it to EFET. Please find in the following chapter our proposed reference implementation of eSM including the API and communication protocols.

Please note this is not Fidectus' interpretation or a custom build; instead, it is a port of the eSM 2.1 and CpML[4] specification to OpenAPI.

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[1] In reference to chapter 5 of the "EFET eSM – Electronic Settlement Matching Standards Version 2.1, September 2019".
[2] EFET electronic Conformation Matching.
[3] To overcome SOAP limitations, Restful architectures are used: Mumbaikar, S and Padiya, P 2013, "Web Services Based on SOAP and REST Principles", *International Journal of Scientific and Research Publications*, vol. 3, no. 5
[4] Commodity product markup language: https://www.cpml.org/

Proposed Reference Implementation of eSM

Fidectus' proposed **eSM OpenAPI reference implementation** is hosted on **SwaggerHub**.[5] The SwaggerHub is integrating design, visualization and the automated generation of code for energy trader and service provider endpoints (see Figure 1). It allows for design and model of the API according to the eSM specification-based standard. It comes with easy editing, publishing, version control, documentation, commenting & collaboration as well as team management functionalities. Even lifecycle integration and **functional testing of the eSM OpenAPI reference implementation can be performed out-of-the-box** (Trading Party/Service Provider and inter Service Provider Interfaces).
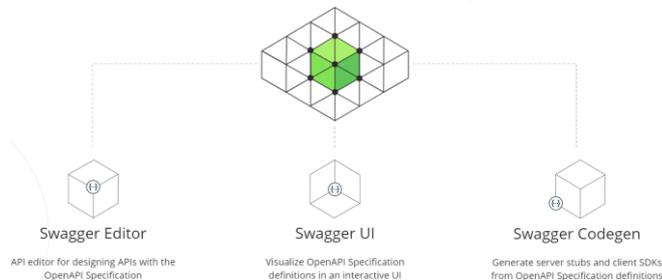

Figure 1 SwaggerHub OpenSource Tools

We have ported all CpML eSM 2.1 schema definitions to the according OpenAPI Specification Version 3.[6] In addition to the already defined **xml** schema, we have also integrated the more recent **json** format. As OpenAPI is file-agnostic, **additional file-formats can be added easily by EFET or CpML in future releases**.

Full transparency as well as low total cost of ownership are inherently supported. However, the eSM OpenAPI reference implementation is so flexible, that it can also be handled in a file itself. SwaggerHub can also be integrated to GitHub which is currently being used by CpML and allows for community-driven collaboration. Please find the full eSM OpenAPI reference implementation here: **https://app.swaggerhub.com/apis/Fidectus/eSM/2.0/**

Communication and Authorisation process

The reference implementation proposes **OAuth2**[7] to provide authorised access to a system. OAuth is an open protocol and current market best practice leveraging a dual token exchange in order to authorize API access. This well-established standard allows for authorisation between mobile, desktop and web-based systems.[8]

When a user (or a trader's legacy system such as e.g. SAP or Endur) sends a request access token to an eSM service provider platform, the platform returns a token to the energy trader's legacy system. The energy trader's system then accesses the secured data with token and API key in request header. Once the authorised connection is established, the authorised data can be exchanged. (see *Figure 2*).
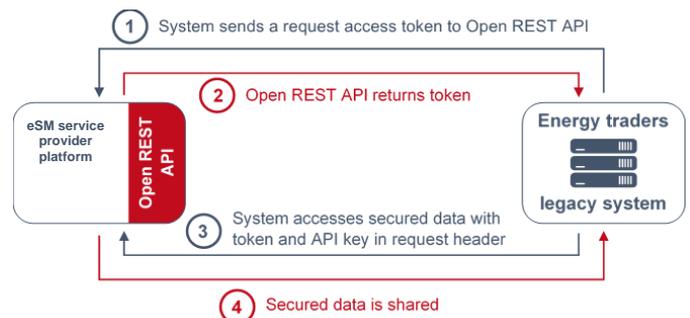

Figure 2 OAuth2 authorization

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[5] https://swagger.io/tools/

[6] https://swagger.io/specification/

[7] https://oauth.net/

[8] Mumbaikar, S and Padiya, P 2013, "Web Services Based on SOAP and REST Principles", *International Journal of Scientific and Research Publications*, vol. 3, no. 5

Fulfilment of EFET's requirements

EFET controlling the standard & avoiding cost to govern and maintain it

Fidectus hereby **hands over** the eSM OpenAPI reference implementation **to EFET BPOC**. Once a decision is made by BPOC, full control can be transferred with immediate effect from Fidectus to EFET BPOC.

As the **governing and neutral industry body, EFET** should always be **accountable** for the eSM OpenAPI standard. The responsibility to maintain and update the eSM OpenAPI can either be executed by BPOC itself, be mandated to CpML or be managed in an open and community-/ industry-driven approach. OpenAPI is based on open, globally supported and community-driven Linux-Foundation. There is a nominal fee or free way to set up in perpetuity to maintain the spec.

Achieving Interoperability

To ensure full interoperability, our proposal follows the AFUL definition: "*Interoperability is a characteristic of a product or system, whose interfaces are completely understood, to work with other products or systems, present or future, in either implementation or access, without any restrictions.*"[9] and the EFET eSM requirements as: "*Companies will thus be able to achieve integration with these different service providers and/or systems without having to develop and maintain a different interface for each.*"[10]

Interoperability is achieved through **three building blocks**, which are now integrated and aligned in one place - the eSM OpenAPI reference implementation:
1. EFET eSM human-readable document[11],
2. CpML machine-readable schemas[12] and
3. Specification of API (i.a. operations, messages, services) and communication protocol with strong encryption.

The eSM OpenAPI is applicable to any connection, no matter if a trading company wants to establish a direct connection to another trading company or via a service provider or even between service providers (see Figure 3).
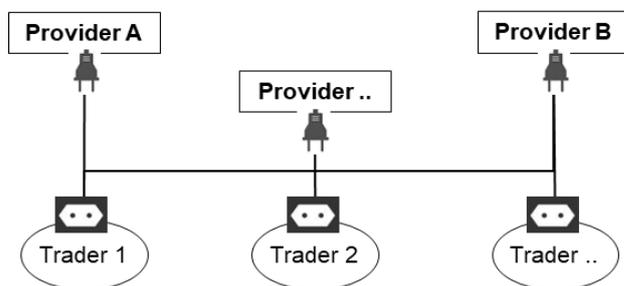

Figure 3 Full Interoperability

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[9] http://interoperability-definition.info/en/
[10] Source: EFET Electronic Settlement Matching, November 2019, Rel 2 - Version 1, page 8
[11] https://www.efet.org/Files/Standardisation/EFET%20eSM%20v2_1.pdf
[12] https://www.cpml.org/specifications.html

Low Total cost of ownership, low Time-to-market, enabling competition and innovation

Technology is a tool to solve business problems and as such one must always consider the total cost of any solution including but not limited to the following: opportunity costs, operational costs, hardware/software, integration, etc.

eSM offers the opportunity to automate a Back-office process using today's best practices. Embracing today's best practices and leveraging modern protocols helps improve the talent pool energy companies will attract as the best and brightest want to develop skills that are portable and advance their careers. Service Suppliers and Integrators will keep human capital costs lower as they too leverage the larger talent pool to create competition for developers, architects and delivery teams.

Larger development teams and pools of experienced resources translates to quicker development and go to market timing. Companies can right size on command, meeting business and market requirements as they surface. In the past, many have complained of the bottleneck created waiting on their legacy integrator to do work on connectors. OpenAPI removes the dependency on a single vendor allowing business great flexibility. With competition, purchasing offices achieve better pricing. The ability to select vendors for eSM on the fly without any custom work ensures matching and bilateral netting quickly achieve commodity pricing with outstanding service as switching is so easy ("Plug'n'Play"). There will be no development work and workflows remain intact ensure vendor lock is a thing of the past.

Economies of scale are achieved as modern architecture abstracts much of the functionality from proven models already deployed. For example, the world's largest financial institutions use Restful technology to rapidly deploy scalable secure applications which ensure data is always protected whether it is in motion or at rest. The community was able to develop scalable, cost effective solutions which meet the stringent security criteria of financial institutions without breaking the operational budget. The shared expertise of thousands of developers across the largest enterprises in the world have vetted the model for years and provide the knowledge base used to develop the best practices we recommend EFET adopt. Why would EFET continue supporting an aged model which encourages the overhead of managing encryption certificates when the rest of the world has found a secure and cost-effective alternative?

Recommending OpenAPI lowers the hurdle to adaption by taking risk out of the equation. EFET embracing OpenAPI sends the message to new market entrants wishing to develop software solutions for the European energy market that they will encounter a level playing field. The cost of capital for start-ups using OpenAPI and modern best practices is less than those chasing propriety solutions resulting in new entrants and lower cost structures.