Estfeed Data Source and Application Integration Process

Process Guide

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30.09.2016	0.5	Copied from Redmine wiki	Urmet Jänes
30.09.2016	0.6	Clarifications, references, initial list of services for 2015 and 2016	Urmet Jänes
14.10.2016	0.7	References to service documentation. Person, usage point kinds described and fixed in service list	Urmet Jänes
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09.12.2016	0.11	GetElectricityPriceHistory, GetWeatherObservationHistory, GasUsagePoints, GasConsumptionHistory	Urmet Jänes
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04.07.2017	1.1	Process diagrams, restructuring	Urmet Jänes
28.07.2017	1.2	Highlighted activities. Removed PoC service list. Mandate object kind list added. Improvements throughout.	Urmet Jänes

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1 Introduction

This document describes the technical steps necessary for a member to join the Estfeed platform and integrate the member's information systems to exchange data with Estfeed. The intended audience are senior members of the technical team managing and performing the activities of of planning and fulfilling an Estfeed integration project.

All sections describing process activities are highlighted like this paragraph. They will provide the cornerstones of a project plan and help in understanding what needs to be done to successfully execute the integration process.

Estfeed service design principles are also explained, among with the current list of services available on the platform.

Organisational procedures (e.g agreements to participate on Estfeed and X-Road) are not covered.

1.1 References

1. Cybernetica AS. Estfeed Protocol Specification. Y-1029-1
2. The Estonian Information System Authority. Data Exchange Layer X-Road. https://www.ria.ee/en/x-road.html
3. Cybernetica AS. Estfeed Service Payload Formats. Y-1028-8
4. ETSI. ETSI EN 319 412-1 Electronic Signatures and Infrastructures (ESI); Certificate Profiles; Part 1: Overview and common data structures. http://www.etsi.org/deliver/etsi_en/319400_319499/31941201/01.01.01_60/en_31941201v010101p.pdf
5. Cybernetica AS. Estfeed Contract Controller Service. Y-1028-7

1.2 Terms and Abbreviations

Adapter	See Estfeed Adapter.
Application	Information System consuming services (data services, device manipulation services, etc) provided by Data Sources.
Data Source	Information System providing a set of Estfeed services.
Estfeed Adapter	Software component that provides an interface to the Estfeed platform.
Information System	Estfeed member's software system that exchanges data over Estfeed.
Open Data	Data not pertaining to a person, as opposed to Private Data.
Private Data	Data containing any information about a specific defined or identifiable person ("Personal data" in the context of data protection legislation).

2 Concepts

2.1 Estfeed Adapter and Protocol

All member information system communication with the Estfeed platform takes place over HTTP-based Estfeed Protocol (see [1] for details). A special adapter server and an X-Road security server serve as the gateways to Estfeed. The servers can be installed on an Estfeed member's premises or hosted by Elering. The former is preferred for high-volume members. The hosted solution, on the other hand, provides for quicker integration and less administration overhead.

Each Estfeed Adapter and services that can be accessed through that Adapter must be enabled centrally by Estfeed administrators.

2.2 Roles of Data Source and Application

Estfeed members are of two types – data/service providers (Data Sources) and data/service consumers (Applications). If a member has both roles, it needs two connection points to Estfeed (one for each role).

A Data Source provides one or more services which are characterised by a standardized data format. The same service may be provided by several Data Sources at the same time, e.g., listing a person’s devices at different market participants. Service use may be initiated by an Application through sending a request, or by a Data Source by publishing data to Estfeed. There are also mandatory services that are required for correct operation of the platform.

An Application uses services provided by one or more Data Sources. See Annexes of this document for the list of the services. Each service is separately enabled for the Application and Private Data services also require consumer approval (mandate) for data delivery. See the figure below on how mandates control access to data.

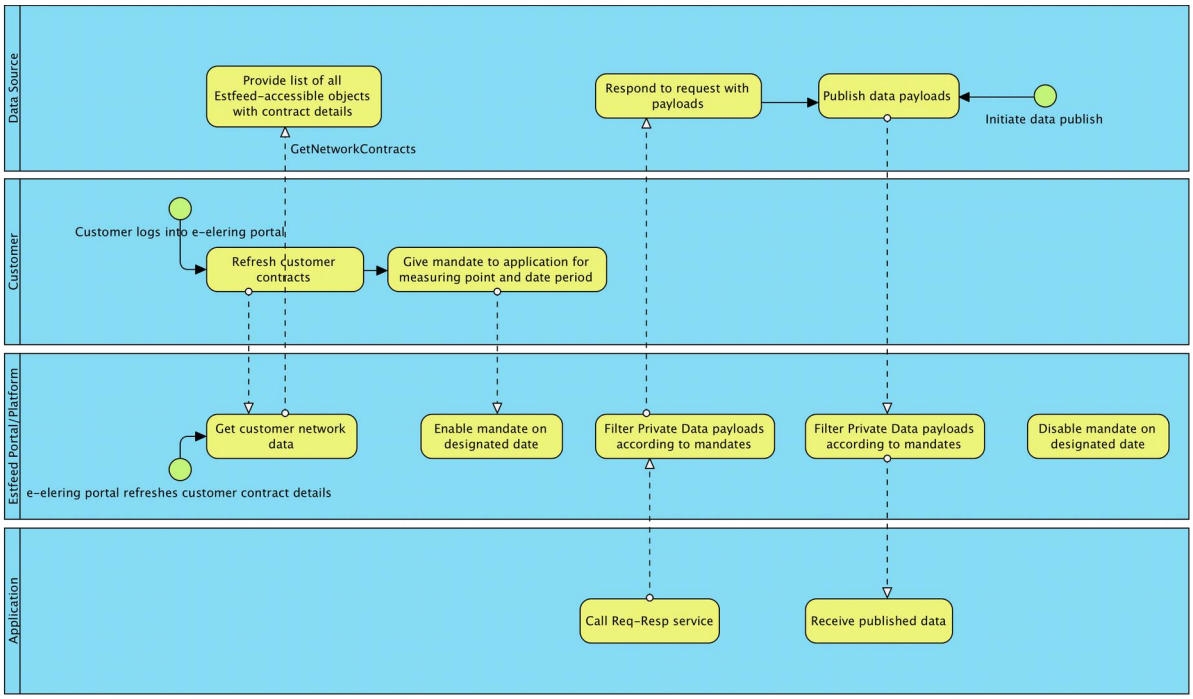

Figure 1. Private Data access process

3 Integration Process Overview

Estfeed integration for a member consists of three separate sub-projects:

1. specifying service formats, choosing what services to use or provide (see Annex B) or if new service specifications need to be developed (see 9.1);
2. developing Estfeed protocol support and data exchange logic for in-house information systems [1];
3. deploying separate systems for development, test, prelive (beta) and live (production) use (see 6).

The complete integration process is detailed below on Figure 2, listing activities by all parties managing Estfeed, X-Road and system development for the Estfeed member. Estfeed-specific parts of the process are handled in more detail by the rest of this document.

Note that in some cases the Estfeed member is not required to carry on all X-Road activities by itself. The hosting provider of a Security Server and Adapter may be able to do much of the X-Road integration as part of a service.

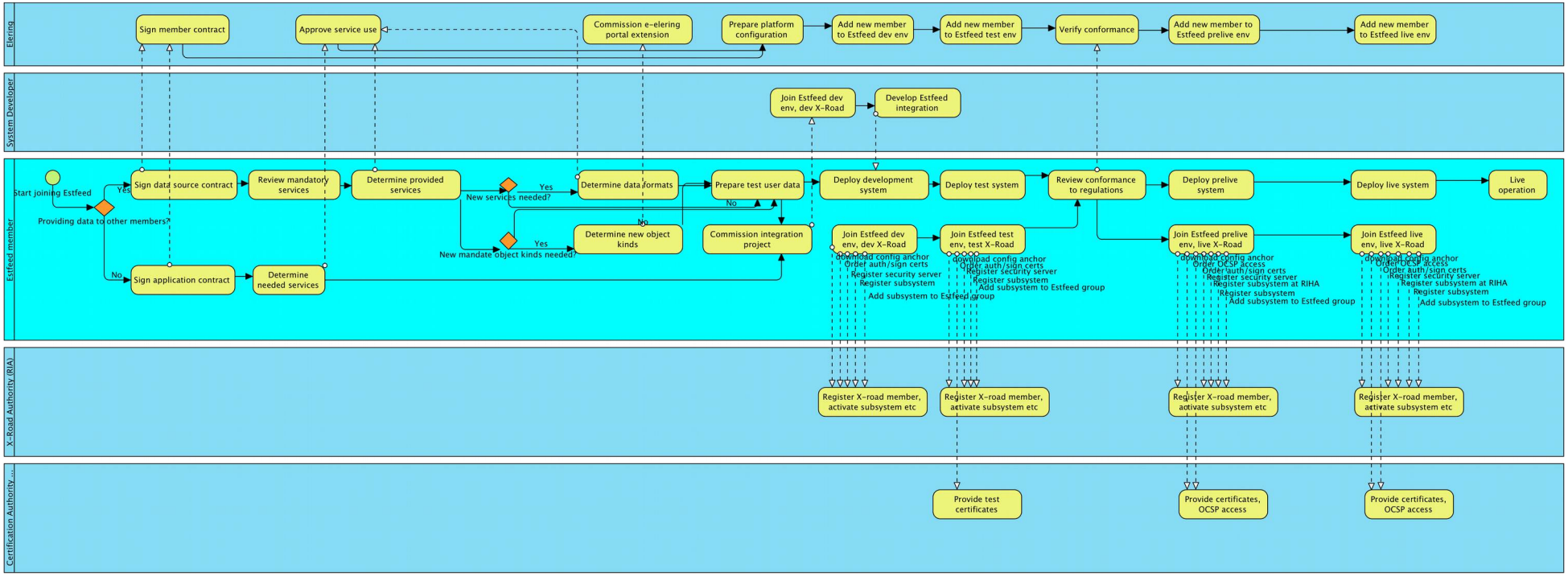

Figure 2. Generic Estfeed integration process

4 Member Information System Interface

To receive and/or send data with Estfeed, each member must develop an integration layer in their information systems. This integration layer will implement the specifics of the Estfeed protocol and services/payloads as appropriate for the member.

1. Decide on an architectural approach of interfacing (e.g., separate IS, modifications to pre-existing software, data mirroring/access, etc).
2. Define the data conversion/mapping rules to/from Estfeed payloads.
3. Develop the Estfeed protocol endpoint.

5 Estfeed Development Environment

The Estfeed development environment supports Estfeed members on platform development and allows to test Estfeed integration in a proven preconfigured environment. The environment is administered and hosted by Elering and uses the X-Road v6 development environment for communication.

Each development team for a Data Source or an Application will have access to (virtual) servers set up by Elering, with the following features:

- Ubuntu with SSH access (unique password or key-based access);
- DMZ-type setup:
  - access to the X-Road security server only;
  - inbound and outbound Internet access to enable linking to test Applications and services in developer environments;
- test Estfeed services, to be able to test/simulate both sides of a data exchange and/or mock specific test cases;
  - one Application Adapter and one Data Source Adapter with corresponding X-Road subsystems, Application and Data Source defined by Estfeed administrator;
  - if necessary, Open Data Request-Response and Publish service linking the Data Source and Application for private tests;
  - additional Adapters can be configured by Estfeed administrator if required;
  - Private Data services and test mandates can be configured by Estfeed administrator if required;
  - access to test Data Sources as required;
  - Adapter logs available on the host;
- test software (on request)

  test Application for interactive sending of service requests and viewing of received data;
  - headless test Data Source for user-configured test scenarios.

The development environment additionally includes test Data Sources for all OpenData services and those Private Data services/Data Sources that have a test Data Source (with mock/hashed data) available. Access to these is enabled when necessary.

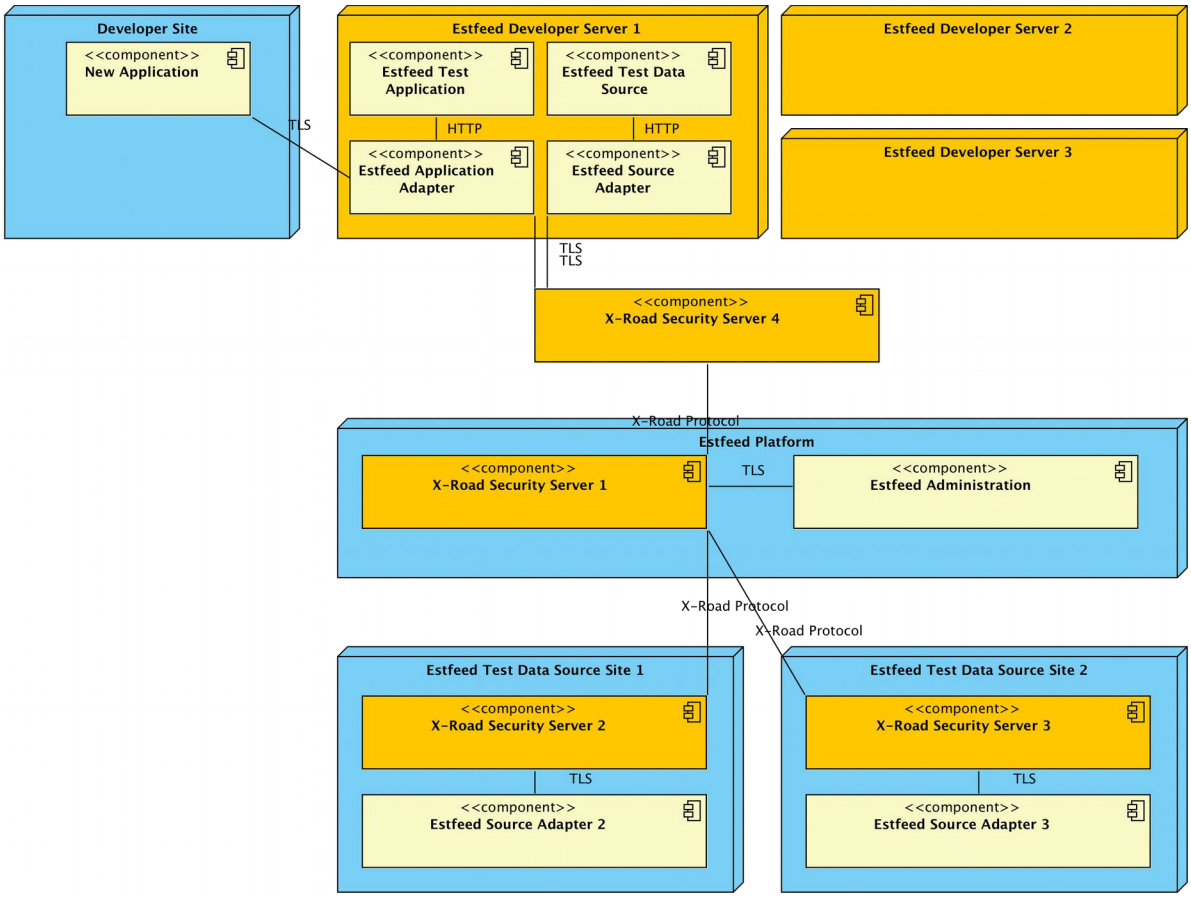

Figure 3. Development Estfeed

Available at various maturity levels are a test client for sending requests, test server to provide a set of preconfigured payloads and triggering of publish, test services providing various kinds of test data (live data for e.g., weather, prices), visibility of Adapter logs to the developer.

Future development: developer pack:

1. Estfeed Java SDK
2. Sample Application, Data Source
3. Postman/cURL sample requests
4. Sample messages
5. Protocol message XSD
6. Documentation – protocol, services, overview

Developer:

1. Request development server setup

Estfeed admin:

1. Register new organisation on X-Road
2. Set up Application and Data Source Adapters
3. Set up new Open Data and Private Data test services for the server
4. Enable services (new and pre-existing), mandate objects
5. Communicate service, mandate object names, Adapter addresses etc.

6 Deployment Environments

In addition to the **development environment** there are Estfeed t**esting, prelive and live environments**. Each Estfeed member must participate on all environments as follows.

1. Development environment
    1. Data Source: real service names and realistic test data (Fresh dates, contents and Publish timing as on live system). The best strategy to provide a test Data Source would be to deploy a copy of the production system with customer identities changed, and a method for copying live data to the test system. Data for specific test person ID-s must be available (see below).
    2. Mock Data Sources allowed for development/testing
    3. Application: development versions
    4. Developer access allowed
    5. Estfeed portal and platform: latest development version
    6. X-Road development environment
2. Testing environment
    1. Data Source: production-ready versions. Real service names and realistic test data (Fresh dates, contents and Publish timing as on live system). The best strategy to provide a test Data Source would be to deploy a copy of the production system with customer identities changed, and a method for copying live data to the test system. Data for specific test person ID-s must be available (see below).
    2. Application: Production-ready versions
    3. Estfeed portal and platform: current or next stable version
    4. X-Road test environment
    5. **NB! The testing environment must be used to assess conformance to relevant regulations (e.g Data Protection Act) before joining the prelive/live environments.**
3. Prelive environment – used for beta testing of next production release with limited access
    1. Production-ready versions of all components (either next release or identical to live)
    2. Data Sources: fully functional live data
    3. Applications: beta versions
    4. Estfeed portal and platform: next production release
    5. X-Road production environment, full legal status
4. Live environment
    1. Production SLA requirements for all Applications and Data Sources.

2. Fully functional live data.
3. Public access for e-elering Portal, public Applications.
4. Estfeed portal and platform: production release.
5. Data Source and Application: production systems.
6. X-Road production environment, full legal status.

All Estfeed members must have processes and systems in place to support **all four** Estfeed environments.

Joining each X-Road environment with an Estfeed Adapter server is a separate process, especially when an Estfeed member deploys an in-house Security Server. Each joining process involves several parties and there are variations depending on the X-Road environment used.

In a very simplified way, setup for a new environment requires the following activities:

1. Set up X-Road Security Server.
2. Set up X-Road Subsystem on Security Server.
3. Connect Subsystem to X-Road and Estfeed group.
4. Add Subsystem to Estfeed configuration.
5. Set up Adapter.
6. Connect Adapter to X-Road Security Server.
7. Connect Adapter to Information System.
8. Enable required services in Estfeed configuration.

7 Test Persons

All test Data Sources (I.e those deployed to Estfeed development and test environments) must provide data for the following mobile ID and ID card Estonian test persons (see http://www.id.ee/?id=36373, http://www.id.ee/?lang=en&id=30494). These are ideal for an Application to test fully integrated functionality with data received from Estfeed services.

- 14212128025 – mobile ID +37200007
- 51001091072 (Lithuanian ID code) – mobile ID +37060000007
- 11412090004 – mobile ID +37200000766
- 47101010033 - ID card MÄNNIK, MARI-LIIS
- 37101010021 - ID card ŽAIKOVSKI, IGOR

8 Application Integration

An Application uses pre-existing services (see Annex B) provided by Data Sources. Thus, the integration process involves understanding what data and services are available, how to implement the Estfeed Protocol and how various regulations apply to the Application and IT environment.

For many use cases, the set of needed services is already clear and used the same way by many members. The services are usually used as a set, for instance `GetElectricityUsagePoints` can be used with a person identifier to retrieve the usage points the person has allowed the Application to see, and then `GetElectricityConsumptionHistory` for each usage point retrieves the actual consumption data.

9 Data Source Integration

9.1 Service Specification

A new service specification needs to be developed if a service provided by a Data Source is of a new kind for Estfeed – the request (if any) and/or data format (service kind) on existing service cannot be reused. This section provides the principles of Estfeed service design.

NB: Many Data Sources can use previously defined services to make their data available on the Estfeed platform. Applications always use the services that are already available. Thus for many users this section just provides background information.

Many services are provided concurrently by multiple Data Sources. These specifications are only developed once and updated in coordination by all involved Data Sources. Estfeed also has provisions for providing multiple versions of a service concurrently. A new version is the preferred way of providing an updated service. Old versions can be decommissioned only when it has been verified that all Applications have moved to new version(s).

Estfeed services as a rule provide data in XML format. Data (payload) may be Private – pertaining to one object (device, measuring point, etc); or Open – not related to any private object.

Each Estfeed service must be accompanied by a service description detailing the logic and payloads, example messages and preferably also by XSD definitions of the payloads.

Steps to specify a service:

1. Assess suitability of current service specifications – both from same industry and others (e.g., is electricity consumption format applicable to LNG as well?).
2. Decide if service provides Private Data governed by the Data Protection Act.
3. Decide mandate object type and format.
4. Develop or reuse a data payload format (service kind) – XSD and field specifications.
5. Develop request format(s), if any.

9.2 Service Naming

A service name should provide understanding about the usage of the service and the data/service it provides. Names like GetElectricityUsagePoints and GetHeatingUsagePoints make it clear that they are Request-Response services that provide usage point lists, respectively for electricity and heating data. Likewise, SendSMS is clearly an SMS sending service.

9.3 Mandate Objects

A Data Source providing Private Data on its own customers must implement the `GetNetworkContracts` Contract Controller |5] service to provide lists of mandate objects to the Estfeed system so that the customers can add mandates for Private Data access.

The new Contract Controller must also be specifically configured in e-elering portal along with identifiers like a domain identifier for the new member.

The list of mandate object kinds in Estfeed is fixed, new kinds require adding to several components across the system as a separate development project. Each mandate object kind has its own naming scheme that ensures uniqueness across different Data Sources.

Mandate object kinds are named hierarchically, e.g `UsagePoint.Electricity` and `UsagePoint.Heating` refer to energy usage points (energy meters) for electricity and heating, respectively.

See the service list (Annex B) and mandate object type list (Annex D) for the full list of supported mandate object kinds.

9.4 Service Kind and Payload Format

The service kind defines the output format of the service – the format of the payload data that is the Estfeed Data message delivered as the output of a service. The service kind can be shared between many services, an example being the electricity and gas consumption history services that use the same generic ConsumptionData data format.

The recommended payload presentation format is XML. When an international standard is available for the kind of data, this should be used. The energy consumption services have been modelled by IEC Common Information Model (CIM) standards, in particular IEC 61968 series.

For services that publish several data payloads at once (e.g., for many mandate objects), it is strongly advised to group many payloads into one message, up to the maximum message size limit. This will ensure maximum system throughput.

The request payload is always service-specific, but the designer of a new payload should model it in similar fashion to current services, to ease the implementation effort of service users.

Private Data response and publish payloads must always reference a mandate object. Private Data requests may reference one, but payloads without an associated mandate object are also permitted. For instance, for a service for querying objects associated with a person, the request payload would contain the person ID and no mandate object codes, while the response would contain several payloads, each for a specific object and associated with that object's mandate object code. Estfeed will then filter the response to only pass the data for which the customer has given mandates for to the querying Application.

Responses to a request do not need to contain payloads. This is beneficial for services that perform an action and do not return any meaningful data. Failures can be communicated with the `error` message.

9.5 Person Identification

Most Private Data services operate on data belonging to a natural or legal person. To avoid ambiguous person references, Estfeed uses a common identification scheme based on [4].

This ETSI scheme encodes a person's identification type and code origin in the same code. See Contract Controller specification [5] for allowed values. For instance, Estonian codes are represented as follows:

- PNOEE-47101010033 – natural person ID code (PNO), Estonia (EE), code 47101010033
- NTREE-12218141 – legal person registry code (NTR), Estonia (EE), code 12218141

In request and response payloads, the field for the person owning the data should be named `Person`.

Annex A Estfeed Service List, 2015 PoC

This section is intentionally left blank

Annex B Estfeed Service List, 2016

This is the list of all active services on the Estfeed platform by end of 2016. Refer to [3] for details.

OpenData services – no personal data involved:

Service Code	Ver	Kind	Type	Publish frequency	Provider	Source of Data	Description
WeatherForecast	v1	WeatherForecast.v1	Publish	Hourly	Elering	Foreca	Forecast of temperature, wind etc for several locations. Hourly weather for 72 hours, 3-hour average for 10 days. Hourly forecast and 3-hour forecast are separate messages.
Weather Observation	v1	WeatherObservation.v1	Publish	Hourly	Elering	Foreca	Measurements of temperature, wind etc in the last 24 hours for several locations. 1 hour average values provided.
DayAheadElectricityPrice	v2	ElectricityPrice.v1	Publish	Daily	Elering	ENTSO-E	Market electricity prices for the next calendar day. Sent as two messages for the previous calendar day (0:00-23:59 EET). Publishes only data that is available at the time of the data retrieval and publish.
GetElectricityPrice History	v1	ElectricityPrice.v1	Request-Response	N/A	Elering	ENTSO-E, Nordpool	Historically published market electricity prices for requested time period.

Service Code	Ver	Kind	Type	Publish frequency	Provider	Source of Data	Description
GetWeatherObservationHistory	v1	WeatherObservation.v1	Request-Response	N/A	Elering		Historically published measurements of temperature, wind etc for requested time period. 1 hour average values provided.

PrivateData services that provide or manipulate personal data:

Service Code	Ver	Kind	Mandate Object Kind	Type	Publish frequen-cy	Provider	Source of Data	Description
GetElectricity UsagePoints	v2	ElectricityUsagePoints.v2	UsagePoint.Electricity	Request-Response	N/A	Elering	AVP	Returns a list of electricity usage points of a person as multiple payloads, one for each mandate object. Request payload includes person ID, type and country does not reference a mandate object.
GetElectricity Consumption History	v2	ConsumptionData.v1	UsagePoint.Electricity	Request-Response	N/A	Elering	AVP	Returns hourly consumption/production data of one usage point as one payload. Request payload includes related person's EIC code (improvement: no person EIC code needed) and time period of the history.
Electricity ConsumptionData	v2	ConsumptionData.v1	UsagePoint.Electricity	Publish	Daily	Elering	AVP	Consumption history for the previous calendar day for a configurable set of usage points. Each publish is a large

Service Code	Ver	Kind	Mandate Object Kind	Type	Publish frequen -cy	Provider	Source of Data	Description
								number of payloads up to the maximum Estfeed message size limit. The service publishes data from AVP avaliable at a predefined time of day. Data format is shared with other consumption services
GetNetworkContracts	v1	ContractController.v1	any kind possible	Request-Response	N/A	all Data Sources	customer register	List of mandate objects related to network contracts a Data Source has for a specific person.
GetGas UsagePoints	v1	GasUsagePoints.v1	UsagePoint.Gas	Request-Response	N/A	Elering	gAVP	Returns a list ofnatural usage points of a person as multiple payloads, one for each mandate object. Request payload includes person ID, type and country does not reference a mandate object.
GetGas Consumption History	v1	ConsumptionData.v1	UsagePoint.Gas	Request-Response	N/A	Elering	gAVP	Returns hourly gas consumption/production data of one usage point as one payload. Request payload includes related person's EIC code (improvement: no person EIC code needed) and time period of the history.
Gas ConsumptionData	v1	ConsumptionData.v1	UsagePoint.Gas	Publish	Daily	Elering	gAVP	Consumption history for the previous calendar day for a configurable set of usage points. Each publish is a large number of payloads up to the maximum

Service Code	Ver	Kind	Mandate Object Kind	Type	Publish frequen -cy	Provider	Source of Data	Description
								Estfeed message size limit. The service publishes data from AVP available at a predefined time. Data format is shared with other consumption services

Annex C Estfeed Service List, planned future services

This is a list of services that are planned and/or designed for future implementation provided there is market demand.

OpenData services – no personal data involved:

Service Code	Ver	Kind	Type	Publish frequency	Provider	Source of Data	Description
SendSMS	v2	SMSResult.v1	Request-Response	N/A	Elering	Telia	SMS sending service, Request payload includes phone number and message.

PrivateData services that provide or manipulate personal data:

Service Code	Ver	Kind	Mandate Object Kind	Type	Publish frequen-cy	Provider	Source of Data	Description
GetDeviceList	v2	DeviceList.v1	EndDevice	Request-Response	N/A	Elering	N/A	Demo service to retrieve a list of devices. Returns multiple payloads, one for each mandate object. Request payload includes person ID, does not reference a mandate object.
Device Consumption	v1	DeviceConsumption.v1	EndDevice	Publish	manual	Elering	N/A	Demo service that can be triggered to publish a device consumption message

Service Code	Ver	Kind	Mandate Object Kind	Type	Publish frequen -cy	Provider	Source of Data	Description
DeviceOnOff	v1	DeviceOnOff.v1	EndDevice	Request-Response	N/A	Elering	N/A	Demo service to demonstrate end device switching
GetHeating UsagePoints	v2	Heating UsagePoints.v2	Legal PersonUsagePoint.Heating	Request-Response	N/A	VKGS	Kamstrup	**Prototype only.** Returns a list of heating usage points of a person as one payload. Request payload includes person type.
GetHeating Consumption History	v2	ConsumptionData.v1	UsagePoint.Heating	Request-Response	N/A	VKGS	Kamstrup	**Prototype only.** Returns hourly consumption/production data of one usage point as one payload. Request payload includes time period of the history. Data format is shared with other consumption services.
Heating ConsumptionData	v2	ConsumptionData.v1	UsagePoint.Heating	Publish	Daily	VKGS	Kamstrup	**Prototype only.** Consumption history for the previous calendar day for a configurable set of usage points. Each publish is an individual message with one payloada large number of payloads up to the maximum Estfeed message size limit. Data format is shared with other consumption services.

Annex D Mandate Object Kind List

Mandate Object Kind	Description
UsagePoint.Electricity	An electricity meter or other electricity measuring device
UsagePoint.Gas	A natural gas meter