

Business Document Exchange Architecture - BEDA

This document is modified on basis of "The PEDRI - an executive summary" written for the PEPPOL project.

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Summary

An instances of a Business Document Exchange Architecture (BDEA) is called a Business Document Exchange Infrastructure (BDX-Infrastructure). A BDX-Infrastructure lets service providers exchange business documents on behalf of their customers (typically private companies or public sector organizations). This model is referred to at the 4-corner model because it lets business partners (two or the four corners) exchange business documents via independent service providers (the remaining two corners). The heart of the BDX-Architecture is a simple, robust, scalable and secure addressing and discovery mechanism. It supports service providers and their customers in discovering business partners and their capabilities.

*The vision of **BEDA** is that:*

Global exchange of business documents between any two business partners should be as easy as exchanging emails.

Purpose

The purpose of this document is to give an overview of the intended architecture of a BDX-Infrastructure. And furthermore to engage the industry in discussions that can lead to a common understanding and final architecture.

Introduction

It is widely recognized that the 4-corner model is the right model for secure and reliable exchange of business documents between business partners.

[explanation of the 4-corner model here]

A complete architecture for instances of the 4-corner model must address interoperability at several levels:

1. Organizational interoperability: Alignment of business processes and business models
2. Legal interoperability: Alignment of legislative frameworks ensures a level legal playing field
3. Semantic interoperability: The content and semantic meaning of business documents
4. Technical interoperability: Transport protocols, security, trust

The biggest obstacles are that are hindering that the 4-corner model in spreading to a comprehensive global infrastructure are:

Lack of interoperable business models. Interconnection between two service providers may ruin the market for other service providers.

Establishing trust between service providers

- Addressing recipients and their capabilities between service providers

[more discussion here]

Architecture overview

A BDX-Infrastructure is a network of connected service providers and their customers. A private company or a public sector institution can be connected to a BDX-infrastructure through an existing service provider or by acting as their own service provider. This section gives an overview of the various components.

[Illustration here - shows service providers and customers in the 4-corner model]

Addressing registries

The heart of the BDX-Architecture is a network of federated addressing registries. These registries store information about the capabilities for exchange of business documents for the connected private companies and public sector institutions from different countries.

This network of e-business registries provides the users/interactors of BDX-Infrastructure with reliable trustworthy information about the participating businesses, the business processes they support and the individual business documents exchanged in each business process..

The private companies and public sector institutions are registered with a globally unique identifier as the key for accessing the information in the registry. This identifier is used for looking up the the receivers address (at which the business documents can be sent to). I.e. the identifier is similar to a postal address and is the key for obtaining information in the registry.

A number of different identifiers can be used as keys in the registries.

[Illustration here]

Using the identifier a number of questions can be asked to the registry. E.g.

- To what address can I send my business document?
- Can I expect an "order change" in return when I send company Y an electronic order?
- What transport standard should I be using when sending an electronic catalogue to company Y?

These questions are off course not asked by humans. The registry is primarily accessed by middleware products that need information about how and where they should send an electronic business document.

The registries are run and managed by various service providers connected to BDX-Infrastructure.

PKI Infrastructure

The use of digital certificates is an important part of any BDX-Infrastructure. A certificate authority issues certificates to be used by service providers in order to support that service providers can exchange business documents with service providers that they have never exchanged business documents with before. Responses from registries are signed with these trusted certificates. Digital certificates are also used for encryption to ensure confidentiality and integrity in the exchange of the documents. The certificates used for encryption does not have to be issued from a recognized certificate authority.

Associated with each registration in the addressing registries is a public key related to a digital certificate. The public key allows the sender of a business document to encrypt the document such that it can only be read by the intended recipient. The recipient uses a private key to decrypt the message.

The certificate used for encryption may or may not be issued by a recognized certification authority. If the registry operator allows registrations with self issued certificate (e.g. if a PGP key is used) then the registry operator is required to authenticate the user or the organization behind the registration by other means. The reason for this is that in case of disputes about one or more registrations, it must be possible to trace back exactly "who did what and when" with the registrations. The registry operator is only accountable for performing authentication and for logging all interactions. What is registered in the registry is the responsibility of the organization behind the registration.

Access points

An access point is a gateway that allows an existing infrastructure to connect to an BDX-Instance. An access point consists of two sides:

- A local side facing the chosen middleware solution for the local infrastructure,
- A an BDX-Instance side facing the standardized an BDX-Instance interfaces.

The local side is build on the basis of commercial and/or open source off-the-shelf software (i.e. message oriented middleware), whereas the an BDX-Instance side is implementing a standardized adaptor developed for the an BDX-Instance specifications.

Access points should have the ability to use existing services (such as PKI services etc.) and may use a shared registry infrastructure, depending on registry infrastructure mechanisms scheduled to be defined in a near future.

Transport protocols

[Here we will explain that different transport protocols can be used. It is important that any BDX-Infrastructure has a default transport protocol which must be supported by all Access Points (service providers).

Addressing Registry infrastructure

The fundamental requirement for a registry infrastructure is that it must allow a sender or gateway to discover the recipient endpoint in order to deliver a business document to the recipient - whether the recipient endpoint is an access point, an proxy chosen by the recipient, or a technical endpoint set up by the final recipient - and that discovery is a machine-to-machine process.

In order to discover this endpoint, the sender or gateway should be assumed to know as little as possible information about the recipient or intermediaries between the sender and

the recipient, apart from the information that is common to all or most business documents exchanged. This may be as little as:

- A business level identifier, representing the recipient organization
- The type of the business level identifier
- A country code representing the country of the recipient
- The type of document that the sender wants to send

The fundamental requirements for the operation of the registry infrastructure is

- That it must be scalable
- It should be as decentralized as possible
- Every recipient endpoint in the infrastructure must be discoverable for every sender

It would be desirable for the registry infrastructure to support independent, commercially driven registry operators, that may connect into the registry infrastructure within some legal agreement framework. Assuming these properties of the infrastructure, it should be expected that a large number of independent registries will be operated.

Discoverability

A fundamental challenge of the registry infrastructure is *discoverability*, i.e. to ensure that

- Registries are discoverable
- Recipient endpoints are discoverable

In a BDX registry structure, there are two kind of registry entities in the registry infrastructure:

1. **Service Metadata Locator** - which hold references to other registries in the infrastructure
2. **Service Metadata Publisher** - which hold information on recipient endpoints and their properties, or *endpoint metadata*.

In a decentralized registry structure, in order to find a recipient endpoint, the sender (or a sender proxy) must find a suitable *addressing registry* to look up the recipient endpoint, based on metadata known about the recipient.

For the discovery of *e-business registries*, the only information available for the sender is the business ID and / or country code.

Discovering recipient endpoints

When the relevant *Service Metadata Publisher* has been found, the sender can perform a lookup based on

- The business identifier and identifier type
- The type of document
- Various required capabilities of the endpoint, e.g. transport profile and semantic properties

Governance

References

Terminology

Addressing registry - contains information about the e-procurement capabilities for exchange of business documents for the an BDX-Instance-connected private companies and public sector institutions from different countries.

Addressing registry operator - A private company or a public sector institution hosting an addressing registry. The customers of the operator can be registered in the registry.

Business document - A business document is an electronic document used to communicate business transactions between companies and private sector institutions. Examples of business documents within the procurement domain are electronic product catalogues, orders and invoices.