CEN

WORKSHOP

AGREEMENT

CWA 16049

December 2009

ICS 35.240.60

English version

Assessing new business processes and technologies for eInvoicing

This CEN Workshop Agreement has been drafted and approved by a Workshop of representatives of interested parties, the constitution of which is indicated in the foreword of this Workshop Agreement.

The formal process followed by the Workshop in the development of this Workshop Agreement has been endorsed by the National Members of CEN but neither the National Members of CEN nor the CEN Management Centre can be held accountable for the technical content of this CEN Workshop Agreement or possible conflicts with standards or legislation.

This CEN Workshop Agreement can in no way be held as being an official standard developed by CEN and its Members.

This CEN Workshop Agreement is publicly available as a reference document from the CEN Members National Standard Bodies.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No.:CWA 16049:2009 E

Contents

Foreword

This CWA has been prepared by the CEN/ISSS Workshop on 'eInvoicing Phase 2' (WS/eInv2)

The CWA has been approved at the final workshop plenary meeting on 10 September 2009.

This CEN Workshop Agreement is publicly available as a reference document from the National Members of CEN: AENOR, AFNOR, ASRO, BSI, CSNI, CYS, DIN, DS, ELOT, EVS, IBN, IPQ, IST, LVS, LST, MSA, MSZT, NEN, NSAI, ON, PKN, SEE, SIS, SIST, SFS, SN, SNV, SUTN and UNI.

This CWA is part of a set of CWAs that has been prepared by Phase II of the CEN/ISSS Workshop on Electronic Invoicing in the European Community.

The objective of this Phase of the Workshop is to help to fill gaps in standardization for the use of electronic invoice processes, to identify the various practices in member states, to integrate the emerging technical and practical solutions into effective good practices, and to define and disseminate these good practices for eInvoices in close coordination and cooperation with private industry, solution providers and public administrations.

Five initial Projects have been established with a view to supporting the:

1. Enhanced adoption of electronic invoicing in business processes in Europe;
2. Compliance of electronic invoice implementations with Council Directive 2001/115/EC and Directive on the Common System of Value Added Tax (2006/112/EC as well as Member States' national legislation as regards electronic invoicing.;
3. Cost-effective authentication and integrity of electronic invoices regardless of formats and technologies;
4. Effective implementation of compliant electronic invoice systems in using emerging technologies and business processes; and
5. Emerging network infrastructure of invoice operators throughout Europe.

In addition, the Workshop has assumed the overall responsibility, as far as CEN is concerned, for the standards aspects of the European Commission's expert group on electronic invoicing, complementing and linking with the relevant Commission groups, and ensuring the relevant global standards activities are correctly informed and primed. . In this activity, it aims to ensure collaboration with other CEN/ISSS groups, including WS/eBES, with UN/CEFACT (TBGs1 and 5), ISO TC 68 and ETSI/TC ESI.

The CEN eINV2 WG4 consists of:

Adrian Mueller Technical Expert / Mueller Consulting
Andrea Caccia Member / Innovery
Francis Berthomieu Member / Orange
Anders Grangard Member, WS Co-Chair / GS1 International
Otto Mueller Member / Mueller Consulting
Wolfgang Eckert Member / Deutsche Post
Klaus Foerderer Member / GS1 Germany
Peter Potgieser Member / ABN AMRO
Erwann Revolt Member / Orange
Dirk Weidenbach Member / xft

Companies supporting the current CWA

Accelya, France
ACEAT, Tax Agency of Spain, Spain
Adobe Europe, United Kingdom
Agenzia della Entrate, Italy
AITI, Association of the Italian Corporate Treasurers, Italy
ARIBA, Germany
Atos Origin, The Netherlands
AUDI AG, Germany
Austria Pro, Austria
B2boost SA, Belgium
BMW AG, Germany
Campus 02, Austria
CBI Consortium, Italy
Datacert, United Kingdom
Deutsche Post, Germany
Dr. Otto Mueller Consulting, Switzerland
EDIFICE
ELMA, Finland
EQUENS, The Netherlands
FHNW, Fachhochschule Nordwestschweir, Switzerland
FIR-DIG Consultants, Italy
FMS Group, Italy
France Telecom, France
GS1 international, Belgium
Hilti A.G., Liechtenstein
IBM, United Kingdom
Infocert spa, Italy
Innovery spa, Italy
Itella Information AS, Estonia
Legal Counsel Engel-Flechsig, Germany
Ministerio de Industria, Turismo y Comercio, Spain
MKE, Belgium
Odette International ltd., United Kingdom
RBS, The Netherlands
SFTI, Sweden
STS Group, France
Sofid/eact, Italy
TecCom GmbH, Germany
Thales, United Kingdom
The Netherlands Tax and Customs Administration, The Netherlands
Tieke, Finland
Trustweaver, Sweden
VAT Forum cv, Belgium
Verband der Automobilindustrie e.V., Germany
XFT GmbH, Germany

Introduction

In eBusiness rapid evolution and development occurs, where the uptake of eInvoicing is an example. Within this steady flow of innovation, business processes are continuously streamlined, new technologies are implemented, business processes are adapted for eInvoicing and a continually growing number of documents describing this development is produced.

These documents have a wide range of (professional) backgrounds, serve several purposes, describe different business models and have an even larger number of definitions used for explaining the particular document, its background and purpose.

In this environment new business process cycles and technologies emerge, are developed or are adapted for eInvoicing and need to be accepted in the market and by the regulators, especially the VAT administrations. Therefore, a generally understandable methodology and guidance is required for any market participant who wants to assess a new eInvoicing-related technology concerning its potential, i.e. its suitability to be used within one or more eInvoicing process steps**.** The methodology should also be applicable when *adapting* or *designing* a technology or business process to use for the benefit of eInvoicing.

For this purpose and in order to identify the impact of emerging technologies on eInvoicing a framework for common understanding is needed as a benchmark for the assessment. This framework must provide the ways and means for categorisation of eInvoicing-related topics and can also serve as a basis for discussion and a reliable source for consultation.

In order to classify a new technology or business process within the “big picture” this framework must also give a high-level overview over existing models of interaction between seller and buyer to efficiently exchange electronic invoices. In addition, it must reflect the requirements stipulated by the regulations.

1. Scope

The present CEN Workshop Agreement gives guidance for the assessment of new technologies and business processes. The result of the assessment is a high-level (approximate) analysis on how technologies and business processes can be integrated into the eInvoicing environment. The analysis shows the compliance with (legal and organisational) requirements - or the according gaps - and gives guidance for implementation to the business community. These requirements include Value Added Tax (VAT) legislation but are not limited to it. They comprehend accounting, company and commercial law, as well as any other kind of regulation. Therefore, the assessment guidelines are not only aimed at implementing VAT-compliant eInvoicing, but at eInvoicing in general. The methodology chosen consists of following a few well-defined steps. It consists of comparing the new technologies or business processes against a framework describing the eInvoicing environment.

The framework consists of four abstraction layers which

- contain the terminology to be used,
- show the interrelation with the basic interaction models in place,
- allow that any new process steps can enhance, replace or seamlessly be integrated into existing processes,
- allow to identify the process steps where a certain new technology can be applied to.

In order to achieve a practice-oriented procedure and a short learning curve the methodology follows a bottom-up approach. The assessment starts with the investigation of the specific properties of the new technology or business process and then positions these properties against the framework by comparing them step by step with the said abstraction layers bottom-up.

This CWA aims at European eInvoicing professionals as target audience. The framework allows to categorise the different aspects of eInvoicing in order to assess developments in eInvoicing, may they be the application of new technologies or the adaptation and customisation of business processes. As it contains a comprehensive list of definitions, it also enables to discuss eInvoicing on an international level more intensely, without risking the possibility that the parties concerned are miss-communicating due to different contexts. Therefore, the document is also for use within an extended audience with an interest in eInvoicing.

2. Normative References

The following normative documents contain provisions which, through reference in this text, constitute provisions of this CWA:

[1] COUNCIL DIRECTIVE 2006/112/EC of 28 November 2006 on the common system of Value Added Tax

[2] CWA 15582, eInvoice Reference Model for EU VAT purposes specification

[3] CWA 16047, E-Invoicing Compliance Guidelines - Commentary to the Compliance Matrix

3. Definitions, symbols and abbreviations

3.1 Definitions

See Annex A for an extensive list of definitions.

3.2 Abbreviations

AS2	Applicability Statement 2
ASF	Atom Syndication Format
ebXML	electronic business using XML
ETSI	European Telecommunications Standards Institute
HTTP	HyperText Transfer Protocol
IETF	Internet Engineering Task Force
MD	Message Domain
MIME	Multipurpose Internet Mail Extensions
REM	Registered E-Mail
RFC	Request for Comments
OFTP	Odette File Transfer Protocol
TS	Technical Specification
UN/EDIFACT	United Nations/Electronic Data Interchange For Administration, Commerce and Transport
XML	eXtensible Markup Language

4. eInvoicing Framework

4.1 Introduction

As discussed in chapter 1 “Scope” the eInvoicing Framework is a generic and comprehensive model for assessing the relevance and impact of new technologies, (business) processes, products and services. The framework focuses on eInvoicing topics, but takes also into account that eInvoicing is embedded in an entire electronic) order-to-payment cycle. The framework consists of four generic layers or levels that are applied to/instantiated for eInvoicing:

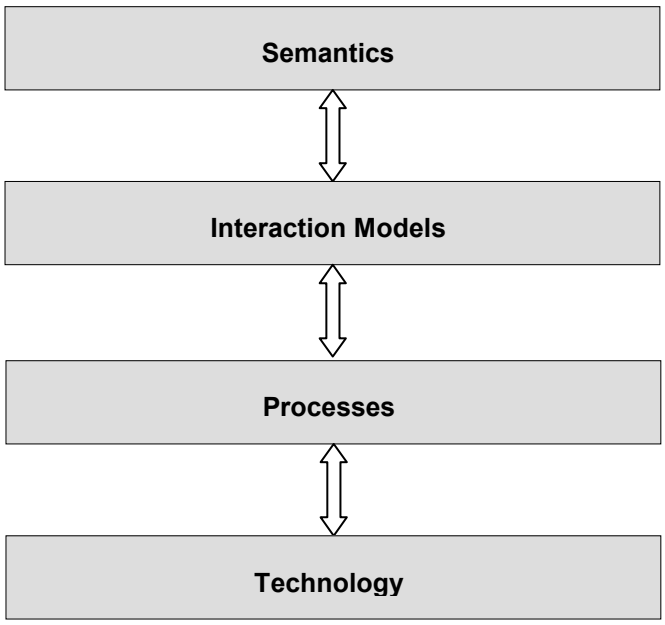

Figure 1 - eInvoicing Framework

The layers are specified by the following short descriptions:

- **Semantics**
  The Semantics layer is the topmost layer within the framework. It consists of a set of common agreed unambiguous definitions for terms in the layers beneath. This tier guarantees the usage of terms that are unambiguous within the context of eInvoicing and eProcurement. It provides a basis for communication without misunderstandings that could otherwise be caused by the usage of terms, which have different definitions in different context domains.

- **Interaction Models**
  The layer of Interaction Models deals with the high-level business view on how sellers and buyers organise the transfer of invoices, i.e. how many service providers are involved and which of their services are used.

- **Processes**
  Within this layer the processes and their components are situated. This includes the process steps down to the “atomic” functional modules.

- **Technology**
  Within this layer the specific technologies are situated. These technologies, whether they have already been established or are still under development, serve to implement the processes of the superordinate layer.

4.2 Semantics

Special consideration is given to the topmost layer “Semantics” in order to provide an easy level of understanding on terms and their definitions in a common list of definitions. The word ‘semantics’ in the context of this CWA is defined as: *the relationships between terms and their definitions or sets of definitions*. The fact that for one term different definitions may exist is a source of misunderstanding and confusion. It is therefore necessary to differentiate any ambiguous term according to its background/context and to provide terms defined uniquely within the context of eInvoicing. Therefore, one can effectively use the resulting definitions including the background and purpose of these definitions for communication, discussion, innovation, development and implementation.

Hence, the purpose of this section is to provide the target audience with a list of definitions that enables one to:

- compare the terminology used in the documents specifying new business processes and technologies with the list of definitions and specify any imprecise or unsuited definitions;
- identify the terms in the named documents that have synonyms in other documents;
- identify which terms are best suited to be used in communication and/or discussion based on that definition and its description.

It is important to consider the different backgrounds of the target audiences based on the different areas of expertise that play a role within eInvoicing, e.g. VAT legislation, supply chain management or technical know-how.

See “Annex A: List of Definitions” for a detailed enumeration of terms and their definitions. It is provided as a sample which may be utilised as a basis of an agreed set of terms and definitions. This enumeration may also be used as a basis for dynamic collaboration systems (e.g. Wikis) in order to update, enhance and refine this list of definitions.

4.3 Interaction Models

The layer of Interaction Models deals with the high-level business view on how sellers and buyers organise the transfer of invoices and the exchange of related documents. It covers the “strategic” decisions upon eInvoicing implementation, i.e. within this tier, the partners imply the number of involved parties in the exchange of invoices and the according separation and allocation of obligations between these parties. They choose their service provider(s) or use a bilateral exchange. Out of these Interaction Models, result the according organisational interfaces. The named strategic decisions depend mainly on the amount of transferred invoices (a bigger amount justifies higher investments on the sides of the partners), but also on the fact if the exchange is domestic or cross-border and on the complexity of the underlying processes.

As the number of contractual parties constitutes the legal set-up, the Interaction Models layer is also the tier of contract law where it is specified which “components” of the subordinate Processes layer have to be applied for compliant eInvoicing and how they are attributed to the parties. Please note that in the “4-corner” Interaction Model two or more service providers exist; still, a seller or buyer has a contractual relationship with only one service provider in the exchange chain. Therefore, the “4-corner-“ and the “multi-corner-model” are not distinguished as they imply the same contractual relations between seller and buyer and their service providers.

The Interaction Models for e-invoicing can be specified as follows:

- **Bilateral model**
  Within the bilateral model the seller and the buyer organise and stipulate the exchange of invoices between themselves in a one-to-one relation and act as direct contract parties. Please note that this model does not exclude that one of the two parties may rely on the help of a technical enabler for the implementation and operation of the invoice-transfer, as the technical implementation does not affect the agreement between the two parties.
  The bilateral model can be further divided into the following sub-models:

- **Seller-Buyer direct**
  Each party performs the same steps as when transferring paper invoices, i.e. the seller's workflow ends with the sending of the issued invoice and the buyer's rights and obligations start with the receipt of the invoice. Both parties handle their infrastructure independently.
- **Seller direct**
  The invoice sender provides an infrastructure (e.g. a web-portal) to allow customers to view invoices electronically and usually provides access to other services as well. This method is often used by utilities and telecom operators.
- **Buyer direct**
  Within this sub-model the buyer's infrastructure provides a function that is used by the seller for the issuing of an electronic invoice. Typical examples are web-portals of buying organisations which are used by their trading partners.

- **3-corner model:**
  The 3-corner model describes the exchange between the seller and the buyer both utilising services of the same provider, i.e. the trading partners each have separate contractual relationships with the same service provider.
  Technically speaking, the parties are connected to a single hub. This hub is the service point for the consolidating, dispatching/sending and receiving of (invoice) messages and usually additional services like the creation/signing of an invoice or its technical verification.

- **4-corner model (and multi-corner model):**
  As in the 3-corner model, each trading partner utilises the services of a contracted provider for the exchange of (invoice) messages. Within the 4-corner model the trading partners make use of the services of two different contracted providers; these service providers have to organise the exchange of information between themselves. In certain cases the service providers do not have a direct agreement with each other and communicate with the help of one or more intermediaries. This is indicated by the term *multi-corner model*.

4.4 Processes

This level contains the organisational processes that have to be performed in order to provide eInvoicing compliant to VAT and other relevant regulations. The "Processes" layer can be further divided into three sub-layers:

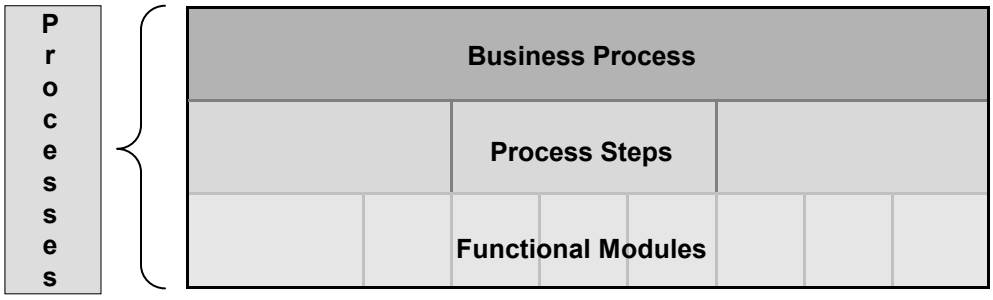

Figure 2 - Sub-Layers in the "Processes" Layer

Business Process
This sub-layer contains the entire (cross-company) business process cycle. Specifically, this includes the process of eInvoicing, i.e. generating, transmitting and controlling an invoice (including any related data or documents) from the seller to the buyer (or from the buyer to the seller if the variant of self-billing is applied) with electronic means. Within the context of eInvoicing the Business Process is either

- **Conventional (supplier-organised) billing** or
- **Self-billing**

Within this sub-layer also other business processes with similar requirements are located. They may therefore be adapted for eInvoicing (compare the example of Registered Electronic Mail [REM] within section "5.3 Assessment of business processes").

Process Steps
The process steps are the operational components of the invoicing business process.

CWA 16047 "e-Invoicing Compliance Guidelines" describes in chapter 6.3 the relevant process steps of an eInvoicing process cycle. These are the appropriate and necessary steps to complete the procedural workflow of an eInvoice life cycle.

The according process steps for the exchange of an eInvoice are the following:

1. **Prepare invoice data:** Preparation of the invoice data required to issue an invoice
2. **First mile:** Transmission of the invoice data from the supplier to its service provider
3. **Create invoice:** Creation of the invoice in the agreed format
4. **Send or make available:** Exchange of the eInvoice or its deposition at a web-address for collection
5. **Receipt and technical verification:** Entering of the invoice into the receiving system followed by technical checks (e.g. syntax or signature verification)
6. **Formal verification:** Checking of the correctness of required content (e.g. date or VAT numbers)
7. **Last mile:** Transmission of the invoice from the service provider to the destined recipient
8. **Material verification and processing:** Handling of the invoice data according to business rules

Please note that steps 2. "First mile" and 7. "Last mile" are not performed in the bilateral model as they describe the communication with a service provider.

For a detailed description of these process steps please consider CWA 16047 "e-Invoicing Compliance Guidelines" chapter 6.4.

Functional Modules
According to business process modelling the process steps are iteratively broken up into smaller processes until a further division is not useful anymore. Out of such a division result the "atomic" functional modules (also referred to as *"basic processes"*) which the processes and process steps are composed of. Such a functional module can be a building block of different process steps.

CWA 15582 "eInvoice Reference Model for EU VAT purposes specification" is the result of business process modelling applied to eInvoicing and lists functional modules of eInvoicing.

These functional modules are either positioned within a company or situated within a clearly defined organisational interface with business partners. Therefore, their exact procedural flow may be subject to compliance auditing. The outcomes of the functional modules may be the topics of contractual agreements within the Interaction Models layer.

CWA 15582 "eInvoice Reference Model for EU VAT purposes specification" lists the following functional modules in the eInvoicing environment:

- **Scanning**
- **Conversion**
- **Communication/Transportation**
- **Authentication**
- **Integrity**
- **VAT Compliance Checking**
- **Printing**
- **Storage**

Please note that this list may be extended.

4.5 Technology

Within this layer the specific technologies are situated. They serve to implement the functional modules and process steps of the eInvoicing process of the superordinate layer, i.e. they have to be considered under the aspect of ensuring compliance.

When identifying new technologies and distinguishing them from established technologies one has to consider that this distinction is sometimes arbitrary. It has further to be taken into account that a technology that is established in another context may create a new effect when used within eInvoicing, i.e. is a tool for (VAT-) compliant and cost-effective eInvoicing.

What has been stated above can be demonstrated with the following examples:
The producing, exchanging and receiving of UN/EDIFACT invoice messages has been established for a long time. The same holds true for the transport of these messages over the Odette File Transfer Protocol (OFTP). The arising of OFTP version 2, which offers additional features, compared to the predecessor version, e.g. concerning authenticity and integrity, opens up new possibilities for the implementation of compliant processes.
Another example of a specification for the transport of messages (with similar features like OFTP v2) is the “Applicability Statement 2“ (AS2). AS2 is already well established for certain big market players in the supply chain but under the aspect of additional market potential to be exploited, i.e. the exchange of electronic invoices between small enterprises, it has to be regarded as a new technology.
More examples of new technologies are ebXML messaging services for the transport of invoice messages or the Atom Syndication Format (ASF) for web-publication.

5. Assessment methodology

5.1 Overview

Assessing technologies and business processes using the eInvoicing Framework comprehends the systematising of these technologies and business processes in a practice-oriented way. It must be applicable with a short learning curve. The purpose of such an assessment is to get a quick but reliable overview of the possibilities of a technology or business process. Therefore, the assessment procedure follows a bottom-up approach and the workflow consists of few and well-defined steps. “Bottom-up” means that the assessment starts with the investigation of the specific properties – i.e. the tasks that can be performed - of the technology or business process. Then these properties are positioned within the eInvoicing Framework by comparing them step by step against the layers superordinate to the technology and processes layer.

5.2 Assessment of technologies

The steps for assessing a technology are the following:

1. The technology to be assessed is introduced into the technology layer by identifying the according specifications, standards and documentation for this technology.

2. The assessment within the process layer (see section 4.4 Processes”) includes the two following sub-steps:

   - Which functional modules are implemented by the technology? Check which functional modules can be performed with the technology to be assessed.

   - Which process steps contain the identified functional modules? Check which eInvoicing process steps as described in the “processes” section include the functional modules identified in 2.1 by assessing for each process step which of the functional modules it includes.

3. Checking for which interaction models the use of the technology is suited.
   (See chapter 4.3 Interaction Models” for an enumeration of the interaction models.)

4. Examine if the specific terminology is compatible with the definitions used in the semantic layer. This is done by comparing the terms applied in the documents specified in step 1 with the terms and definitions from Annex A “List of Definitions” and check if the definitions are consistent.

   4.1 If this comparison fails and mismatches show up, the terminology has to be aligned. After completion of the alignment, the assessment is started again at step 2.

5. Decision of implementation according to the role of the assessor within the interaction model(s) and according to market needs for enhancing the eInvoicing process.

6. During implementation of the technology the e-Invoicing Compliance Guidelines for the according process steps are considered.

The specific example below serves to demonstrate how this procedure model can be applied in practice. The example chosen is the specification “Applicability Statement 2” (AS2) which is a specification for the reliable transportation of any kind of data over HTTP. AS2 is often used to transport EDIFACT-messages.

1. AS2 is specified in IETF RFC 4130 “ MIME-Based Secure Peer-to-Peer Business Data Interchange Using HTTP, Applicability Statement 2 (AS2)”.

2. Processes:

   a) Functional modules:

   - Communication/transportation is performed
   - Authentication may be secured/guaranteed
   - Integrity may be secured/guaranteed

b) The Process steps:

- First mile
- Send (or make available)
- Receipt and technical verification
- Last mile

include the functional modules communication/transportation, authentication and integrity and thus can benefit from the technology AS2.

3. Interaction models:

   - AS2 can be applied within all interaction models.

4. Semantics:

   - The terms and their definitions used in IETF RFC 4130 " MIME-Based Secure Peer-to-Peer Business Data Interchange Using HTTP, Applicability Statement 2 (AS2)" are consistent with the definitions in Annex A "List of Definitions". The same holds true for the RFCs that RFC 4130 is based upon. (See chapter 1.1 "Applicable RFCs" of RFC 4130.)

5. A possible decision step might look like the following:
   A service provider within a 3-corner-model decides to implement AS2 for the first mile and the last mile steps, i.e. to offer communication over AS2 for sellers and buyers. Therefore, the other process steps identified in step 2.2 (send and receipt) are not affected by a migration to AS2. In terms of functional modules this means the module communication/transportation is enhanced in the service provider's service offering.

6. For the specific implementation of AS2 for their customers, this service provider considers the risks, requirements and controls in the e-Invoicing Compliance Guidelines for the process steps first mile and last mile in order to avoid any pitfalls.

5.3 Assessment of business processes

The assessment of a business process using the eInvoicing Framework follows a similar approach as the assessment of a technology described in chapter 5.2 Assessment of technologies".

The according steps are the following:

1. Identify the eInvoicing relevant process steps of the business process to be assessed.

2. Check which process steps of the eInvoicing process (see 4.4 Processes") are covered by the business process. Check also if the steps which are not covered by the business process and which are performed by the existing or traditional procedure are affected by unwanted side-effects of the business process.

   If the steps not covered are affected seriously, i.e. if side-effects are likely to emerge, reject or improve the business process.

3. Checking which interaction models can profit from/make use of the technology.
   (See chapter 4.3 Interaction Models" for an enumeration of the interaction models.)

4. Examine if the specific terminology is compatible with the definitions used in the semantic layer. This is done by comparing the definitions applied in the documents describing the business process (and underlying technologies) with the terms and definitions from Annex A "List of Definitions" and check if the definitions are consistent.

   If this comparison fails and mismatches show up, the terminology has to be aligned. After completion of the alignment, the assessment is restarted at step 1.

5. Decision of implementation, i.e. adaptation of the business process to eInvoicing according to the role of the assessor within interaction model(s) and according to market needs for enhancing the eInvoicing process.

6. During adaptation of the business process the e-Invoicing Compliance Guidelines for the according process steps are considered.

The specific example below serves to demonstrate how this procedure model can be applied in practice. The example is as follows:

A service provider is entitled to transport electronic messages as registered mail according to postal law. This is also known as Registered Electronic Mail (REM). Such a REM-solution needs to comply with the national legal regulations and has to organise the process flow and implement the technical application accordingly. The REM-solution in the example is (technically) implemented according to ETSI TS 102 640 V1.1.1 "Registered Electronic Mail (REM); Architecture, Formats and Policies".
The service provider aims at enhancing his service to a business process, i.e. using the REM-solution for eInvoicing. It therefore assesses its solution for compliance with eInvoicing practices, i.e. the process steps of REM are compared with the process steps necessary for eInvoicing and it is considered how these steps have to be rearranged and how the process flow has to be adapted.

In short, the business process would be adapted by using a REM-infrastructure as an eInvoicing-infrastructure:

1. ETSI TS 102 640 part 1 "Architecture" describes in Annex A the actions flows. Hence, the according process steps which are eInvoicing-relevant can be identified:
   Submit message to sender's REM-MD (Message Domain), Message forward to recipient's MD, Delivery of Notification, Message download by recipient/delegate, Message delivery to recipient, Message retrieval by recipient/delegate.

2. A REM solution can

   - be applied to the process steps: first mile, creation of invoice, Send or make invoice available, Receipt and technical verification of invoices, last mile.

   - NOT be applied to the process steps: prepare invoice data, formal verification of invoices, material verification and processing.

   → The steps "prepare invoice data" and "material verification and processing" which can not be performed with the REM solution are performed at the sites of the seller and buyer. For the step "formal verification of invoices" the following applies: This step may be performed at the buyer's side or the service provider has to extend the REM solution to perform this step. These are also the steps which are at risk to be affected by side-effects. However, these risks are minimised by implementing a REM-solution with standardised interfaces as specified in ETSI TS 102 640-1 V1.1.1 "Registered Electronic Mail (REM); Architecture, Formats and Policies".

3. The REM solution is suited for a 3-corner model. A REM solution that is enabled (has implemented the according interface) for the communication with other REM-service-providers is also suited for a 4-corner model.

4. The terminology in ETSI TS 102 640 V1.1.1 "Registered Electronic Mail (REM); Architecture, Formats and Policies" is compliant with the one in Annex A "List of Definitions".

5. Upon a decision for implementation the e-Invoicing Compliance Guidelines are considered concerning the process steps first mile, creation of invoice, send or make invoice available, receipt and technical verification of invoices, last mile in order to avoid any pitfalls.

Annex A: List of Definitions (informative)

The following documents are sources for the List of Definitions:

Short name	Full name	Organisation
94/820	94/820/EC: Commission Recommendation of 19 October 1994 relating to the legal aspects of electronic data interchange (Text with EEA relevance)	European Commission
CENcomp	CEN e-Invoicing Compliance Guidelines v1.0	CEN
CWA15574	CWA 15574: Commission Recommendation 1994/820/EC October 1994, proposed revision with the requirements of Directive 2001/115/EC, present day e-Commerce practices and revised definition of EDI Electronic Data Interchange	CEN
CWA15578	CWA 15578: Survey of VAT Data Element usage in the Member States and the use of codes for VAT Exemptions, July 2006	CEN
CWA15579	CWA15579: E-invoices and digital signatures	CEN
CWA15581	CWA15581: Guidelines for eInvoicing Service Provider; July 2006	CEN
CWA15582	CWA 15582: eInvoice Reference Model for EU VAT purposes specification - July 2006	CEN
IDABC	IDA E-PROCUREMENT PROTOCOL - XML SCHEMAS INITIATIVE E-ORDERING AND E-INVOICING PHASES, Version R0.3, January 2005	European Commission / Valoris
IEEE	IEEE Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries. New York, NY: 1990.(iftikahr)	IEEE (Institute of Electrical and Electronics Engineers)
INNOPAY	E-invoicing 2008,European market description and analysis	European Banking Association / INNOPAY
RFC4949	RFC 4949: Internet Security Glossary, Version 2	IETF (Internet Engineering Task Force)
SigDir	DIRECTIVE 1999/93/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 December 1999 on a Community framework for electronic signatures	European Commission
UBL2	Universal Business Language v2.0	OASIS (Organization for the Advancement of Structured Information Standards)
VATDIR	COUNCIL DIRECTIVE 2006/112/EC of 28 November 2006 on the common system of value added tax	European Commission

Term	Definition	Source
3-Corner model	An invoicing process set-up whereby *Trading Partners* have separate contractual relationships with the same Service Provider. When both senders and receivers of invoices are connected to a single hub for the dispatch and receipt of invoices, it is referred to as a 3-Corner model. This central hub consolidates the invoices of several receivers and many senders in the case of accounts payable, and several senders and many receivers in the case of accounts receivable processing. Consolidators and trade platforms are usually '3-Corner models' in which both senders and receivers are connected to the service. The 3-Corner model in principle can only offer reach to the parties that are connected to the central hub. This means that either invoice senders or invoice receivers often have to connect to multiple hubs in order to increase their reach. To solve limited reach in 3-Corner models, roaming has been introduced.	CENcomp; INNOPAY
4-Corner model or Multi-Corner model	An invoicing process set-up whereby each *Trading Partner* has contracted with one or several separate *Service Providers*, whereby the Service Providers ensure the correct interchange of invoices between the Trading Partners. When senders and receivers of invoices are supported by their own consolidator service provider (for the sender) and aggregator service provider (for the receiver), it is referred to as a 4-Corner model. A network usually based on open standards provides connectivity and the facilities for the secure trusted exchange of invoices and or other business documents. In the 4-Corner models, the consolidator and aggregator roles are often two different service providers.	CENcomp; INNOPAY
Accountability (technical)	The property of a system or system resource that ensures that the actions of a system entity may be traced uniquely to that entity, which can then be held responsible for its actions. (See: audit service.) Tutorial: Accountability (a.k.a. individual accountability) typically requires a system ability to positively associate the identity of a user with the time, method, and mode of the user's access to the system. This ability supports detection and subsequent investigation of security breaches. Individual persons who are system users are held accountable for their actions after being notified of the rules of behavior for using the system and the penalties associated with violating those rules.	RFC4949
Accounts payable	buyer party for payment-related issues	
Accounts payable automation	The (semi-) automated management of accounts payable administration by automated processing of invoices. Accounts payable automation requires integration of the invoicing process with accounting software.	INNOPAY
Accounts Receivable (AR)	supplier party for payment-related issues	IDABC

Term	Definition	Source
Accounts receivable automation	The (semi-) automated management of accounts receivable administration by managing invoices sent and payments received. Accounts receivable automation requires integration of the invoicing process with accounting software.	INNOPAY
Accreditation	Accreditation means the formal recognition of the technical and organizational competence of an authority to execute a specific service as described in the scope of accreditation.	
Acknowledgement of receipt	The acknowledgement of receipt of an EDI message is the procedure by which, on receipt of the EDI message, the syntax and semantics are checked, and a corresponding acknowledgement is sent by the receiver.	94/820
Advanced electronic signature	an electronic signature which meets the following requirements: a) it is uniquely linked to the signatory; b) it is capable of identifying the signatory; c) it is created using means that the signatory can maintain under his sole control; and d) it is linked to the data to which it relates in such a manner that any subsequent change of the data is detectable;	SigDir
Aggregator	Short description: Provides bill payers a single point of contact for the reception of bills from multiple senders. Long description: often an invoice payer will need to connect to multiple seller direct solutions and/or consolidators. To avoid 'silo' effects involving multiple connections and integration projects, an Aggregator provides bill payers with a single point of contact for as wide as possible a number of invoices on the receiving side. This is considered to be of special value to SMEs and consumers. Again the Consolidator itself may perform this function as part of a total service and in other cases the Aggregator is a different entity.¨ [Please note: The term bill is used as a synonym of *invoice* in this definition.]	INNOPAY
Agreed format of an electronic invoice	The format that the *Trading Partners* have agreed to use as the format of the data to be exchanged between them.	CENcomp
Amount	A number of monetary units specified in a currency where the unit of the currency is explicit or implied	IDABC
Archiving (also Storage, Record or Document Retention)	The keeping of E-Invoices and related *audit trails* and materials under the conditions and for the period required by a Tax Administration and other applicable law.	CENcomp
Audit of an electronic invoice or electronic invoicing process	The process of inspection of an E-Invoice and/or the processes and systems used for handling or storing an E-Invoice during its life cycle by a Tax Administration to ascertain the compliance of that E-Invoice and the underlying sales / purchase transactions with applicable law.	CENcomp
Audit service	A security service that records information needed to establish accountability for system events and for the actions of system entities that cause them. (See: security audit.)	RFC4949

Term	Definition	Source
Audit trail	Information or data (whether in the form of logic, e.g. an algorithm or computer code, or a process, or a set of transactions, or a recording e.g. an event log, a video etc) that allows an auditor to verify that a process was performed in accordance with pre-defined expectations.	CENcomp
Auditability of an electronic invoice or electronic invoicing process	The ability for an electronic invoice or electronic invoicing process to be audited.	CENcomp
Authenticate	Verify (i.e., establish the truth of) an attribute value claimed by or for a system entity or system resource. (See: authentication, "relationship between data integrity service and authentication services" under "data integrity service".)	RFC4949
Authentication	The process of verifying a claim that a system entity or system resource has a certain attribute value. (See: authenticate, authentication exchange, authentication information, data origin authentication, "relationship between data integrity service and authentication services" under "data integrity service".)	RFC4949
Authenticity	The property of being genuine and able to be verified and be trusted. (See: authenticate, authentication.)	RFC4949
Basic process	see functional module	
Bilateral exchange model	A model for the exchange of information directly between a buyer and a seller in a one-to-one relation. These can be seller driven or buyer driven (see seller direct and buyer direct).	INNOPAY
Biller portal	Web portal of an invoice provider to which the invoice receivers can log on with a username and password and check and manage their invoices. This is often a protected environment.	INNOPAY
Billing collaboration	In the Billing collaboration, a request is made for payment for goods or services that have been ordered, received, or consumed. In practice, there are several ways in which goods or services may be billed.	UBL2
Billing Service Provider (BSP)	Business provider offering services to senders and receivers involving the sending, collection and administrative processing of invoices.	INNOPAY
Business process integration	The activity of integrating (various) business processes.	INNOPAY
Buyer	An organization to whom the Supplier makes a supply and that may be obligated to receive and store an Invoice, as well as being required to report and declare; and being entitled to deduct/reclaim applicable input tax VAT.	CENcomp

Term	Definition	Source
Buyer direct	Powerful buying organisations require their suppliers to deliver e-invoices directly to their systems, often providing tools to convert accepted orders into VAT compliant invoices. In addition to the use of a buying portal, the sender may use a direct connection or an EDI system. Service providers may be involved as technical enablers. banks. They are usually national in scope but may also support cross-border flows.	INNOPAY
Certificate	See *Public-Key Certificate*	
Certificate Policy	Named set of rules that indicates the applicability of a certificate to a particular community and/or class of application with common security requirements (ISO/IEC 9594-82001) (Each CP is assigned a unique Object Identifier – ID by an authorised entity.)	CWA15579
Certification authority (CA)	Body trusted by all users to create and assign (public key) certificates	CWA15579
certification-service-provider (CSP)	Entity or a legal or natural person who issues certificates or provides other services related to electronic signatures	SigDir
Code	A character string (letters, figures, or symbols) that for brevity and/or language independence may be used to represent or replace a definitive value or text of an attribute together with relevant supplementary information.	IDABC
Contracting	Process in which two trading entities agree bilaterally on what the trade will entail and how the trade will be executed. The result of this process is an agreed and exchanged contract. Contracts may cover all aspects of a trade and all processes that are part of the end-to-end trade process: ordering, delivery, invoicing, payment and taxation. The contracting process may vary from an extensive written contractual agreement to a verbal agreement in an 'over the counter' transaction	INNOPAY
Conversion	The act of automatically converting the format of an electronic invoice from the format of the sender to the format of the recipient (Format Conversion), or converting the encoding of content (e.g different code list or units of measure), using agreed mapping processes that do not alter the information represented by the document (Content Conversion).	CENcomp
Correctness	The property of a system that is guaranteed as the result of formal verification activities. (See: correctness proof, verification.) Tutorial: Documents SHOULD NOT use this term without providing a definition; the term is neither well known nor precisely defined. Data integrity refers to the constancy of data values, and source integrity refers to confidence in data values. However, correctness integrity refers to confidence in the underlying information that data values represent, and this property is closely related to issues of accountability and error handling.	RFC4949

Term	Definition	Source
Correctness integrity	The property that the information represented by data is accurate and consistent. (Compare: data integrity, source integrity.) Tutorial: Documents SHOULD NOT use this term without providing a definition; the term is neither well-known nor precisely defined. Data integrity refers to the constancy of data values, and source integrity refers to confidence in data values. However, correctness integrity refers to confidence in the underlying information that data values represent, and this property is closely related to issues of accountability and error handling.	RFC4949
Correctness proof	A mathematical proof of consistency between a specification for system security and the implementation of that specification. (See: correctness, formal specification.)	RFC4949
Credit management	The management of invoice collection, outstanding invoices and the associated payment risks and the processing of received payments. The sender can outsource this set of tasks to a BSP or specific service provider. The payment risks can be transferred to the party in question.	INNOPAY
Credit Note	Sent by the supplier to the buyer confirming that the supplier owes him money. It is an advice of a credit to be compensated against account balances payable as a result of a previous invoice.	IDABC / INNOPAY
Customer	See *Buyer*.	
Customer Service	Supplier party responsible for issues related to purchase order fulfilment (despatch, delivery and carriage);	IDABC
Data	Information in a specific representation, usually as a sequence of symbols that have meaning.	RFC4949
Data exchange	The transfer of data between processes, data stores or organisations	
Data integrity	The property that data has not been changed, destroyed, or lost in an unauthorized or accidental manner. (See: data integrity service. Compare: correctness integrity, source integrity.)	RFC4949

Term	Definition	Source
Data integrity service	A security service that protects against unauthorized changes to data, including both intentional change or destruction and accidental change or loss, by ensuring that changes to data are detectable. (See: data integrity.) Tutorial: A data integrity service can only detect a change and report it to an appropriate system entity; changes cannot be prevented unless the system is perfect (error-free) and no malicious user has access. However, a system that offers data integrity service might also attempt to correct and recover from changes. The ability of this service to detect changes is limited by the technology of the mechanisms used to implement the service. For example, if the mechanism were a one-bit parity check across each entire service data unit (SDU), then changes to an odd number of bits in an SDU would be detected, but changes to an even number of bits would not. Relationship between data integrity service and authentication services: Although data integrity service is defined separately from data origin authentication service and peer entity authentication service, it is closely related to them. Authentication services depend, by definition, on companion data integrity services. Data origin authentication service provides verification that the identity of the original source of a received data unit is as claimed; there can be no such verification if the data unit has been altered. Peer entity authentication service provides verification that the identity of a peer entity in a current association is as claimed; there can be no such verification if the claimed identity has been altered.	RFC4949
Data origin authentication	The corroboration that the source of data received is as claimed. (See: authentication.)	RFC4949
Data origin authentication service	A security service that verifies the identity of a system entity that is claimed to be the original source of received data. (See: authentication, authentication service.) Tutorial: This service is provided to any system entity that receives or holds the data. Unlike peer entity authentication service, this service is independent of any association between the originator and the recipient, and the data in question may have originated at any time in the past. A digital signature mechanism can be used to provide this service, because someone who does not know the private key cannot forge the correct signature. However, by using the signer's public key, anyone can verify the origin of correctly signed data. This service is usually bundled with connectionless data integrity service. (See: "relationship between data integrity service and authentication services" under "data integrity service".	RFC4949
Data security	The protection of data from disclosure, alteration, destruction, or loss that either is accidental or is intentional but unauthorized. Tutorial: Both data confidentiality service and data integrity service are needed to achieve data security.	RFC4949
Debit note	A reminder of an outstanding amount due under a previous invoice.	INNOPAY

Term	Definition	Source
Deception	A circumstance or event that may result in an authorized entity receiving false data and believing it to be true. (See: authentication.)	RFC4949
Delcredere	Invoice sent to an agent paying for a number of buyers.	INNOPAY
Delivering	Process in which the seller 'delivers' to the buyer the ordered (part of the) performance. The result of this process is an agreed delivery. As such it may entail all activities necessary to conform to the agreed performance, such as manufacturing, transport or service delivery.	INNOPAY
Delivery Party (Role)	The party to whom goods should be delivered. The Delivery Party may be the same as the Originator. The Delivery Party must be referred to at line item level in RFQ, Quotation, Order, Order change, Order Cancellation, and Order Response. The Delivery Party may be referred to at line level in Invoice, Self Billed Invoice, Credit Note, and Debit Note. The Delivery Party may be stipulated in a transport contract.	UBL2
Delivery Point	Buyer party that receives goods/works/services and identifies variances in receipt;	IDABC
Despatch Advice	Sent by the supplier to the buyer to inform him that goods or services have been dispatched and/or delivered.	IDABC
Despatch Party (Role)	The party where goods are to be collected from. The Despatch Party may be stipulated in a transport contract.	UBL2
Despatch Point	Supplier party responsible for the delivery of goods	IDABC
Digital document	An electronic data object that represents information originally written in a non-electronic, non-magnetic medium (usually ink on paper) or is an analogue of a document of that type.	RFC4949
Digital notary	An electronic functionary analogous to a notary public. Provides a trusted timestamp for a digital document, so that someone can later prove that the document existed at that point in time; verifies the signature(s) on a signed document before applying the stamp. (See: notarization.)	RFC4949
Digital signature	Data appended to or a cryptographic transformation of, a data unit that allows a recipient of the data to prove the source and integrity of the data unit and protect against forgery (ISO/IEC 7498-2)	CWA15579
Direct debit/authorisation	Payment method whereby consumers authorise a provider to deduct money from their account, either on a one-time basis or on a regular basis.	INNOPAY

Term	Definition	Source
eBusiness	A way of conducting business electronically, leveraging technology initiatives such as ecommerce, electronic data interchange (EDI), and electronic funds transfer (EFT). Electronic storefronts, self-service. Web applications and Web-based supply chain integration are a few examples of new e-business opportunities. (Source Internet)	CWA15578
ebusiness service customer	the person or organization who acquires electronic business services from an ebusiness service *supplier*	CWA15582
ebusiness service supplier	the person or organisation who supplies electronic business services to a customer	CWA15582
EDI message	An electronic data interchange message (EDI message) consists of a set of information, structured using agreed formats, prepared in a computer readable form and capable of being automatically and unambiguously processed.	CWA15574 / CWA15581
E-invoicing Service Provider (Service Provider)	An organisation that, on the basis of a contractual agreement, performs certain processes in relation to the E-Invoice life cycle on behalf of a *Trading Partner*, or that is active in the provision of support services necessary to realise such processes. Trading Partners can use multiple e-Invoicing Service Providers; see *3-corner model* and *4-corner model* definitions. An e-Invoicing Service Provider can subcontract all or parts of its services to other providers; such subcontractors can also be e-Invoicing Service Providers if they meet the criteria set out in this definition.	CENcomp
Electronic Bill Presentment and Payment (EBPP)	Electronic Bill Presentment and Payment (EBPP), usually consumer-oriented 'bill paying' presented and paid through the Internet. Other terms such as IBPP (Internet Bill Presentment and Payment), EBP (Electronic Bill Presentment) and OBPP (Online Bill Presentment and Payment) are also in use.	INNOPAY
Electronic data interchange (EDI)	The transfer of commercial, administrative and business information between computer systems, using data formats which the parties have mutually agreed. EDI exchanges of invoices are normally used between trading partners to (partially) automate their supply chain. In most interpretations, the use of structured data alone does not make a process EDI. A key element of an EDI system is the Interchange Agreement between the EDI trading partners making provision for the use of various technical, security and business procedures including those aimed at ensuring and proving the authenticity of the origin and integrity of the data. In this context, Electronic data interchange or EDI is a generic term that covers conventional EDI file formats (UN/EDIFACT, ANSI-X12) as well as later developments using XML (Extended Markup Language) using UN/CEFACT or other formats. Web EDI covers the techniques used to facilitate EDI via the Internet which may include forms EDI accessed via a web browser.	CENcomp

Term	Definition	Source
Electronic Data Interchange (EDI) ***according to 94/820/EC: Commission Recommendation***	Electronic data interchange is the electronic transfer, from computer to computer, of commercial and administrative data using an agreed standard to structure an EDI message.	94/820
Electronic invoice / e-invoice	An electronic dataset prepared by or on behalf of a *Supplier* listing items sold and presented to the Buyer for payment, which contains all details agreed between the *Trading Partners*.	CENcomp
Electronic invoice data / e-invoice data	A dataset not yet or no longer representing an electronic invoice, but which is intended to become an electronic invoice or which has been derived from an electronic invoice.	CENcomp
Electronic invoice life cycle	A process comprising (1) the creation or issue of the *electronic invoice* by, or in name and on behalf of the *Supplier*; (2) receipt of the invoice by or on behalf of the Buyer; and (3) *storage* of the electronic invoice during the *storage period* by or on behalf the Supplier and the Buyer.	CENcomp
Electronic Invoice Presentment and Payment (EIPP)	Electronic Invoice Presentment and Payment, Originated in the B2B (Business-to-Business) world and describes the process through which companies present invoices and organise payments through the Internet.	INNOPAY
Electronic signature	Data in electronic form which are attached to or logically associated with other electronic data and which serve as a method of authentication	SigDir
Electronic Statement Presentation (ESP)	Refers to the electronic presentment of a variety of other commercial documents, apart from invoices, such as account statements, purchase orders, delivery notifications etc. Not included are many unstructured documents that are exchanged.	INNOPAY
Electronic-signature product	Hardware or software, or relevant components thereof, which are intended to be used by a certification-service-provider for the provision of electronic-signature services or are intended to be used for the creation or verification of electronic signatures	SigDir
Electronic Tax Invoice	The designated electronic invoice for tax audit purposes with at a minimum all the properties that are legally required. In this Commentary and the Compliance Matrix, the Electronic Tax Invoice is referred to as *E-Invoice* [*electronic invoice*]; […]	
End-to-end trade process	The activity or set of activities that result in a trade that is then settled between the trading entities concerned, their respective banks and their respective tax authorities.	INNOPAY
Enterprise Resource Planning (ERP)	Systems that contain many of the tools and software to create, account for and manage invoices as part of wider corporate processes.	INNOPAY
Exchange	See data exchange	

Term	Definition	Source
Exchange format	The exchange format is the format in which the invoice is exchanged between sender and receiver. The exchange format can either be structured or unstructured. The exchange format can change during the exchange in the situation where a service provider changes the format of the invoice.	INNOPAY
Exchange models	Exchange models are the models for the exchange of business documents between a sender and a receiver. There are bilateral, 3-party/corner and 4-party/corner models.	INNOPAY
Exporter (Party Role)	The party who makes regulatory export declarations, or on whose behalf regulatory export declarations are made, and who is the owner of the goods or has similar right of disposal over them at the time when the declaration is accepted.	UBL2
Factor	The person or organization who supplies factoring services	CWA15582
Factored invoice	invoice assigned to a third party for financing and collection.	INNOPAY
Factoring	A form of invoice financing for the seller, where an invoice or a collection of invoices is sold to a factoring company. The factoring company is responsible for collection of the invoice.	INNOPAY
Financial institution	An establishment responsible for facilitating customer-initiated transactions or transmission of funds for the extension of credit or the custody, loan, exchange, or issuance of money.	RFC4949
Financial Supply Chain	The financial business processes mirroring the business processes, such as qualification, pricing calculations and financing.	INNOPAY
Fulfilment	Fulfilment is the collaboration in which the goods or services are transferred from the Despatch Party to the Delivery Party.	UBL2
Functional module	A business process can be divided iteratively into sub-processes until further division is not useful anymore. The smallest resulting sub-processes are the functional modules.	
Grace period	time period which permits the certificate revocation information to propagate through the revocation process to relying parties (ETSI TS 101 733)	CWA15579
Group invoice	Collection of invoices covering a number of sales.	INNOPAY
Hardware Security Module (HSM)	The cryptographic module used to securely store the private key and generate the advanced signature in electronic invoices. It may generate the key pair itself or it may securely import a private key securely generated in a secure environment, e.g. another HSM.	CWA15579
Identification	An act or process that presents an identifier to a system so that the system can recognize a system entity and distinguish it from other entities. (See: authentication.)	RFC4949

Term	Definition	Source
Identifier	A character string to identify and distinguish uniquely, one instance of an object in an identification scheme from all other objects in the same scheme together with relevant supplementary information	IDABC
Identity	The collective aspect of a set of attribute values (i.e., a set of characteristics) by which a system user or other system entity is recognizable or known. (See: authenticate, registration. Compare: identifier.)	RFC4949
Identity proofing	A process that vets and verifies the information that is used to establish the identity of a system entity. (See: registration.)	RFC4949
Importer (Party Role)	The party who makes, or on whose behalf an agent or other authorized person makes, an import declaration. This may include a person who has possession of the goods or to whom the goods are consigned.	UBL2
Information system	An organized assembly of computing and communication resources and procedures -- i.e., equipment and services, together with their supporting infrastructure, facilities, and personnel – that create, collect, record, process, store, transport, retrieve, display, disseminate, control, or dispose of information to accomplish a specified set of functions.	RFC4949
Integrity	See: data integrity, correctness integrity, source integrity, system integrity. *Editor's note: Most often used in the sense of data integrity.*	RFC4949
Interchange Agreement	The provisions of Interchange Agreements are intended to govern the rules of conduct and methods of operation between the Parties in relation to the interchange of data by EDI. Several models of Interchange Agreement have been developed by European and International bodies.	CENcomp
Interconnectivity	The state or quality of being interconnected, i.e. having a connection with multiple systems.	
Interoperability	The ability of two or more systems or components to exchange information and to use the information that has been exchanged.	IEEE
Internal control	A process, effected by an organization's people and information technology (IT) systems, designed to help the organization accomplish specific goals or objectives.	CENcomp
Internet banking portal	Web portal of a banking institute on which its account holders can engage in Internet banking.	INNOPAY
Invoice	The invoice is a document or a data set […] formally specifying details of a (or part of a) trade […].	INNOPAY
Invoice finance	Service provided to either buyers or sellers to finance a purchase.	INNOPAY

Term	Definition	Source
Invoice header data	Data that relates to the whole invoice, e.g. invoice date, invoice number, seller and Buyer identification, name and address, bank account details etc. Some data is typically made available at header level in an invoice because it may be valid for all detail lines, but may be over ridden as necessary by making the data available at detail line level, e.g. discount, currency code, VAT rate, delivery address, tax point, etc.	CENcomp
Invoice issuer	The person or organization making the invoice, claiming payment for the goods or services rendered to the customer.	CWA15582
Invoice line data	Data that relates to the goods item or service being invoiced, e.g. goods item identification, quantity, price, description, etc… Some invoice line data may be made available in the header if it is valid for several invoice line items, but may be overruled at line level.	CENcomp
Invoice Point	Buyer party for payment-related issues.	IDABC
Invoice Response	Response sent by the supplier to the buyer in response to an invoice to inform him of discrepancies in the invoicing process.	IDABC
Invoicee	The person or organization who will receive the invoice for the delivery of products or services.	CWA15582
Invoicing	Buyer to deliver the agreed contra-performance usually defined in monetary value, and explicitly and separately stating the applicable tax. The result of this process is an exchanged and agreed invoice including a tax statement.	INNOPAY
Invoicing by progress payments	A process of invoicing in stages against a series of contracted deliverables.	INNOPAY
Invoicing method	Manner, approach and agreements regarding the invoicing process.	INNOPAY
Issue of an e-invoice	This is a legal term that is defined differently in different jurisdictions. The e-invoice starts its *life cycle* as a formal document for *VAT* purposes when it has been issued.	CENcomp
Issuer of an e-invoice	The party issuing the electronic invoice (the *Supplier* or a party – a *Service Provider* or, in the case of *Self-Billing*, the *Buyer* – issuing the e-invoice in its name and on its behalf).	CENcomp
Master data	In this context for *Trading Partners*, Master Data are data that are stable over longer periods of time such as the names, addresses, and identifications, e.g. VAT numbers, DUNs number, GS1 GLN numbers. For product or services, Master Data may include product names, descriptions, tax category, and identifications such as GS1 identifier.	CENcomp

Term	Definition	Source
Non-repudiation service	A security service that provide protection against false denial of involvement in an association (especially a communication association that transfers data). (See: repudiation, time stamp.) Tutorial: Two separate types of denial are possible -- an entity can deny that it sent a data object, or it can deny that it received a data object -- and, therefore, two separate types of non-repudiation service are possible. (See: non-repudiation with proof of origin, non-repudiation with proof of receipt.)	RFC4949
Non-repudiation with proof of origin	A security service that provides the recipient of data with evidence that proves the origin of the data, and thus protects the recipient against an attempt by the originator to falsely deny sending the data. (See: non-repudiation service.) Tutorial: This service is a strong version of data origin authentication service. This service can not only verify the identity of a system entity that is the original source of received data; it can also provide proof of that identity to a third party.	RFC4949
Non-repudiation with proof of receipt	A security service that provides the originator of data with evidence that proves the data was received as addressed, and thus protects the originator against an attempt by the recipient to falsely deny receiving the data. (See: non-repudiation service.)	RFC4949
Notarization	Registration of data under the authority or in the care of a trusted third party, thus making it possible to provide subsequent assurance of the accuracy of characteristics claimed for the data, such as content, origin, time of existence, and delivery. (See: digital notary.)	RFC4949
Online banking portal	See Internet banking portal	INNOPAY
Order Point	Buyer party for issues related to purchase orders;	IDABC
Order Response Simple	The Order Response Simple is the means by which the Seller confirms receipt of the Order from the Buyer, indicating either commitment to fulfil without change or that the Order has been rejected.	UBL2
Ordering	Ordering is the collaboration that creates a contractual obligation between the Seller Supplier Party and the Buyer Customer Party.	UBL2
Order-to-cash process / *Order-to-cash cycle*	The combined ordering-delivery-invoicing-payment process as part of the end-to-end trade process, from the seller's perspective.	INNOPAY

Term	Definition	Source
Originator (Party Role)	The party that had the original demand for the goods and/or services and therefore initiated the procurement transaction. The Originator participates in pre-ordering activity either through RFQ and Quotation or by receiving a Quotation as a response to a punchout transaction on a marketplace or Seller's website. If the Originator subsequently places an Order, the Originator adopts the role of Buyer. The Originator is the typically the contact point for queries regarding the original requirement and may be referred to in an Order Change, Order Cancellation, or Order Response.	UBL2
Outsourced service provider roles	These roles include the supply of services to any part of the invoicing process itself and indeed to other parts of the end-to-end trade process. They may be 'invisible' to the external environment by providing commercial entities with outsourced business integration and processing services or they may also be 'visible' in also providing consolidator services. For many service providers the value added in supporting their customers in de-materialising their end-to-end trade process and/or providing outsourcing services, is the focus of their revenue model.	INNOPAY
Partner	See *Trading Partner*.	
Party	In UBL, a party is defined as an individual, a group, or a body having a role in a business function.	UBL2
Payee (Party Role)	The party to whom the Invoice is paid.	UBL2
Payment	The process in which the buyer 'pays' to the seller the agreed monetary value (as the contra-performance) through their respective payment service providers or banks. The result of this process is an exchanged and agreed payment (transfer of monetary value), including the applicable tax.	INNOPAY
Payment Service Provider (PSP)	Service provider that offers access to one or more payment method for selling parties that want to offer these payment methods to their customers. Primarily active in the world of online shops.	INNOPAY
Permanent storage	Non-volatile media that, once written into, can never be completely erased.	RFC4949
Physical invoice	The invoice in physical format. In practice this is always the invoice on paper. See also under invoice.	INNOPAY
Presentation format	The presentation format is the format in which the invoice is made understandable for humans. Presentation format is mainly in an unstructured form, such as PDF, HTML or a proprietary presentation format as offered for example by ERP systems. Such proprietary formats convert a structured exchange format (such as EDI or XML) into a human understandable format.	INNOPAY

Term	Definition	Source
Print&mail	Creating a paper invoice on the basis of electronic data, making it ready to be sent (putting it in an envelope, addressing it and adding postage) and the actual sending by regular mail. The sender can outsource this set of tasks to a BSP (Billing Service Provider).	INNOPAY
Private key	In an asymmetric public key cryptosystem, that key of an entity's key pair which is known only by that entity	CWA15579
Procurement portal	Portals operating as a consolidator in the B2B market. They can provide their services to senders as well as receivers.	INNOPAY
Pro-forma invoices	Prepared in advance of a formal invoice	INNOPAY
Provider (Party Role)	The party responsible for the integrity of the information provided about an item.	UBL2
provision by electronic means	Provision to the addressee of data using electronic equipment for processing (including digital compression) and storage, and employing wire, radio, optical or other electromagnetic means	VATDIR
Public key	(1) the key of a signature key pair used to validate a digital signature or (2) the key of an encryption key pair used to encrypt confidential information.	CWA15579
Public Key Certificate	A set of structured data that has been electronically signed by a “certification authority” to “bind” the identity of a legal or natural person to a “public key” that can be used e.g. to verify electronic signatures created by that person.	CENcomp
Punchout application	Punchout applications are a technological innovation whereby an *Originator* is able to directly access a *Seller’s* application from within their own procurement application.	UBL2
Purchase Order (PO)	Sent by the buyer to the supplier to inform him that he wishes to purchase goods, services or works.	IDABC
Purchase Order (PO) Change	Purchase order change, sent by the buyer to the supplier to inform him that he wishes to modify or cancel a previous order.	IDABC
Purchase Order (PO) Response	Purchase order response, sent by the supplier to the buyer (who has previously sent him an order) to accept the order fully or partially or to reject the order.	IDABC
Purchase portal	Portal of specific large procurer (receiver) to which his providers (senders) have to be connected to be able to deliver and bill to the procuring party.	INNOPAY
Qualified Electronic Signature	An advanced electronic signature based on a qualified certificate and created by a secure signature-creation device	CWA15579
Quantity	A counted number of non-monetary units possibly including fractions along with the specified unit of quantity	IDABC

Term	Definition	Source
Readability of an electronic invoice	The ability of an auditor (e.g. Tax Administration or accountant) to interpret the content of an E-Invoice.	CENcomp
Receipt Advice	Sent by the buyer to the supplier to acknowledge receipt in full or in part and notify when necessary of under/over-delivery, error or damage in the delivery.	IDABC
Receiver	The party receiving the invoice, usually the buyer or purchasing party.	INNOPAY
Reconciliation	The activity of matching information in different processes. As such reconciliation is part of several business processes within an entity.	INNOPAY
Rectification Advice	Sent by the supplier to inform the buyer of the action to be taken as regards as variances notified in the receipt advice.	IDABC
Registration	1. /information system/ A system process that (a) initializes an identity (of a system entity) in the system, (b) establishes an identifier for that identity, (c) may associate authentication information with that identifier, and (d) may issue an identifier credential (depending on the type of authentication mechanism being used). (See: authentication information, credential, identifier, identity, identity proofing.) 2. /PKI/ An administrative act or process whereby an entity's name and other attributes are established for the first time at a CA, prior to the CA issuing a digital certificate that has the entity's name as the subject. (See: registration authority.) Tutorial: Registration may be accomplished either directly, by the CA, or indirectly, by a separate RA. An entity is presented to the CA or RA, and the authority either records the name(s) claimed for the entity or assigns the entity's name(s). The authority also determines and records other attributes of the entity that are to be bound in a certificate (such as a public key or authorizations) or maintained in the authority's database (such as street address and telephone number). The authority is responsible, possibly assisted by an RA, for verifying the entity's identity and vetting the other attributes, in accordance with the CA's CPS. Among the registration issues that a CPS may address are the following [R3647]: - How a claimed identity and other attributes are verified. - How organization affiliation or representation is verified. - What forms of names are permitted, such as X.500 DN, domain name, or IP address. - Whether names are required to be meaningful or unique, and within what domain. - How naming disputes are resolved, including the role of trademarks. - Whether certificates are issued to entities that are not persons. - Whether a person is required to appear before the CA or RA, or can instead be represented by an agent. - Whether and how an entity proves possession of the private key matching a public key.	RFC4949

Term	Definition	Source
Registration authority (RA)	1. An optional PKI entity (separate from the CAs) that does not sign either digital certificates or CRLs but has responsibility for recording or verifying some or all of the information (particularly the identities of subjects) needed by a CA to issue certificates and CRLs and to perform other certificate management functions. (See: registration.) 2. /PKIX/ An optional PKI component, separate from the CA(s).The functions that the RA performs will vary from case to case but may include identity authentication and name assignment, key generation and archiving of key pairs, token distribution, and revocation reporting Tutorial: Sometimes, a CA may perform all certificate management functions for all end users for which the CA signs certificates. Other times, such as in a large or geographically dispersed community, it may be necessary or desirable to offload secondary CA functions and delegate them to an assistant, while the CA retains the primary functions (signing certificates and CRLs). The tasks that are delegated to an RA by a CA may include personal authentication, name assignment, token distribution, revocation reporting, key generation, and archiving. An RA is an optional PKI entity, separate from the CA, that is assigned secondary functions. The duties assigned to RAs vary from case to case but may include the following: - Verifying a subject's identity, i.e., performing personal authentication functions. - Assigning a name to a subject. (See: distinguished name.) - Verifying that a subject is entitled to have the attributes requested for a certificate. - Verifying that a subject possesses the private key that matches the public key requested for a certificate. - Performing functions beyond mere registration, such as generating key pairs, distributing tokens, handling revocation reports, and archiving data. (Such functions may be assigned to a PKI component that is separate from both the CA and the RA.)	RFC4949
Reliability (technical)	The ability of a system to perform a required function under stated conditions for a specified period of time.	RFC4949
Remittance advice	A notice by the payer to the sender of the invoice that a payment has been made.	INNOPAY
Remittance data	Data containing payment details, used for reconciliation of payment data.	INNOPAY
Repudiation	Denial by a system entity that was involved in an association (especially a communication association that transfers data) of having participated in the relationship. (See: accountability, non-repudiation service.)	RFC4949

Term	Definition	Source
Roaming	This refers to the comparatively nascent concept of 3-party based service hubs being connected to one another either in a national context or in a cross-border environment to offer a more complete service in terms of reach. It is suggested that roaming may be achieved through a central 'hub of hubs', or through 'hub-to-hub' connections. There are a number of initiatives in this area such as the Hub Alliance. Roaming presents a set of issues concerning the maintenance of information integrity and authenticity of origin, as well as compatibility of business models. [Compare *Routing*.]	INNOPAY
Role	A set of responsibilities	
Routing	The sending of e-invoices over one or more hubs. [Compare *Roaming*.]	
Sales Point	Supplier party responsible for purchasing issues prior to fulfilment of Purchase Order.	IDABC
Secure-signature-creation device	A signature-creation device which meets the requirements laid down in Annex III of DIRECTIVE 1999/93/EC	SigDir
Security audit	An independent review and examination of a system's records and activities to determine the adequacy of system controls, ensure compliance with established security policy and procedures, detect breaches in security services, and recommend any changes that are indicated for countermeasures. […] Tutorial: The basic audit objective is to establish accountability for system entities that initiate or participate in security-relevant events and actions. Thus, means are needed to generate and record a security audit trail and to review and analyze the audit trail to discover and investigate security violations.	RFC4949
Security audit trail	A chronological record of system activities that is sufficient to enable the reconstruction and examination of the sequence of environments and activities surrounding or leading to an operation, procedure, or event in a security-relevant transaction from inception to final results. (See: security audit.)	RFC4949
Security Policy	A set of rules and practices that specify or regulate how a system or organization provides security services to protect sensitive and critical system resources	CWA15579
Self Billed Credit Notes	When using Self Billed Credit Notes, the Customer is raising the Self Billed Credit Note in the name and on behalf of the Supplier. Therefore the Supplier and the Customer are still both responsible for providing taxation information.	UBL2
Self-billed invoice	Invoice originated by the buyer and sent to the seller to cover goods or services supplied by the seller.	INNOPAY

Term	Definition	Source
Self-Billing	A method of invoicing whereby the *Buyer* issues the invoice in name and on behalf of the *Supplier*. Self-Billing may be facilitated by a *Service Provider*.	CENcomp
Seller	See *Supplier*.	
Seller direct	an invoice sender (often with the support of a service provider as a technical enabler) sends ('push') or provides a web-site/portal ('pull') to allow customers to review and pay invoices usually electronically as well as access other services. This method is often used by utilities and telecom operators.	INNOPAY
Sender	The party submitting the invoice, as a rule the Seller or selling party.	INNOPAY
Server	A system entity that provides a service in response to requests from other system entities called clients.	RFC4949
Service Provider	See e-invoicing Service Provider	
Signatory	A person who holds a signature-creation device and acts either on his own behalf or on behalf of the natural or legal person or entity he represents	SigDir
Signature-creation data	Unique data, such as codes or private cryptographic keys, which are used by the signatory to create an electronic signature	SigDir
Signature-creation device	Configured software or hardware used to implement the signature-creation data	SigDir
Signature-verification-data	Means data, such as codes or public cryptographic keys, which are used for the purpose of verifying an electronic signature	SigDir
Source integrity	The property that data is trustworthy (i.e., worthy of reliance or trust), based on the trustworthiness of its sources and the trustworthiness of any procedures used for handling data in the system. Usage: a.k.a. Biba integrity. (See: integrity. Compare: correctness integrity, data integrity.) Tutorial: For this kind of integrity, there are formal models of unauthorized modification that logically complement the more familiar models of unauthorized disclosure. In these models, objects are labelled to indicate the credibility of the data they contain, and there are rules for access control that depend on the labels.	RFC4949
Source Transaction Data	Relatively dynamic or transaction-specific business documents and information that are typically required to create an E-Invoice. This may included a contract, an order, despatch information, delivery information, customer and product files, and possibly other details.	CENcomp

Term	Definition	Source
Static non modifiable document	Electronic document drafted in such a way that its content is not modifiable during the access and storage phases, as well as is immutable in the time; to this purpose the electronic document shall not have macro instructions or executable code, capable to activate functions that can modify acts, deeds or data represented in the same document.	CWA15579
Storage format	The storage format is the format in which the invoice is stored and accessible for auditing reasons. The storage format is mainly subject to tax regulations, since the invoice receiver must be able to hand over the stored invoices in the case of a tax audit.	INNOPAY
Storage of an invoice by electronic means	Storage of data using electronic equipment for processing (including digital compression) and storage, and employing wire, radio, optical or other electromagnetic means	VATDIR
Storage period of an electronic invoice	The amount of time that applicable law requires the electronic invoice to be stored and available for audit.	CENcomp
Straight Through Processing (STP)	The immediate and direct transfer of data from the Financial Supply chain flows in various systems at various parties, including automated reconciliation.	INNOPAY
Structured invoice document	(e.g. EDI or XML) Creation of a structured invoice document consists of the compilation of the required data into an agreed e-invoice message with a known structure, format and content such as is the case with EDI and XML messages. This means that contrary to the case with a paper document, where the receiver may well be unfamiliar with the format, with a structured invoice message the format is pre-defined and known to the parties involved.	INNOPAY
Supplier	An organization that supplies goods or services to the *Buyer* and that may be obligated to issue and store a Invoice, as well as to report, account for and pay applicable output tax VAT.	CENcomp
Supply chain	A series of entities involved in trade, each acting as both buyer and seller.	INNOPAY
Supply chain finance	Financing all or some of the processes throughout the end-to-end trade process, including facilities such as factoring, invoice discounting, pre-shipment finance, inventory financing and general trade finance.	INNOPAY
Supply chain integration	The activity of integrating processes that take place along a supply chain, both within and between entities.	INNOPAY
System integrity	An attribute or quality "that a system has when it can perform its intended function in a unimpaired manner, free from deliberate or inadvertent unauthorized manipulation." (See: recovery, system integrity service.)	RFC4949
System integrity service	A security service that protects system resources in a verifiable manner against unauthorized or accidental change, loss, or destruction. (See: system integrity.)	RFC4949

Term	Definition	Source
Tax Representative	Supplier party responsible for keeping VAT records and accounts for taxable transactions in another Member State.	IDABC
Taxation	The process of administrating, declaring and settling tax amounts as explicitly stated on the exchanged and agreed invoice. The process also includes any settlement of the applicable tax between the respective tax authorities. There is a process for the verification of intra-community trade, via the VAT Information Exchange System (VIES).	INNOPAY
Third party service provider	A company to whom specific tasks or services are outsourced**.** In electronic invoicing some or all of the tasks associated with the creation, issuance, format conversions, transmissions, storage etc. may be outsourced to a third party.	CWA15581
Time Stamp Token	Data object that binds a representation of a datum to a particular time, thus establishing evidence that the datum existed before that time;	CWA15579
Time Stamping Authority	Authority which issues time-stamp tokens	CWA15579
Total Invoice Management	An accounts payable and accounts receivable automation solution where an external service provider facilitates the reception, authorisation and processing of all incoming invoices, including paper invoices.	INNOPAY
Total invoice management providers	Environment where not all invoices are de-materialised, these service providers provide full e-invoicing services and for scanning and/or the parallel handling of paper invoices so as to provide a complete offering. This will often include archiving services.	INNOPAY
Trade	A voluntary exchange of 'performances' between entities involved in a trade.	INNOPAY
Trade platforms	Trade platforms are typically central platforms facilitating the exchange of Trade related documents. Often such providers offer services for both sender and receiver covering multiple processes in the end-to-end trade process. Services offered to buyers range from order placement, invoice authorisation and settlement, invoice query resolution and archiving. Services offered to sellers range from responding to an order, invoice creation and exchange, invoice status monitoring and remittance advice.	INNOPAY
Trading Partner	*Supplier* or *Buyer*.	CENcomp
Traditional billing	Traditional billing is where the supplier invoices the customer when the goods are delivered or the services provided.	UBL2
Transmission by electronic means	Transmission [...] to the addressee of data using electronic equipment for processing (including digital compression) and storage, and employing wire, radio, optical or other electromagnetic means	VATDIR

Term	Definition	Source
UN/Edifact	As defined by the UN/ECE, the United Nations rules for electronic data interchange for administration, commerce and transport, comprise a set of internationally agreed standards, directories and guidelines for the electronic interchange of structured data, and in particular, interchange related to trade in goods and services, between independent computerized information systems.	94/820
Universal Business Language (UBL)	Universal Business Language (UBL) is a library of standard electronic XML business documents such as purchase orders and invoices.	
UN-Layout Key (UNLK)	United Nations Layout for Trade documents, including the invoice. UN Recommendation 1 and Recommendation 6; ISO 6422.	CENcomp
Unstructured invoice document	(e.g. PDF, JPEG, HTML or email) is an invoice that is created manually or automatically from a system and instead of printing it for submission on the spot or sending out, it is compiled into an electronic document. As an alternative, a traditional invoice can also become electronic by scanning the paper invoice into an electronic document.	INNOPAY
Value Added Network (VAN)	Third-party network service provider that offers specialised trade related services to trading parties connected through the VAN.	INNOPAY
Value Added Tax (VAT)	A consumption tax that is levied at each stage of production based on the value added to a product or service at that stage.	CENcomp
VAT administration	The government organisation responsible for collecting VAT	CWA15582
VAT Information Exchange System (VIES)	VIES is an electronic means of transmitting information relating to VAT-registration (= validity of VAT-numbers) of companies registered in EU. Furthermore, information relating to (tax exempt) intra-Community supplies between Member States' administrations is also transmitted via VIES.	INNOPAY
Voluntary accreditation	Any permission, setting out rights and obligations specific to the provision of certification services, to be granted upon request by the certification-service-provider concerned, by the public or private body charged with the elaboration of, and supervision of compliance with, such rights and obligations, where the certification-service-provider is not entitled to exercise the rights stemming from the permission until it has received the decision by the body.	SigDir
Web Publication / Web Presentation	In the context of e-invoicing, a method of exchanging invoices with the Buyer by placing the original electronic invoice on an agreed web site, but where the original electronic invoice never leaves the secure closed environment operated by the Supplier.	

Annex B: Informative References (informative)

The following documents are referenced in the body of this document and provide information concerning eInvocing:

[1] IDA E-PROCUREMENT PROTOCOL - XML SCHEMAS INITIATIVE E-ORDERING AND E-INVOICING PHASES, Version R0.3, January 2005

[2] 94/820/EC: Commission Recommendation of 19 October 1994 relating to the legal aspects of electronic data interchange (Text with EEA relevance)

[3] CWA 15574: Commission Recommendation 1994/820/EC October 1994, proposed revision with the requirements of Directive 2001/115/EC, present day e-Commerce practices and revised definition of EDI Electronic Data Interchange

[4] CWA 15578: Survey of VAT Data Element usage in the Member States and the use of codes for VAT Exemptions, July 2006

[5] CWA 15579: E-invoices and digital signatures

[6] CWA 15581: Guidelines for eInvoicing Service Provider; July 2006

[7] DIRECTIVE 1999/93/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 December 1999 on a Community framework for electronic signatures

[8] RFC 4949: Internet Security Glossary, Version 2

[9] E-invoicing 2008, European market description and analysis

[10] Universal Business Language v2.0

[11] ETSI TS 102 640-1 V1.1.1 “Registered Electronic Mail (REM); Architecture, Formats and Policies“

[12] IETF RFC 4130 “ MIME-Based Secure Peer-to-Peer Business Data Interchange Using HTTP, Applicability Statement 2 (AS2)”

[13] IEEE Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries. New York, NY: 1990.

Bibliography

The following material, though not specifically referenced in the body of the present document, gives supporting information.

[1] UN/CEFACT International Trade and Business Processes Group, TBG1: Cross Industry Invoicing Process (version 2)

[2] MIP Politecnico di Milano: Electronic Invoicing as a "keystone" in the collaboration between companies, banks and PA (2008)