CEN

WORKSHOP

AGREEMENT

CWA 16464-1

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English version

Electronic invoicing - Part 1: Addressing and Routing

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-CENELEC Management Centre can be held accountable for the technical content of this CEN Workshop Agreement or possible conflicts with standards or legislation.

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

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Contents

Foreword

This CEN Workshop Agreement has been drafted and approved by a Workshop of representatives of interested parties on 2012-02-15, the constitution of which was supported by CEN following the public call for participation made on 2010-02-26. It forms one of a set of CWA's prepared by this Workshop.

A list of the individuals and organizations which supported the technical consensus represented by the CEN Workshop Agreement is available to purchasers from the CEN-CENELEC Management Centre. The following organizations endorsed this document:

- AITI, Italy
- CEGEDIM, France
- Dr. Otto Mueller Consulting, Switzerland
- Hilti Corporation, Liechtenstein
- Hub2Hub, Italy
- ID Cyber-Identity Ltd, Switzerland
- Legal Counsel, Stefan Engel-Flechsig, Germany
- OFS Portal LLC, USA
- Orange – France Telecom Group, France
- Sage France, France
- SERES, France
- STS Group, Belgium
- Trustweaver Sweden, Sweden
- Voxel Group, Spain
- xft GmbH, Germany

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The draft CWA was presented and discussed with industry representatives during two Open meetings, the first on September 22 and the other on December 12, 2011, both held in Brussels. The public comments period run from July 15th 2011 until September 15th 2011.

The final review/endorsement round for this CWA was started on 2012-04-04 and was successfully closed on 2012-04-16. The final text of this CWA was submitted to CEN for publication on 2012-04-18.

This CWA is part of a set of CWAs that has been prepared by Phase II and Phase III of CEN/WS e-Invoicing.

The following persons from the CEN/WS eInvoicing III Working Group 3 participated in the work of this document :

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Comments or suggestions from the users of the CEN Workshop Agreement are welcome and should be addressed to the CEN-CENELEC Management Centre.

1 Introduction

The communication from the European Commission Nr. 0712 "Reaping the benefits of electronic invoicing for Europe" [1] from 2 December 2010 states in Action point 3.2:

- *"CEN should analyse by end of 2011 the need and propose actions for the adoption of interoperable Addressing and Routing procedures by the e-invoicing industry participants."*

This demand overlaps to a certain extent with a task in the business plan of the CEN Workshop on e-Invoicing phase 3 [20] from 9 February 2010. This task requires the workshop's task group 3 on Interoperability "to tackle the Addressing and Routing issue". The subject was therefore discussed in more detail and the results issued in a separate (this) CEN Workshop Agreement (CWA). However, it must be stressed that despite the attribution of substantial resources a profound analysis was beyond the possibilities, i.e. further work has to be performed for an in-depth analysis.

The Expert Group report on Electronic Invoicing [2] deals with the topic of Addressing and Routing as well and sets out several requirements for more open Addressing and Routing principles. (Compare section "4.1 Expert group report".)

These principles do not only apply to electronic invoicing but to all other e-business *messages*. As such, interoperability should be achieved by easy and cost-effective integration into the existing supply chain management and not be constrained to individual industrial or trade sector solutions.

Addressing means managing the logical identifiers which refer to (trading) parties and resolve them to the referenced Routing information.
Routing is finding a path to the recipient of a data set and the transmission to the final recipient or an intermediary.
A message is an electronic envelope that contains Addressing and Routing information in its header and which includes one or more E-Invoice, Electronic Business Document or other information as its payload.

The explanations in the previous paragraph show that Addressing and Routing of messages is important in an environment of highly automated e-business exchange. This is not the case in scenarios which rely on manual interaction, e.g. a supplier entering invoice data in a web-interface provided by a large buyer. Therefore, the scenario of automated exchange ("Straight Through Processing") is assumed for all statements within this document.

CWA 16464-2 Model Interoperability Agreement for Transmission and Processing of Electronic Invoices and other Business Documents [4] specifies the requirements set out in chapter 2.4 and Conformance Criterion 3 of CWA 16464-3 on Conformance Criteria and gives an example of how the systems of two Service Providers can regulate how they interoperate in general. This document elaborates on the chapter 2.5 and Conformance Criterion 6 of the CWA 16464-3 Conformance Criteria for Interoperability between Electronic Invoicing Service Providers [3]. It examines the *Addressing* and *Routing* of electronic *messages* in a European and global environment. It analyzes the current situation and gives guidance on further actions to be taken.

2 Scope

Within the framework of CWA 16464-3 Conformance criteria for Interoperability between Electronic Invoicing Services, the scope of this deliverable, CWA 16464-1: “Addressing and Routing Status Review”, is predominantly to examine the present day selection, differentiation and usage of party *identifiers* in Addressing and Routing of e-Invoices and e-business *messages* in Europe to foster interoperability across Service Providers.

The review’s focus is on *Addressing* of *messages* in an e-business environment. For the discussion of this subject, technical and commercial topics have to be considered. The view on these topics is specified by applying a three-layered model (content, messaging, transport) and sets the focus on the middle layer, which is about e-business messaging.
The document further elaborates on the logical address identifiers in a *message* envelope, i.e. the ones used in messaging, e.g. the EDIFACT and CEFACT header segments, and the use of *meta-identifiers* for the differentiation of *identification schemes*, especially the International Code Designator (ICD) defined within the ISO/IEC 6523 standard.

This document therefore focuses on the main issues related to these two aspects of *Addressing*:

- What are the *identifiers* currently used for *Addressing* and how are the *identification schemes* they use specified?
- How can we reconcile these *identifiers* to the network endpoint *addresses* the messages are routed to?

3 Background

Trade has evolved in many years. Where it originally started as barter, it has developed in a number of dimensions. One of the major changes is the fact, that not all of the actions belonging to trade are required to happen at the actual moment and place of the trade itself (e.g. the transfer of money from the bank account of the *buyer* to the *supplier* may be later or sometimes even earlier in time). In modern times the information exchange facilitating these steps has migrated from paper to electronic information transfer. This has emphasized the need to align the information exchanges to the trade flow – ensuring that the relevant parties are identified and informed.

Please note: While this workshop focuses on Invoicing, we realize that other business information exchanges take place and that these should not be regarded as outside the *Addressing* and *Routing* context described here.

The most common transfer of Invoice information is currently by paper documents being exchanged (routed) from the *supplier* to the *buyer*. These have an *Addressing* and *Routing* requirement: the paper needs to be delivered to the appropriate party (where the invoice information is processed). The ‘delivered to’ requires some understood way of Routing the document and the ‘relevant party’ requires suitable identification of the *buyer* party.

In a computerized or electronic transfer the Invoice exchange is between two business applications over a computer network, i.e. this exchange is highly automated. This concept of no or minimal manual interaction is also referred to as Straight Through Processing (STP). The new challenge is how to identify the correct business party, and then how to identify the application in the network that is used by this party for sending and receiving.

Electronic invoices as well as other electronic documents are exchanged in *messages*. A *message* is an electronic package of information used for transmission, containing one or more document(s) (sometimes known as the payload) and an envelope that contains *Addressing* and *Routing* information.

So we can say that Party Identification is required to know **who** to deliver the Invoice(s) to (and who they came from), and *Message Addressing* is required to know **where** to deliver the *message* (and the Routing necessary).

Addressing information are logical identifiers which refer to the involved parties.

Routing information allows to find a path to the recipient of a transmission and to forward it to this recipient.

This document elaborates on the *identifiers* used for *Addressing* and how the different *identification schemes* can be reconciled.
Some generic observations on possible Addressing mechanisms such as address directories are also made in this document.

Within this document, we will approach these issues based on 3 different scenarios for automated exchange:

- *Bilateral exchange* or *2-corner model*: There is a network suitable for electronic information exchange to which both computers (i.e. of *buyer* and *supplier*) have been connected.
- *3-corner model*: In the three corner model there is a party functioning as an intermediary between the *buyer* and the *supplier*. This intermediary (such as an e-Invoice service provider) can function on the *supplier* side or on the *buyer* side (or both).
- *4-corner model*. Where both *buyer* and *supplier* use different intermediaries. Now the two intermediaries exchange Invoices with each other on behalf of their clients.

4 Problem statement

4.1 Expert group report

To achieve a wider framework for the exchange of electronic invoices and related e-Business documents, the key requirements identified in the Expert Group report on Electronic Invoicing aim at more open Routing and Addressing principles to be used to enhance interoperability between trading partners, both SMEs and larger organizations. The main requirements mentioned in the report are the following:

- *"There should be a separation of the message envelope (header) from message content."*
- *"All networks and network based solutions should publicly make available their various Addressing and Routing structures and numbering conventions on a transparent basis."*
- *"All networks and network based solutions may (but should not be compelled to) publish an easily accessible directory, in which are found the identifiers and addresses of end-users, who wish that such information be published in this way."*
- *"No end-user should be compelled to agree to the publication of such information, for any reason such as confidentiality, or use of practices where it discovers the necessary details on a private bilateral basis."*
- *"Existing identifiers and numbering conventions should be used where possible e.g. ISO/IEC 6523 [5][6], IBANs, GS1 GLN, D-U-N-S numbers, VAT numbers etc, although this may have drawbacks for those trading across multiple environments.*
  Industry participants are encouraged to cooperate in the development and adoption of more interoperable and easy to use Addressing and Routing procedures within a standards body such as CEN, taking due account of the relevant international standards."

4.2 Unique business identifiers

For the exchange of e-Invoices the trading partners (e.g. legal entities) must be indicated unambiguously. Unique *Identifiers* serve the purpose of *Addressing* of parties involved. Typically these *identifiers* are based on recognized party identification schemes such as Commercial Registries, VAT numbers, D-U-N-S numbers, GLN numbers, or contractually agreed bilateral *identifiers*. These *identifiers* may also reference the means of *Routing* (or delivering) the message to the corresponding network endpoint (see Figure 1). The technical transport, i.e. the *Routing* within the network(s) such as the data-packages in the Internet, are not discussed in this document as this is best described in the corresponding technical specifications.

4.3 Addressing parties and their delivery endpoints

For the *Addressing* of parties and delivery endpoints of the *message* exchange flow, a common agreement is necessary concerning the *identifiers* used (especially in multi-party environments). As the usage of these *identifiers* is specified in the interchange agreement between the trading partners, the proper usage of these *identifiers* is commercially binding. And when we introduce the role of an e-Invoice Service Provider as an intermediary to this exchange flow, the lack of standards often drives

Service Providers to reinvent the wheel for each new agreement – either by agreeing on a common scheme to be used or by implementing mapping tables between two schemes. Only a standardized or generally accepted *Addressing* system can provide true *interoperability* of these various *identifiers*.

This *Addressing* system should not limit participants to agree on one single, common *identifier scheme* but rather support the use of different *identifier schemes (*as may be agreed between the different parties). For example, parties participating in e-Prior (EC e-procurement using a Global Location Number (GLN) *identifier*) [5][6] should be able to continue to use their same GLN *identifier* with all other trading parties in other e-business processes. Parties using a national registration number as identifier, e.g. a French SIRENE number or a VAT number should also be able to continue using this number. Therefore, the Addressing system must provide an umbrella that allows the use of different existing identification schemes.

The applied logical *identifiers* are ideally non-descriptive and are therefore persistent. For example, the change of the name of an organization does not affect its *identifier*. On the technical level, the persistent logical *identifiers* serve as references to the technical addresses which may be bound to a specific implementation technology and so change upon the migration to another technology.

5. Principle of the three layer model

In order to differentiate the types of *identifiers*, the usage of *identifiers* can best be understood using a three-layer view. This concept originates from the EDIFACT world, but is also followed and applied in more recent developments, e.g. XML-based messaging protocols. Each layer performs a specific function independent of the layers above or below it.

The figure below depicts the three separate layers of identifier usage for e-Invoicing and e-business:

a) Content

b) Messaging

c) Transport

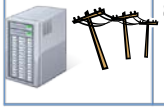
Layer	Purpose	Used in	Identifiers (examples)	Usage (examples)
Content (logical) 	Trading (or other) party identification	eInvoice or other eBusiness documents	VAT-, CR-nr., GLN, D-U-N-S, ODETTE code, EasyNumber; Standards for meta-identifiers (embedding): ISO-6523, OASIS ebCore PartyID, URN	UBL-, UN/CEFACT-, ISO20022-Party Identification, EDIFACT NAD/CTA segment
Messaging (logical) 	**Delivery endpoint identification, reference**	**Messages / envelopes / Packaging of documents**	**VAT-, CR-nr., GLN, D-U-N-S, ODETTE code, EasyNumber, provider-specific and dedicated schemes; Standards for meta-identifiers (embedding): ISO-6523, OASIS ebCore PartyID, URN**	**ebMS sender/ recipient PartyID, AS2-To/-From headers, EDIFACT UNB, UN/CEFACT SBDH**
Transport (Routing, technical) 	Technical interface, Network address	Internet, private networks, Local Area Networks (LAN's)	IP-, X25-, MAC-addresses, proprietary protocols	IP-, X25- networks, Ethernet source / destination

Figure 1 - The three layers of identifier usage

a) The *identifiers* in the upper (Content) layer are used to identify the commercial parties involved in the business transaction and are part of the Invoice document itself. Examples of such *identifiers* are official numbers such as the VAT number or the Commercial Registry number of a company, the GS1 GLN (Global Location Number), Dun & Bradstreet D-U-N-S (Data Universal Numbering System) number, ODETTE code, BIC (Business Identifier Code) or EasyNumber (Enterprise Access SYstem Number).

   Identifiers in the content cannot be relied upon for *Routing* messages. For several reasons:

   - The addresses used to identify the commercial parties involved in the business transaction may vary from the origin and destination of the messages themselves.

   - Many e-Invoice Service Providers that route *messages* do not interpret ("look into") the *document* and so may not be able to deliver the *message*.

   - If the Invoice *document* is encrypted or in a format unknown to an intermediary it is actually not possible for intermediaries to view these addresses.

b) The middle (Messaging) layer is the one of *messages* sent in e-business, i.e. of the "envelopes" that the documents are packaged within. It contains the logical *identifiers* for endpoint addresses (where *messages* are to be delivered). Messaging *identifiers* are independent (agnostic) of the document content or the network technology or topology applied.

   The logical *identifiers* in the Messaging layer are those for *Addressing* of e-Invoicing/e-business *messages* because they specify the actual place to deliver for the *message* (and the place of origin).

   Identifiers at the Messaging level may be the same as those at the Content level, examples of the usage of *identifiers* within the Messaging layer could be found in the AS2-specification (AS2-To and AS2-From) headers or in OASIS ebXML Messaging (the PartyId element for sender and recipient identification). Also the UN/CEFACT Standard Business Document Header (SBDH) contains an *identifier*-field within the *sender*- and *recipient*-element.

   Please note: In practice it is often the case that multiple envelopes are nested, i.e. one envelope is enclosed in another. For the sake of simplicity, these distinctions are not further elaborated in this document.

c) The lowest (Transport) layer covers *identifiers* on the technical network protocol used for the transmission of electronic data. These technical *identifiers* or addresses are based on the network protocol used. Examples are the Internet, the SWIFT network (both using the TCP/IP protocols), and packet switching networks such as X.25 (sometimes used by Value Added Networks).

The distinction between the use of *identifiers* in each layer allows the separation of maintenance for each identification system.

The focus of this paper lies on the logical *identifiers* used for the Addressing of the various parties in a trading relationship and their Messaging end points (delivery or origin), i.e. the ones used in the Messaging layer. We can now re-phrase the issues defined in the Introduction of this document to be:

- What are the *identifiers* currently used for *Addressing* [in the Messaging layer] and how are the *identification schemes* they use specified?

6. Current approaches for identifying participants

Today a wide range of approaches which identifiers are used for the *Addressing* of participants can be found in the market. These vary from mandating one specific identification scheme, using different schemes in parallel to using mapping tables. Some examples are given below. Due to the availability of the information, several examples are given which concern the procurement in the public sector.

- An example for mandating a single identification scheme is ePRIOR (Electronic PRocurement Invoicing and Ordering). ePRIOR is the project to direct electronic invoices as well as other electronic messages to the European Commission (EC). For ePRIOR, the GS1 Global Location Number (GLN) was chosen as identifier for *Addressing* and *Routing* of messages between trading parties. [7]
- The PEPPOL infrastructure for Addressing and Routing will not implement its own scheme for identifying Parties. Instead it will support a federated system for uniquely identifying parties. This requires defining a controlled set of *identification schemes* required by PEPPOL implementations. The list of *identifiers* can be found in the PEPPOL identifier policy document [8] and is based upon ISO/IEC 6523 [8]. The mentioned *Addressing* infrastructure is explained below.
- The Norwegian market for exchanging invoices to the government will use the national "organisation number" as *identifier*. This is because every company in Norway has to be registered in a public register for tax and VAT reporting to the government. The company has to give its end address or service provider address into the register. Norway is adopting the PEPPOL infrastructure (see above) for delivering documents to the Norwegian government.
- In the Netherlands, in the public e-Invoicing solution "Digipoort" (which is provided by the organization Logius) the *Addressing* and *Routing* of e-Invoices is based on the following two numbers:
  Companies are identified based on their number assigned by the Chamber of Commerce ("KvK"). KvK acts as the Commercial Register in the Netherlands. The KvK number is registered under ISO/IEC 6523 [6].
  Government agencies are based on an "Overheidsidentificatienummer" (OIN – Dutch Government Identification Number), which is derived from a number used by the tax agency. [9]
  The Digipoort platform is a combination of a B2B portal that supports SOAP-based messaging (ebMS or other) and email. It also has a portal.
- In Sweden, the absolute majority of companies and public sector organizations are identifying themselves using either GS1 GLN or Swedish Organization numbers (not the same as VAT numbers). All operators are able to route using these and it is also possible to use these *identifier* types in most ERP and Accounting systems (which is a very important aspect on *identifiers* and their scheme types).
  Both the Swedish Organization number and the GS1 GLN are registered under ISO/IEC 6523 [6]. The International Code Designator (ICD) Value (ISO 6523 code) for the Swedish Organization Number is 0007, the one for the GLN is 0088.
  Another example from Sweden describing the usage of logical identifiers within EDIFACT *messages* is described in the paper "Application of ISO/ EDIFACT and OFTP"[10]. This example concerns a private company and is not restricted to public procurement messages.
- The situation in France can be described as follows:
  Within the private sector the predominant *identifiers* used are GLN's, VAT numbers and the SIRENE *identification scheme* (SIREN/SIRET) for the domestic market.
  In the public sector, the Chorus Project - which is the future financial information system of the French State - works with the SIRET number for French *suppliers* or with the VAT number if the *supplier* is not based in France.
- The situation in Spain can be described as follows:
  Within the private sector the predominant identifiers used are GLN's, VAT numbers and the NIF (número de identificación fiscal – Spanish national tax identification number) for their domestic market.
  For the public sector the NIF is used. If the *supplier* is not based in Spain the VAT number is used.
  In Catalonia, the "consorci Administració oberta de Catalunya" (Open Administration of Catalonia Consortium) regulates the usage of identifiers in the "Guía de integración para plataformas privadas al hub e-FACT" (Integration Guide for private e-hub platforms for e-Invoicing). [11]
- An exa*mple of an identification scheme for Serv*ice Providers is the German e-Invoice alliance group for the *message* exchange flow between Service Providers. Their "Roaming-ID" allows the unique identification of a Service Provider. This *identifier* is used as the reference for the communication between two Service Providers. It consists of a two-letter country code according to ISO-3166, e.g. "DE" for Germany and a four-digit code that is assigned by the e-Invoice alliance to the service provider. So an example for such a number is "DE1234".

- Some e-Invoicing Service Providers use their self-managed *identification scheme* to identify all trading parties. When it comes to a four-corner setup, i.e. when trading parties have to be identified that are clients of the partnering Service Provider often the following approach is chosen: The customer of the partnering Service Provider is assigned an *identifier* from the self-managed *identification scheme*. As the identifiers have to be translated between the *identification scheme* that is used by the partnering Service Provider and the self-managed scheme, a mapping table for each Service Provider collaboration is set up and maintained. One row of a mapping table contains the self-managed *identifier* of a trading party in one field and its counterpart from the *identification scheme* used by the other Service Provider.
- In Japan the "Common XML/EDI Framework" was defined by the "Common XML/EDI Practice Promotion Council" (COXEC) in 2005. COXEC aims to promote EDI services with a service model to SMEs widely.
  Within this framework ISO/IEC 6523 [6] is used as registration system for *identifiers* and a Uniform Resource Name (URN) scheme following the ebCore Party Type [12] structure (using the syntax originally defined in OASIS document "ebXML Collaborative Partner Profile Agreement [CPPA] v2"[13]).
  The predominant *identification scheme* is the Japanese registration system "standard company code" issued by the "Japan Information Processing Development Corporation / Electronic Commerce Promotion Center" (JIPDEC/ECPC). [14]
- In Mexico, government documents such as the Comprobante Fiscal Digital (CFD) identify both sender and receiver by means of the Federal tax identification number, or Registro Federal de Contribuyentes (RFC). At the messaging layer, identification varies by participant and protocol, with protocol-based identifiers, such as AS2 Name, being agreed upon by the participants.
- Meta-identifiers: Several of the specific examples show that meta-identifiers based upon ISO/IEC 6523 are used to dedicate specific identification schemes. ISO/IEC 6523 was first specified in 1984. The current version was issued in 1998. ISO/IEC 6523 consists of two parts. Part 1 "Identification of organization identification schemes" [5] specifies the structure of identifiers of an identification scheme. Part 2 "Registration of organization identification schemes" [6] specifies the registration procedure for International Code Designator (ICD) values which are the meta-identifiers used to dedicate identification schemes. Since March 2011 the registration authority for ICD values is the American National Standards Institute (ANSI).
  The examples above show that registering an ICD value (e.g. of an e-Invoicing Service Provider's identification scheme to identify clients) provides a good basis for interoperability of the registered identification scheme.
  A list of the registered ICD values is published and can be found on the web. [15]
  Some relevant *identification schemes* and their ICD values can be found in the Annex A of this document.

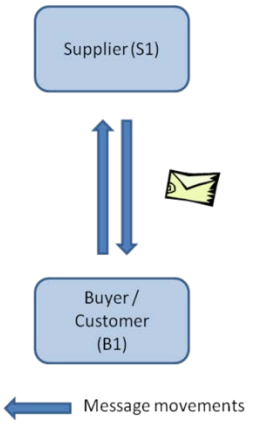
The examples above can be summarized as follows: Mostly official (VAT-, Tax-numbers etc.) and/or private reusable *identification schemes* like the GS1 GLN are used for *Addressing*. Only two of the examples are about dedicated *identification schemes*, i.e. *identifiers* that are only used for this specific purpose. (But in the case of Germany the example applies to Service Providers themselves, not to their clients which are the trading parties.) In several examples ISO/IEC 6523 is mentioned. ISO/IEC 6523 provides the *meta-identifiers* to differentiate different *identification schemes*. The examples are summarized in the table below. Please bear in mind that this table only summarizes the examples - which are based upon the input received during the workshop. It does not claim to be comprehensive or complete.

	Official ID(s) (VAT or other)	Private (International) IDs (e.g. GS1 GLN)	Dedicated IDs (assigned by Service Providers)	Use of Meta-Identifiers (ISO 6523)
EU (ePRIOR)		x		
Europe (PEPPOL)	x	x		x
Norway	x			x
Netherlands	x			x
Sweden	x	x		x
France	x	x		
Spain	x	x		
Germany (Service Providers)			x	
Japan		x		x
Mexico	x			
Not country specific			x	
TOTAL (max. 11):	**7**	**6**	**2**	**5**

7. Current approaches to Routing messages

Following from the explanations above, similar approaches are used for the logical *identifiers* used in the Messaging layer.

Because of the networking characteristics of business relationships, electronic invoicing has evolved



along similar patterns in most business sectors.

Figure 2 - Schematic design of a bilateral exchange or 2-Corner model

7.1 Bilateral exchange/Two corner model

Initially the organizations involved develop direct bilateral exchanges with their trading partners, as shown in the Figure below. Issues of *interoperability* between partners are resolved by specific

identifiers and Addressing schemes in the partner's trading agreements. In the Figure below ABC Co. has a direct route to deliver their invoice messages to Big Ltd (for example, a direct email address). This approach requires individual organizations to manage their own Addressing schemes for automated exchange and faces challenges when it comes to expansion and maintenance. For example, if Big Ltd changes its email address it has to notify all its trading partners and these have to update their individual systems.

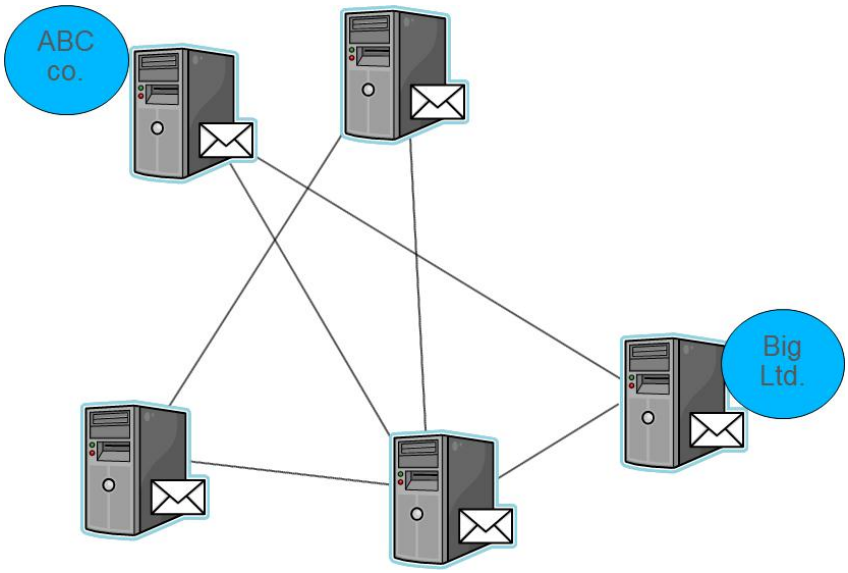


Figure 3 - Routing using a Bilateral exchange model. The trading parties communicate directly with each other

7.2 Three Corner Model

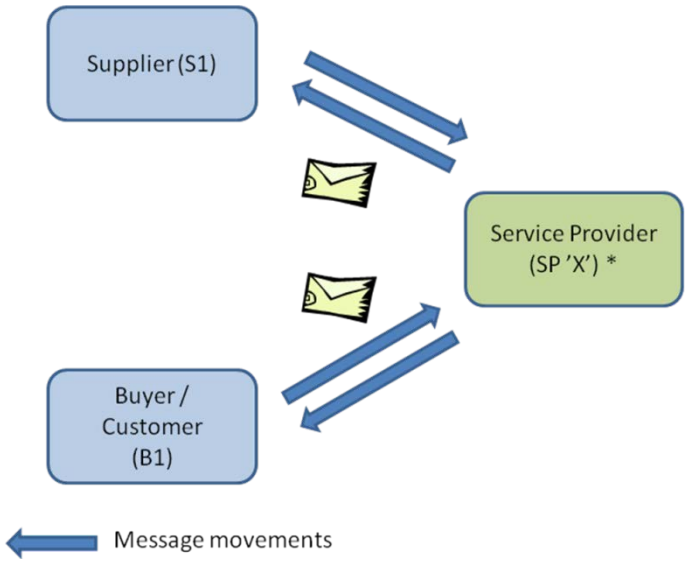


Figure 4 - Schematic design of a 3-Corner model

A more common environment for electronic invoicing is for trading parties to use an intermediary service provider (or Value Added Network). These provide a community of trading parties based around a common service for the delivery of messages. In some cases the Service Provider also adds value in terms of invoice creation and processing. Because the intermediary introduces a third party to the bilateral arrangements this environment is known as a three corner model, as shown below:

In the example, ABC Co. now relies on Inv.net to deliver its invoices to Big Ltd. With this approach the service provider (Inv.net) manages the governance of a common *Addressing identifier scheme*. However, the reach within the 3-corner model is limited to the customer-base of the service provider.

Please note: There is always the risk in a 3-Corner Model that one of the parties is locked in by a more powerful trading partner; e.g. the powerful participant can dictate the usage of a specific Service Provider to its partners. For an SME this can lead to a situation where it has to connect to several Service Providers which leads to a multiplication of efforts

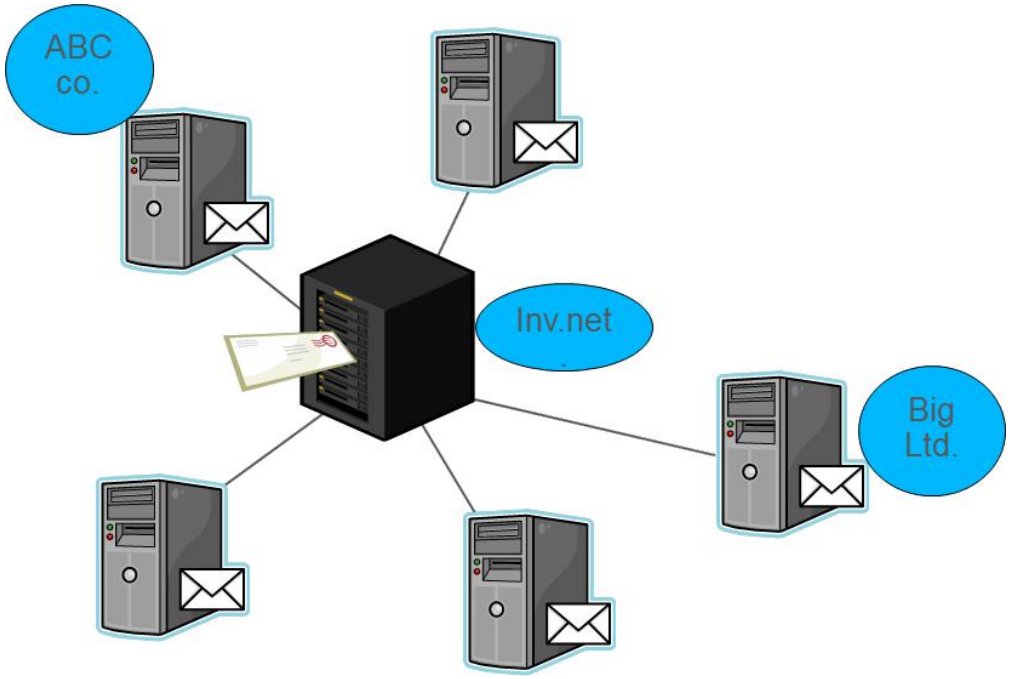


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Figure 5 - Routing using a simple 3-Corner model. The trading parties communicate over one intermediary.

7.3 Four Corner Model

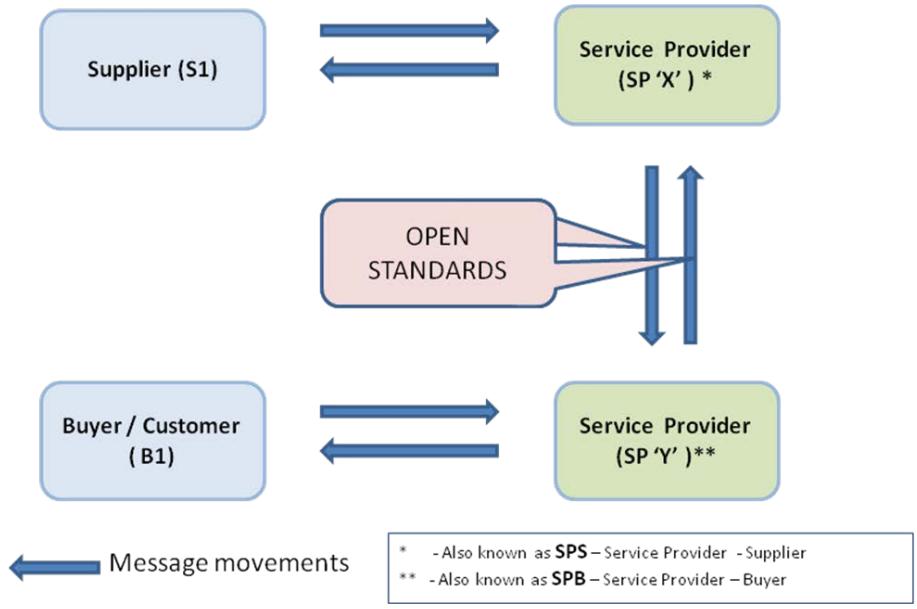

Figure 6 - Schematic design of *Routing* using a 4-Corner model. The trading parties communicate over two intermediaries.

The initial promise of the 3-corner model and the open market for service providers has meant that by 2011 there were more than 100 '3-corner models' service providers operating in the European electronic invoicing market[1]. However, few of these communities are isolated in their business activities, creating the requirements for *Routing messages* between different 3-corner models.

While in some circumstances individual organizations choose to subscribe to multiple service provider communities, the growing trend has been for service provider-to-service provider 'interconnections' to be established. These enable *messages* to be routed to the required service providers who then pass them onto the organizations who are their clients. Especially SME's are reluctant to be compelled into a 3-corner model and benefit from the 4-corner model.

Because invoice *messages* may now be routed between two intermediaries this is referred to as a four corner model. For example, ABC Co. now passes its invoice *message* to Inv.net, Inv.net passes this to MyBank (based on some bilateral commercial and technical arrangements) and MyBank delivers it to Big Ltd, as shown below.

This model requires an agreement and reconciliation on the *identifier* scheme(s) used to deliver e-Invoicing/e-business *messages* between service providers.

Typically this is achieved either by distributed publication or through some form of *registry* or *directory* containing the *identifiers* of trading parties that are accessible through the interconnections. Party's entries in the directory map between the *identifier* of the trading party and the corresponding delivery endpoint of the e-Invoice/e-business *messages* (of their service providers). Data protection has to be considered for such *directory* schemes and specifically that a trading party is able to maintain full control over its published data. Such *directories* can be operated with interfaces that provide a minimum set of functions and the interfaces may be based upon existing standards.

The four corner model is increasingly the common situation when exchanging European electronic invoice *messages*. However, this requires individual service providers to manage their own bilateral sets of interconnection agreements, typically involving various *Addressing* schemes and protocols. Once again these are challenges when it comes to expansion and maintenance. In this approach, an

[1] 2011, Billentis.

agreement on the scheme to be used is required. If a provider-specific scheme is used, it may lead to a vendor lock-in for a trading party that wishes to change its service provider, where the trading party cannot dissociate himself from the service provider. Another hampering factor is the fact that it is difficult and problematic to connect two or more existing *identifier schemes* when different provider networks are connected.

7.4 Four Corner Model using Open Standards

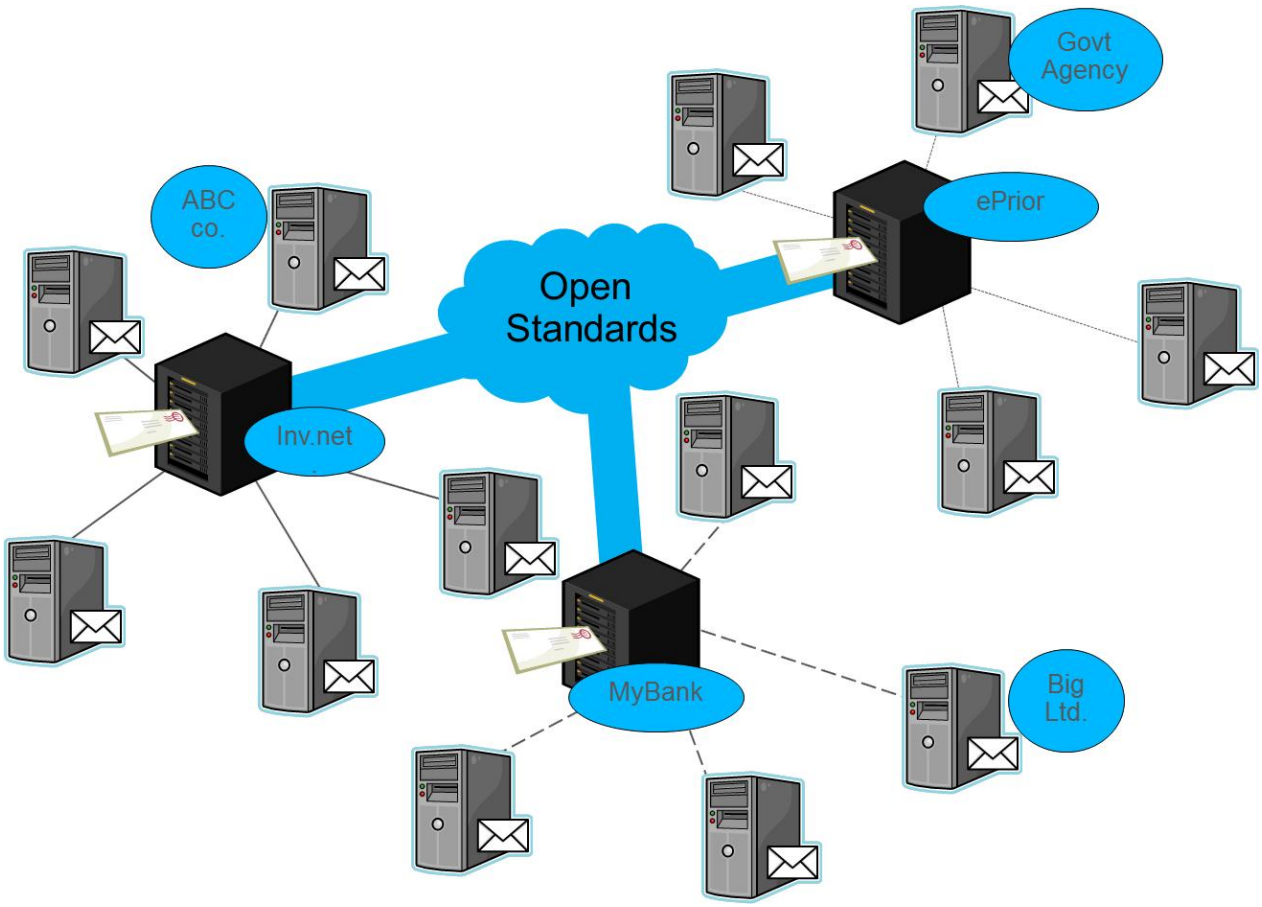

Figure 7 - Routing in the open 4-Corner model environment

The explanations above suggest that a variety of *identification schemes* exist and will continue to exist. The market participants, especially service providers are unwilling to abandon their existing *identification schemes*. Further, there are market participants who wish for provider-independent *identifier* schemes in order to enable end-users to migrate easily from one service provider to another. Such an approach would also allow an integration of the *Addressing* into other processes within the supply chain management, e.g. into the master data management in an ERP (Enterprise Resource Planning) *system*. On the other hand, a service provider which has its own specific *identification scheme* in use – which its *system*-architecture depends on – might consider this a strategic asset and wants to keep the control over it.

Interoperability agreements are required to provide operating compliance, i.e. the means that provide the required *interoperability*. On a legal and compliance level this can be achieved by setting up interoperability agreements between service providers following the “Model Interoperability Agreement” [4]. To achieve these requirements, common standards for how to operate (*route*) *messages* between service providers are needed. These would create an ‘open’ four corner model, as shown in the previous figure.

Using such an environment, service providers (such as Inv.net, MyBank and ePrior in the Figure above) can operate their interconnections with all other European service providers using one standardized interface. This in turn means that trading parties are not required to adopt multiple *Addressing identifiers* for *Routing* their *messages*. So ABC Co can identify the delivery points for their electronic invoices to both Big Ltd and Govt. Agency using a common Addressing scheme, independent on the service providers involved.

An 'open' four corner electronic invoice messaging model operates in a similar way to other federated systems of *Routing* as seen in postal, GPS and telephony services. It means that service providers (and trading parties if they wish) can develop a single interface for all their *message Routing*.

A key part of the architecture of an 'four corner model using Open Standards is that the *identifiers* of trading parties and their delivery endpoints are accessible through a shared *directory* infrastructure. Between two service providers the *directory* contains the technical address, communication interfaces and may even contain the type of documents that can be handled. An entry has to be kept up to date by the trading party or its service provider. With this approach different *identification schemes* may coexist together for the exchange of e-invoice *messages*.

Please note: The term 'Open Standard' is used in this document as defined in "European Interoperability Framework for pan-European eGovernment Services" [19]. This means that market participants are able to easily access, develop and maintain an Open Standard. The term 'open' is NOT to be understood in the sense of lack of specification-details.

7.5 Directories in a Four Corner Model

This *directory* infrastructure does not need to be a single directory – just a single method of accessing the *directory* information. An example of the distributed *directory* approach is the infrastructure designed within the PEPPOL (Pan-European Public Procurement Online) project. The resolution of trading party *identifiers* and their delivery endpoints is based upon the Domain Name System (DNS) (which is the naming system the Internet builds on). Service providers maintain their own (standardized) *directories* (called Service Metadata Publishers) and having a single central '*directory* of the *directories*' link these together (this is known as the Service Metadata Locator). This master directory indicates which specific service provider *directory* contains the end point delivery address (and other details) of any given trading party. The PEPPOL infrastructure uses the OASIS BDX standards for their *directory* infrastructure – meaning that these are open for any other trading party, service provider or community to adopt.

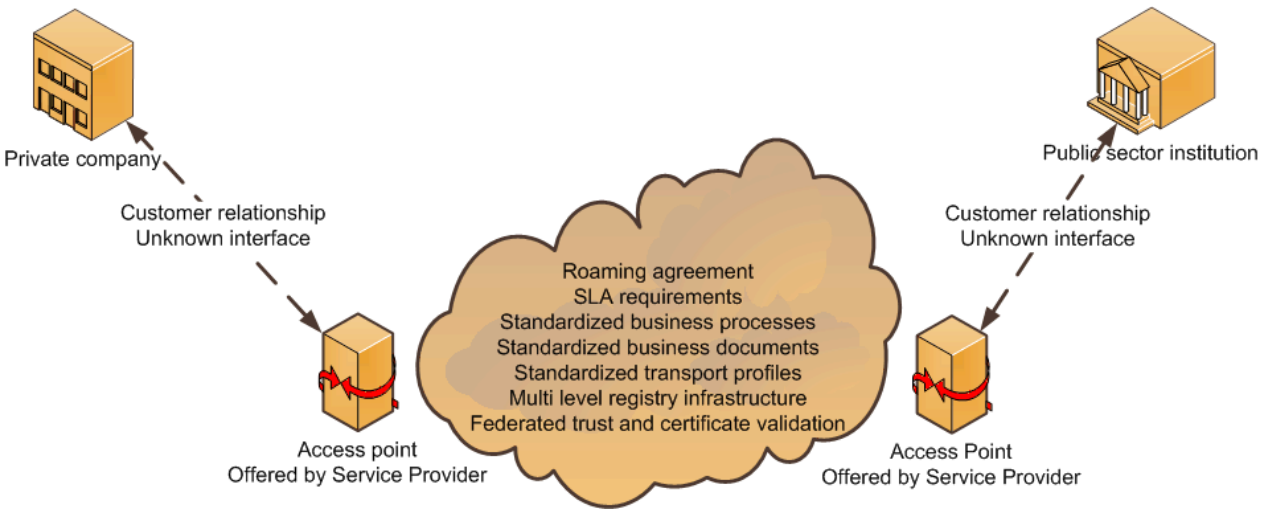

Figure 8 - The service providers act as access points to the PEPPOL infrastructure

The following figure illustrates how a *message* may be *routed* to the correct endpoint using the PEPPOL infrastructure:

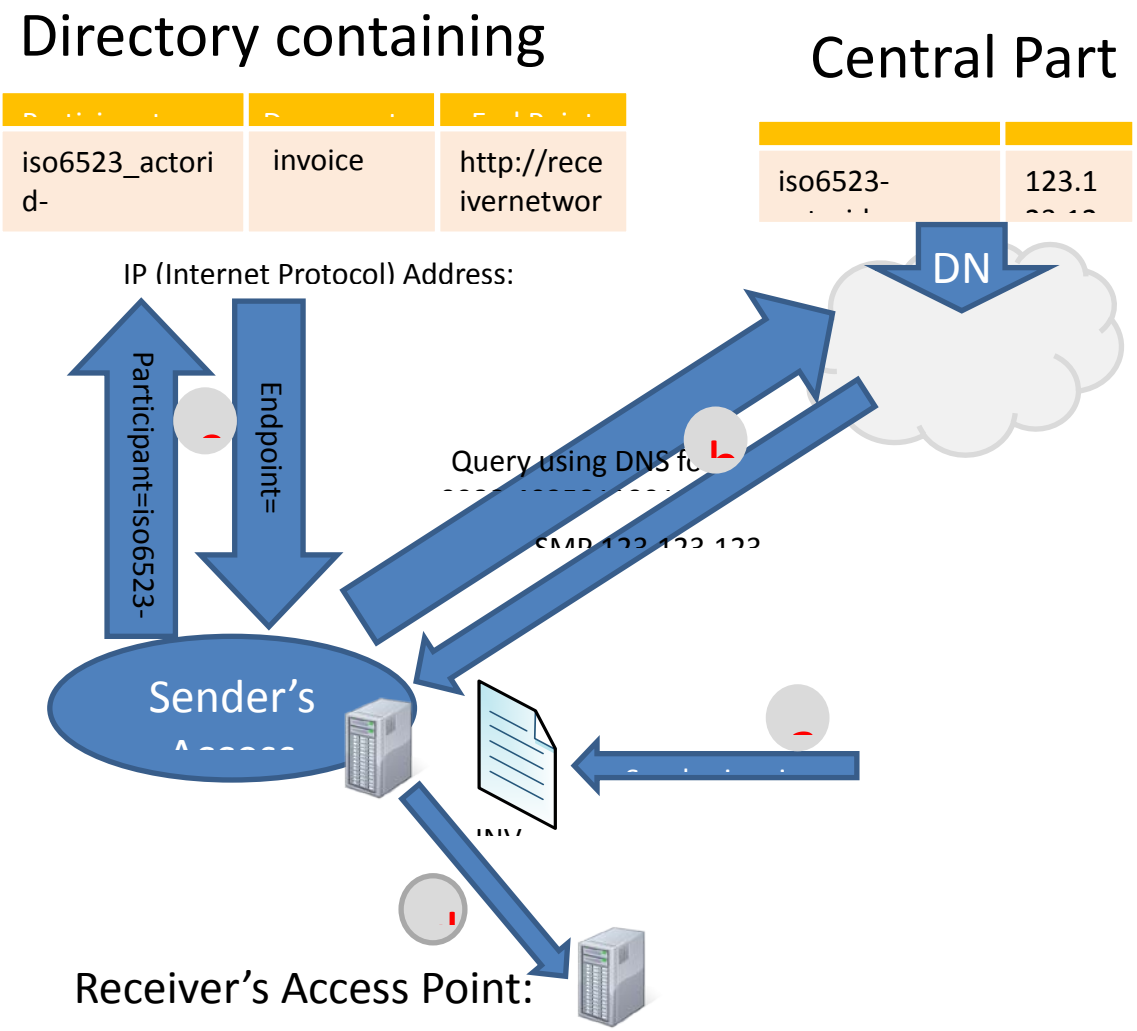

Figure 9 - PEPPOL identifier lookup according to [8] (simplified):

a) The supplier submits an invoice for the buyer uniquely identified by 0088:4035811991014 to his "Access Point" (Service Provider).
b) The Access Point queries the central part (SML) of the PEPPOL directory infrastructure over the DNS and receives the network address of the directory responsible for the party identified by 0088:4035811991014
c) The Access Point queries the specific directory (SMP) using the unique identifier of the buyer party and receives the technical address where to deliver the invoice.
d) The Access Point delivers the invoice to the technical address that it has received from the SMP-directory.

A key point for the 'open' model is that the central master *registry* needs to be operated under a sustainable business model and under a governance policy that is acceptable to the stakeholders involved.

8. Possible solutions: Standards for identification schemes

The explanations above show that a variety of *identification schemes* exist. The market participants, especially service providers are unwilling to abandon their *identifier scheme* in use. Further, there are market participants who wish for provider-independent *identifier* schemes in order to enable end-users to migrate easily from one service provider to another and to enable an *Addressing* mechanism based upon *directory* lookup which allows for a large-scale traffic volume. Such an approach would also allow an integration of the *Addressing* into other processes within the supply chain management, e.g. into the master data management in an ERP (Enterprise Resource Planning). On the other hand, a service provider which has its own specific *identifier scheme* in use – which its *system*-architecture depends on – might consider this a strategic asset and wants to keep the control over it.

A solution to better align different *identification schemes* is to define them in a meta-identification scheme. CWA 16036 [16] describes the approach of “federation of *identification schemes*” and gives recommendations on this topic in section 5.2.5 (usage of ISO/IEC 6523 [5][6] and of Uniform Resource Name - URN). It also discusses registration policies of *identification schemes* and contains legal considerations.

The “OASIS ebCore Party Id Type Technical Specification” [12] implements the recommendations on “federation of *identification schemes*, provides registered URN namespaces for ISO/IEC 6523 [5][6] and other relevant meta-identification schemes. It also gives examples how these URN-based meta-identification schemes can be applied in XML-based protocols, e.g. ebXML messaging. However, these Uniform Resource Names can also be used in protocols which are not based upon XML, e.g. in AS2. Therefore, the “OASIS ebCore Party Id Type Technical Specification” fulfils all requirements to a *meta-identifier* scheme.

A solution for a common *Addressing* mechanism could be a *directory* infrastructure where the *directories* contain the *Addressing* information, i.e. the mapping of the logical *identifiers* to the *Routing* information as entries). A good starting point for such an infrastructure is the PEPPOL *directory* infrastructure explained above. However, the end-users should not be forced to use this infrastructure but should be left the choice to participate in this infrastructure or another of their own preference.

9. Recommendations

The analysis carried out within this document as demanded by the communication from the European Commission Nr. 0712 "Reaping the benefits of electronic invoicing for Europe" [1] shows that different *identification schemes* for the Addressing of e-business messages are in use. The examples given in chapter 6 demonstrate that the usage of national public *identifiers* (which are free of charge) is well established. In parallel, private (international) *identification schemes* are often used. The examples show further that a common *Addressing* system is a need; it is already practised to a certain extent by the usage of *meta-identifiers* in order to reconcile the public national *identification schemes* and the private ones (and thus preventing a monopoly situation). The workgroup therefore recommends to build upon this existing practice of meta-identification and to evolve it further. The actions to be performed for this development comprehend the following:

- The analysis performed in this document has to be taken further within a reasonable time frame and the respective resources in order to gain detailed results.

- A consensus has to be built on a framework for the meta-identification of unique business identifiers. This goal can be achieved by large scale adoption of existing standards (like ISO/IEC 6523 [5][6] and OASIS ebCore Party Id Type [12], see above). At the time of writing this document a proposal for such an activity is pending (“A pan-European Cyber-identity for business: a federation of business identifiers“). This proposal does also consider policies for *identifier* usage. Existing policies like the national procurement policies and the PEPPOL *identifier* policy [8] can be taken into account and developed further if necessary.

- As the chapter “Current approaches for identifying participants” shows, most of them are in line with the proposal (usage of ISO/IEC 6523). It is therefore strongly recommended that *identification schemes* that are used for *Addressing* are registered under ISO/IEC 6523.

- Further work has to be conducted to investigate the possibilities of a common *directory* infrastructure for *Addressing*. This work should not only take technical aspects into consideration, but should focus on legal and compliance topics and aspects of governance of common infrastructures for *Addressing* and *Routing directories*.

- All this work should be performed under the premise of an existing variety of solutions and business models. The requirements of SME’s should be taken into account specifically (as described in CWA 16461 Electronic invoice processes in Europe and enablement of SMEs to use them efficiently [17]) and the other Conformance Criteria of CWA 16464-3 Conformance criteria for Interoperability between Electronic Invoicing Services[3] and CWA 16464-2 Model Interoperability Agreement for Transmission and Processing of Electronic Invoices and other

Business Documents[4] should be taken into account. The scope should be on the European market, but interoperability on a global scale should be the aim.

10. References

The following documents are referenced in the body of this document:

[1] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Nr. 0712
"Reaping the benefits of electronic invoicing for Europe"
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0712:FIN:EN:PDF

[2] Final Report of the Expert Group on E-Invoicing
http://ec.europa.eu/enterprise/sectors/ict/files/finalreport_en.pdf CWA 16464-3
“Conformance Criteria for Interoperability between Electronic Invoicing Service Providers”

[3] CWA 16464-3, *Electronic invoicing - Part 3: Conformance Criteria for Interoperability between Electronic Invoicing Services*

[4] CWA 16464-2, *Electronic invoicing - Part 2: Model Interoperability Agreement for Transmission and Processing of Electronic Invoices and other Business Documents*

[5] ISO/IEC 6523-1, *Information technology — Structure for the identification of organizations and organization parts — Part 1: Identification of organization identification schemes*

[6] ISO/IEC 6523-2, *Information technology — Structure for the identification of organizations and organization parts — Part 2: Registration of organization identification schemes*

The ISO/IEC 6523 documents are available for purchase at the ISO website:
http://www.iso.org/iso/search.htm?qt=6523&searchSubmit=Search&sort=rel&type=simple&published=on
A description of ISO/IEC 6523:
http://en.wikipedia.org/wiki/ISO_6523

[7] GLN application in the European Commission’s e-PRIOR project
http://www.pwc.com/en_GX/gx/eu-institutions-services/assets/GLN_Case_Study.pdf

[8] PEPPOL "Policy and recommendations for the use of Identifiers"
http://www.peppol.eu/work_in_progress/wp8-Solutions%20architecture%2C%20design%20and%20validation/specifications/v1-0-specifications/peppol-identifier-schemes/view

[9] Baseline informative eFactureren (Dutch language)
http://www.logius.nl/fileadmin/logius/product/e-factureren/Baseline_informatie_eFactureren_v16_bedrijven.pdf

[10] Application of ISO/ EDIFACT and OFTP
http://www.volvoit.com/SiteCollectionDocuments/Volvo%20IT/edi/documents/Application_of_ISO_EDIFACT_and_OFTP.pdf

[11] “Guía de integración para plataformas privadas al hub e-FACT” (Integration Guide for private e-hub platforms for e-Invoicing)
https://seu.aoc.cat/docs/EFACT_Guia_integracion_hub.pdf

[12] OASIS ebCore Party Id Type Technical Specification Version 1.0
http://docs.oasis-open.org/ebcore/PartyIdType/v1.0/PartyIdType-1.0.html

[13] OASIS ebXML Collaborative Partner Profile Agreement (CPPA) v2
http://www.oasis-open.org/committees/ebxml-cppa/documents/ebcpp-2.0.pdf

[14] “[ebxml-cppa] PartyId/@type minor revision proposal” (Description of identifier usage in the Japanese COXEC system)
http://markmail.org/message/gjf5y62app3jqms7

[15] The list of International Code Designator (ICD) values registered conformant with ISO/IEC 6523-2
http://www.cyber-identity.com/download/ICD-list.pdf

[16] CWA 16036, *Cyber-Identity: Unique Identification Systems For Organizations And Parts thereof*
ftp://ftp.cen.eu/CEN/Sectors/TCandWorkshops/Workshops/CWA16036CyberID.pdf

[17] CWA 16461, *Electronic invoice processes in Europe and enablement of SMEs to use them efficiently*

[18] E-Invoicing Glossary of Terms

[19] European Interoperability Framework for pan-European eGovernment Services
http://ec.europa.eu/idabc/servlets/Doca2cd.pdf

[20] Business Plan for a CEN Workshop on eInvoicing phase 3 (CEN WS/INV3)

Other basic documents:

[21] CWA 16050, *A framework for the emerging network infrastructure of eInvoice service providers throughout Europe*
ftp://ftp.cen.eu/PUBLIC/CWAs/eInV2/CWA%2016050.pdf

11. Definitions: See in the Glossary of Terms [18]

12. Annex A: Meta-Identification following ISO/IEC 6523: International Code Designator (ICD) values

The ISO/IEC 6523 standard defines a *meta-identifier*, the International Code Designator (ICD) and specifies the registration procedure. The complete list of registered ICD values is available on the web [15]. An extract of the registered identification schemes is shown below. Please note that the PEPPOL identifier policy [8] does mandate most of these values in chapter 2.2.

ICD Value	Issuing Organization	Identification Scheme
0002	INSEE: French National Institute for statistics and Economic studies	Système Informatique pour le Répertoire des Entreprises et de leurs Établissements (SIRENE - covering SIREN and SIRET)
0007	National Tax Board	Swedish Organization Number
0037	Finnish tax board	LY-tunnus
0060	Dun & Bradstreet	Data Universal Numbering System (D-U-N-S Number)
0085	Swiss Chambers of Commerce	Swiss Chambers of Commerce Scheme
0088	GS1	Global Location Number (GLN)
0096	The Danish Chamber of Commerce	DANISH CHAMBER OF COMMERCE Scheme
0097	Ediforum Italia	Ediforum Italia number
0106	Dutch Chamber of Commerce/Register of Commerce	KvK number
0135	Società Interbancaria per l'Automazione	SIA Object Identifiers
0142	Servizi Centralizzati SECETI	SECETI Object Identifiers

0147	Japan Information Processing Development Corporation / Electronic Commerce Promotion Center	standard company code
0169	Swiss Commercial Registers	Swiss Federal Business Identification Number
0177	ODETTE	ODETTE code

ISO/IEC 6523 does allow the specification of bilaterally agreed ICD values. These values have to be between 9900 and 9999. This should be a temporary solution, as it is preferable to have a registered ICD value. The PEPPOL identifier policy makes use of this and specifies the following values:

Assigned Code	**Issuing Organization**	**Identification Scheme**
9901	Danish Ministry of the Interior and Health	
9902	The Danish Commerce and Companies Agency	Danish Commercial Number
9904	Danish Ministry of Taxation, Central Customs and Tax Administration	Danish Tax number
9905	Danish VANS providers	Danish VANS number
9906	Ufficio responsabile gestione partite IVA	Italian VAT number
9907	Italian TAX Authority	Italian tax number
9908	Enhetsregisteret ved Bronnoysundregisterne	Norwegian Organisation Number
9909	Enhetsregisteret ved Bronnoysundregisterne	Norwegian VAT Number
9912	National ministries of Economy	European VAT number
9913	Business Registers Network	REID
9914	Austrian administration	Österreichische Umsatzsteuer-Identifikationsnummer
9915	Austrian administration	Österreichisches Verwaltungs bzw. Organisationskennzeichen
9916	Austrian administration	Firmenidentifikationsnummer der Statistik Austria
9917	Icelandic National Registry	Icelandic Registry number