Global Interoperability Framework

Proposals for a common approach

Version 1.0

2020-06-18

Preface

The Global Interoperability Framework (GIF) has been created by an international group of associations and bodies with a common interest in overcoming barriers to interoperability for the exchange of supply chain digital transactions. They formed a joint working group (GIF Working Group) in 2019 to develop a neutral framework for collaboration, which could have application in many environments across the globe. This message announces the publication of our GIF document, which can be downloaded from www.gifworks.io/download-document/

The Working Group members are currently:

- Connect ONCE (ONCE), the Open Network for Commerce Exchange (USA), a collaborative forum for B2B e-Commerce;
- EESPA, the European E-invoicing Service Providers Association (EU), a pan-European trade association, whose members are active in electronic invoicing and supply chain automation;
- OpenPEPPOL (EU) a not-for-profit association responsible for the development, maintenance and implementation of the PEPPOL specifications enabling cross-border e-Procurement;
- The Business Payments Coalition- BPC (USA), a volunteer group of organisations and individuals working together to promote greater adoption of electronic business-to-business invoices, (B2B) payments, and remittance data.

The Global Interoperability Framework (GIF) is a set of recommended practices, policies, and standards for the operation of any 'four-corner' interoperability network organised within a collaborative governance framework wishing to be GIF compliant. Such a network allows its dedicated access points, which are typically service and solution platform providers of various kinds, to quickly and easily inter-connect their extensive customer networks for the secure and robust exchange of digital supply chain-related transactions such as e-invoices and orders. The GIF objective is to enable smoother implementation of end-user business connections by building economies of scale and scope.

As a state of the art reference model, the GIF reflects currently well-accepted technologies and building blocks. It is open to innovation and evolution as new technologies achieve acceptance and critical mass. At this stage the GIF Working Group is not proposing the building of an *actual physical network* to operate at a global level, but rather seeks to promote maximum alignment of interoperability frameworks operating in different settings based on common building blocks, whilst also allowing for the needs of different geographies or sectors.

This is an Invitation to all industry stakeholders to review these materials and send us your feedback, either in a document by e-mail to info@gifworks.io or in the response form on our web-site: www.gifworks.io/feedback

We are very interested in your thoughts about the business and technical content, and also on the desirability of expanding the present working group to take the work forward in terms of refinement and adoption. Please get involved and send in your input by 30 September 2020 at the latest.

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Executive Summary

1. A group of associations[1] came together in 2019 to explore the establishment and adoption of a **Global Interoperability Framework (GIF)**. This proposal is the first output of this work and is offered to interested parties for consultation and input with a view to its refinement and adoption.
2. For the purposes of this document **interoperability** is defined as the ability of a seller or a buyer together acting as trading parties to exchange compliant e-invoices and other supply chain electronic messages containing the essential information elements required by both seller and buyer, irrespective of the information technology environment, back-office systems, or third-party solutions or services used by each.
3. Although interoperability is usually based on a cooperation model between **service provider/access points**[2] offering access to an interoperable network, it is also essential to consider the requirements and facilities required to fully support the needs of end-users i.e. the trading parties in the chain, as this is the underlying interoperability that needs to be supported. A section of this proposal deals with the end-user perspective
4. The **GIF** is defined as a set of **recommended practices**, policies, standards and guidelines that enables the exchange of e-Invoices, and other supply chain documents and messages independently of adjacent payment, accounting and enterprise resource planning (ERP) systems.
5. The GIF is intended to guide the creation of individual instances of an interoperability network, which may be created at global, national, regional or sectoral level based on common components and practices that are proven, fit-for-purpose, secure and robust.
6. **The Recommended Practices** are principally orientated towards the B2B and B2G e-business and supply chain spaces, and propose '**building blocks**', which simplify adoption and offer the following benefits:

- ***Meeting the needs of end users (buyers and suppliers):***
    - *Accelerating the use of automated digital processes*
    - *Making it simpler and faster to connect to trading partners*

[1] Connect ONCE (ONCE) is the Open Network for Commerce Exchange (USA), EESPA is the European E-invoicing Service provider Association (EU), OpenPeppol (EU) is the association responsible for the Peppol specifications and the BPC is the Business Payments Coalition (USA).

[2] Service provider/access point is used throughout this document to connote a provider of supply chain automation services in a broad sense, within which it usually offers an 'access point' connection to an interoperable network on behalf of its customers.

- *Supporting full end-to end compliance and process traceability*
- *Is cost-effective through economies of scale and scope*

- ***Supporting their service providers and network access points:***
  - *Providing a base layer of common services agreed at a cooperative level*
  - *Providing common interoperability 'building blocks'*
  - *Reducing and controlling adoption costs, whilst allowing a focus on value-added services*
- ***And for the whole digital economy:***
  - *Creating a secure, robust and scalable environment*
  - *Saving time and effort by all parties*
  - *Supporting more harmonised real-time models for reporting, procurement, accelerated payments and archiving*

7. The GIF is not a proposal for building an actual physical network to operate at a global level, either to substitute for or to complement existing interoperability frameworks and is not a solution in every situation requiring support for interoperability or a universal panacea. It is a foundation for the efficient operation of a widely applicable general approach to interoperability.

8. The GIF-WG membership is currently comprised of individuals representing each of the four organizations that came together to explore a GIF agenda. The objective has been to strike agreement on a set of agreed interoperability components and to demonstrate how the cooperating member-driven organizations **share a consensus** on designing, promoting and adopting such a framework.

9. The GIF-WG has defined **4 building blocks** of the GIF that are fully addressed in subsequent sections of the proposal document. In analysing the domains in which potential interoperability components could be defined it was envisaged that there could be the 4 building blocks memorably all beginning with the letter **D**:

- **Delivery:** this is the fundamental highway or network based on protocols and technical artefacts, which permits interoperability at the technical level. It is based on a four-corner model whereby trading parties are each connected to a service provider/access point, which in turn technically connect with each other through the delivery network
- **Discovery**: this defines the basis on which information about a trading party is accessible to another trading party usually facilitated by their respective service provider/access points. This information includes the network location and capabilities of a trading party, its identifiers and the service provider/access point platform it uses, based on the use of tools provided in support of the delivery network.

- **Data**: this is the business content that needs to be conveyed between parties and is a distinct layer separate from the others. This Data could be virtually anything in terms of the information making up a message 'payload', but in this context are defined as structured data or documents pertinent to the Financial Supply Chain, such as orders and invoices.
- **Directives**: these are the legislative, regulatory and rules requirements that surround the business environment, such as taxation procedures, the rules governing the interoperability network itself, and a variety of other 'rules' such as those imposed by business actors, usually the trading parties, and by wider legislation covering privacy, contract law, and compliance with specific laws.

10. The second section of the document sets out a number of **principles and requirements** with which the working group agrees: namely 18 fundamental and critical business and technical requirements as set out in the recent US Technical Assessment Report (for the establishment of a U.S. interoperability framework) and as another perspective a set of guiding principles for interoperability proposed by the European Multi-Stakeholder Forum on e-Invoicing.

11. Following the sections on the 4 building blocks are a set of Recommended Practices for the guidance of service providers from the **end-user perspective.**

12. Consideration has also been given in a final section to the role that service provider/access points and interoperable networks could play in supporting global approaches to governmental fiscal compliance initiatives, based on so-called **Continuous Transaction Controls**. At this stage, only some preliminary thoughts have been set out, mainly because the area is still in a state of flux.

This **jointly agreed position paper** on Recommended Practices for a Global Interoperability Framework, which is now published for industry review. On receipt of feedback and additional perspectives it is planned to expand the GIF-WG to ensure a fully representative grouping with a view to taking the **next steps**.

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1. Introduction

1.1. What is the Global Interoperability Framework?

A group of associations[3] came together in 2019 to explore the establishment and adoption of a Global Interoperability Framework (GIF). They formed a Working Group (GIF-WG) to take this joint initiative forward based on regular calls and meetings. This proposal is the first output of this work and is offered to interested parties for consultation and input with a view to its refinement and adoption.

For the purposes of this document **interoperability** is defined as the ability of a seller or a buyer together acting as trading parties to exchange compliant e-invoices and other supply chain electronic messages containing the essential information elements required by both seller and buyer, irrespective of the information technology environment, back-office systems, or third-party solutions or services used by each. Although interoperability is usually based on a cooperation model between service provider/access points[4] offering access to an interoperable network, it is also essential to consider the requirements and facilities required to fully support the needs of end-users i.e. the trading parties in the chain, as this is the underlying interoperability that needs to be supported.

The **Global Interoperability Framework (GIF)** is a set of recommended practices, policies, standards and guidelines that enables the exchange of e-Invoices, and other supply chain documents and messages independently of adjacent payment, accounting and enterprise resource planning (ERP) systems. Electronic delivery standards, together with the semantic models and machine-readable syntax for the business data being exchanged facilitate document and data delivery within an open network of service provider/access points. Access points offered typically by service providers are therefore able to leverage the GIF components to significantly reduce cost and complexity.

The GIF is intended to guide the creation of individual instances of an interoperability network, which may be created at global, national, regional or sectoral level based on common components. The Framework has been developed by pooling views, experiences and understandings with an emphasis on practices that are proven, fit-for-purpose, secure and robust.

The GIF is '**neutral vehicle**' to facilitate open collaboration on common issues and, where possible, to agree components that are used by service and solution providers, operating in the supply chain automation industry, and which provide access points to interoperable networks and offer value-added services to facilitate end-to-end interoperability between the trading parties that they serve. The Recommended Practices are principally orientated

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[4] Service provider/access point is used throughout this document to connote a provider of supply chain automation services in a broad sense, within which it usually offers an 'access point' connection to an interoperable network on behalf of its customers.

towards the B2B and B2G e-business and supply chain spaces, and propose '**building blocks**', which simplify adoption and offer the following benefits:

- ***Meeting the needs of end users (buyers and suppliers):***
  - *Accelerating the use of automated digital processes*
  - *Making it simpler and faster to connect to trading partners*
  - *Supporting full end-to end compliance and process traceability*
  - *Is cost-effective through economies of scale and scope*
- ***Supporting their service providers and network access points:***
  - *Providing a base layer of common services agreed at a cooperative level*
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- ***And for the whole digital economy:***
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A simple analogy is the mobile phone network. Each telephony provider has its own capabilities and infrastructure to service its customers and it has also agreed a set of services, protocols and interoperability modules that ensures its customers can connect to any other mobile phone user. This is irrespective of the telephony provider, to which the other user is subscribed. Without a common interoperability agreement between telephony providers, the network would not operate the way it does today.

1.2. What the GIF is <u>not</u>

The GIF is <u>not</u> a proposal for building an actual physical network to operate at a global level, either to substitute for or to complement existing interoperability frameworks. Neither is it a linking mechanism to provide interoperability between existing networks. The latter is a complex concept and is usually accomplished by the role of specific actors, who are connected to multiple networks and provide the necessary intermediation facilities. However, such concepts could be considered to form the basis for future evolution of the GIF, where they add value to end-users.

The GIF is <u>not</u> a solution in every situation requiring support for interoperability or a universal panacea. It is a foundation for the efficient operation of a widely applicable general approach to interoperability. There will always be variations, for example, based on bilateral partnerships between service providers to meet specific business requirements. Likewise the recent growth and further development of national schemes for real-time reporting or

clearance of invoiced transactions to tax authorities will require some adjustment of delivery mechanisms and required information flow.

1.3. GIF-WG objectives and next steps

The GIF-WG membership is comprised of individuals representing each of the four organizations that came together to explore a GIF agenda. It was intended to produce a 'pathfinder' prospectus over a 12-month period.

The objectives of the GIF-WG have been to strike agreement on a set of agreed interoperability components and to demonstrate how the cooperating member-driven organizations share a consensus on designing, promoting and adopting such a framework.

Consideration has also been given to the role that service provider/access points and interoperable networks could play in supporting global approaches to governmental fiscal compliance initiatives, for example by including the delivery, reporting, registration and clearance of electronic invoices on behalf of tax-paying customers. At this stage, only some preliminary thoughts have been set out in section 8 below, mainly because the area is still in a state of flux.

The GIF-WG has therefore delivered this jointly agreed position paper on Recommended Practices for a Global Interoperability Framework, which is now published for industry review. On receipt of feedback and additional perspectives it is planned to expand the GIF-WG to ensure a fully representative grouping with a view to taking the next steps.

1.4. What are the Building Blocks for the GIF: The 4 "D's"?

The GIF-WG has defined 4 building blocks or layers of the GIF that need to be addressed in this Recommended Practices document.

In analysing the domains in which potential interoperability components could be defined it was envisaged that there could be 4 building blocks, memorably all beginning with the letter D:

1. **Delivery:** this is the fundamental highway or network based on protocols and technical artefacts, which permits interoperability at the technical level. It is based on a four-corner model whereby trading parties are each connected to a service provider/access point, which in turn technically connect with each other through the delivery network
2. **Discovery**: this defines the basis on which information about a trading party is accessible to another trading party usually facilitated by their respective service provider/access points. This information includes the network location and capabilities of a trading party, its identifiers and the service provider/access point platform it uses, based on the use of tools provided in support of the delivery network.
3. **Data**: this is the business content that needs to be conveyed between parties and is a distinct layer separate from the others. This Data could be virtually anything in terms of the information making up a message 'payload', but in this context are defined as

structured data or documents pertinent to the financial supply chain, such as orders and invoices.

4. **Directives**: these are the legislative, regulatory and rules requirements that surround the business environment, such as taxation procedures, the rules governing the interoperability network itself, and a variety of other 'rules' such as those imposed by business actors, usually the trading parties, and by wider legislation covering privacy, contract law, and compliance with specific laws.

These layers and components are illustrated in the diagram below:

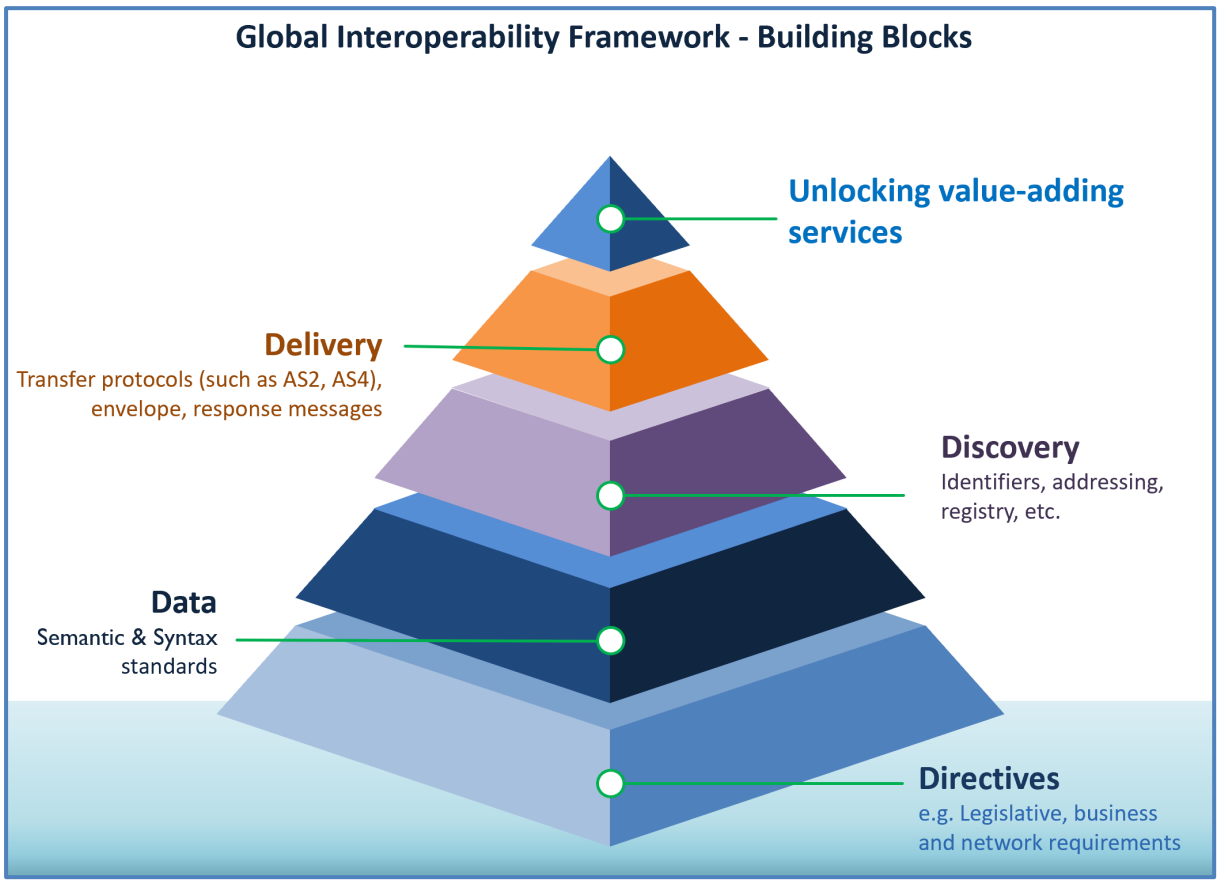


Figure 1. Global Interoperability Framework – Building Blocks

After a section dealing with key principles and requirements and guiding principles, each of the four 'D-layers' are discussed in turn and the proposed Recommended Practices for each layer spelt out.

2. Key requirements and guiding principles

The GIF-WG fully agrees with and endorses for the GIF the following 18 fundamental and critical business and technical requirements as set out in the US Technical Assessment Report[5] (for the establishment of a U.S. interoperability framework):

1. The ability for trading parties and their service provider/access points to connect in an interoperable way, **while preserving the flexibility for co-existence of models deployed in the current eco-system.**

2. **Need for a fit-for-purpose network infrastructure** that is robust, secure and ensures end-to-end message delivery without duplication of messages and with non-repudiation.

3. **Delivery assurance** regardless of whether the receiving gateway is available at the time of delivery.

4. **Scalability** to support large numbers of connected parties.

5. **High volume messaging throughput** and the ability to transmit large messages (up to 50 MB or as otherwise agreed).

6. Diverse means for identifying parties and discovering routing addresses to enable the **broadest possible reach.**

7. **Trusted authentication procedures** that ensure confidentiality of customer information when accessing addresses of trading parties and access points.

8. Adequate capability for a **secure message envelope** to carry e-Invoices, associated structured and unstructured documents and attachments.

9. Network attributes that protect **authenticity** and provide **tamper-proof integrity** of information transmitted.

10. **Data privacy protections** that preserve the confidentiality of customer information.

11. **Encryption** for both documents and the delivery channel.

12. A range of **response, status and servicing messages** to permit a dynamic flow of information and asynchronous interactions.

[5] Business Payments Coalition. (2019) 'e-Invoice Interoperability Framework: e-Delivery Network Feasibility Assessment'.

13. **Cost-effective tools and solutions to support implementation by small and medium-size businesses.**

14. **Agreements**, operating procedures and a governance model with the flexibility to meet market complexity.

15. Well-established **non-proprietary standards** that are open, royalty-free, and vendor-agnostic protocols and operational tools deployed and maintained without significant technology development or adaptation.

16. **Extensibility and flexibility to address gaps and future requirements** without burdensome rework or costly investment.

17. **Integration with existing automated processes without disruption**, but retain an independence from adjacent payment, accounting and enterprise resource planning (ERP) systems.

18. Incorporates lessons learned and **best practices** from established operational frameworks.

As another perspective, the following guiding principles[6] have been developed as a way of encapsulating the key drivers for interoperability and these are also endorsed by the GIF-WG:

- **Principle 1 on reach and automation:** Economic operators should be able to reliably send, or make available, and receive supply chain documents such as e-invoices and purchase orders to and from all types of trading partner, public or private, globally. Transmission should support the automation objectives of these economic operators, whilst also supporting the need to employ manual processes when necessary, for example in the event of discrepancies or when automatic matching and processing is not possible for a receiver owing to the relative immaturity of its information systems and procedures (especially relating to smaller organizations).
- **Principle 2 on choice and interoperability**: All economic operators acting as suppliers should be able to choose the transmission tools, mechanisms, or service and solution providers that meet their requirements, provided that these are interoperable and compatible with the transmission mechanisms of buyers, whoever they may be. It is recognized that connections between highly heterogeneous economic operators need to made and sustained.
- **Principle 3 on solutions**: The use of service and solution providers is strictly a matter for economic operators. Providers offering business, information technology and communication services are encouraged to develop and continuously evolve efficient and cost-effective (not exceeding the cost of paper-based processes) products and services, which support business and technical interoperability, and, wherever

[6] Contained in the Report of the European Multi-Stakeholder Forum on e-Invoicing (EMSFEI) regarding Interoperability and Transmission of e-Invoices with a special focus on the needs of Small and Medium-sized Enterprises (SMEs).

feasible, remove the need for human intervention. The latter is dependent on the preparedness of economic operators to adapt their processes and deploy the necessary skills. The market for services should be competitive, innovative and offer choice to users of all sizes.

- **Principle 4 on fiscal compliance**: Transmission solutions should enable all economic operators to fully meet their obligations in respect of compliance with applicable fiscal rules, such as VAT and similar regulations (e.g. GST, Sales & Use Taxes), and requirements for authenticity, integrity and legibility relating to e-invoices. This may increasingly require reporting and registration facilities to meet the requirements of tax authorities

- **Principle 5 on standards**: The environment should embrace standard definitions, open and non-proprietary technical standards and well-established business practices to support ease of implementation, continuing use and maintenance. It should support the common models and methods of e-invoicing and electronic data interchange, and include provision for confidentiality and non-repudiation, appropriate levels of security, timely receipt and response messages, and, as required, visualization in human-readable form.

- **Principle 6 on addressing**: addressing, routing and identification mechanisms should be progressively standardized by the industry and should be easily discoverable through a registry or directly in an e-invoicing solution.

- **Principle 7 on governance**: Stakeholders need to take care to create and safeguard boundaries between the competitive space and the areas of cooperation appropriate to networked environments. Appropriate governance should be established for such cooperation models.

3. Delivery

3.1. Overall architecture

Recommended Practice: the overall architecture of the Global Interoperability Framework is based on a four-corner model. This GIF recommends the CEF e-Delivery specifications as meeting the needs of a four-corner model since all the specific components of Delivery and Discovery described below can be accomplished within these specifications, which are in common use and widely adopted. Developed in the EU and based on global OASIS standards, this open source tool is recommended as fully fit-for-purpose.

The four-corner model helps achieve the interoperability found, for example, in the telephone system for the invoice senders and receivers who use different service provider/access point platforms. Senders connect to a service provider/access point solution to send e-Invoices and other supply chain documents. Some of these e-Invoices may be directed to receivers present

on the same platform (three-corner models[7]), but many will be directed to other platforms used by other receivers. Under interoperability agreements, two service provider/access points connect to each other and transmit or accept messages and documents on behalf of their customers. Three-corner and four-corner models co-exist within the same e-delivery network. Indeed, the two models are mutually reinforcing as traffic from a three-corner model is often re-directed through a four-corner model.

The Global Interoperability Framework does not envisage the preclusion of an end-user corporate from becoming an access point in an e-delivery network, but it is the exception rather than the norm. It is usually less work and more cost effective for corporates to connect to the network through a service provider/access point rather than setting up and maintaining its own access point. Valuable network effects are also created.

The four-corner model depicted in Figure 1 delivers the essential architecture for pervasive reach for all parties.

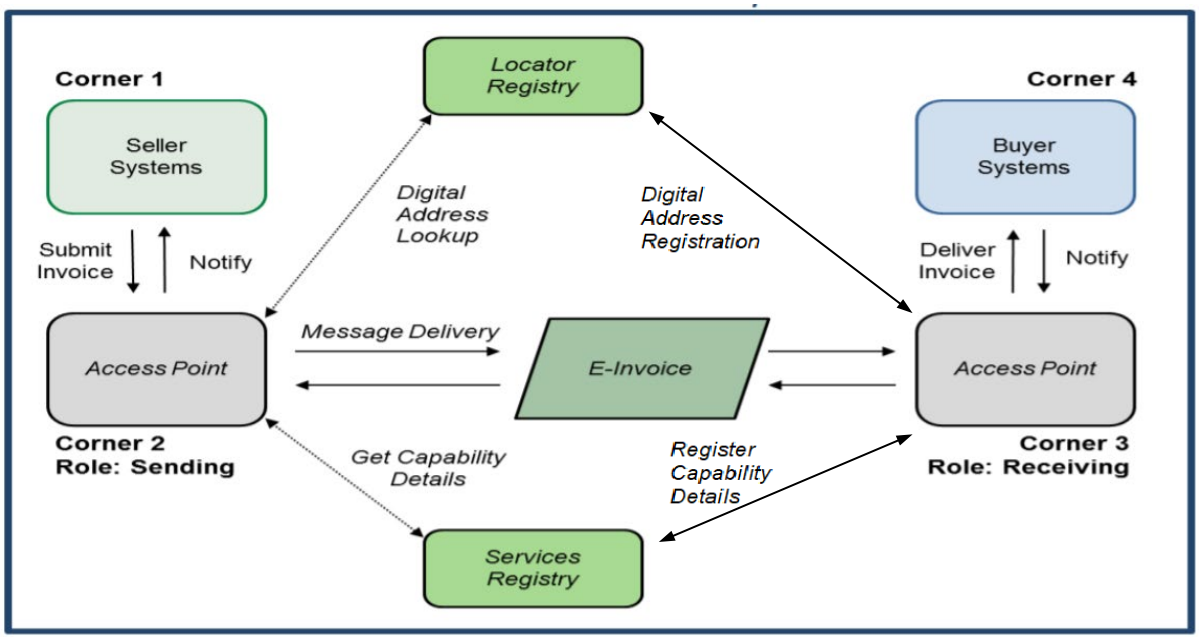


Figure 2. The four-corner Model for Delivery

The rules and interoperability requirements for a successful interoperability framework predominantly focus on the linkages between service providers/access point providers in corners 2 and 3. The linkages between trading parties and the access points (corners 1 to 2 and corners 3 to 4) are outside the scope of the Framework and under the control of the parties concerned. Some comments and guidelines in this end-user specific area are however

[7] A connection mode where a single service provider or platform connects both the seller and the buyer to its single platform to offer and coordinate e-Invoicing and other supply chain services.

provided in a later section of this document. Service provider/access points usually deliver many other additional value-added services to their customers apart from connectivity.

An Interoperability Framework addresses the inefficiency of bilateral agreements and point-to-point connections, replacing them with a standardized common agreement for all participants within the e-delivery network and one connection that supports many external points on a scalable basis. This model helps increase market penetration by simplifying the implementation, maximizing business end-point reach through a single connection that allows connecting with many, and increasing the affordability for small and medium-size enterprises (SMEs).

Standardized four-corner models for interoperability, such as the CEF e-Delivery specifications, the Peppol specifications and the EESPA Model Agreements, lower the entry barrier for market participants and the costs to set up interoperability connections between service provider/access points. Both the latter schemes, Peppol and EESPA, as well as the US BPC/e-Invoicing initiative have either adopted or are considering CEF e-Delivery as the basis of its network model.

CEF e-Delivery provides specifications and software for a network of nodes for digital communications. It is based on a distributed model where every participant becomes a node using standard transport protocols and security policies. It helps public administrations, businesses and citizens to exchange electronic data and documents in an interoperable, secure, reliable and trusted way. The e-Delivery artefact is one of the building blocks of the European Commission's Connecting Europe Facility (CEF). These building blocks are reusable specifications, software and services that will form part of a wide variety of IT systems in different policy domains of the EU.

The CEF e-Delivery building block is based on the AS4 messaging protocol, open and free for all, developed by the OASIS standards development organisation. Organisations need to organise the use of an Access Point, which is commonly provided by a service provider to exchange information.

Unless already provided for within the that network instance, an interoperable e-delivery network based on a common agreement at the transport level may be supplemented by for individual bilateral agreements between service provider/access points at the business level covering issues such as business flows to be supported, and compliance with regulatory requirements. The transport level agreements and any such additional business agreements may be based on Model Agreements drafted by the organizers of an interoperability network instance.

There are industry voices who see the growth of centrally provided cloud solutions, the block chain, and distributed ledger technology as opportunities for an environment for permission-based access rights to shared data rather than the sending and receiving of structured messages. However, these ideas are not yet represented in practical or scalable solutions that can be recommended at this time, but they should be monitored as they evolve and mature. For example, it is likely that use-cases for ‘trusted log’ functionality will in future be met by means of block chain which can be embedded in an interoperable network.

3.2. Message transport protocols

Recommended Practice: based on the current state of technology, participants in an instance of a GIF based network should support both the AS2 and AS4 message transport protocol models. It is recommended that over time AS4 should be the sole recommended practice. Other messaging paradigms and models will evolve over time and will need to be considered at the appropriate moment.

The message transport protocols for the GIF need to enable the exchange of e-Invoices or any type of digital documents between two access points in an interoperable, secure, reliable and trusted manner. Message transport protocols in use today vary in the way that they meet these requirements.

AS2 and AS4 are very similar but have different technical attributes. Currently, AS2 is widely used by EDI networks for e-Invoicing and supply chain message transport (in addition to the commonly used x400 protocol now typically being replaced by AS2/AS4). AS4 is a newer protocol that offers synchronous trade, additional logging, and metadata and header capabilities. CEF e-Delivery uses AS4; Peppol is migrating to AS4 to align with CEF. Given that many current implementations use AS2, access points must support both protocols for a period. However, all Peppol Access Points were required to support AS4 by the first quarter of 2020[8]. EESPA currently uses AS2 and is open to an industry migration to AS4.

The GIF recommends support for both the AS2 and AS4 models. Support for both allows service providers/access points the option of migrating to AS4 in accordance with their business needs. Over time, new connections should use AS4.

3.3. Message envelope standards

Recommended Practice: The GIF recommends the use of envelopes in which message 'payloads' can be securely transported and specifically recommends support for both the SBDH and XHE envelope technology standards for message exchange whilst advocating the adoption of XHE as the desired longer-term approach.

Current delivery networks often but not exclusively use either envelopes or headers to address messages to their delivery destination. An envelope is technically different from a header. A message envelope is like a postal envelope that has a delivery address and can contain multiple documents inside that are not visible to those involved with the delivery, unless they know how to open it. A message header is like a postcard, where there is a delivery

[8] https://peppol.eu/support-for-the-peppol-as4-profile-mandatory-in-the-peppol-edelivery-network-from-1-february-2020/

address and content that is visible to anyone handling the postcard (although the contents are not limited in size).

A message envelope is the container or header that contains an embedded message. Although much document exchange takes place without it, a message envelope is an important technology that supports message integrity and confidentiality. For example, access points in corners 2 and 3 can route documents without seeing the content. A header on the other hand does not enable either integrity or confidentiality; it also supports delivering attachments and different message types at the same time.

Uses for an envelope include:

- Privacy and confidentiality
- Sending multiple documents in one message
- Sending attachments and response messages

UN/CEFACT Standard Business Document Header (SBDH) specification is a header technology commonly used instead of an envelope. SBDH has not been formally adopted as a standard and requires customization prior to implementation.

The Exchange Header Envelope (XHE) is a new joint OASIS and UN/CEFACT specification, which supports both a header and an envelope and supersedes the two prevalent header/envelope standards (OASIS Business Document Envelope (BDE) and SBDH). XHE is currently the only envelope technology standard available that provides end-to-end envelope technology to support a four-corner model.

The GIF recommends the XHE specification envelope technology for the uses noted above, while allowing the SBDH specification to support current exchanges until the XHE specification is widely adopted.

3.4. Message Payload Standards

The content of a supply chain message such as invoice or purchase order are classified within the GIF as Data and is therefore comprehensively addressed in the section on Data below. Apart from the messages and standards for the business content messages, payload standards include business status or response messages exchanged between parties. These are also covered below under Data. The technical acknowledgement messages exchanged at the delivery level form an intrinsic part of the AS2 and AS4 protocols and are therefore part of the Delivery layer.

4. Discovery

4.1. High-level discovery principles

Recommended Practice: it is recommended that the GIF supports a combination of a bilateral discovery mechanism, and in every instance support for a centralised discovery environment based on registry services and directories.

One of the challenges in a GIF interoperability framework is identifying how and to what extent trading parties and their service provider/access points are participating. *Discovery* refers to the processes and technology used to 'discover' or look-up trading party capabilities, how to send electronic invoices or other messages to them, and how to authenticate their credentials. Another discovery process challenge is determining the structure and permitted use of the identifiers to be used. In this section, both the areas of Discovery and Identifiers are described in terms of the contribution they make to the Global Interoperability Framework.

In order to support discovery within and across a network, the required information can be:

- Either, maintained and shared bilaterally between trading parties and their service provider/access point on a decentralised basis,
- Contained in a registry, or a directory,
- Or, both.

The bilateral discovery model is common because trading parties are able to exchange information during procurement or contractual activities undertaken prior to subsequent operational activity such as invoicing. Although it is not very scalable as transaction volumes and trading relationships proliferate, it is likely to remain in use between habitual trading parties, as it is valued by those who are reluctant to participate in a registry for confidentiality reasons or simply know the discovery information to support a trading relationship.

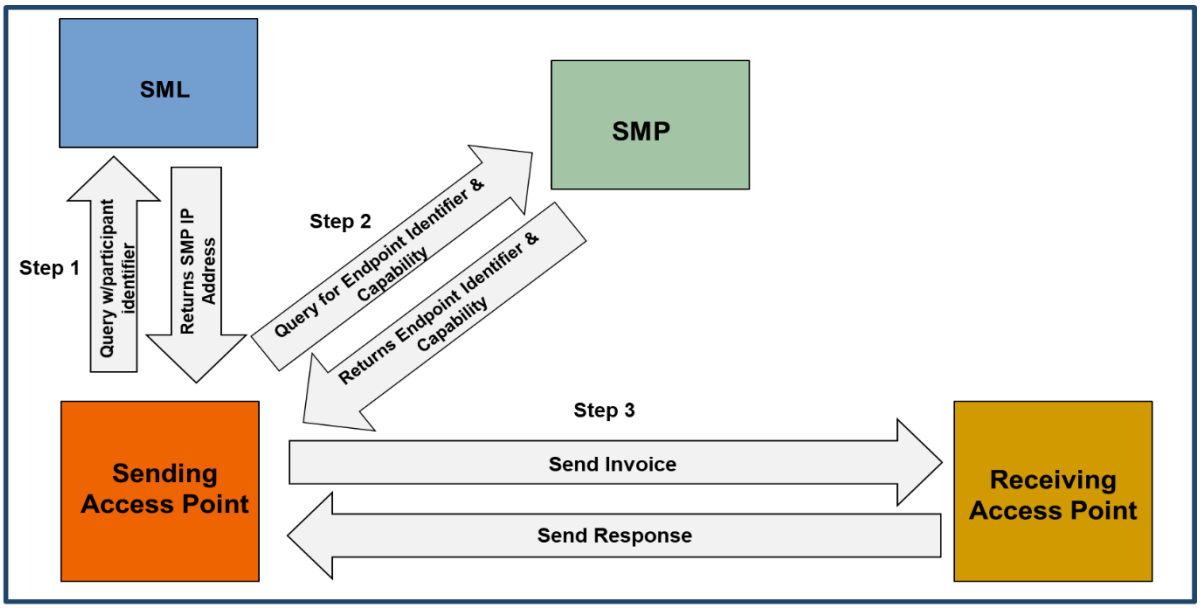
Many trading parties take advantage of a registry service operating at the network level and/or use a separate directory service provided by various entities within the same network eco-system. A *registry* contains technical information about identifiers that encapsulates the legal or entity identity, location, and the routing instructions of participants in the network. It is used for *technical interoperability* and allows access providers in corners 2 and 3 to create the necessary connections for the delivery of messages. Such registries (or metadata directories) contain a minimum set of metadata elements required to operate and support the required network connections.

A registry and all eligible entities may also be connected to a *directory* that contains a wider variety of business information elements about a trading party; it is analogous to the yellow pages. It is used for *business interoperability* but may also contain the information that supports *technical interoperability* (such as identifiers) for convenience. Service and solution providers of various kinds typically offer and manage these directory services. Such a directory may list document receivers and contain company information, documents supported, contact details, business rules and electronic address identifiers. This facilitates timely and highly automated on-boarding of parties and allows business users to discover a receiver's capabilities and initiate document exchange based on fully accessible routing details.

Type	Usage	Usage
Registry	Technical	The e-delivery network uses the registry information for discovery of identity, location and routing (i.e. The essential metadata for automated messaging). By only supporting automated processes the information held can be described as 'sparse'.
Directory	Business	Directories, similar to 'yellow pages', are used by businesses users to discover who is on the framework, and extensive information about trading parties and their capabilities. Directories may also contain the same metadata that is found in the Registry.

Table 1. Usage differences between Registry and Directory

For example, the Connecting Europe Facility (CEF) e-Delivery specification creates a four-corner network configuration using standard artefacts. Discovery consists of two components; **the Service Metadata Publisher** (SMP), which publishes the capabilities of a receiving party, and **the Service Metadata Locator** (SML), which identifies the location of the Service Metadata Publisher (SMP) of the receiving party (the latter's service provider/access point will typically arrange for such publication). These standard components provide the benefit of facilitating dynamic discovery across a four-corner model network, and compared with bilateral discovery, avoids having to maintain multiple routing tables. Figure 3 is a simplified illustration of the process[9] [10].



Source: Business Payments Coalition

[9] Business Document *Metadata Service Location Version 1.0,* OASIS Standard, August 01, 2017.

[10] *Service Metadata Publishing (SMP) Version 1.0, OASIS Standard*, August 01, 2017.

Figure 3. Process Flow for Dynamic Discovery of an Endpoint Location

Trading parties exchange documents through service providers/access points that connect with many other service providers/access points. To locate a trading party endpoint on the network, the sending access point first queries (Figure 3, Step 1) the SML using the Entity Identifier to find the Universal Resource Locator (URL) of the Service Metadata Publishing (SMP). The query provides a response informing the sender where the end-point recipient SMP record resides. A second query (Figure 3, Step 2) is initiated to the SMP to retrieve the end-point identifier and confirm the capabilities of the receiver.

In addition to the discovery processes discussed above, the e-delivery network requires a standard set of entity identifiers, electronic address identifiers and electronic routing addresses. The wide range of identifier types and standards used today reflects the diversity of potential e-Delivery network participants.

4.2. Identifiers for entities and electronic addresses

Recommended Practice: it is recommended that all GIF instances conform to the three level definitions of identifier- Entity, Electronic Address, and Electronic Routing Address, as described.

The previous section provided an overview of the network discovery process and its implementation in various ways. This section provides an analysis and implementation recommendations for the specific use of identifiers for business and routing addresses, and the practical deployment of registry services.

The primary function of access points is addressing and routing of invoices and related documents, which requires identifiers to determine where messages are to be sent. The core identifier elements for routing are included in Table 2 below.

Element	Description
Entity Identifier	Unique digital identifier of a trading party or business entity. This can be a Legal Entity Identifier.
Electronic Address Identifier	Unique digital address used by a trading party for the routing to it of digital documents and messages
Electronic Routing Address	The electronic routing address associated with an Electronic Address Identifier that defines the service provider/access point or platform that supports the routing and processing of digital documents and messages to and from a trading party

Table 2. Core Identifier Elements

The Entity Identifier should support characteristics such as business classification, location, legal jurisdiction, nationality, and levels within an ownership structure. It is specific to the business entity and completely independent of a service provider/access point or any other trading party (except for a link to the issuer, which may be a regulatory body or government entity). An Entity Identifier may form a component of or a 'path' to the discovery of an electronic address or an electronic routing address, effectively as an alias or proxy in a look-up table.

There is no single global identifier system or convention in common use; each framework uses a slightly different approach as appropriate for their market. The following list illustrates several identifier examples currently in use or being implemented:

- Country specific VAT Number
- Country specific legal entity or registration number
- Global Locator Number (GLN)
- Data Universal Numbering System (DUNS)
- International Bank Account Number (IBAN)
- Global Legal Identifier (being implemented by the GLEIF (Global Legal Identifier Foundation).

At this time, a single Entity Identifier scheme is not feasible. Migration toward a single identifier such as the Global Legal Entity Identifier (GLEI) would be preferred over time. However, until a single identifier achieves broad market adoption it will be necessary to allow the use of multiple identifiers that can interoperate across multiple networks to enable discovery across systems that currently use different identifiers.

Therefore, the GIF will need to support multiple Entity identifier schemes from the ISO/IEC 6523 identifier standards. ISO/IEC 6523 defines a structure for uniquely identifying organizations and divisions or subsidiaries. Given the diversity of identifiers in use across the global, clear rules and practices must be established for the operation of Entity Identifiers, especially as it is likely that a single legal entity may use multiple identifiers in parallel. Identifiers with widespread usage and those needed for cross-border trade should be considered. Businesses can agree bilaterally on identifiers for their own use and within and across e-Delivery networks, although preferably such identifiers used in a bilateral exchange should be standardized and commonly recognisable. Entity Identifiers can be used within the interoperability framework and for other external purposes.

The Electronic Address Identifier is a specific electronic identifier used to enable a trading party to send and receive digital documents and messages to/from another trading party, independent of the specific routing or platforms being used and whether they are provided internally or operated by a third party. A legal entity may use one or more Electronic Address Identifiers. For example, a legal entity may use one Electronic Address Identifier for the receipt of orders and a separate Electronic Address Identifier for the receipt of invoices and other documents. It will often contain information elements derived from the Entity Identifier, but this is not mandatory or exclusively the case. An Electronic Address Identifier

may also be linked with digital capabilities and business rule details defining what can be sent or received using this address and how either party will handle such exchange. In practical terms it may only be used by the service provider/access point for an end-user, as message traffic will normally be sent to or received from an Electronic Routing Address.

The Electronic Routing Address (i.e. a service provider/access point or receiving technical platform address) is linked to the Electronic Address Identifier and used within the e-delivery network to identify the service provider/access points or technical platforms comprising corners 2 and 3 (Figure 1).

All these addresses need to be available to end-users and all other service provider/access points to support interoperability. If the exchange is bilateral, the relevant electronic addresses are only those of the sending and receiving trading parties. To enable discovery of this and other permutations, registries post identifiers and addresses.

Entity Identifiers and the Electronic Address Identifiers can be easily conflated because elements of one may be used as a component of the other. As has been stated above, the Entity Identifier I can be used as a proxy or alias for the Electronic Address or Routing Address, in the discovery process.

A simple electronic address works perfectly in an email type solution. But in a more complex B2B network such as is supported by the GIF further elements are required to meet the generic requirements for privacy, uniqueness of bilateral exchanges and the use of identifiers which can be shared for use across different business applications and in an environment where an end-user may use several service provider/access points.

Thus the 'electronic identifier' of each end-user is necessarily a *combination* of an identifier of the end user itself, and that of a service provider/access point/access point. The entity identifier operates at a higher level including within message content to denote the business and legal identity of an entity, but it may be used within a or as a reference to an electronic address within the network environment. The area of identifiers would benefit greatly from a further level of standardization in the area of the definition of identifiers and the various messages for enrolment and activation of registry services.

4.3. Discovery process: rules and conditions

Recommended Practice: It is recommended that the use of the GIF in specific instances contains a range of possible permission levels and transaction filters described as Open, Conditional, and Pre-authorised, as suited to the trading environment concerned.

The discovery process must support defined rights and responsibilities for end-users and service provider/access points to establish exchange across the e-delivery network in accordance with the requirements of the end-users. Service provider/access points can assign rules to the receiving or sending of transactions across the e-delivery network as required by the end-user.

Such rules will typically apply to both the parties with whom a trading party wishes to deal and to the range of documents or transactions supported. Each category may be subject to varying degrees of limitation ranging from fully open to specific limitations of both the 'who' with and the 'what' content. For example, end-users may be open to receive e-Invoices from anyone on the network; or they may want to apply conditions such as restricting receipt of transactions from only one region; or they may wish to specify specific formats or usage specifications; or they may want to prevent discovery of their connection without specific approval and regulate the permissions for access to their data in the registry. As outlined in the table describing connection conditions, these conditions are a vital component of the overall framework, given the sensitive commercial and competitive nature of the information.

In terms of process, a registry, directory operator and service provider/access points all need to support the various permissions and restrictions required by the end-user. A business directory may only publish non-confidential information. The service provider/access point may build rules to filter transactions and perhaps actually block unwanted transactions. The registry may need to prevent access to network routing details unless an authorization code has been provided or the receiving party has specifically added the sender ID to a managed list of senders able to access their routing details within the Registry. These conditions are critical to the end-user for functions such as fraud prevention and compliance. Consequently, the e-delivery network will need to support different conditions for connections to be established. The table below provides the types of connection conditions that may need to exist.

Level	Description
Open	Open connection where the receiving party is open to receive all classes of transaction and documents supported by the e-delivery network, from any trading party with a business relationship, and through any channel with the required access capabilities.
Conditional	Conditional connection whereby the connection is open to any trading party but there are limitations on the transaction and document types or processes supported.
Pre-authorized	A connection can only be established following pre-authorization by the receiving end-user and communicated directly or through its nominated service provider/access point.

Table 3. Connection conditions

4.4. Discovery Standards

Recommended Practice: The use of the OASIS specifications for the SML and SMP artefacts are recommended within the GIF.

Registries and directories store identifiers, routing and capabilities information. A registry is a vital component to support dynamic discovery. OASIS is the only organization that has developed a set of open, non-proprietary standards for dynamic discovery, the OASIS Business Document Metadata Service Location 1.0 (SML) and OASIS Service Metadata

Publishing 2.0 (SMP) specifications. These in turn have been adopted by CEF and form an integral part of their e-Delivery specifications.

OASIS refers to its registry as a metadata directory. The metadata directory enables dynamic discovery for connections between trading parties in contrast to static EDI routing tables.

5. Data

5.1. The fundamental role of data

At the heart of interoperability lies the process designed to make it easy for end-users to efficiently exchange sets of structured business data with their trading partners. Interoperability is important as each trading partner may be in a different country or use widely different applications to process the exchanged data. Without interoperability, each trading partner could be repeatedly required to build - and maintain - interfaces that correctly interpret the file contents on a bilateral basis. The whole point of the GIF initiative is to make it possible to fully automate the global exchange of business transactions, using structured data files.

With interoperable exchange, there are two key elements that are common to the sender and receiver in managing and transmitting the 'payload' of a message, namely the semantic standard and the syntax standard. The semantic standard (or model) defines the precise business meaning of each data or information element that is conveyed within the structured data file. The syntax standard defines how information elements are embedded within the structured data file in a machine-readable technical language, such as XML, used to facilitate exchange between the parties. A syntax standard will usually have its own semantic model, but it is equally possible to reflect one semantic model (such as EN16931) in more than one syntax. This is the same as with the spoken word, where the same 'meaning' can be expressed in different languages. However, it is also the case that not all languages share the same range of defined words (or semantics) and so great care must be taken in binding a particular semantic model in one or more syntaxes. The accuracy of the syntax bindings are crucial and some discrepancies can all too easily arise. So, as we consider the data/information components of the GIF, we need to be aware that this, as the conveyor of business information, benefits most from a clear and common understanding by all parties.

In this section, the GIF focuses on the invoice as the payload message where recent standardization activities have been prominent, and which illustrate an approach to interoperability that could be implemented on a global scale. In section 5.4 below reference is made to other documents and transactions to which the data practices described herein could also be applied.

5.2. Context for data exchange

The focus of the GIF is on exchange within a 4-Corner model, which is the already described networking model that connects the four parties to facilitate the delivery of electronic data files.

In the 4-Corner model:

Corner 1	is the sender (e.g. the seller in the case of an invoice exchange)
Corner 2	is the sender's service provider/access point
Corner 3	is the receiver's service provider/access point
Corner 4	is the receiver (e.g. the buyer in the case of an invoice exchange)

The 3-Corner model is a simplified version in that Corners 2 and 3 are the same service provider– which negates the need for interoperability between two service platforms. Nevertheless the service provider is obligated to maintain a separate business and operational relationship with each trading party.

Within a 4-corner model, there are three approaches that might currently be used. .

1. Corners 2 and 3 exchange data in a standardised format that is understood by both service providers/access points and may have been specified within their chosen interoperability framework and the associated agreements. Each service provider/access point manages the data interface with their customer (i.e. the seller or buyer). The data format exchanged between the service provider/access points will use an agreed semantic model and syntax that is common to both the service providers/access points.
2. Corners 2 and 3 are required to exchange a data file in a format defined by the receiver. In this case, the sender either creates the file in the defined format or their service provider/access point creates this file on their behalf. The file is 'passed through' to the receiver's service provider/access point, for onward transmission to the receiver.
3. Corners 2 and 3 are required to exchange a data file in a format defined by the sender. In this case, the sender either uploads the file in the format it has defined, or their service provider/access point creates this file on their behalf in the sender-defined format. The file is 'passed through' to the receiver's service provider/access point, for onward transmission to the receiver, in the required format.

Recommended Practice: The GIF recommends case 1. as the most flexible and scalable interoperability approach as it does not involve the imposition of a format proposed by one of the trading parties through the use of an accepted exchange standard.

It is worth explaining and discussing the possible party roles carried out by the parties comprising these four corners, in relation to data:

- The sender may provide the whole message content i.e. the original invoice or might supply sufficient data for its service provider/access point to create the payload message to be expressed in the exchange standard to be used.
- The sender's service provider/access point may forward the message payload to the buyer's service provider/access point, if it already meets the required standard, or may provide value-added services such as invoice creation, formatting, validation and

any additional content such as a human readable version in preparation for forwarding the message to the receiver's service provider/access point.

- The receiver's service provider/access point, which facilitates transfer to the receiver, may validate the message content, and prepare it for integration into the receiver's system. Invoice status information may be sent or received by means of response messages. . It may also provide value-added services, such as business controls, matching, booking information, workflow, dispute management, and support for human readability.
- The receiver (e.g. the buyer in the case of an invoice exchange) will receive the payload information and is responsible for all the processes leading to payment of the invoice.

Data interoperability is clearly illustrated in the above option 1. as it deploys a common exchange standard to be used by intermediaries irrespective of the data formats used or required by either end-user. As recommended above, this has the potential to allow all service providers/access points to support a single data model for global exchange. Each service provider/access point manages connections in and out of their platform for their customers but can then connect data from any customer with any of its interoperating trading partners i.e. where the partner is connected to a service provider/access point supporting the interoperable data standard.

5.3. The challenge and development of standards

One of the primary challenges in the global market today is the usage of many different data standards for common business documents such as e-invoices and purchase orders. It is the resulting complexity that slows adoption and decreases interoperability because it creates overhead and additional cost to manage multiple data integration maps, which convert data from one format to another

The process of creating globally accepted standards for these critical documents remains partially complete given widely varying business processes and, in the case of invoices, fiscal practices. For example, in the area of e-invoices the following examples and initiatives are relevant:

- The recently developed European Norm (EN) 16931, is a semantic standard for a core invoice to be used in the context of public procurement and in private sector e-invoicing in the European Union. The standard also provides for a Core Invoice Usage Specification (CIUS) and an Extension Methodology to meet the specific business needs of the parties. The EN specifies two syntax standards, which must be supported by receivers, and provides syntax bindings for them.
- The PEPPOL BIS 3.0 created for use in the Peppol network and compatible with EN 16931, as it is a CIUS, conforming to the EN definition and includes a syntax standard.
- The OASIS UBL common library of XML business document standards, both for semantics and syntax.

- The UN/CEFACT Cross Industry SCRDM (Supply Chain Reference Data Mode) semantic model and syntax (but easily map-able with UBL semantic and syntax standards).
- UN/CEFACT EDIFACT (semantic and syntax).
- The current BPC project to create a semantic model for an e-invoice to meet the needs of the US market. This is partly derived from the EN16931 with the addition of Extensions.
- A current project to create an international invoice standard within the Peppol community, for which more details are awaited
- A vast array of local national, sectoral and regional standards.
- A recent general proposal to explore the preparation of an ISO standard for an electronic invoice.

To help the GIF-WG to reach wide agreement on, and subsequent adoption of common components for interoperability, the GIF recommendations are set out for review in the following paragraphs headed GIF Data Components. In each case, a single global recommendation has been sought. If that has proved not to be possible then regional, or sectoral, recommendations will need to be sought. However, interoperability is always strongest and supports the lowest cost and most scalable adoption with single components, which are very widely supported.

The question of standards for Continuous Transaction Control (CTC) reporting systems for fiscal purposes in a growing number of countries including the submission format for invoice details is the subject of a separate section below.

5.4. GIF Data Components: Semantic Model

Recommended Practice:

1. The GIF supports the concept of a single semantic model to form the preferred and recommended exchange standard used by all instances of GIF implementation. It is recognised that the journey towards identifying such a semantic model is not yet concluded and so further effort is required to identify and design that single semantic model.

2. It is currently recommended that the EN 16931 model should form the basis of the exchange standard at the semantic level. This model will require some modification in terms of extensions to the functionality in order to realise the ambition of a single exchange standard.

3. The GIF supports the concept of the separation of the semantic model and the syntax standard. This separation is recommended because it allows the most appropriate semantic model and syntax standard to be selected. This recommendation would apply to all document and data sets. As explained in section 5.3 below, the GIF also recommends the use of a single syntax standard as a key element of the combined single exchange standard.

A semantic model is a structured set of logically interrelated information elements, all of which are defined in business process terms independently of any representation in a syntax standard. Such a model creates the potential for all pieces of information to be constantly

and consistently understood. Such information elements may also be subject to rules about the way they should be handled in business processes by defining the actors and their roles; business functions, required processes, rules, and terms.

Historically the semantics for a business document were embedded in the syntax of the chosen standards family in which it was developed. More recently, standards have been developed based on a separation of the semantic layer from the syntax layer. Such a separation allows the semantic model to be either expressed in a single or more than one syntax.

The EN 16931 in the EU has adopted this pragmatic approach, which is endorsed by the GIF. The approach also includes the concept of the Core Invoice Usage Specification (CIUS), through which the trading parties may agree on the precise information elements they wish to select for use from within the full Semantic Model. Even though a CIUS is by definition conformant to the underlying semantic model, care must still be taken to prevent undue proliferation or conflicting approaches. There is also the potential to add Extensions for the addition or alteration of required information elements to be framed according to a defined methodology at both the semantic and syntax levels. Again the undue proliferation of Extensions will be a barrier to interoperability if not carefully managed. But it is the case that the EN 16931 was developed with the B2G market in mind, although with the intent to serve the B2B and so it is not surprising that some extensions of functionality will be demanded.

It is expected that there is a demand for a single core semantic standard, for example, for an e-invoice, and over time a clear winner for this idea should emerge at a global level. As a preferred candidate the GIF recommends the semantic model for the core elements of an e-invoice as defined in EN 16931-1. Additional functionality and variation of the cardinalities present in the EN semantic model could be added to support wider business needs.

5.5. GIF Data Components: Syntax standard

Recommended Practice: The GIF recommends the ISO/IEC 19845 - OASIS UBL syntax as a single syntax in which to express the semantics of the supported business documents forming the payload to be exchanged between the parties.

Syntax is the means by which semantic information elements are expressed in machine-readable technical languages.

In terms of options for a universally acceptable syntax, the ISO/IEC 19845 - OASIS Universal Business Language (UBL) syntax is in widespread use globally and adoption is growing. UBL is in common use in the many current interoperability frameworks such as the CEF e-Delivery Building Block and within the Peppol specifications. Peppol established the Business Interoperability Specification (BIS) with the OASIS UBL 2.1 common directory of data elements and syntax. EESPA also uses UBL 2.1 syntax based on the semantic model of CEN BII2 for interoperability exchanges. The intention to recommend a single syntax standard is enshrined in the Recommended Practice above.

The European Committee for Standardization (CEN) European Norm (EN) 16931 standard has one semantic model with two syntax options (UBL 2.1 and SCRDM CII UN/CEFACT XML). While they have valid reasons for this implementation, multiple syntaxes result in greater complexity to manage system mappings.

The GIF therefore recommends the appropriate OASIS UBL 2.X version due to its common data dictionary and use of a single syntax.

5.6. GIF Data Components: supported document types

Recommended Practice: The GIF will support invoices, credit notes, as well as attachments in digital (binary in the MIME format as a structured business document payload expressed for example in Base 64) and human-readable form. Attachments, relevant to local laws, regulations, trading party agreements, or specific needs, may include supporting information, such as time sheets and consumption reports, as well as an invoice represented in another format, including a human-readable format, where required to be delivered to corner 4 for compliance or convenience reasons.

It should be noted that local laws may restrict or compel the use of attachments, which represent an original invoice.

Further documents will be added to the GIF, such as purchase orders, dispatch advices, advanced shipping notice, remittance advice ….

5.7. GIF Data Components: response messages

Recommended Practice: The GIF recommends the wide use and exchange of response messages, covering transaction approval status, queries, business-level issues and rejections, based on the joint EESPA/Peppol standard, which covers transfer, message and business content and is UBL-based at the syntax level.

Message responses cover the current status, the reasons for that status and the proposed treatment and servicing of the payload in support of the underlying document flows. The status information within these messages may include numerous structured elements based on defined code lists, such as:

- Status (e.g.to convey that an invoice or transaction is in process, under query, or an invoice is approved for payment)
- Reason for the status (e.g. prices or quantities incorrect, reference errors, or the approval process is completed)
- Action codes (e.g. request to provide information e.g. a request to issue a credit note and resubmit an invoice.)
- Detailed clarification or additional information, for example a delivery reference.

Such response messages should be capable of being be originated by the end user (at corner 4) and/or their service provider/access point (corners 2 and 3) as required in relation to the specific status information. For example, the service provider/access point may report on an invoice than cannot be processed due to data issues whereas the buyer may report on the payment status as within their back office application. Such response messages should be routed from or on behalf of Corner 4 through the two service provider/access points at Corner 3 and 2 to Corner 1.

A common set of message responses is currently under joint development by EESPA and OpenPeppol. The response messages, built using the OASIS UBL common directory of data elements, and could be extended in support of multiple document types and additional functionality requirements as required.

6. Directives

6.1. Scope of the 'Directives' section

The scope of 'Directives' issues (short for legislative, regulatory, business and governance requirements) fall into three areas:

1. *Requirements created by legislation and regulation:*

These are usually defined by government bodies and include the legislative and regulatory framework, the rules relating to the taxation and fiscal compliance environment, any mandated processes for the compulsory uses of digital processes, provisions for transaction reporting and clearance, and specific rules on anti-money-laundering, 'know your customer', and archiving, as well as contractual and statutory requirements.

2. *Business requirements:*

These are defined by the trading parties- both buyer and seller, and perhaps their representative bodies, such as rules for required business profiles and processes, required information elements, specific calculations, document formats, the use of other types of invoice than the commercial invoice, the use of credit notes, the expectations for support of fiscal compliance, and the provision of status information on transactions.

3. *Governance requirements*:

These are generated within the interoperability community itself to provide for the safe and effective operation of the interoperability framework, and include the governance structure, the operational rule-book, recommended or required model agreements, the treatment of end-user (trading party) requirements and expectations, direct support for fiscal compliance, and implementation support.

The following sections set out some key considerations, principles and **Recommended Practices** for these three areas.

6.2. Legislative and Regulatory requirements

At a detailed level, these requirements are principally composed of:

- International, national and regional legislation and regulations affecting supply chain transactions and documents.
- Tax models, including actual tax rules and their fulfilment: chiefly in respect of invoices
- Government mandates for mandatory e-invoicing or supply chain automation adoption.
- Anti-Money Laundering and 'Know your Customer'/'Know your Supplier' regulations and practices.
- New fiscal compliance models based on so-called Continuous Transaction Controls, which include clearance and real-time e-invoice reporting requirements and new features such as direct clearance models involving a tax authority (so-called 'fifth corner' with whom messages are exchanged).
- Regulations on archiving, including on what must be archived for each party in order to comply with local regulation on invoicing.
- Other more general statutory regulations and contract law affecting the supply chain area.

The following recommended practice form part of the Global Interoperability Framework in relation to legal and regulatory requirements:

Recommended Practice on knowledge-building and the provision of support to users in relation to legal and regulatory requirements:

The organizers of a GIF instance within a community should become aware of the legal and regulatory requirements that impact supply chain automation and interoperability activities in the jurisdiction (or jurisdictions) covered by that GIF instance.

It is then explicitly a matter for that community to provide such facilities as are necessary to allow it's users to respect the requirements and to support end-to-end compliance with them. Some of these requirements might be supported within the interoperability framework itself, whilst others could be purposely left to users of the framework perhaps within a framework of rules or simply left to users directly.

Great care should be taken to identify and choose those requirements that should be the direct concern of the interoperability framework being implemented, and those (usually the majority) that remain the sole concern of the trading parties and/or their service provider/access point.

In very specific terms, organizers should be prepared to identify those parts of the requirements where users of the interoperability framework may seek direct support by means of rules, processes, standards and formats, messages and other features offered within the interoperability framework.

Examples of such opportunities and areas falling into the category identified in the previous paragraph above could include (at the community's discretion):

1. Facilities, procedures and rules to support end-to-end fiscal compliance through the provision of tools to support and evidence 'authenticity of the origin and integrity of content', such as digital signatures and seals deployed within a highly secure messaging environment, and based on non-repudiation and well-formed standardised messages.
2. Such tools or rules could extend to archiving (including the furnishing of an identical archive of an 'original invoice' or the same content, when local regulations have made it mandatory), and the provision of matching and business control mapping tools.
3. It may be legally necessary for Corner 2 to have a formal mandate from Corner 1 to create a tax invoice in electronic form on its behalf.
4. The interoperability framework could include rules for collaboration between corners 2 and 3 where non-compliance of a fiscal or other legal nature is detected during transmission along the chain. Prevention of unwarranted or unauthorized amendment of invoices at corner 3 is a bad practice that needs to be addressed in the rules and processing environment to avoid infringement of end-to-end compliance.
5. Depending on the legal jurisdiction concerned there could be rules and procedures to identify an 'original invoice' or dataset. This could include the management of rejections and the correction of documents and the elimination any discrepancy that might arise between the records held in the 4 corners of the environment by ensuring access to a commonly held dataset in the possession of all parties. Clear rules could be provided on roles and responsibilities for the locus of invoice or document creation, credit note issuance, other correction processes, and fiscal compliance responsibilities.
6. There should be clarity on the processing and replacement of 'rejected' items, based on 'cancel and replace', as appropriate. Good practice dictates is that once an invoice is successfully transferred between Corner 2 and 3, it does exist, and as a data-set it cannot be modified and must be archived on both sides. Any required correction must then be carried out through credit notes and/or debit notes and/or a corrective Invoice. However, in the case where Corner 3 considers that an e-invoice received is not compliant or acceptable, a specific dialogue must be initiated with Corner 2 to correct that discrepancy.
7. Support for controls to be made by Corner 2 and 3 to identify their respective customers (including over time) in order to support 'Know Your Customer/'Know Your Supplier' commitment end-to-end compliance.
8. Support for usage specifications and/or document extensions in support of national or sectoral specificities, especially focused on the increasing role of government mandates.
9. Arrangements required for the increasing requirement for 'split payments' (one to the seller and one to the tax authority or to a specific bank account of the seller, either as the routing of the required payments or as a form of 'withholding' tax).
10. The definition and implementation of quality standards for the synchronization and compatibility of processes across the whole processing and delivery chain.

All such provisions as are agreed to be supported should be reflected in the rulebooks and operational agreements of specific interoperability frameworks.

6.3. Business Requirements

Recommended Practice on the provision of support to users in relation to business requirements

Organisers of community interoperability frameworks should take care to create an environment that meets the interoperability needs of the end-users or the trading parties and their chosen service provider/access point.

Most of the business requirements described above are the province of the trading parties and must be agreed and communicated by them. They may form part of contractual arrangements or agreed procedures. The organisers of an interoperability scheme should not stipulate requirements that are inappropriate or unnecessary and are best left to the trading parties to identify.

Such organisers should develop facilities to support such requirements in a balanced manner. Specific support can be provided through:

1. In the data layer through the choices made in relation to the exchange standard to be used (both at a semantic and syntax level) and in relation to the availability and functionality of response messages)

2. The provision of model rules and procedures as identified below in the section on governance requirements.

3. An openness to the development of new features and capabilities as end-user requirements evolve.

Examples of business requirements specified by the trading parties (often the buyer) and requiring codification in rules and market practices are as follows:

- Requirements for the presence of specific references in order to identify transactions and allow the matching of invoices with other supply chain documents or events, such as a Purchase Order (P.O) reference, a contract or tender reference, an advanced shipping notice reference, a despatch advice reference, a goods receipt reference, a buyer reference.....
- Calculation and tolerance rules for decimals and rounding of amounts
- Rules for the specific use of credit notes, debit notes or negative invoices
- Any rules on dates (e.g. invoice date needs to be close to its transmission date).
- Business profiles, processes and case rules, including specific business elements to be provided. These could include the use of types of invoice other than a classical commercial invoice, invoices referencing multiple deliveries or purchase orders (or not), , invoices with a payment schedule, invoices with a withholding tax deduction or requiring split payments, and any required sectoral information, especially at the invoice line-level……..
- Any specific e-invoice format requested as the tax invoice or as the 'e-tax invoice' (which may have to be archived identically by the supplier and the buyer depending on applicable regulations).

- Provisions for the digital signing or sealing of a document such as a tax invoice to secure compliance.
- The obligation or capability to provide status information on the invoice process, to be exchanged through standardized 'response messages'.
- Any specific controls required to be exercised by the supplier and/or its service provider/access point relating to any aspect of a process including compliance with usage specifications.
- Procedures for the management of discrepancies, and control failures on all sides.

6.4. Governance for Interoperability frameworks and schemes

Directives concerns not only the external regulatory and business requirements but also the 'directives' created for governing, managing and participating in interoperability frameworks or schemes which adopt and comply with the Global Interoperability Framework (GIF).

A fundamental issue arises in this context: whereas it is considered appropriate and very practical for interoperability frameworks to adopt uniform standards at the **technical** level, a diversity of approach is a realistic expectation at the **governance** level. This is based on the diversity of communities, different traditions and approaches to agreements and rules, and varying business scope and requirements to be addressed. Nevertheless, the governance arrangements need to address the following key areas:

- Governance structure/model rules for the specific interoperability community
- The rules covering the operation of the network
- Model Agreements to be entered into within the four-corner model
- Treatment of end-user seller and buyer requirements and expectations, including fiscal compliance and buyer rules, if supported within the interoperability framework.
- Implementation guidelines and support

The following represent identified areas which constitute a set of requirements, each containing a set of illustrative **Recommended Practices** and applicable principles:

Recommended Practices for the Governing entity

1. *Each framework or scheme should act under the auspices of a designated governing entity, which may be a single purpose entity for the purpose or an entity forming part of an organisation with wider purposes.*
2. *The governing entity should be independent and autonomous in terms of strategic direction and operational control*
3. *A not-for-profit principle should normally apply.*
4. *Explicit reference should be made to competition law and compliance with it.*
5. *The entity may contract with or recognise the roles of others in carrying out tasks under defined agreements for operational, technical and management responsibilities*

6. *The governing entity should have a governing board composed of representatives of framework/scheme participants as well as other stakeholders such as end-users, public bodies, relevant associations, together with various 'non-executive' representatives.*
7. *The powers and roles of the Boards and other functions and committees within the governing entity should be transparently defined and discharged.*
8. *The governing entity should have a dispute resolution and arbitration machinery with defined procedures and remedies.*

Recommended Practices for participation

The primary participants in a framework or scheme will typically be entities providing services and solutions and providing an access point to the interoperability network to end-users, being commercial enterprises, and public sector or not-for-profit organisations.

1. *There may be different categories of participating entity.*

2. *Admission criteria should be open, transparent, non-discriminatory, and administered in a consistent way. There may be admission criteria regulating the financial and operational robustness of a participant; but such criteria should be proportionate and reflective of the actual risks likely to arise.*

3. *There will need to be established complaints, redress and arbitration procedures*

Recommended Practices for Rules and Agreements

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1. *Each framework or scheme needs to adopt a well-functioning rulebook covering all matters concerning adherence of participants, rights and obligations, business and technical responsibilities, and other areas covered below, all set out in a Model Agreement.*
2. *There should be an adoption and adherence agreement identified and forming part of the Model Agreement and Rulebook, which will be signed by all participants.*
3. *Such agreements will typically be multilateral on a 'sign-once, cover all' basis, although other models may be adopted.*
4. *Where required provision may be made for bilateral agreements between service provider/access points to cover issues such as pre-authorization of business flows, and compliance requirements.*
5. *The relationship between a participant and its end-user customers will be separately documented on a bilateral basis, although a Model Agreements may be included to cover common obligations.*

6. *It is recommended that rules and obligations concerning business responsibilities should be separated from the rules and obligations concerning the functioning of technical artefacts such as delivery channels and system-wide discovery mechanisms.*
7. *No participant should be obliged to contract with another participant within the scheme unless it is commonly agreed that this is a requirement and adequate redress procedures are established where disputes arise.*
8. *Rules and agreements should promote quality standards and the use of benchmarks and certification.*
9. *Where contractors and outsourcing is used by the governing entity or any participant in the framework or scheme such arrangements should be documented in a binding agreement.*

Recommended Practices for Technology and standards

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1. *The object of interoperability frameworks and schemes is to provide a highly automated environment based on well-proven and robust technology.*
2. *Standards should where possible be open, non-proprietary, and freely available.*
3. *High standards and rules for security, data stewardship, data protection, risk management, automated on-boarding and compliance with defined best practices should be established and maintained.*
4. *Reasonable demands may be made on participants to gather useful metrics and performance indicators.*

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7. The end-user perspective in delivering interoperability

Interoperability is the overriding requirement for trading parties in a trading relationship. By definition, trading parties represent a highly heterogeneous universe and their individual requirements must drive the needs of service provider/access points in an interoperable network.

Sometimes we think of interoperability as only that dimension existing between inter-operating service providers, but of course the end-to-end user perspective is also vital. That is why it is logical to think carefully about the end-user perspective and the practical ease-of-use of interoperable networks and schemes.

The ideal situation is for a trading party to connect once to a single chosen service provider/access point and use that one connection to integrate seamlessly with any other trading party. Connecting once to a service provider/access point and through it connecting to all partners which are similarly connected to their chosen service provider/access point forms a good basis for pervasive interoperability, irrespective of the back-office technology used by each trading party. Business units within a connected group may, of course, use

different providers, and in the real world trading parties may use a number of service providers for different markets and situations. Nevertheless the point about the benefits of the value of concentrated flows still holds good.

In reality, end-users acting as suppliers or buyers, whether engaging with a three-corner model or a four-corner model are faced with a variety of customer experiences. The market for e-invoicing services is highly competitive and offers a diversity of products and services. With this in mind, the GIF is intended to provide a package of common building blocks support end-to-end interoperability whilst fully preserving the pro-competitive aspects of the market.

To reflect the end-user perspective this section of the GIF includes some **Recommended Practices** containing consistent guidelines for the customer experience in the so-called 'first mile' or 'last mile' of the transaction chain. These cover recommended practices for the day-to-day connection to and operation of e-invoicing services and solutions including the functionality of portals and data capture mechanisms, document and data management, minimum service characteristics and service levels including responses and error handling, and direct support for the exchange process.

These **Recommended Practices** are aimed at the service and solution provider community with the objective of ensuring that suppliers and buyers are provided with a consistent experience from the on-boarding stage and usage of multiple inter-connected e-business platforms. Whilst aimed at service and solution providers as individual entities they are also relevant to their trade associations and community forums that support the interoperable eco-system. The recommended practices pay particular attention to the needs and perspectives of all businesses, including small and medium-sized businesses and the challenges of the conduct of both domestic and cross-border business, by creating a focus on a number of key areas and a number of useful considerations and practical suggestions for improving the performance of e-business exchanges.

Recommended Practice 1- service providers/access points operating within an interoperable network should ensure that a comprehensive and consistent set of business document types is supported and matches other service provider offerings to the maximum feasible extent. This will enable end-users to engage with a large number of their business partners in a consistent way to speed up the adoption and deployment of end-to-end services. Such services also need to be tailored towards the digital capabilities of a heterogeneous end-user base.

For the end-user, the range of services made available by and between service provider/access points at corners 2 and 3 should be comprehensive and consistently available to all trading parties across the whole four-corner end-to-end delivery network. Where possible the attributes of the services provided at the network level between corners 2 and 3 should be a 'super-set' of the services being required between any individual trading parties at corners 1 and 4; this means the provision of a range of data elements and functionality from which the required service cluster can be selected and tailored to the individual end-user. This service cluster will also include appropriate value-added services provided by the service provider/access point on a competitive basis. The table below shows a sample of the

documents typically exchanged between seller and buyer for illustration purposes and demonstrates that capabilities can vary substantially.

SUPPLIER	Document Type		BUYER
	←	Purchase Order Create	←
	→	Purchase Order Response	→
	→	ASN/Delivery Advice	→
	→	Invoice	→
	←	Invoice Response	←

Figure 4.Sample of typical document type exchange between Supplier and Buyer

The ideal scenario is where trading parties are able to exchange the same set of business documents and response messages. In practice this can be a significant challenge as the supplier must not only implement the necessary capabilities but also monitor the capabilities of their customers when enabling e-business. The table below shows a sample of the engagement capabilities of a number of customers in different sectors and the variety of documents exchanged.

Trading Party	PO	PO Change	PO Confirmation	ASN/Delivery Advice	Invoice	Invoice Response
Customer 1 (e.g. Large Company)	x	x	x	x	x	x
Customer 2 (e.g. SME)	x				x	
Customer 3 (e.g. Logistics Provider)	x			x		
Customer 4 (e.g. Government Entity)					x	
Supplier 1 (e.g. Large supplier)	x	x	x		x	x
Supplier 2 (e.g. SME)	x				x	x
Supplier 3 (Electronics)	x	x	x	x	x	x
Supplier 4 (Manufacturer)	x	x			x	

Table 4.

To best support buyers and suppliers, all service provider/access points, at corners 2 and 3, should support the full range of document types and capabilities required to be fully effective. In turn they also need to provide support to develop the capabilities of all trading parties to meet the needs of other trading parties, or provide an alternative route to making available the information present in a received business document, even if one of the parties is not able to ingest the business document within its own system.

If the end-user has 200 customers enabled and 10 customers are not able to implement one or more business documents the supplier will need to maintain two or more separate business workflows to enable transactions with all their customers. This increases complexity as well as cost and leads to a lack of scalability where customers have significantly varying capabilities. Service provider/access points should provide the maximum level of support for the capabilities of their customer and work to improve the level of consistency, whilst recognising differing customer capabilities and resources.

Recommended Practice 2- service providers/access points need to support a consistent set of interface methods and protocols, ranging from an automated file transfer with truly integrated end-users to operations with those end-users that seek the services of the service provider/access point through portal technologies or other kinds of technical connection. A set of defined minimum services should be supported based on a community agreement on a set of best practices.

Not all trading parties are capable of using file transfer facilities. In some instances where a supplier may have limited technical connectivity capabilities, the service provider/access point often provides a *portal* for the supplier to interact with the service and the delivery network and undertake the sending and receiving of messages/documents with its customers, as if it had a full B2B integration suite of capabilities. Well-performing portals and the use of application programming interfaces (APIs) are crucial value-added benefits that corner 2 service provider/access point can provide for end-users. Often an end-user may trial their connections through such a portal before they commit to full integration of their ERP system with their service provider/access point.

As the requirement for increased digital integration continues, the use of (many) portals as the user interface to the delivery network could become burdensome and organizations will look to automate the integration between the back-office environment and the service provider/access point. Providing a consistent set of capabilities to the end user, whether using a portal user-interface, , a batch file upload function, or having a fully integrated end-to- end B2B connection is an important requirement for the service provider/access point. Customers should always have a migration path towards automated file transfer as their volumes grow without reducing functionality.

There are some basic best practices that need to be present in all such portals to avoid presenting challenges through their variability, which can be quite extreme. End-users are offered widely varying portals in terms of ‘look and feel’ and performance. For example on-

boarding should not be a radically different experience for customers facing multiple portals. To address this problem, a set of defined minimum services should be supported based on a community agreement on a set of 'best practices'.

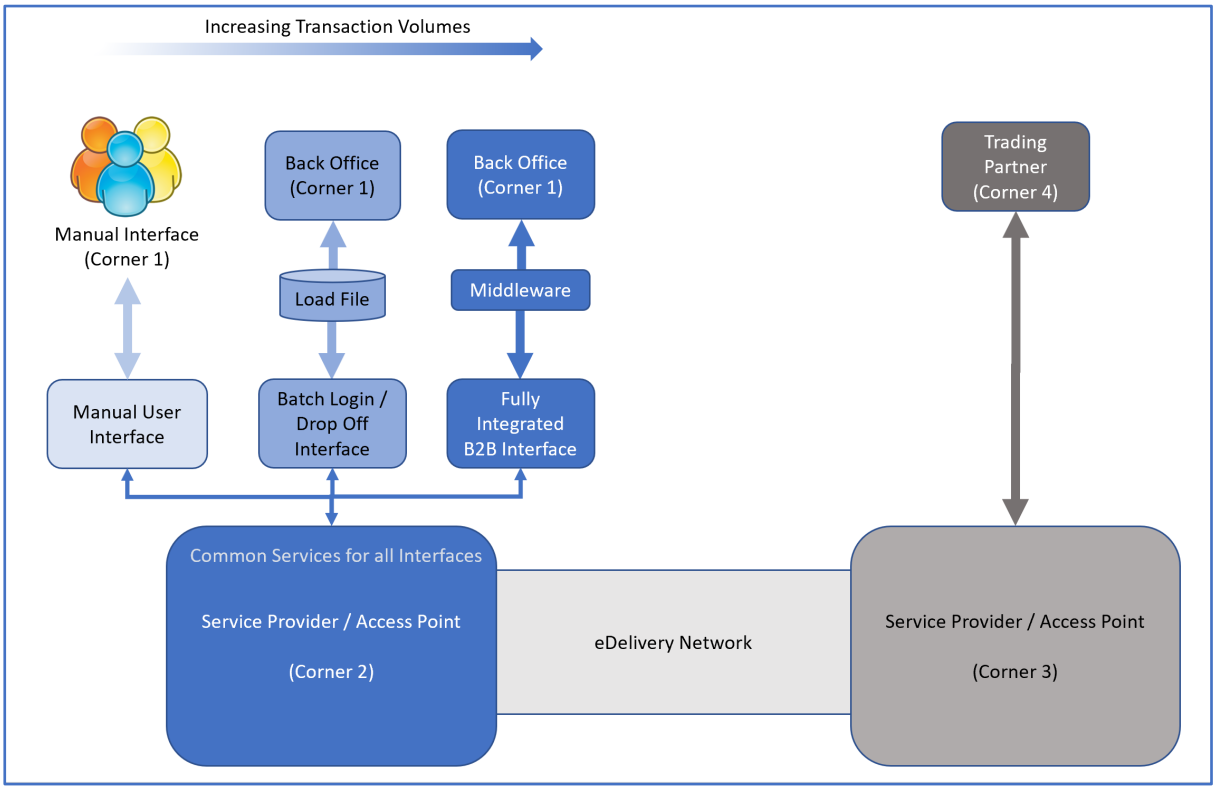

Figure 5. Interface Options Provided by the Service Provider/Access Point

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Recommended Practice 3- service providers/access points should ensure that all their customers have access to an easy-to-use addressing and routing tool. Such tools need to include information about end-user organisational and business hierarchies so that entity and electronic identifiers can be consistently and accurately used and mapped. From the single entity end-user to the global multi-affiliate organisation, consistent use and mapping of identifiers will ensure all end-users can successfully interoperate.

An end-user wants to know how to reliably assign a buyer identifier that enables delivery of business documents to its end-customer. This is a challenge at the time a business relationship commences and especially where there are multiple business affiliates of a large buying organization, with which an end-user does business.

A key issue is how subsidiaries/branches/affiliates are addressed in the messaging process? Typically a large buyer will have a single point of access to the delivery network that multiple affiliates use to send and receive messages. The individual business identifier for each multiple affiliate needs to be passed across corners 2 and 3 or made available in a registry or directory for correct assignment by a supplier at corner 1. The same is true for large multi-national suppliers, the sending affiliate of the large organisation needs to have its identifier correctly

passed to corner 4 to ensure that the correct supplier affiliate is recognized in the buyer's ERP system.

This recommended practice requires that all service provider/access points are able to fully support the discovery system and registry made available within the specific instance of a GIF-based interoperability framework, in addition to maintaining their own directories and client-specific mechanisms. In turn they should provide the necessary look-up or directory services to their customers and always validate (or cater for self-validation of) the presence of plausible identifiers in any message to be exchanged across the network.

Recommended Practice 4- service providers/access points should have the ability to map any data format to the semantic and syntax standards employed in a particular instance of the GIF. This will allow maximum flexibility and differentiation in support of end-users whilst also maintaining the efficiency transmissions between corner 2 and 3. Service providers/access points need to be able to guide end-users so that data elements are deployed in a standardized fashion based on the semantic definitions present in the standard and in any usage guidelines. The development of mappings between data elements used in the various semantic standards/formats used by end-users, will drive more harmonization and speed up the deployment of end-user connections. Individual service providers/access points usually have well established capabilities in this area both at an individual and collective level, which should be further developed.

Ideally the supplier could use a single data standard when connecting to all its customers. In practice this is seldom possible for many reasons, the main one being the existing adoption of a standard used for a particular industry or country/region or simply the prevalence of proprietary formats. It is likely that a supplier has customers in multiple industries and hence may need to support multiple industry standards to conduct business with its trading partners. The GIF network model can help reduce the severity of this issue for the supplier and buyer through mobilising the services of the service provider/access points operating at corners 2 and 3 in the four-corner model. The supplier can connect to their service provider/access point, which will manage the data and create a well-formed business documents in a single exchange or 'pass-through' standard. In turn the receiving service provider/access point will be able to provide format conversion and integration services to support the end-customer needs at corner 4, whilst also observing any requirements for preserving and making available the original fiscally compliant data-set, if required. All service provider/access point connected to the interoperable network should be capable of supporting these requirements.

This recommended practice concerns the identification and correct processing of the data elements that are required by corners 1 and 4 and how will they pass through corners 2 and 3 i.e. will they be untouched based on the pass-through mode, or will they be mapped in and out of the agreed exchange standard to meet the needs of the two trading parties? An example here is the unit of measure, the ANSI UOM for *Meter* is MR and the UNECE UOM for *Metre* is MTR; to ensure proper data mapping the correct use of the exchange standard is crucial. Mapping is an area where use of the GIF can create significant value to end-users and their service provider/access points.

Each end user will have their own unique implementation in their back-office environment. Even common ERP platforms will be configured differently between end users. This causes an issue when we want to address how to deal with back-office systems integration (ERP/Sales Systems/Financial Systems). To ensure that end users can interface to their trading partners in a consistent manner, technology-agnostic business processes should be implemented in a consistent way irrespective of the back-office environment. The diagram below shows a generic Purchase to Pay/Order to Cash business process interface mapping scheme.

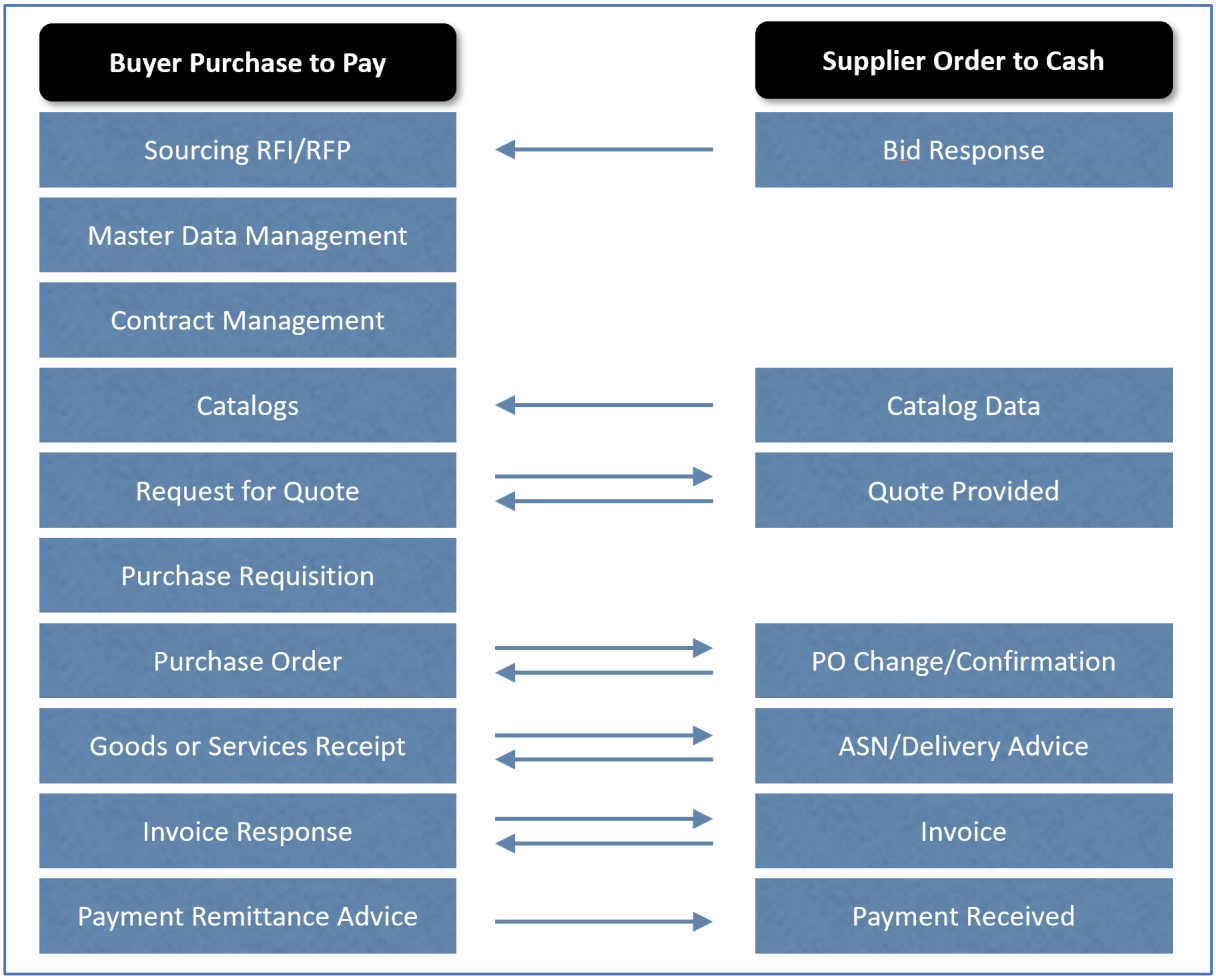

Figure 6. Purchase to Pay / Order to Cash business process

Harmonized business processes which align with the capabilities of the GIF and which can be implemented in the end user's back-office environment will permit maximum adoption of the GIF amongst the end user trading partners.

Recommended Practice 5- service providers/access points should ensure that for each business document transmitted, a corresponding response message is capable of being returned back to the end-user, as required by business circumstances. Not all interoperability models support this at this time, and action is required among all relevant stakeholders to enable implementation of end-to-end response messages as a normal deployment.

It is essential to ensure that response messages are exchanged in a consistent manner, for both transaction success and failure, and they are relayed back to the corner 1 across the network. User needs must be agreed and implemented by all service providers/access points in the delivery chain and adopted by the trading parties; this also helps in error handling as covered below. This is an area where use of a well-designed interoperability framework will add significant value to buyers, suppliers and service provider/access points.

Recommended Practice 6- service provider/access points should consistently apply error handling processes, triggers and responses to support harmonized end-to-end business processes.

There is a need to identify responsibilities for signalling errors detected during the transmission process and for the remedial action to be taken and by whom when a document fails to be delivered or is incorrect at any step in the delivery process between corners 1 and 4. Error handling functions should follow the practices set out in the rules of the applicable interoperability framework and accepted business practices. Consistency in how a service provider/access point signals and manages errors and omissions, is an integral part of consistent service provision, not a separate area of activity. Further development work on how and when to consistently signal and manage errors will be very useful.

Recommended Practice 7- service provider/access points should assess their customer's interoperability capabilities and provide support them in continuously implementing improvements. Providers should also apply continuous improvement efforts to their own capabilities and carry out bench-marking to assess where they stand against best practice.

Before permitting an end-user to commence the use of the interoperable framework, its service/provider should make reasonable efforts to check and enhance the capabilities of its customer, carry out checks and tests, and provide training facilities. Efforts should be made to ensure that the customer's transactions, records, documents and customer identifiers are fit-for-purpose and are able to be processed and delivered across the network. The service provider/access point should satisfy itself that a message can be delivered before releasing a transaction into the network. This will reduce the number of errors that occur one or more corners away from the supplier or buyer. Service providers/access points should develop a schemes for services that enables them to benchmark themselves against best practice, and publish their capabilities to interoperate consistently with other service providers/access points.

8. Emerging developments in the digital economy: the impact of Continuous Transaction Controls for fiscal reporting at national level and emerging technologies

A growing number of countries are introducing so-called ‘Continuous Transaction Controls’ (CTC) in the area of fiscal reporting, e-invoicing and audit, often referred to as 'clearance models', or ‘real-time reporting’, that are designed to protect the tax revenue generation process. These controls have the benefit of helping to close so-called the ‘tax gap’ by improving tax generation. In addition, they are often based on the adoption of electronic invoicing so are very supportive of digital supply chain processes throughout the economy.

However the variety of such systems may inadvertently impact the ability of taxable persons and their service provider/access points to reap the end-to-end benefits of supply chain efficiency both within and across multiple jurisdictions. Unless managed with the interests of all stakeholders in mind, there may be a sacrifice in terms of the cost and efficiency gains for trading parties. This is a danger not necessarily present in all such systems using CTC. What is observable, however, is the proliferation of such CTC instances based on varying standards, definitions and modalities i.e. an almost complete absence of harmonisation.

In terms of current CTC models, there is a clear distinction to be made between 1. Systems designed for the **electronic reporting** of fiscal information – which may relate to paper and electronic invoices – to tax authorities, and 2. Systems designed for **mandatory ‘clearance’ or ‘registration’ of actual electronic invoices** to be submitted to tax authorities. The two modes require different procedures, taxpayer organizational measures and data components.

Given the rapid rise and further evolution of instances of CTC deployment, the GIF has not yet incorporated CTC precepts and interoperability requirements owing to an understandable state of flux. It is intended to incorporate some proposals and recommendations in a future edition of the GIF.

The proponents of the GIF-WG has a legitimate interest in influencing developments in this area given the role that an interoperable eco-system with its community of end-users and service provider/access points could play in CTC systems in cooperation with the public sector, such :

1. Support in the framing of some recommended practices and principles which could directly contribute to the success of CTC developments.
2. Generating recommended practices that preserve and further develop the massive benefits of interoperability models supporting electronic invoicing and supply chain automation, whilst co-existing with the benefits of CTC.

At this stage the following principles are proposed:

1. A balance of benefits

CTCs should be designed and operated in a way that balances the interests of tax authorities and tax-paying businesses in terms of economic and fiscal benefits, compliance, costs of deployment, supply chain efficiency, and possible disruption to established processes.

2. Building on what works

CTC s should where possible build on existing and well-accepted business and supply chain processes. In particular trading parties should be free to use delivery and interoperability mechanisms with their counter-parties that meet their efficiency needs at the point when fiscal processes have been completed. Fiscal agencies should not normally be engaged in the end-to end delivery of supply chain documents and messages.

3. A commitment to harmonization

CTC should use or re-use wherever possible common definitions of business terms and information elements, technical, legal and process specifications, internationally accepted and deployed standards for data, document types, security, and transmission protocols in all specific CTCs at national or international level.

4. Cooperation

The implementation and further development of CTCs need to be based on a clear and transparent legal and compliance framework, where tax administrations and taxpayers build and maintain close cooperative working relationships, and mutual understanding.

Appendix: terms and definitions

For the purpose of this report, important terms and definitions are listed below:

AS2 and AS4: stand for Applicability Statements and are protocol specifications used to transmit sensitive data securely and reliably over the Internet.

Access point: Access point describes a node on a delivery network connecting two service provider/access points (corners 2 and 3) in a four-corner model and providing trading partners (corners 1 and 4) with access to that network.

Business Payments Coalition (BPC): The Business Payments Coalition (BPC) is a volunteer group of organizations and individuals working together to promote greater adoption of electronic business-to-business (B2B) invoices, payments, and remittance data in the USA.

Connecting Europe Facility (CEF): The EU Connecting Europe Facility (CEF) supports initiatives in the sectors of transport, telecommunications and energy. Within this, CEF e-Invoicing provides funding, tools and capabilities to support the roll-out of e-Invoicing to public administrations.

Continuous Transaction Controls: a system of fiscal controls implemented by a growing number of countries in the area of reporting, e-invoicing and audit, often referred to as clearance models, or real-time reporting, that are designed to improve and protect the tax revenue generation process.

CEF e-Delivery: The EU e-Delivery building blocks help public administrations, citizens and economic operators exchange electronic data and documents over a network in an interoperable, secure, reliable and trusted way. It is based on a distributed model, allowing direct communication between participants without the need to set up bilateral channels.

Connect ONCE: the Open Network for Commerce Exchange (USA).

Data: this is the business content that needs to be conveyed between parties and is a distinct layer separate from the others. This Data could be virtually anything in terms of the information making up a message 'payload', but in this context are defined as structured data or documents pertinent to the financial supply chain, such as orders and invoices.

Delivery: Refers to the components of the technical interoperability layer to deliver documents electronically across the Internet.

Directory: An optional service that provides a variety of business information about a trading party that typically includes information on identifiers, attributes, routing and capabilities to support business discovery and successful e-Invoice exchange. In the context of interoperability frameworks, directories do not contain electronic payment information or other sensitive business information.

Directives: are the legislative, regulatory and rules requirements that surround the business environment for interoperability, such as taxation procedures, the rules governing the interoperability network itself, and a variety of other 'rules' such as those imposed by business actors, usually the trading parties, and by wider legislation covering privacy, contract law, and compliance with specific laws.

Discovery mechanisms: The processes and technology used to discover (e.g. look-up) the capabilities of another party, where and how to send an invoice and/or other message and validate and authenticate credentials. This includes registry services and other decentralized discovery mechanisms.

Dynamic discovery: is a multicast protocol for discovering addresses, services, capabilities parties and locations over a network.

Electronic Address Identifier: Unique digital address used by a trading party for the routing of digital documents and messages from and to its systems.

Electronic invoice: An invoice issued by the seller, transmitted and received by the buyer in a structured digital format that allows for automated processing.

Electronic Routing Address: Defines the electronic address of a service provider/access point platform that routes digital documents and messages on behalf of a trading party; it is associated with the Electronic Address Identifier.

Entity Identifier: The unique digital identifier of a trading party or business entity expressing the identity of a legal or fiscal entity, or a natural person. It may form a component or a path to discover an electronic address or routing address.

ERP system: an enterprise resource planning system which integrates back-office support for business processes, accounting, finance and resource management within a corporate entity.

European E-invoicing Service Provider Association (EESPA): A trade association for European e-Invoicing service providers.

EESPA Model Interoperability Agreements: Bilateral or multilateral agreements utilized by EESPA members to establish interoperable connections for exchanging invoices and related documents.

Four-corner model: A networking model that connects four parties to deliver electronic documents and messages: the sender (corner 1), the sender's access point (corner 2), the receiver's access point (corner 3) and the receiver (corner 4).

Global Interoperability Framework (GIF): a set of recommended practices, policies, standards and guidelines that enables the exchange of e-Invoices, and other supply chain documents and messages independently of adjacent payment, accounting and enterprise resource planning (ERP) systems.

Message envelope: A container or structured header that contains an embedded message.

Message payload: The semantic content and machine-readable syntax of the actual business message or document.

Message transport protocols: Technical transmission protocols used to create network connections between endpoints to deliver the message payload, such as an invoice and other documents.

Non-repudiation: One party to a transaction cannot deny having received a message about the transaction nor can the other party deny having sent a transaction.

OpenPeppol: A membership organization that is responsible for the Peppol network that enables businesses to communicate electronically with any affiliated government institution in the procurement process.

Organization for the Advancement of Structured Information Standards (OASIS): Non-profit consortium that drives the development, conversion, and adoption of open standards for the global information society.

Peppol: A set of artefacts and specifications enabling cross-border eProcurement as well as the operation of a transport infrastructure.

Registry services: Is the process (i.e. registry services) and storage in a Registry of network participant identifiers such as identity, location, and routing information used in automated messaging.

SBDH: is Standard Business Document Header

Semantic model: Defines the components of a document including actors and roles; business functions, processes, rules, and terms; and represented information elements (e.g. an invoice).

Semantics: The meaning of the data or information elements used in digital exchanges.

Service Metadata Location (SML): A registry that contains the8 location of the endpoint recipient SMP record used in automated messaging in a network.

Service Metadata Publisher (SMP): Registry that contains the identifier of an endpoint and exchange capabilities of a receiving access point used in automated messaging in a network.

Service provider/access point: herein is a provider of supply chain automation services in a broad sense, within which it usually offers an 'access point' connection to an interoperable network on behalf of its customers. This usually includes services for the formatting, validation, delivery and processing of e-Invoices and other related e-business transactions as well as supporting software and services.

Syntax: The means by which semantic information elements are expressed in machine-readable technical languages (e.g. XML).

XHE: is Exchange Header Envelope a joint OASIS and UN/CEFACT specification, which supports both a header and an envelope and is designed to operate in a four-corner model.

ENDS