THESIS / THÈSE

MASTER IN COMPUTER SCIENCE

EDI Roadmap

GITS, Nadine

Award date:
1993

Awarding institution:
University of Namur

[Link to publication](#)

Facultés Universitaires Notre-Dame de la Paix
Institut d'Informatique
B-5000 Namur

EDI ROADMAP

Nadine Gits

Mémoire présenté pour l'obtention
du grade de Licencié et Maître
en Informatique

Promoteur : Claire Lobet-Maris, chargé de cours

Année Académique 1992-1993

Facultés Universitaires Notre-Dame de la Paix
Institut d'Informatique
rue Grandgagnage, 21, B-5000 NAMUR
Tél. 081/22.90.65   Télex 59222 facnam-b   Téléfax 081/23.03.91

EDI Roadmap

Nadine GITS

Résumé

En peu de mots, l'Electronic Data Interchange (EDI) est l'échange de données dans un format standard entre systèmes informatiques indépendants avec un minimum d'intervention manuelle.

L'implantation de ce type de projet inter-entreprises ne vas pas sans un certain nombre de problèmes tels que analyse coûts/bénéfices, choix de standards EDI et de communication, choix des documents supportés par l'EDI, choix des logiciels de traduction des données en message EDI, choix de la plateforme hardware, choix des partenaires et enfin, choix des moyens de protection.

Le but du Roadmap est de structurer ces problèmes et d'exposer un certain nombre de solutions sous la forme d'un guide d'implémentation.

La pertinence des solutions proposées a été vérifiée à travers quelques études de cas.

Abstract

In a few words, EDI is the interchange of standard formatted data between the independent computer application systems or databases of trading partners with minimal manual intervention.

The introduction of this kind of inter-enterprises project goes along with several problems such as costs/benefits analysis, choice of EDI and communication standards, choice of the documents supported by EDI, choice of the translation (from internal data to EDI message) software, choice of the hardware platform, choice of the partners and, finally, choice of the protection means.

The aim of the Roadmap is to structure these problems and propose some solutions in the form of an implementation guide.

The pertinence of the proposed solutions was verified against some case studies.

Thanks

I would like to express my gratitude to Ms Cl. Lobet-Maris, for being the promotor of this memoir and for helping me to lead it to a good end, and to Ms d'Udekem-Gevers who provided me with a lot of feedback during the redaction of this memoir.

My thanks are also adressed to Mr Collard and his collaborators from DHL Regional Office Europe-Africa, to Mr Demeyere and the IT Staff from DHL Diegem and to Ms Jakobson and the staff from DHL Stockholm, who provided me with precious information for my study cases and helped me on the right way with their questions.

I also express my gratitude to Ms Van Rijsbergen from In-Connection, for sharing her experience with me and for allowing me to follow her during negotiations in EDI projects.

To everyone who collaborated to the achievement of my studies, and specially to my parents and fiancé for their permanent support, thank you.

TABLE OF CONTENTS

- I -

INTRODUCTION

The original aim of this work was to investigate the organizational impacts of EDI.

But, when looking for a company willing to cooperate to this investigations, contacts were token with DHL Worldwide.

DHL was then starting with an EDI pilot project at its location in Sweden and wished the collaboration of the CITA research group to find out if the Swedish solution was expandable to the rest of the organization.

The report I wrote about this project pointed out that it was runned in a quite instinctive way, without no proper costs/benefits analysis, not to talk about a study on possible organizational impacts or portability.

The diffusion of this report among the managers of DHL triggered so many questions that the conclusion was obvious : there was few knowledge about what EDI realy means for an organization.

From all these questions we concluded there was a need to elaborate a clear roadmap about a "standard" EDI implementation, asking and answering all possible questions at all levels concerned by EDI, and giving a possible framework for an EDI implementation.

Once this roadmap was finished, we hoped we would be able to test it on a Belgian EDI project.
But, since these projects were already started and no new projects have occured so far, it was only possible for us to validate the problems already pointed out in the roadmap and to discover the gap between theory and practice, as will be described in the study cases.

This memoir is structured in three major parts :

- Presentation of DHL Worldwide (part II)

> Since the roadmap was realised for and with the collaboration of DHL, it is important to present the enterprise in its sector, to describe its structure and to show the possible impacts of EDI on its organization.

- EDI Roadmap (part III)

> The EDI Roadmap is divided in two major sections, the first giving the framework of a general EDI Policy, the second proposing a project implementation plan.

Globally, the questions asked are :
- What can be gained from EDI ?
- What are the investments needed for EDI ?
- What are the main choices in terms of EDI standards ?
- What documents will be supported by EDI ?
- How to choose a translation software ?
- What are the hardware options ?
- What are the telecommunication options ?
- Who to trade with ?
- How to protect EDI relationships ?

- Case studies (part IV)

The case studies reflect experiences from the practice at DHL and treat implementation issues such as the EDI standards used, the supported documents, the conception of an interface between the internal applications and the EDI software, the requirements for a translation software, the need for exception procedures, the tests, the problems with the partners, and the need to implicate I.T. outsiders who are concerned by the project.

- II -

DHL WORLDWIDE

1. Introduction

The EDI Roadmap described in part III was conceived for and with the collaboration of **DHL Worldwide Express.**

> *"In 1969, a <u>shipping company</u> was having difficulty meeting urgent deadlines between California and Hawaii.*
> *Dalsey, Hillblom and Lynn created a method of meeting these time-sensitive needs.*
> ***DHL** Corporation was formed.*
>
> *In 1972, DHL International was established with its base in Hong Kong. Together, these two grew into DHL <u>Worldwide</u> Express which today spans the globe.*
>
> *As the world's leading international <u>air express company</u> since 1969, DHL has an unmatchable reputation for reliability and speed. DHL has over 1450 offices in over 190 countries employing the services of over 25,900 trained professionals. Local people with local knowledge combining to give DHL extensive experience with customs regulations and flight schedules worldwide. DHL uses over 172 commercial Airlines daily to complement DHL's own fleet of aircraft and to make sure your consignment arrives on time, every time."*

([DHLUGU])

After this brief presentation of the company, we will describe it in its sector (air express transport) in order to locate potential EDI partners and then have a look at the structure of the company and the information flew in this structure to understand the business practices of DHL and the functionalities of EDI according to these practices.

2. Sectorial Description

2.1. Introduction

As we saw above, DHL is an International Air Express Transport company.
In the following pages, we will have a closer look at this sector of activity.

> What is exactly the primary activity of an air express company ?
> What are the main differences with traditional transport or even postal services ?
> Who are the customers of Air Express Companies ?
> Who are the direct competitors of DHL ?
> What is the market share of DHL among its competitors ?

2.2. Primary Activity

In DHL's case, the primary activity is the sending of documents and/or dutiable goods from desk to desk.
This means the packages (documents and/or dutiable goods) are taken by DHL's services at the expeditor's location, and delivered by DHL's services at the consignee's location.

The particularity of this service is, besides a huge physical network allowing to provide an express service, the existence of an information network parallel to the physical network allowing to provide the customer with permanent information about where his sending is, where it is going to, when it is delivered, etc.

Those two networks will be described later on in section 4 - DHL and EDI.

What are the main differences between the Express Courrier Services and the traditional postal services ?

The contents and type of the shipments, or even the fast delivery are not the major differences.
The major difference is in the value added by Express Courriers and received by users.

Examples of this added value are :

- pick up of shipments at home
- rapidity
- reliability (guaranteed notice, acknowledgement of receipt)
- track and tracing
- personnalised service

2.3. Customers

Who is using the services of Air Express Companies and why ?

The amount of customers using the Air Express Services of DHL has grown from 30.000 in 1973 to 900.000 in 1991.
These customers are distributed over all types of business.
For example, DHL can consider among his customers companies like Toyota, Citibank, Rank Xerox, Kodak or Texaco.

Why are these companies using DHL's services ?

At the beginning, the use of Express Services was an exception procedure to send urgent documents or packages.

But, as time goes by, customers found new and better applications of Express Services such as, for example, Just-In-Time Support.

"As suppliers, manufacturers and distributors analyse their total distribution costs and logistics needs, more and more are turning to Just-In-Time inventory systems. It is here that DHL plays a vital role.
By providing timely, reliable deliveries, we help companies save money that would otherwise be tied up in large and ineffectively distributed inventory"

([DHLCOR])

2.4. Competitors

The major competitors of DHL in Europe are :

      FEDEX - Federal Express
      EMS - Taxipost
      TNT Express Worldwide
      UPS - United Parcel Service

2.5. Market Share

Since there is no such thing as an International Federation of Air Express Companies, it is very difficult to obtain figures about the global Air Express market and the shares in this market of the major Air Express Companies.

The only figures available are those concerning DHL, processing over 50 million shipments for about 900.000 customers in more than 190 countries all over the world.

3. Structure of DHL ?

"DHL Worldwide Express is composed of DHL International, Ltd., which serves all locations outside the U.S. and its territories, and DHL Airways, Inc., which serves all locations within the U.S. and its territories and their agents and affiliated companies."

([DHLCOR])

The activities of DHL Worldwide are distributed over 4 major areas :

- Middle East
- Europe/UK and Africa + Elan (EUREKA)
- Far & South East Asia
- United States, Canada and Latin America

and supported by a technostructure taking care of :

- Legal & Directory matters
- Finance
- Communication & IT
- Human Resources
- Planning & Development

The Eureka Area is again divided into 4 areas (North, East, Central and South) and supported by :

- Functional Support
- Operations
- Business Development

Finally the regions are divided in a certain amount of stations over the different countries, responsible for the effective operations.

([DHLIND)]

How do these different parts work together ?

If there is a hierarchical control, the different parts, at local and regional level, are quite autonomous about the means to achieve the objectives of the company.

The control is based on the results, and each regional office is free to define its own policy to achieve these results.
This is also true at the local level.

DHL Worldwide Structure

DHL Worldwide Express (BRU WHQ)

```
                              Chairman
                                 |
        +------------------------+------------------------+
        |                        |                        |
    [Directors]            DHL International          DHL Corporation
```

Directors	DHL International		DHL International	DHL Corporation
Legal & Regulatory Director				
Worldwide Services Director	Chief Executive EUREKA		Chief Executive Officer	Chief Executive Officer
Finance Director				
Communication & I.T. Director	Middle East	Europe/UK & Africa	Far East Asia	U.S.
Human Resources Director		Elan	South East Asia	Canada
Planning & Development Director				Latin America

DHL Regional Structure

DHL Europe and Africa

			CEO			
Area Manager North	Area Manager East	Area Manager Central	Area Manager South	Functional Support Manager	Operations Manager	Business Development Manager

Area Manager North	Area Manager East	Area Manager Central	Area Manager South	Functional Support Manager	Operations Manager	Business Development Manager
Denmark	Austria	Belgium	Central Africa	Finance	BRU Hub	Customer Service
Elan U.K.	Bulgaria	France	Greece	H.R. Dept.	Network Planning	Key Acc. Dev.
Finland	Czechoslovakia	Luxembourg	Italy	Legal	Transfer Gateways	Marketing
Iceland	Eastern Europe	Portugal	North Africa	MIS	Transport	Planning Analyst
Ireland	Elan Rindt	Spain	Southern Africa	Services		Research
Norway	Germany	Switzerland	West Africa			
Sweden	Hungary					
U.K.	Mongolia					
	Netherlands					
	Poland					
	Romania					
	USSR					
	Yugoslavia					
	Albania (1991)					

DHL Station

```
                        GENERAL MANAGER

    SERVICE MGR    MARKETING    SALES    MIS    FINANCE &        HUMAN RESOURCES
                   MGR          MGR      MGR    ACCOUNTING       & TRAINING MGR
                                                MGR
```

SERVICE MGR
- SVC SP MGR
- EPC MGR
- FLEET MGR
- CUST SVC MGR
  - C/S Trainer
  - Tracing Spv
  - C/S Spv
- WPX MGR
  - WPX Spv
- GDC MGR BRU
  - Ops Spv BRU
- GDC MGR ANR
  - Ops Spv ANR
  - Ops Spv LGG
  - Ops Spv GNE

MARKETING MGR
- MARKETING SUPPORT MGR
  - Marketing Analyst

SALES MGR
- TELESALES MGR
  - Claims
- FIELD SALES MGR

MIS MGR
- Operator Spv
- I.C. Specialist
- SPS Trainer
- Comm. Spec.
- Program Analyst

FINANCE & ACCOUNTING MGR
- PURCHASE MGR
  - Creditctrl. Spv
- MGMT ACC MGR
- FINANCIAL ACC MGR

HUMAN RESOURCES & TRAINING MGR
- Recrutement
- Social adm.
- Training

4. DHL and EDI

4.1. Introduction : What is EDI ?

Before examining the impacts of EDI on the organization of DHL, it may be usefull to define EDI as it will be considered in the rest of this work.

EDI is a concept issued from the business world, this explains the lack of accuracy in defining the concept.

From a large point of view, we can say Electronic Data Interchange is a kind of inter-organizational system (IOS).

An IOS is a computerized system allowing remote organizations to communicate with each other.

In his "The Diffusion of Electronic Data Interchange", Hagen K. C. Pfeiffer defines four categories of IOS according to the type of sender and recepient :

Sender \ Recipient	Person	System
Person	Electronic Mail Office Document Interchange	On-line Database Interrogation (Query)
System	On-line Database Interrogation (Response)	Data-Exchange between Applications/Databases

Dependent Databases

Distributed Databases :

a) Unified view of data

b) Global Schema

c) Read/Write, Join

(DB Communication)

Semi-Dependent Databases

Federated Databases :

a) Share/Exchange of Information/Transactions

b) Export Schema

c) Partial Read/Write, (Join)

Autonomous Databases

Electronic Data Interchange :

a) Exchange of Appl.-Spec. Information

b) Exogeneous Appl.-Spec. Schema

c) Message Read/Write Only

EDI in Comparison with Related Concepts

([PFEIFF] - p 38)

It is important to remark that this distinction does not take the possibility of interactive EDI into account, where a person will communicate to a system.

There are a lot of different definitions of EDI in the litterature, so that the one printed below could call some remarks.

We could define EDI as :

"... the interchange of standard formatted data between the [independent] computer application systems [or databases] of trading partners with minimal manual intervention.

EDI involves three main processes :

- *formatting the data into a (...) message, that can be transmitted between computer systems*
- *transmitting the message*
- *translating the message so that the data contained in it can be processed"*

([DATAPRO])

The following chart represents the EDI communication model, showing the sequence of the transmission process of an EDI message, that will enable us to locate the different problems that will be addressed later on.

EDI Communication Model

SENDER

Create In-House File	Create EDI Message	Send Message
Application Programs	Converter	Transmitter Encoder

Transport Message

Communication Medium

RECEIVER

Receive Message	Re-create In-House File	Interpret File
Receiver Decoder	Converter	Application Programs

Extract Information

D.B.

Store Information

D.B.
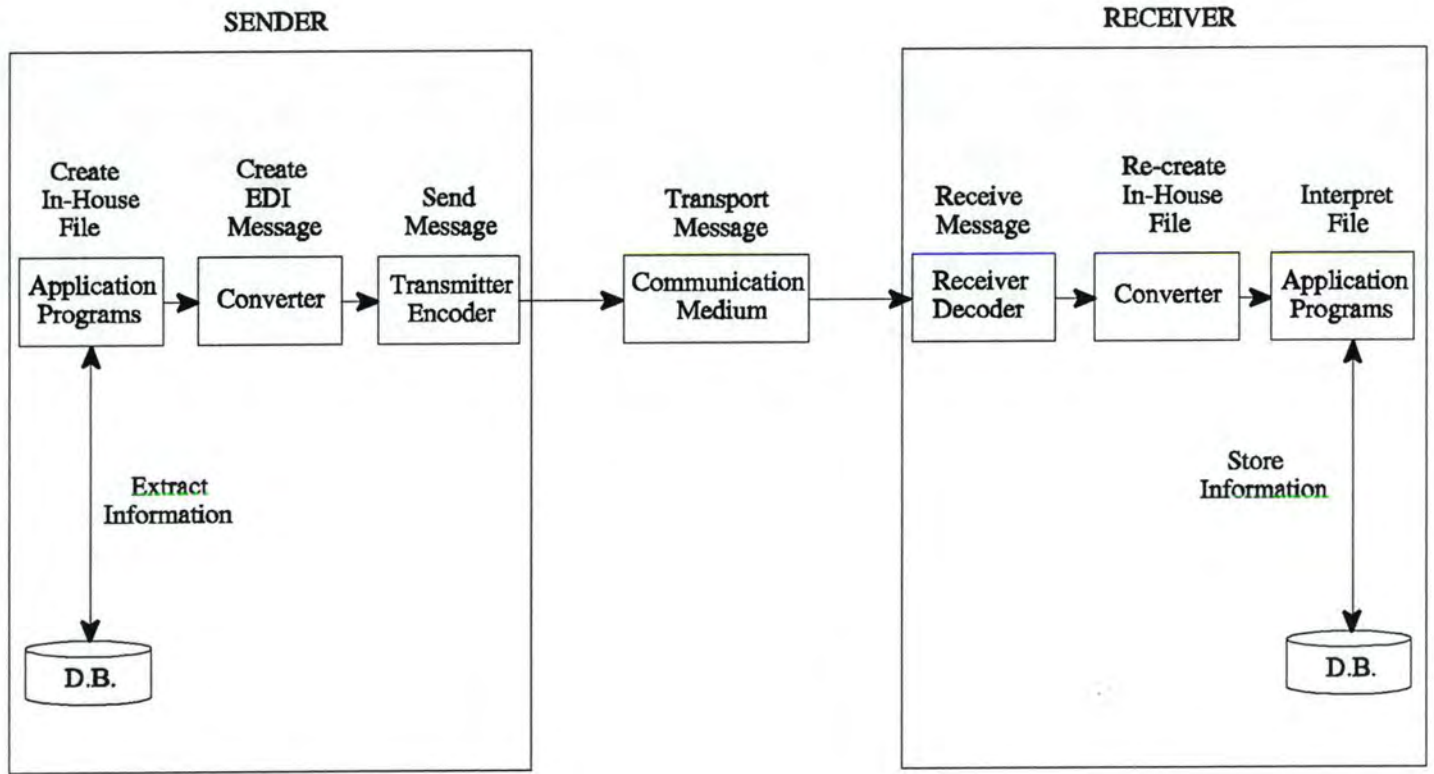
The business practices of DHL are organized according to two parallel networks :

- the physical network : physical shipping procedure
- the information network : information flow about shipments

We will now examine these two networks and then determine the impact of EDI on the information flow

4.2. Physical Flow

The physical structure of DHL is as follows :

There are 13 Hubs communicating with each other all over the 4 main areas served by DHL.

At each Hub is associated a number of Gateways and at each Gateway is associated a number of stations.

From a physical point of view, only the Hubs are communicating with each other.

A Gateway only communicates with associated Hub and Stations and a Station only communicates with the associated Gateway.

What is the physical flow of a shipment :

The expeditor calls DHL Origin Station (Station responsible for the location of the expeditor)for a shipment.

A courrier from Origin Station collects the shipment and brings it to Origin Gateway.

From Origin Gateway, the shipment is directed to the Origin Hub.

From the Origin Hub it goes to the Destination Hub (that can be the same as the origin Hub), then to the Destination Gateway and finally to the Destination Station where a courrier will deliver it at the consignee's location.

This flow is schematised by following picture :
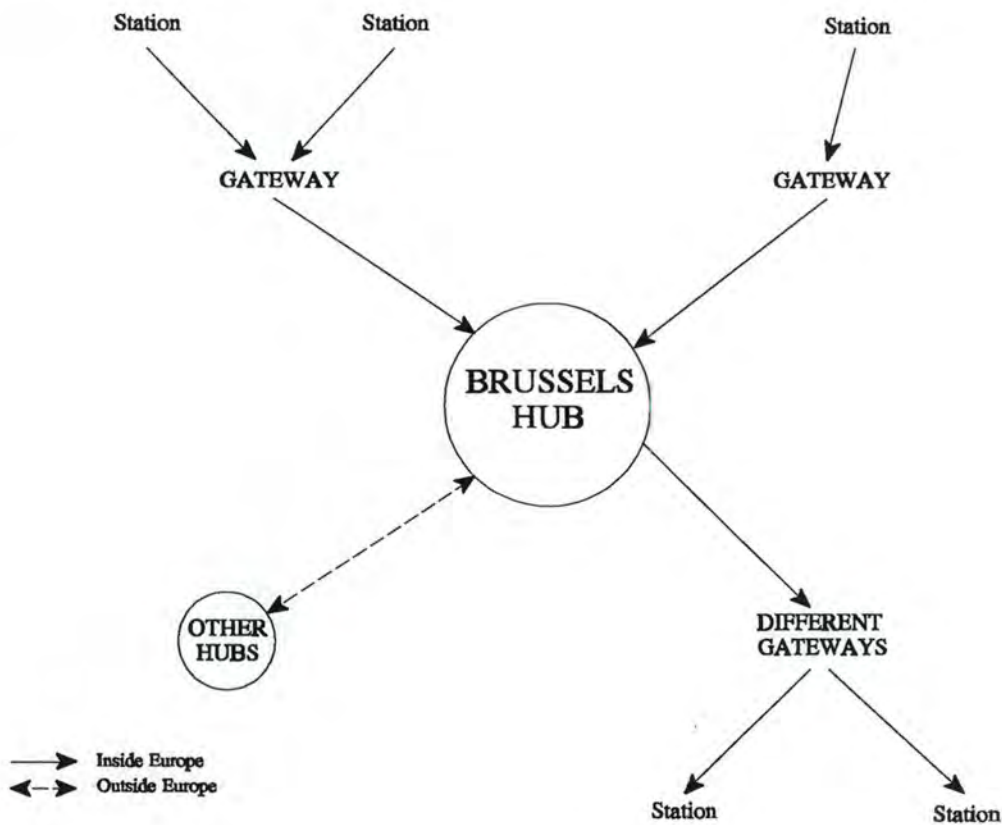
Physical Sending Process

4.3. Information Flow

What is the information flow related to a shipment :

> Together with the shipment, the Airway Bill is collected. The information contained
> on this Airway Bill is entered in DHL's information system at the Origin Station and
> transmitted via the Hub through the network to the Destination Station.

Once the shipment is delivered, the delivery details follow the same way from the Destination Station to the Origin Station

This flow is schematized by following picture :

ORIGIN STATION :

Manifesting : - Laserscanner
                - Manual

VIA HUB /
GEISCO

DESTINATION STATION :

Demanifesting : - Manual

Delivery Details : - Laserscanner
                    - Manual

———▶ Manifesting Details from ORIGIN to DESTINATION
- - -▶ Delivery Details from DESTINATION to ORIGIN
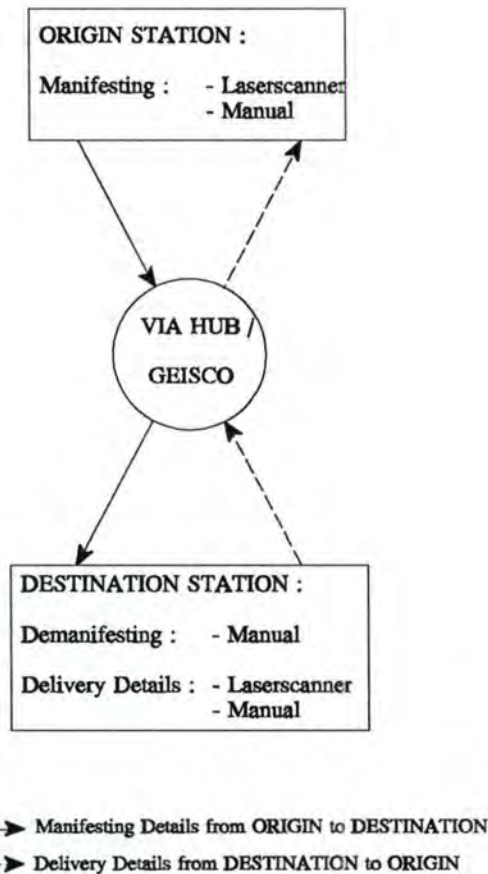
Information Flow about Sendings

4.4. Impact of EDI on the Information Flow

The figure "Shipment Movement and Customer Billing Business Processes" printed next page gives a more precise view of the cycle of a shipment.

This is the environment in which internal DHL messages are moving according to the information flow related to a shipment.

Basically, EDI will intervene only where information needs to be communicated to or from someone external to the DHL network. That does not mean it will not have any impact on the internal information flow.

In many cases, the way to process information will change, eliminating or adding steps in the information flow.

For instance, the electronic transmission of airway bill information will eliminate the need to key-in this information. But, the electronic transmission of an invoice from the customer to DHL, will add a new step : send a acknowledgement of receipt and of contents.

DHL's internal messages are described in part III - Roadmap aswell as the entry points for EDIFACT messages in DHL's environment.

The direct implications on the organization will be explained in part IV - Case Studies, on base of more practical examples.
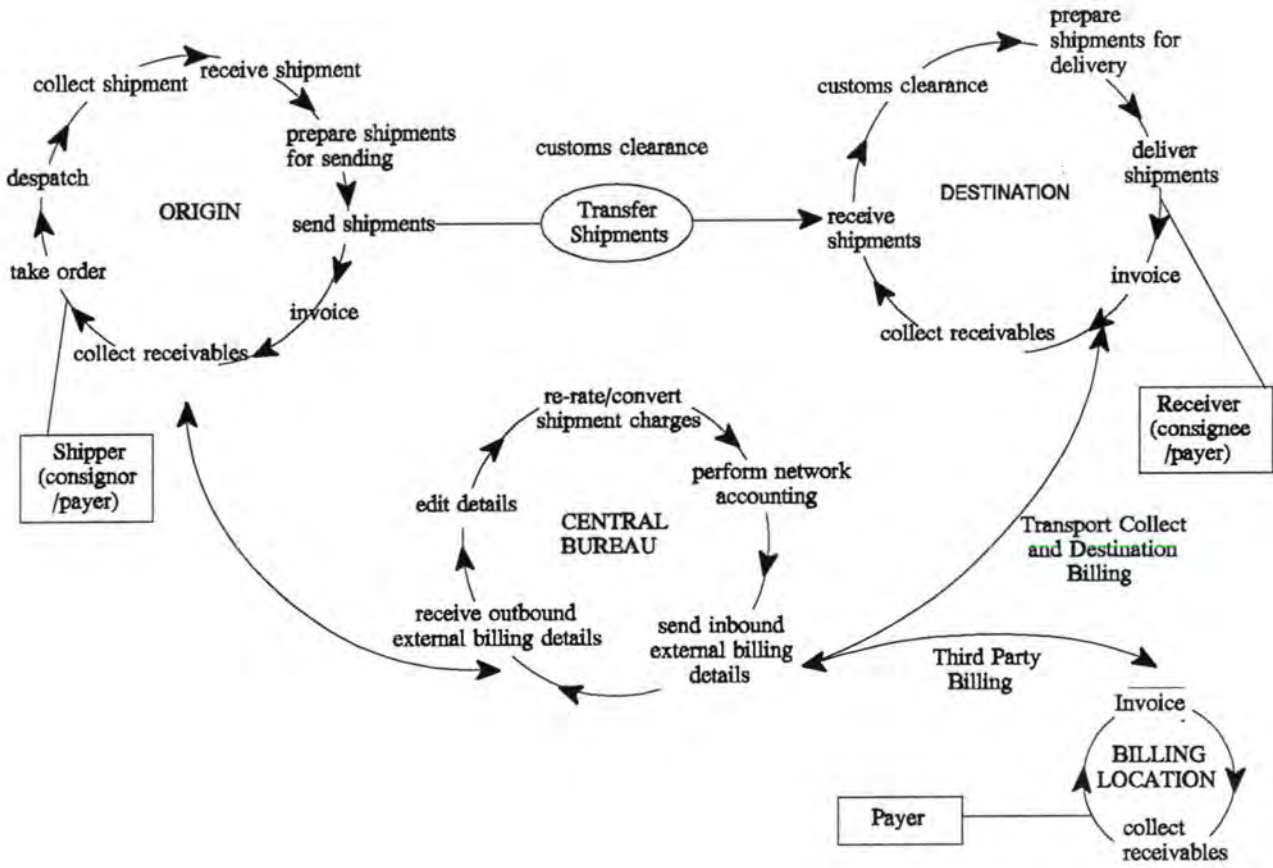
The figure "Entry Points for EDI" shows six possible entry points for EDI in this environment.

EDI_1 From Expeditor to Origin

      Booking a shipment (transmit Airway Bill information)

EDI_2 From Origin to Expeditor

      - Acknowledgement of booking
      - Delivery Details

EDI_3 From Origin to Customs Authorities

      Declaration of Goods

EDI_4 From Customs Authorities to Destination

      Clearance of Goods

EDI_5 From Destination to Consignee

      Arrival Notice

EDI_6 From Origin/Central Bureau/Destination to Payer

      Invoice

N.B.:   Instead of payer we could have written Expeditor or Consignee, the reason we choose a more generic term is that according to the External Billing Principles someone different from shipper or consignee can be charged for the shipment
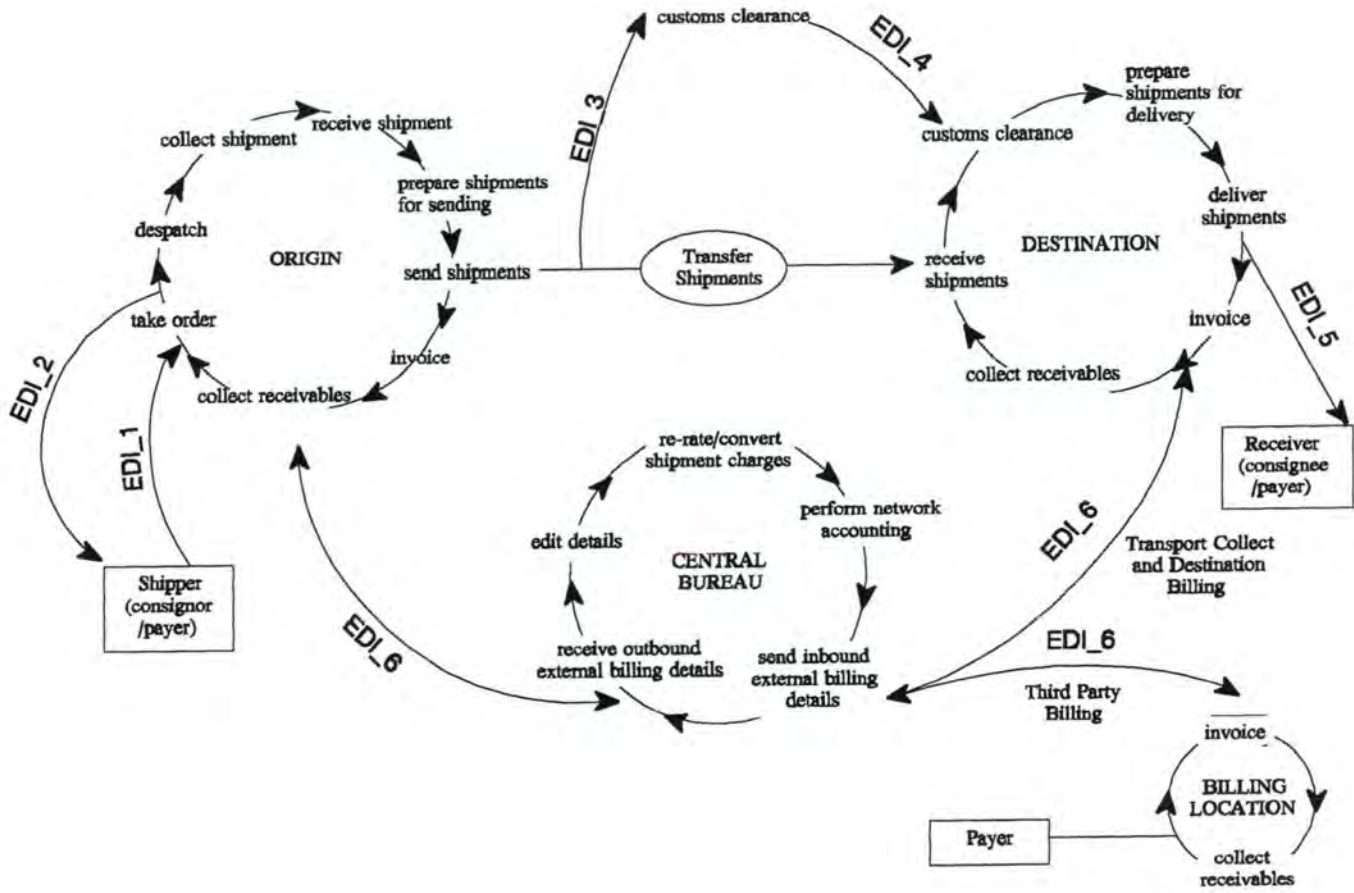
- III -

EDI ROADMAP

1. Why an EDI roadmap ?

1.1. Introduction

The development of EDI requires a lot of technical and political choices.

The aim of the EDI Roadmap is to present these choices in order to provide a company willing to develop EDI with the information necessary to define a coherent EDI policy.

The first step will be to define a General EDI Policy.
We will achieve this by answering the following question :

What does a company need to know <u>before starting</u> electronic trading ?

Then, we will define a framework for a project development, answering the question :

What are the questions to ask when considering a new EDI relationship ?

Doing this, we will have a look at a particular project : the pilot project.

1.2. General EDI Policy

What does a company need to know before starting electronic trading ?

- What are the potential benefits of EDI ?
  What can be gained from less paper processing, less human intervention, standardization... in terms of savings, improving productivity, trading relationships...?

- What are the investments to make and what are the expected costs of EDI ?
- What are the EDI standards options ?
- Which documents will be supported by EDI messages ?
- What are the translation softwares options ?
- What are the possible hardware configurations ?
- What are the telecommunications options ?
- Who will be the electronic trading partners ?
> Which actual partners are potential EDI partners ?
> How to approach these partners ?
> What is the policy in terms of standards and telecommunications against these partners ?
- What are the global security requirements ?
> What are the legal issues ?
> What are the basics of an interchange agreement ? Define a framework of an EDI agreement.
> What are the technical answers to the security requirements?

1.3. Pilot Project

The usual practice is to choose an "ideal" partner - strong business relationship, good structure, experienced in EDI - to increase the chances to success.

Nevertheless, other potential EDI partners are rarely "ideal", and the company could miss important experience by choosing a "too easy" pilot partner.

Therefore, criteria must be defined to select the "most interesting" partner according to the company's overall EDI policy.

1.4. Project Development

What are the questions to ask when considering a new EDI relationship ?

- Does the potential partner fit the criteria defined in the overall strategy ?
- Estimate the benefits
  Gain in time, staff, transaction cost, ...
- Estimate the costs
  Hardware, software, telecommunications, third party services.
  New staff and/or training of staff.
- Choice of a standard :
  Negotiation with the partner to determine the standard to use
- Choosing the messages :
  Which documents will be transmitted electronically ?
  What information is needed for these documents including the information made available by EDI ?
- Translation software :
  Is the software in use in the company suitable for the requirements of this new relationship ?
- Hardware configuration :
  Is the actual hardware configuration suitable for the requirements of the new relationship ?
- Telecommunications :
  Determine the communication means to be used.
- Security requirements of the project :
  Legal issues :
    Set up an interchange agreement.
    Take care of security and responsibility issues.
  Technical issues :
    What technical security procedures are required for the project ?

2. General EDI Policy

2.1. What can be gained from EDI ?

2.1.1. Introduction

Basically, EDI is nothing more than a fast way to exchange information.

Rather than to talk about benefits we should talk about objectives that can turn into benefits. This depends on the capacity to integrate the EDI system to the internal systems.

To achieve its full potential, EDI must be considered as a necessary way of doing business, a tool integrated in the company's overall business strategy.

The expected benefits of EDI are divided into two categories :
- tangible benefits
- intangible benefits

2.1.2. Tangible Benefits

a. Paperless

EDI is faster and reliable than traditonal paper-based methods.

The electronic transmission of data eliminates the need to re-key information from paper reports. This has four major advantages:

- data input functions are reduced
- the risk of errors due to multiple encoding disappears

- the need to reproduce similar data several times,
  according to the needs of the departments, disappears
- data is available sooner

This last advantage improves the control on the business cycle and leaves more time for planning and prevention which results in a better use of the company's equipment and capacity.

b. No human intervention

EDI allows the elimination low value manual procedures such as data input, control and paper document manipulations. This way, staff can be redeployed to more valuable, productive work for the organization.
Nevertheless, according to a survey published in [PFEIFF], *"Almost 70 % of the respondents declared that EDI did not have and will not have any effect on clerical staffing levels. (...) The ability to displace staff seems to be directly proportionate to trading volume. (...) More than 2/3 of high-volume users claim to have saved at least one clerical position and 1/3 of those have been able to displace five or more."*

c. Financial Benefits

EDI reduces processing costs (cf. gain of time and staff) and the transmission cost with EDI is much lower than in a traditional paper-based procedure.

Using EDI allows a lower stock level (cfr. Just In Time production) which frees resources for other purposes.

According to the survey quoted above, the major financial return is the reduced transaction costs. But what is the cost of a transaction. In [GEVERS], it is defined as the costs related to the search for information in the context of relationships between buyer and seller or between partners.
Inventory savings score very low marks.
This is probably due to the fact that practices such as Just In Time production require an high degree of integration of the EDI system that most companies are not able to achieve when first starting EDI.

d. Customs

Declarations precede goods which are then processed more quickly. This reduces customs congestion as even with the shorter lead time obtained with EDI. This results in a greater volume of transactions.

e. Standardization

The use of an international standard eliminates language barriers and facilitates international trading.
Adopting a standard such as EDI requires normalisation of the actual business practices.

2.1.3. Intangible Benefits

EDI establishes closer links with the suppliers/customers
through :

- improved customer service such as an electronic marketing facility allowing the answering of customer questions more rapidly and efficiently
- improved responsiveness
- privileges accorded to electronic trading partners
- the common investments
- the image of the company, up to date in IT matters and able of moving on to other areas
- user agreements determining the basis of the electronic trading
- having more competitive information about trading partners
- increased flexibility

The results of the survey quoted above show that for experienced EDI-users, improved customer service is the most palatable advantage. For more recent users, the responsiveness-effects of EDI seem to be more significant.

2.2. What are the investments needed for EDI ?

2.2.1. Introduction

After having pointed out the more realistic benefits to expect from EDI, it is now time to have a look at the investments needed for EDI implementation and at the expected costs. As for the benefits, we will enhance our findings with real data from the survey published in [PFEIFF].

2.2.2. Tangible Costs

What would be the investments if the EDI system was to be installed from nothing ?

a. Dedicated Hardware

This cost is easy to quantify and comparative analysis can be performed to evaluate different opportunities. This is not a mandatory investment since existing hardware can be deployed with the EDI system.
Nevertheless, one must consider the fact that the system can and most probably will grow in time so that an hardware investment would only be postponed.

b. EDI Software

EDI software must be created or purchased. Again, and as explained in section 6., a large range of off-the-shelve packages are available on the market and cost/quality analysis can be performed.

c. Communication Links

The next investment needed is the establishment of communication links. These costs will depend strongly on whether the company has existing communication links that can be used for EDI (with eventual modifications to be estimated), or whether all the links have to be established from scratch.

d. Staff Investments

Implementing EDI requires new skills, so qualified staff will have to be hired and/or actual staff will have to be trained.

Surprisingly, 90 % of the organizations interrogated for the survey quoted in [PFEIFF] said they did not hire any person with particular responsibility for EDI and 50 % of them claim to have no full time EDI position at all.

2.2.3. Intangible Costs

Besides these more tangible costs/investments, remains a series of less quantifiable costs that can lead to very important investments and thus can not be ignored.

a. System Development/Modification

The introduction of EDI requires systems development or modifications starting with the adaptation of the existing information system.

b. Organizational Changes

EDI will result in some organizational modifications.

These modifications can affect the structure of the organization, the administration and the business practices. But, if these modifications involve costs, it is not easy to quantify them.

The majority of the respondents in the survey quoted above are critical of this statement, and claim they have not and will not have organizational changes.

c. Negotiation

Implementing EDI with trading partners will lead to negotiations that can represent an important investment of time. Again, this investment will depend from one trading partner to another and is difficult to estimate initially.

d. Assistance to Partners

Assistance to partners can also become an important source of costs due to training assistance, education or providing software and/or hardware.

e. <u>System Maintenance</u>

As for any system, the EDI system will need to be updated, supported and will have downtime.
This is an unpredictable item and has unpredictable consequences, therefore this is an important and variable source of costs.

2.3. What are the main choices in terms of EDI standards ?

2.3.1. Introduction
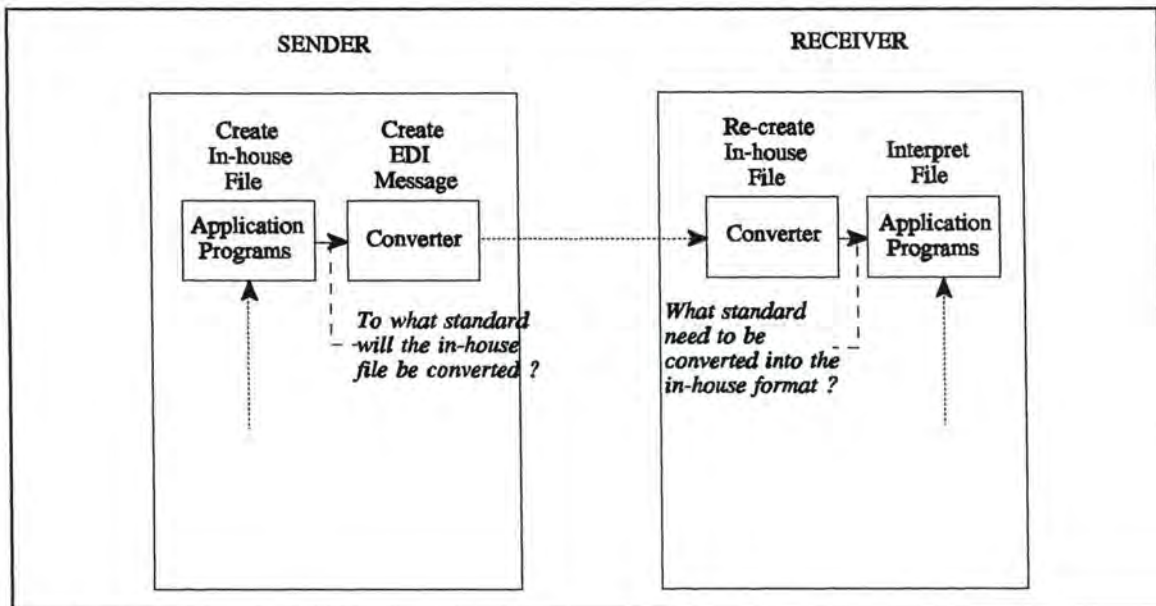
Standards

The objective of EDI is the interchange of processable information between independent computer systems.

That means the strings of alphanumeric characters transmitted must be structured in a way the computer systems can translate them into usable information at the point of receipt.

A message standard defines the semantics and the syntax of the data to be interchanged.

2.3.2. Types of Standards

Hagen K. C. Pfeiffer ([PFEIFF]) differentiates four categories of standards *"depending on whether they were designed for domestic or international use and whether they specifically apply to certain industries only."*

	National	International
Industry-Specific	**VDA**	**SWIFT ODETTE** (EDIFACT-Subsets)
Non-Industry-Specific	**TRADACOMS** (EDIFACT-Subsets ?) **ANSI X 12**	↑ ← **EDIFACT**
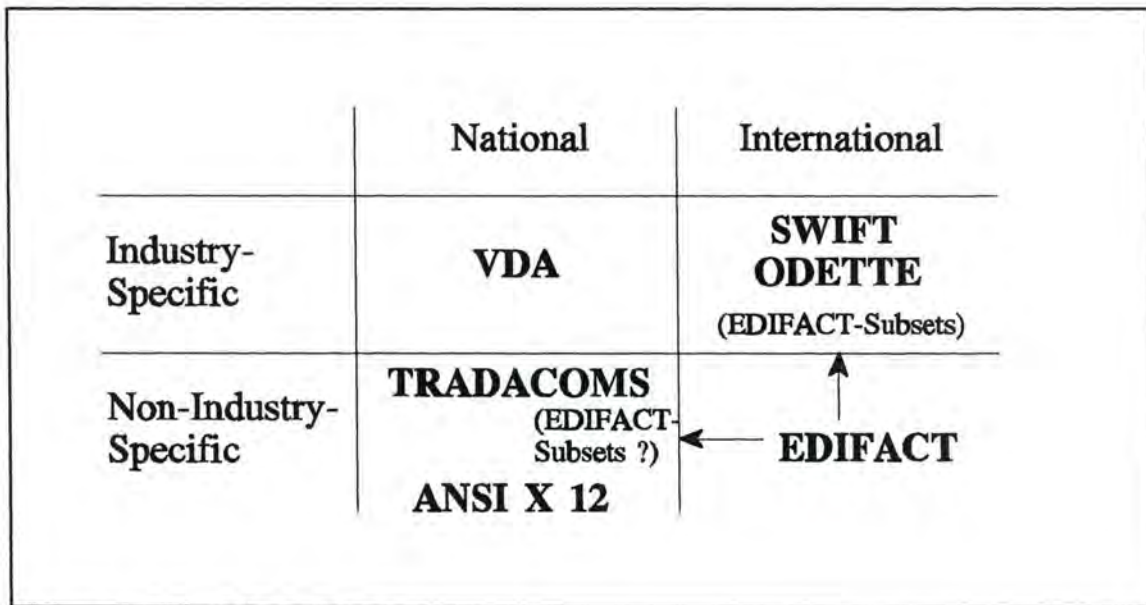
Categories of EDI Standards

([PFEIFF] - p. 47)

In terms of openness, the major characteristic of a standard is its specificity to an industry, or not.

A. Industry Specific

Another distinction can be made about industry specific standards (national and international)

- Proprietary

"These are defined by a single manufacturer for use on that manufacturer's kit; they have the advantage of being available early; usually of being very efficient; and of getting better support from the supplier. The disadvantages include being locked into

one supplier's equipment; being limited in interworking with organizations also using that supplier's equipment; and of being restricted to that supplier's view of the field being covered, which might cause compromises in the running of the user's business."
([OSITOP])

- De Facto

"These arise from either a manufacturer making available its own specifications to others, in the hope of widening the market or its own benefit; or from a grouping of users, who identify a common need, and co-operatively produce a standard to meet this.
De facto standards do not lock users into one supplier, but take longer to develop and implement, especially in competition to proprietary standards. They are more comprehensive than proprietary standards; however the "change control" remains vested in the originator and there may be some reluctance to change to meet new needs, there is also the risk of arbitrary change without consultation with the users."
([OSITOP])

B. Non-Industry Specific

"These are characterised by being developed by a recognized standards development body such as ISO or the various National standards bodies (BSI, AFNOR, DIN, ANSI...). The change control is vested in these bodies and standards cannot be changed without wide consultation through formally defined procedures indeed, the development and refinement of the standards themselves is done only by means of widespread discussions, compromises and agreement. They have the disadvantage of being slow to be defined and slow to be implemented; but they do not tie the user to particular suppliers and give stability in time."
([OSITOP])

The UN/EDIFACT (Electronic Data Interchange for Administration, Commerce & Transport) standard has a particular status.
It is the most open standard (international and non-industry specific) and the more flexible standard.

- Open Standard

EDIFACT was the result of the work done by UN/ECE, analysing the European non-industry specific standard - UN/ECE GTDI - and the American non-industry specific standard - ANSI ASC X.12 - to find out if they could be joined.

In 1986, the acronym was adopted by the United Nations and the syntax by the International Organization for Standardization (ISO) : the first international non-industry specific standard was born.

- Flexible Standard

The key element of the EDIFACT syntax is the message.
Each message can be associated to a traditional paper document and is made of segments, representing the lines or sections of the traditional paper document.
The segments are organised in a tree structure and have two associated attributes :
- mandatory or conditional
- number of repetitions allowed
Flexibility is provided by the fact that subsets can be created from the general structure (by repeating - according to the number of repetitions allowed - or removing conditional segments) to create more user specific standard messages.

Since UN/EDIFACT is the recognized international standard, pressure is increasing on users of the industry specific standards to migrate to it.
The major argument for this is that costs in establishing EDI partnerships increase where the standard used becomes more specific.

2.3.3. DHL's Strategy about Standards

Since DHL is an international company dealing with multi-sectorial customers, EDIFACT represent the best business solution.
However, since, EDI is generally undertaken with larger customers, DHL will have to support any standard used by these customers.

2.4. What documents will be supported by EDI ?

2.4.1. Introduction
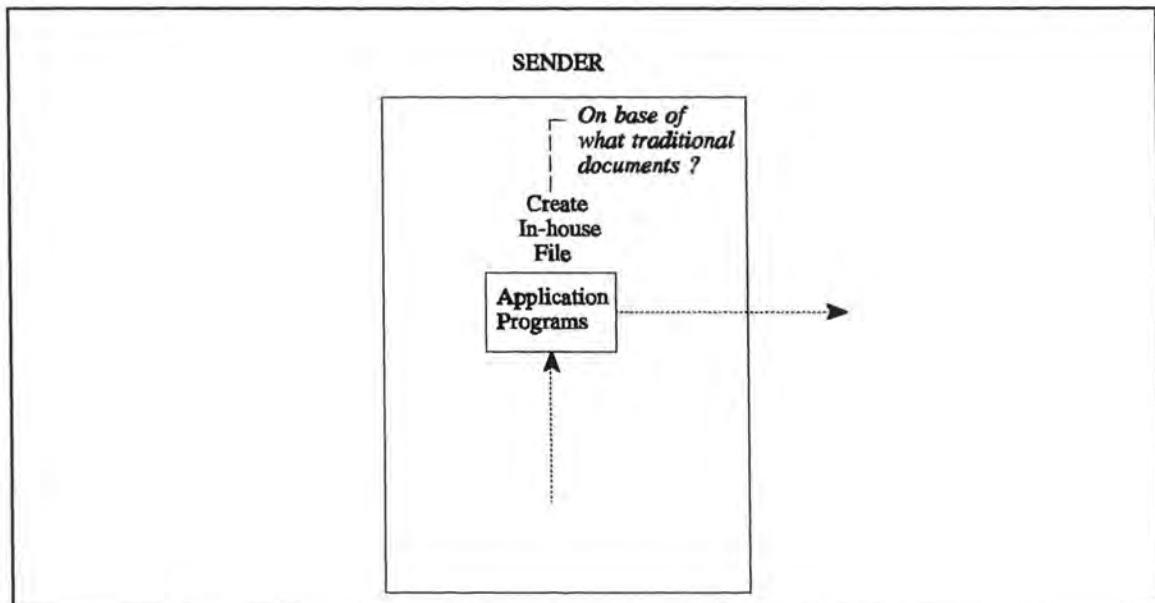
Supported Documents

EDI messages are most of the time based on traditional paper documents.

The traditional paper documents needed to complete a transaction are the first factor in conceiving EDI messages.

Another important factor is the existence of internal messages: they have the same purpose as external EDI messages (transmit information electronically in order to achieve a business transaction), only they move in a different environment that is not subject to control by standardization organizations.

There has to be a logical link between the contents of internal and external messages, since they will provide each other with information - from or to be transmitted outside the system.

The more formal the implementation of internal messages, the easier the translation process to external messages.

Before examining the EDIFACT messages suitable for DHL's business' needs, it is necessary to define and locate the internal messages.

The first chart is extracted from [EURICA] and shows the shipment movement and customer billing business processes : the environment in which messages are moving.

Shipment Movement and Customer Billing Business Processes

2.4.2. Internal Messages

The internal messages can be split in two categories :

- the "standard messages"
- the messages related to external billing

Several versions of the standard messages are in use in DHL. The only ones to be considered are those given as "the" standards in [DHLSTD]

Standard Messages

SD / House Airway Bill Details

> To transmit shipment data between DHL Origin and Destination to advise the Destination of the impending arrival of a physical shipment.
> NOT a record of physical shipment movement.
> (Information from Airway Bill, system and data entry)
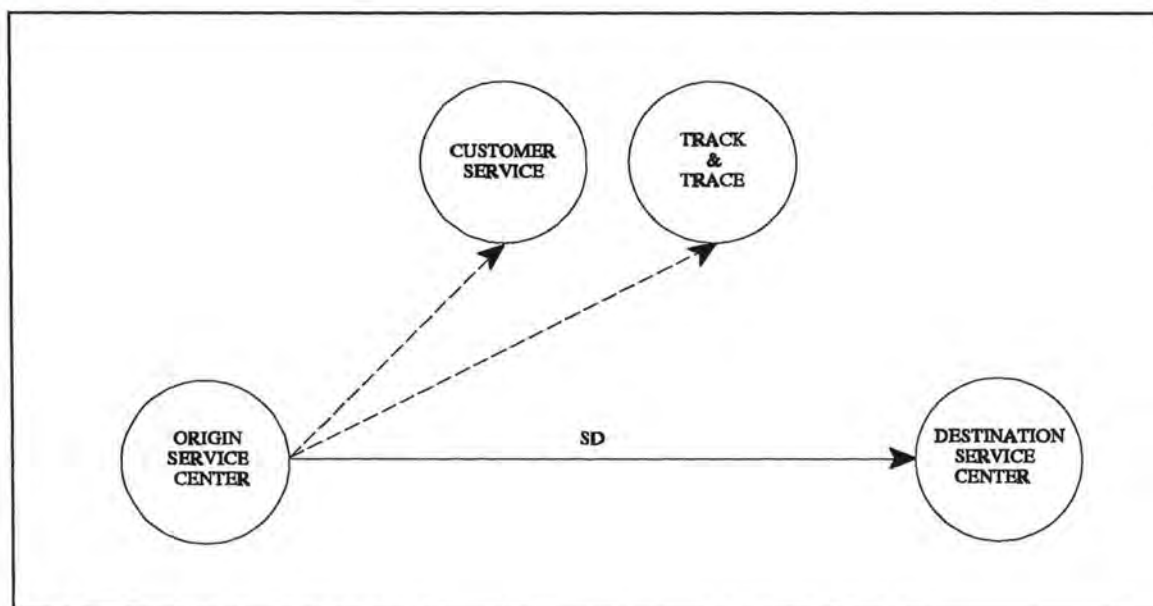
SD / House Airway Bill Details

POD / Proof of Delivery

Message sent to the shipment origin country after shipment delivery, which is used to identify receiving party and date and time of shipment delivery.
(Information from Delivery Sheet and system)
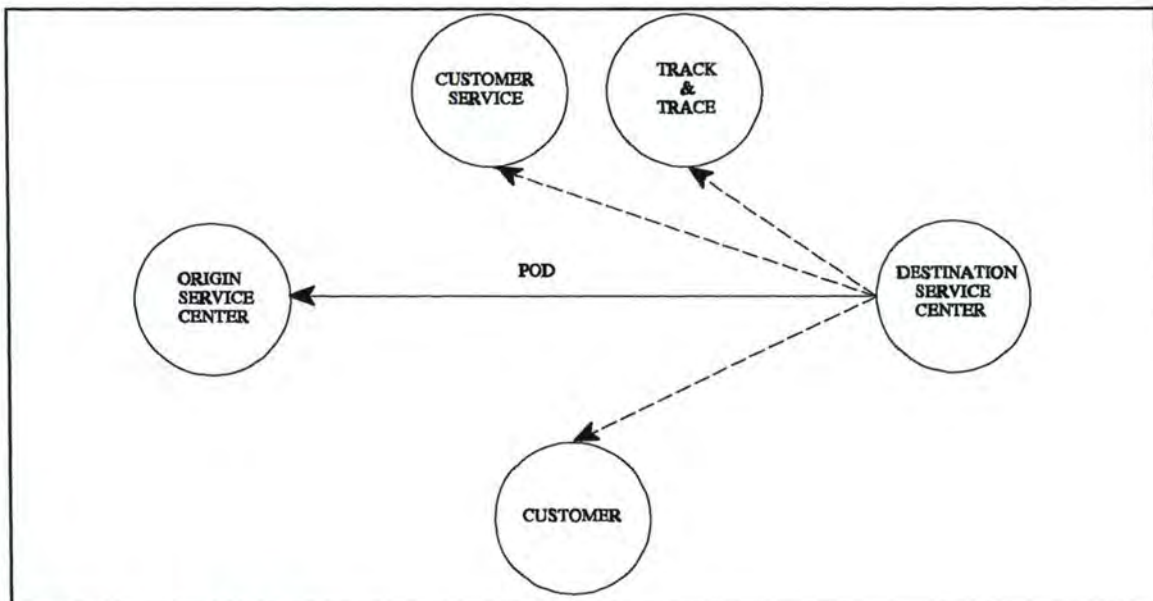
POD / Proof of Delivery

EX / Exception Checkpoint

Electronic message sent to the shipment origin (and optionally destination) country when an exception occurs, which is used to notify sending (and optionally receiving) party of a service exception anywhere in the shipment cycle.

This message is used to identify incidents or exceptions that may occur to a shipment at any point in the shipment cycle, and should be regarded as an "alert" of possible service failure. It is also used locally to identify shipment progress or other shipment events.

(Information from Delivery Sheet and system)
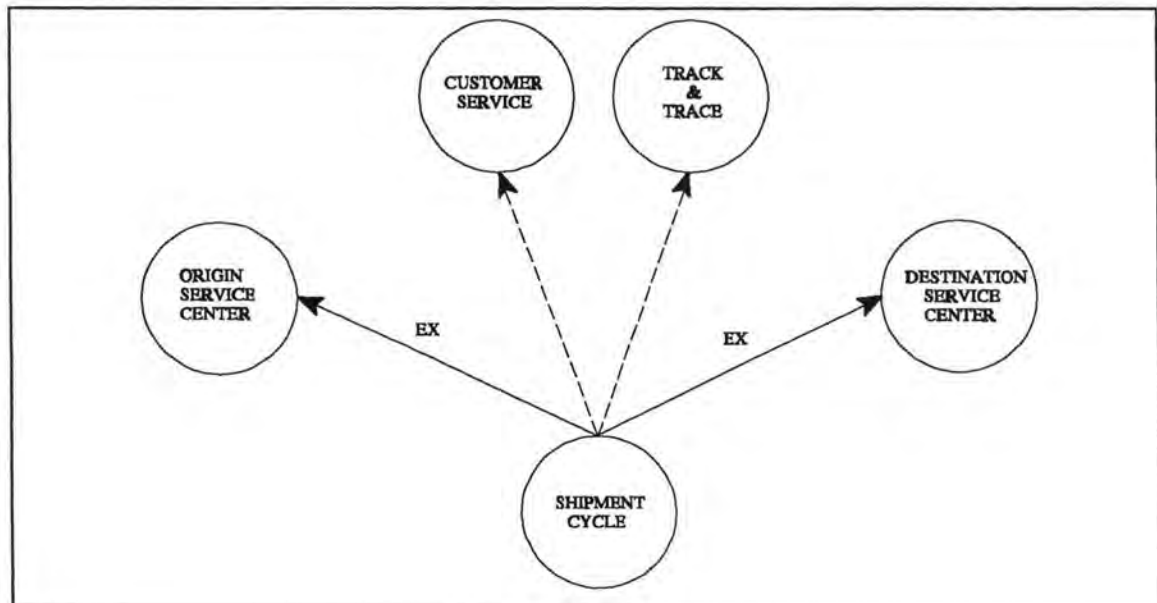
EX / Exception Checkpoint

WC / With Courier Checkpoint

Electronic message for local use when shipments at their destination are assigned to a courier (or truck) for delivery.
This information includes date and time of shipment loading and can be used for local Track and Trace and for transit time analysis.
(Information from Delivery Sheet, system and Airway Bill)
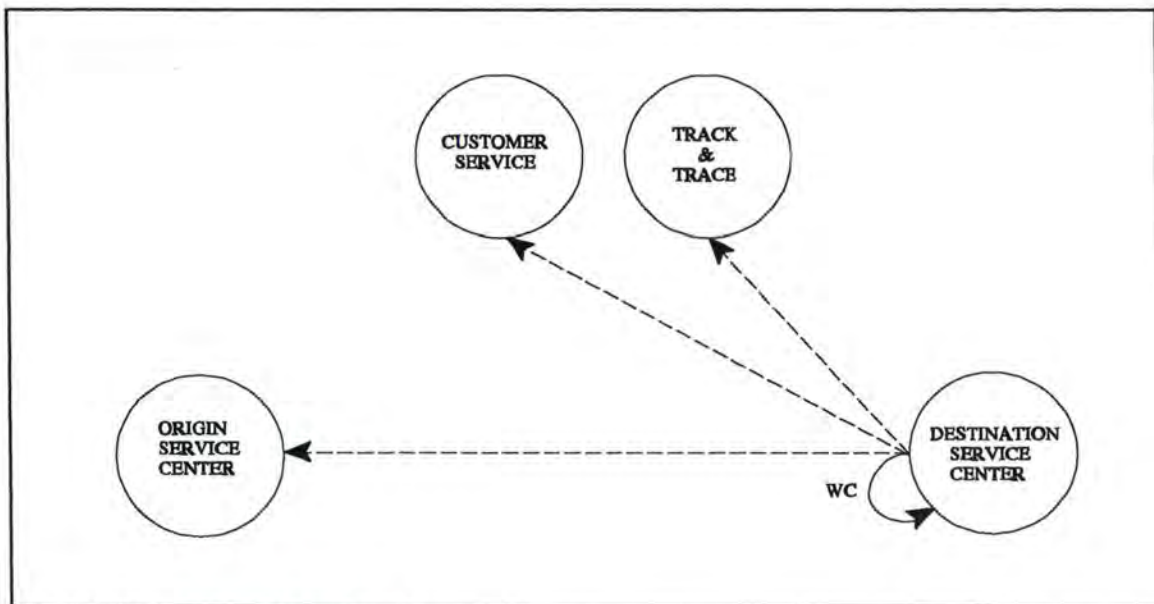
WC / With Courier Checkpoint

WPX / WPX Pre-Alert (manifesting)

This message is used to provide the shipment and commercial invoice information to the destination gateway prior to the arrival of the flight.
It provides an electronic representation of the airbill and corresponding commercial invoice data for each of the physical shipments on the flight.
The message is then used for customs clearance and inventory control.
This message is used by the import gateway for customs clearance, inventory control and pre-planning activities.
NOT a record of physical shipment movement.
(Information from AWB, Data Entry and system)
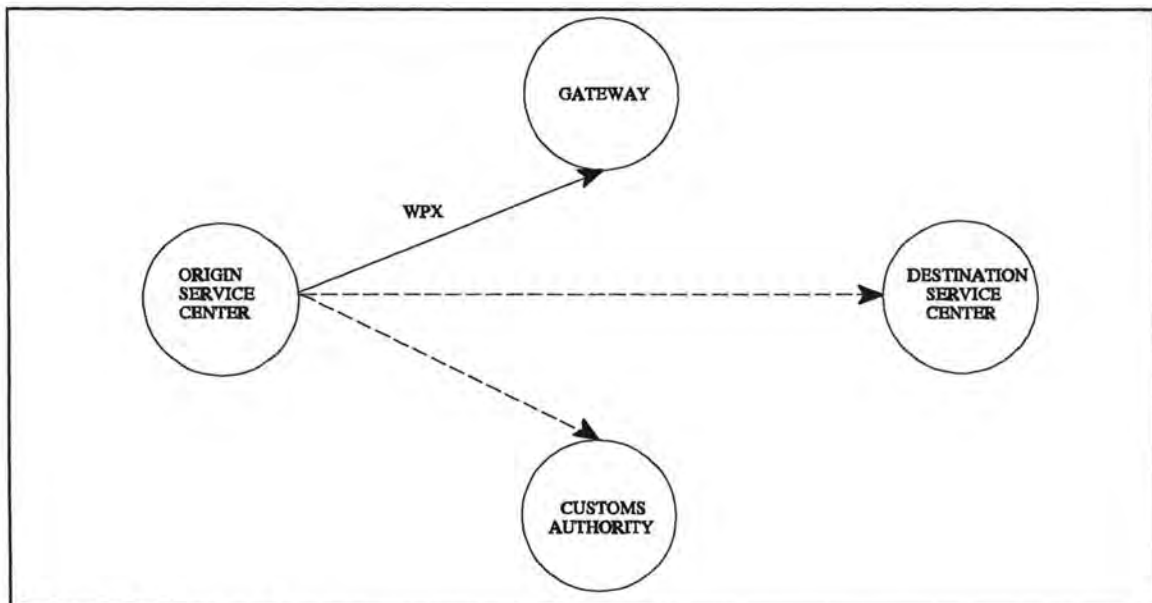
WPX / WPX Pre-Alert

TRQ / Trace Request

Trace Requests are requests for the delivery status of a specific shipment.
Trace Requests are NOT tracking services.
Trace Requests should not be issued unless a service failure occurs or there is a reasonable expectation that there may be a service failure.
Effective tracing is achieved when a customer is provided reliable, timely, and complete information concerning a shipment.
(Information from customer, data entry, system)
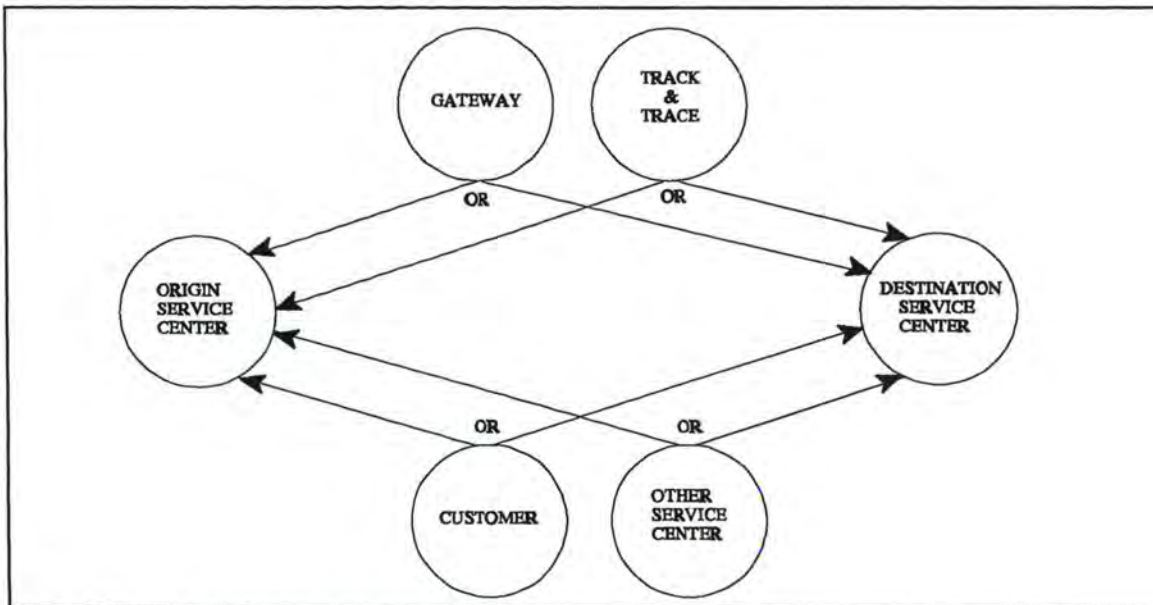
TRQ / Trace Request

TRP / Trace Reply

To respond to a Trace Request with the delivery status of a specific shipment.
Effective tracing is achieved when a customer is provided reliable, timely, and complete information concerning a shipment.
Trace services are NOT tracking services, however, Trace Reply messages will provide shipment tracking checkpoint data.
(Information from Delivery Sheet)
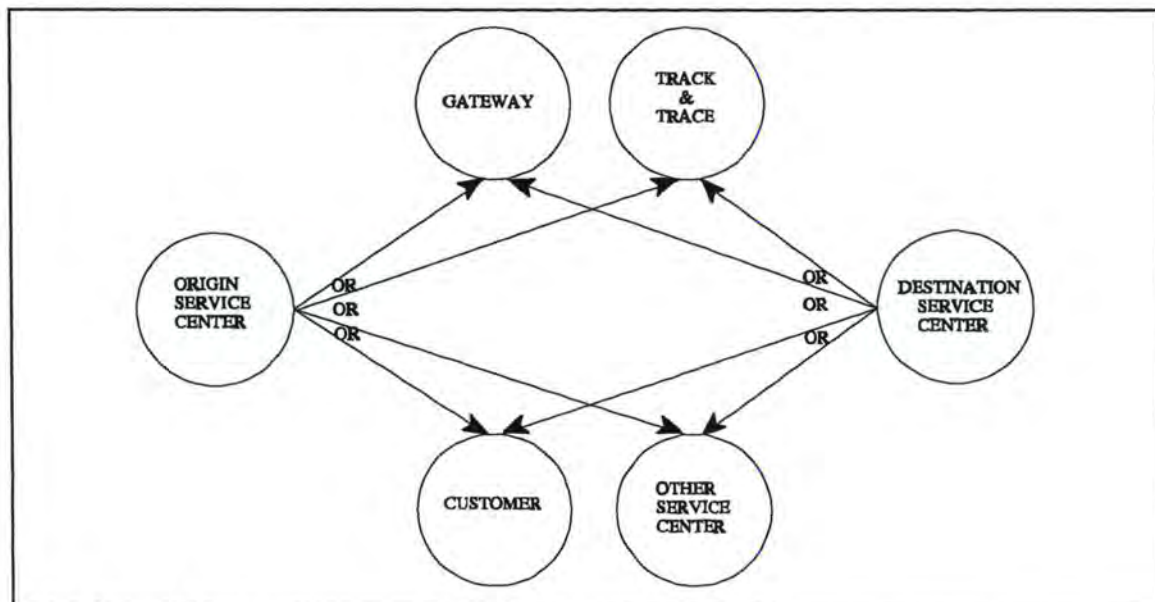
TRP / Trace Reply

FA / Flight Alert

> To record details relating to the Linehaul Mode and to advise the network coordination centers (Flight Ops, Network Control, etc.) of flights carrying DHL shipments that will be arriving in their jurisdiction.
> Used by ground and flight operations as a pre-alert to the flight destination.
> This message follows the flight path.
> This message includes load plan information and flight movement information and should be broken down into two standard messages.
> (Information from Flight Documents)
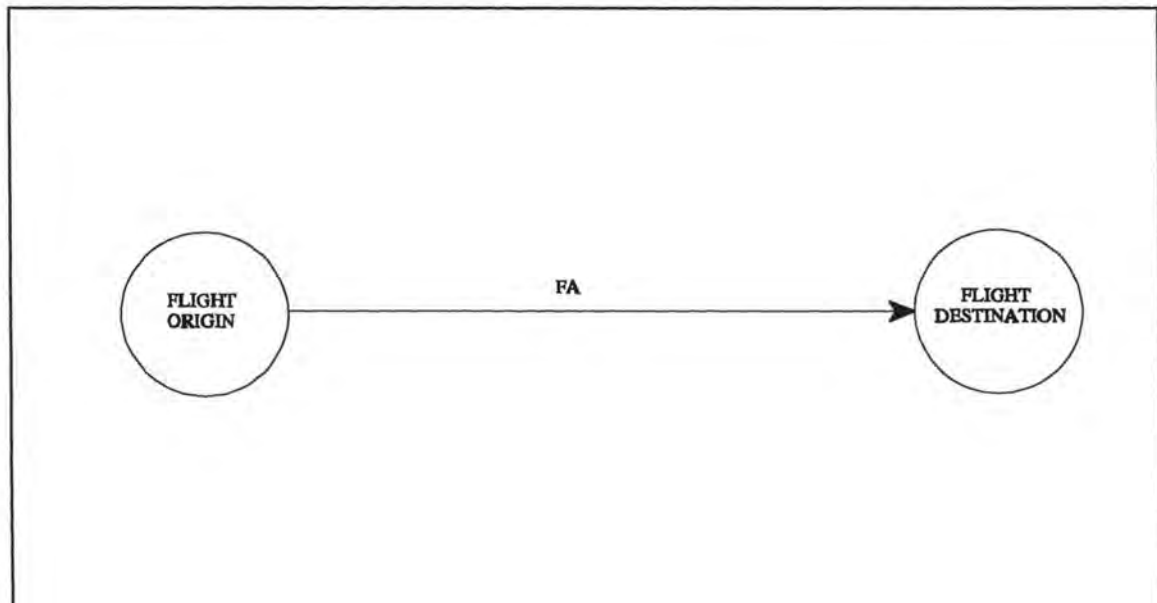
FLIGHT ORIGIN →FA→ FLIGHT DESTINATION

FA / Flight Alert

External Billing Messages

EBR / External Billing Request

This message is the first in a sequence of messages used to initiate the process of External Billing.

External Billing is a service which allows shipment and other related costs to be billed by DHL to a party located in a country other than the origin.

The External Billing Request is a draft of an External Billing Agreement (EBA) prepared by the EBR Contact in the requesting country.

Once it has been approved and a Central Account Number has been issued, it becomes an EBA.

(Information from system, sales documents)
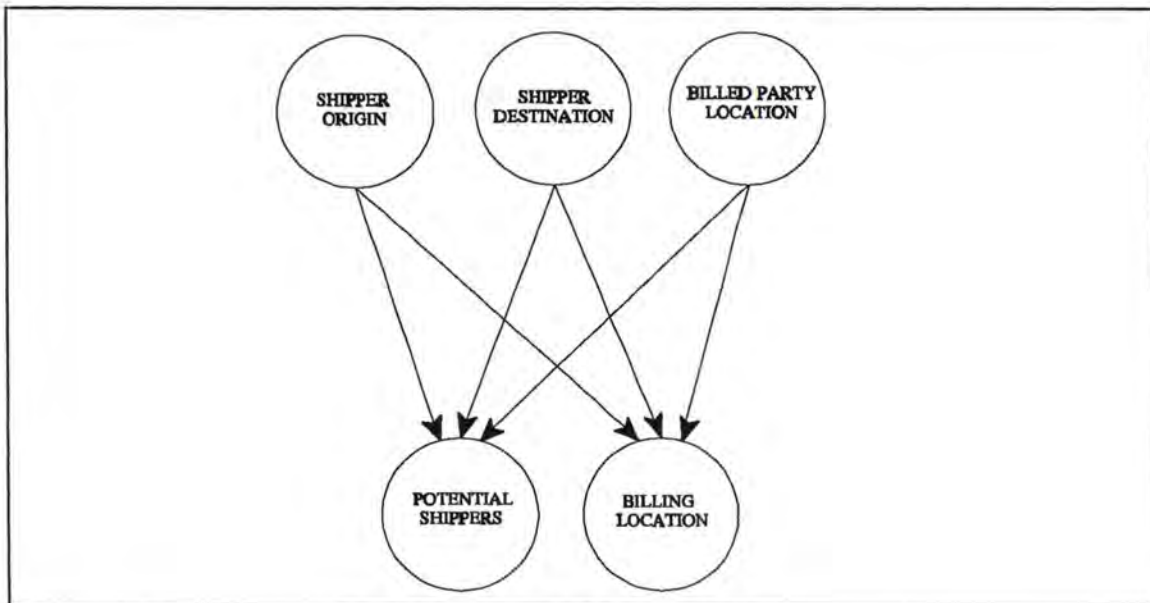
EBR / External Billing Request

EBA / External Billing Authorization

This message is sent in response to an External Billing Request(EBR) and approves the request to externally bill shipments according to the specific EBR.
The original EBR and the rate tables are included in the authorization.
A message must be sent within two working days of receipt of an EBR.
It may be an EBR approval, a rejection (with explanation), a status report, or suggested revisions.
(Information from Sales Documents and system)
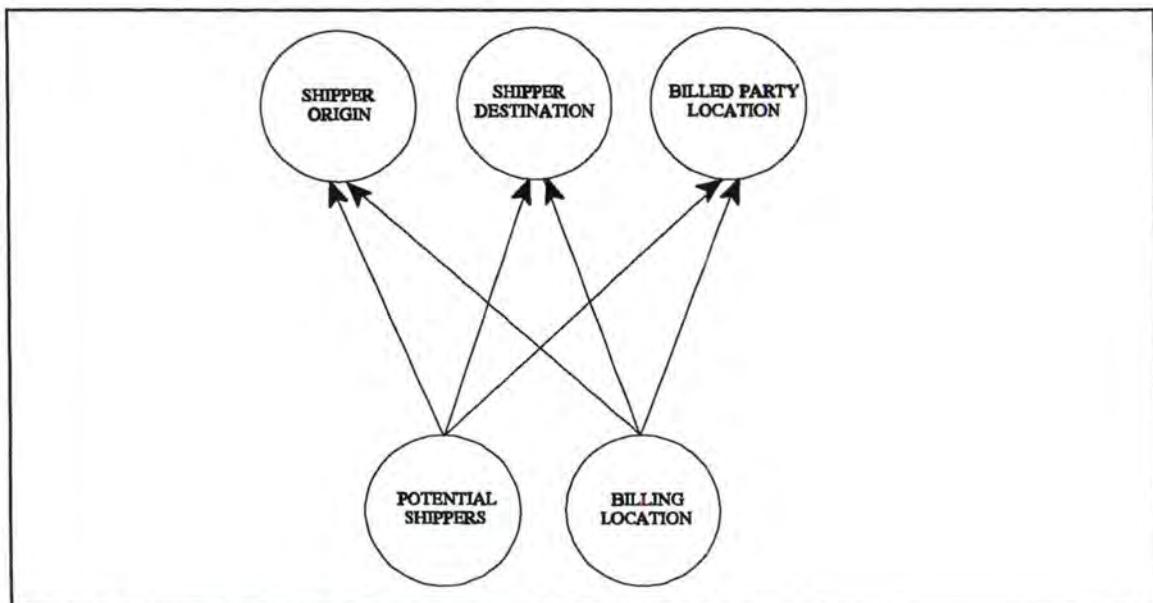
EBA / External Billing Authorization

EBN / External Billing Central Account Number Assignment

This message is sent in response to an External Billing Request approval and provides the central account number to be used when billing shipments between the shipper(s) and billing location identified by the External Billing Request (Agreement).
The new Central Account number can be entered by the billing departments at the origin and used to update the Customer Master File.
Once entered, shipments can be correctly allocated to this external billing account.
(Information from EBR and Central Bureau)
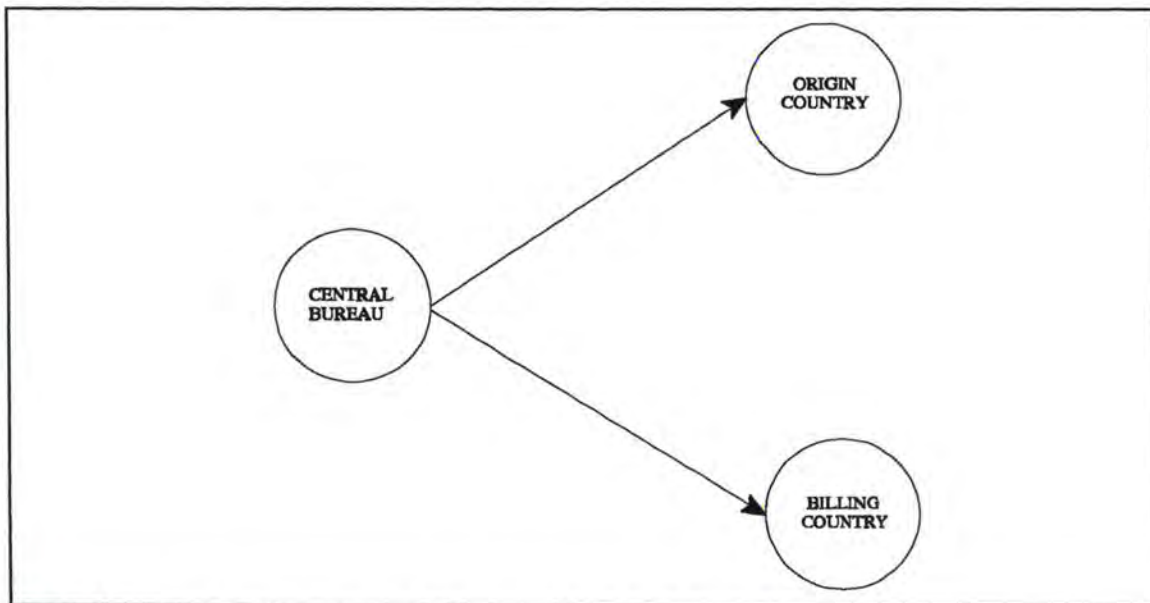
EBN / External Billing Central Account Number Assignment

EBRR / External Billing Account Review Request

Form used to document recurrent external billing problems and request that specific action be taken.
The Account Review Request (ARR) is used when recurrent external billing problems are being experienced with a specific customer.
The DHL location experiencing the problems uses the ARR to document the situation and request or recommend that specific action be taken.
If the problem involves an External Billing Agreement, it must be attached in full, including current rate tables.
(Information from ARR Form)
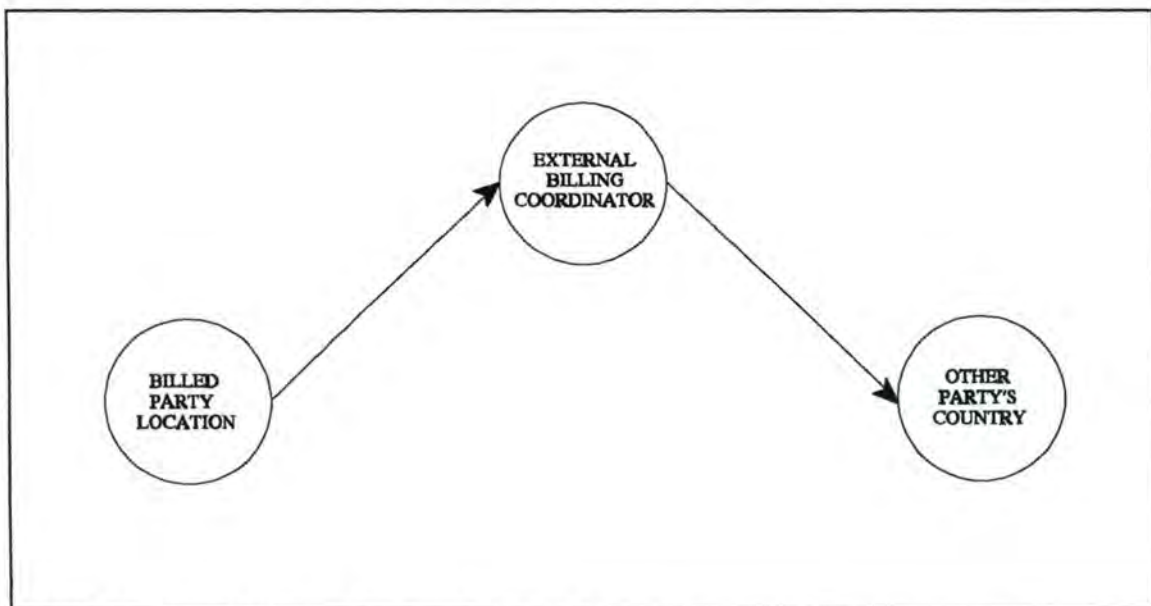
EBRR / External Billing Account Review Request

EBF / External Billing Account File

The EBF is distributed by Central Bureau twice a month through regional offices.
It contains details of all central accounts numbers.
The information in the message is used by the International Billing System in every
billing site to maintain a current list of central accounts for use in external billing.
The entire file is replaced twice a month.
(Information from system, computer supplied list, EBR)
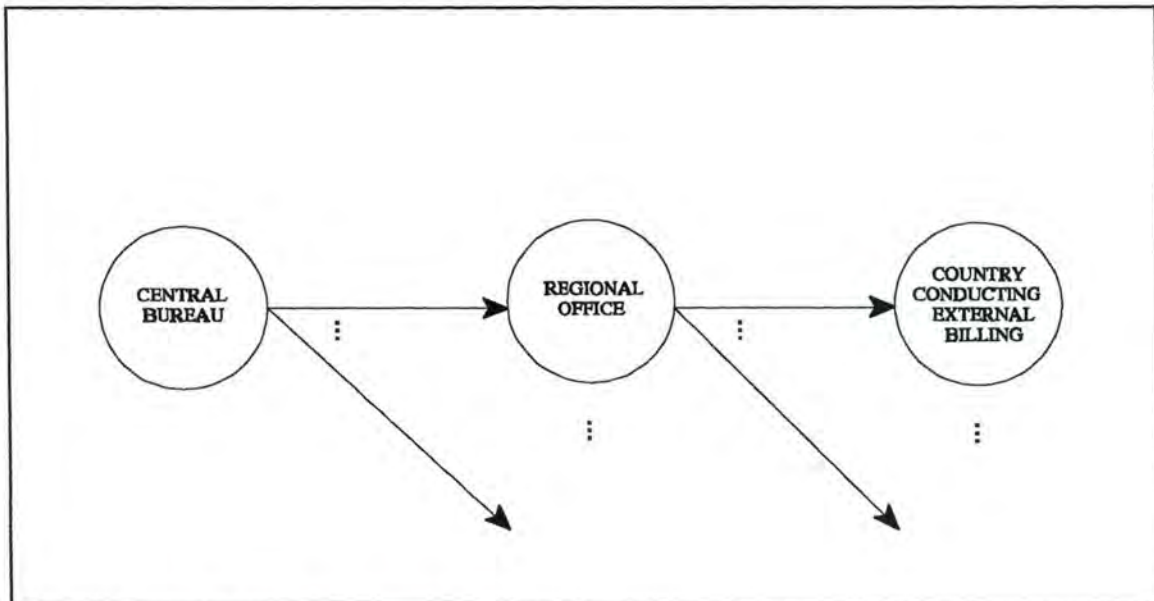
EBF / External Billing Account File

EBI / External Billing Inbound-Outbound Invoice Details

External Billing is a service which allows shipment and other related costs to be billed by DHL to a party located in a country other than the origin.
Outbound : a computer file sent to Central Bureau each month, containing details of all outbound transactions to be processed in another country.
Inbound : a computer file sent to each participating country each month, containing all the external billing charges to be posted by the receiving country.

EBRV / External Billing Reversal

Outbound : a reversal which relates to a charge for which the sending country was nominated the billing location, but which cannot be processed.
Inbound : a reversal sent by a billing location which has been issued against a charge previously sent by the receiving country.
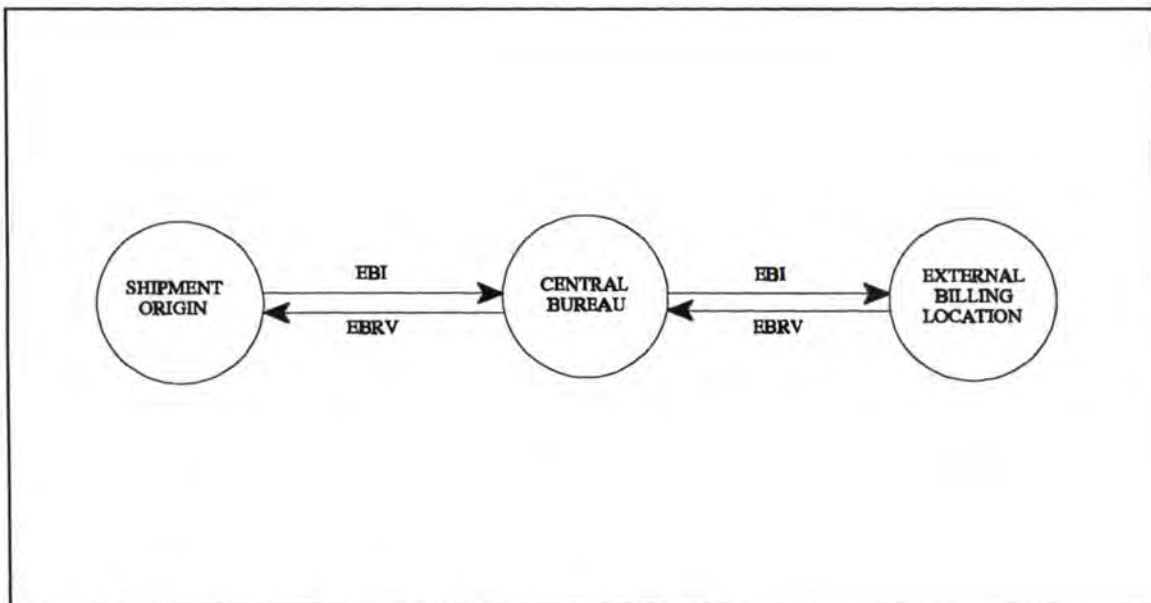
EBI / External Billing Inbound-Outbound Invoice Details
EBRV / External Billing Reversal

2.4.3. EDIFACT Messages

This section will look at the EDIFACT messages that could be used in DHL's business relationships.

Only status-2 messages, that already have been approved and registered as formal recommendations, will be reviewed.

- Customs messages (CUSxxx) are exchanged between the customs authorities and the company :

  CUSCAR - Customs Cargo Report Message
  CUSDEC - Customs Declaration Message
  CUSREP - Customs Report Message
  CUSRES - Customs Response Message

- Transport messages (IFTMxx) are exchanged between a customer and the company :

  IFTMFR - International Forwarding and Transport Message Framework
  IFTMBP - Provisional Booking Message
  IFTMBF - Firm Booking Message
  IFTMBC - Booking Confirmation Message
  IFTMIN - Instruction Message
  IFTMCS - Instruction Contract Status Message
  IFTMAN - Arrival Notice Message

- Invoice message (INVOIC) is sent by the company to a customer :

  INVOIC - Invoice Message

Only the functional definition, field of application and principles of the messages, have been given.
The segment table of each message can be found in the referenced annexes.

The following chart gives possible entry points for the EDIFACT messages in the "Shipment Cycle and External Billing Business Procedures"-chart.

Entry Points for EDIFACT Messages
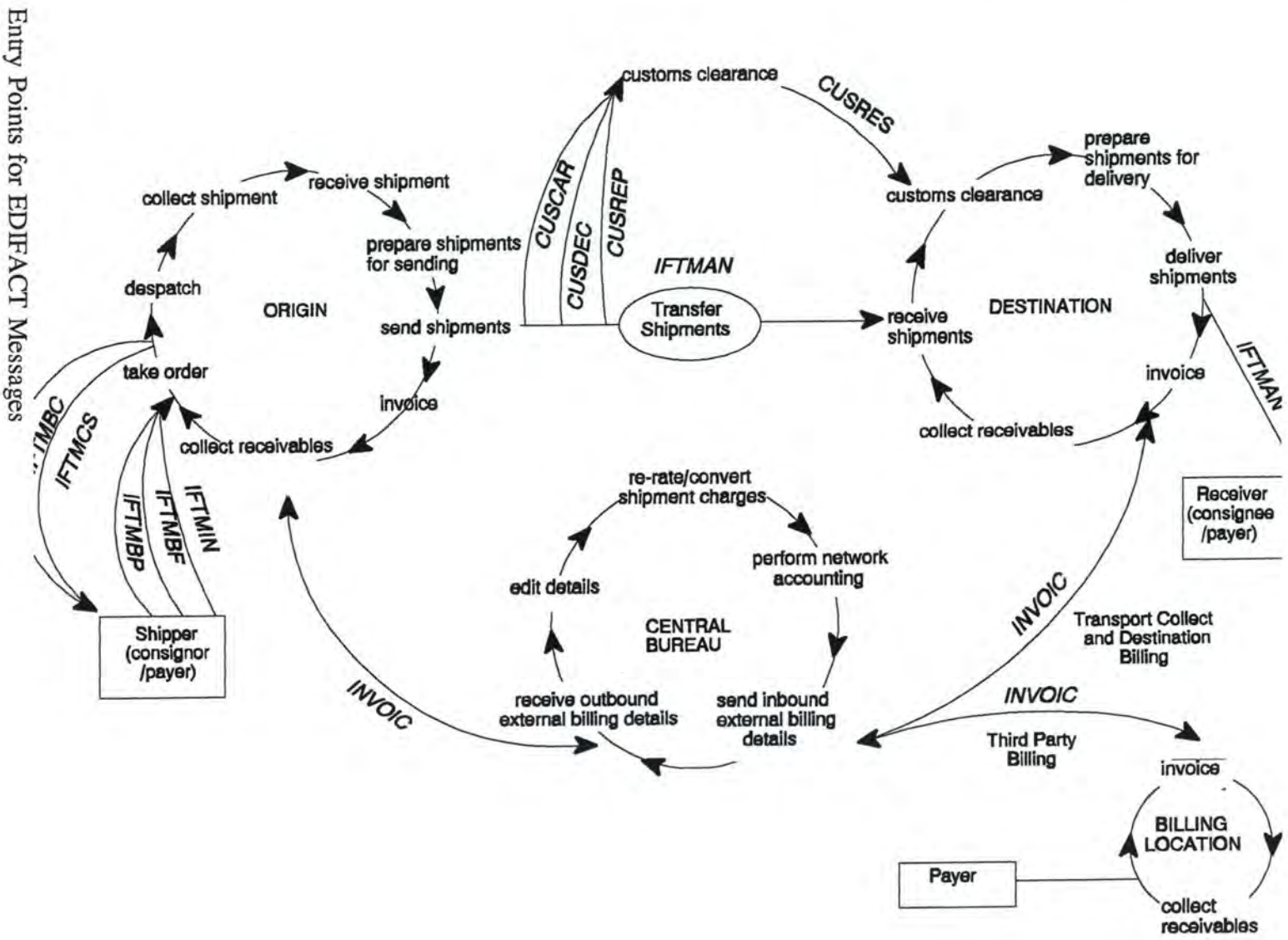
Customs Messages

CUSCAR / UNSM - Customs Cargo Report Message

Functional Definition

This message permits the transfer of data from a carrier to a customs administration for the purpose of meeting customs cargo reporting requirements.

Field of Application

This message may be applied for both national and international trade. It is based on universal practice and is not dependent on the type of business or industry.

Principles

It is envisaged that the Customs Cargo Inventory Report Message may be initiated by the carrier to report individual consignments to a customs administration. The message is transmitted upon arrival of the goods, or where national legislation permits, prior to arrival. The data provides customs with a means of "writing off" or acquitting the cargo report against goods declarations. It also allows customs to undertake selectivity processing in order to select high risk shipments requiring examination.
The message may be used for reporting :
- onward transit/transshipment
- short and part shipped goods
- empty containers
- import/export cargo
- house and masterbill relationships

See CUSCAR Segment Table, Annex p. 146

CUSDEC / UNSM - Customs Declaration Message

Functional Definition

This Customs Declaration Message (CUSDEC) permits the transfer of data from a declarant to a customs administration for the purpose of meeting legislative and/or operational requirements in respect of the declaration of goods for import, export or

transit. The message may also be used, for example :
- to transmit data from an exporter in one country to an importer in another country;
- to transmit consignment data from one customs administration to another;
- to transmit data from a customs authorithy to other government agencies and/or interested administrations.

Field of Application

This message may be applied for both national and international trade. It is based on universal practice and is not dependent on the type of business or industry.

Principles

This message incorporates the necessary transport, statistical and customs information. Provision has also been made for the inclusion of appropriate commercial information which may be accepted by customs in lieu of supporting documentation.
The design principles adopted allow for referencing one or more commercial documents pertaining to the same declaration and for the grouping of document lines into a single customs item. A customs item consists of the grouping of those document lines having the same customs characteristics (e.g. tariff number, declared use, etc). The message correspondingly permits the use of single or multi-packaging concepts and their identification to a customs item.

See CUSDEC Segment Table, Annex p. 149

CUSREP / UNSM - Customs Report Message

Functional Definition

This Customs Conveyance Report Message permits the transfer of data from a carrier to a customs administration for the purpose of meeting reporting requirements in respect of the means of transport on which cargo is carried.

Field of Application

This message may be applied for both national and international trade. It is based on universal practice and is not dependent on the type of business or industry.

Principles

It is envisaged that the Customs Conveyance Report Message may be initiated by the carrier to report details of the means of transport on which cargo is conveyed to a customs administration.

The message is transmitted upon arrival of the vessel, flight, etc., or where national legislation permits, prior to arrival. The data provides a means of establishing the basis of a cargo inventory report for the conveyance in question.

Details of individual consignments carried on the conveyance will be subsequently transmitted to customs using a CUSCAR message or a series of such messages.

It also allows customs to undertake selective processing in order to select high risk movements and shipments requiring
examination.

The message embodies reporting requirements of all modes of transport. Each message covers the data requirements for one movement. The message may be used for reporting empty containers as well as numbers of passengers and crew.

See CUSREP Segment Table, Annex p. 157

CUSRES / UNSM - Customs Response Message

Functional Definition

This Customs Response Message (CUSRES) permits the transfer of data from a customs administration to the sender of customs data. It may also be used by Customs to transmit electronic customs clearance of goods.

Field of Application

This message may be applied for both national and international trade. It is based on universal practice and is not dependent on the type of business or industry.

Principles

It is envisaged that this message will allow a customs administration to respond to single or batched customs messages or give information to approved part(y)s; for example, errors in data, release/clearance notifications, etc. It is recognized that this message may be used by other parties to respond to customs messages.

See CUSRES Segment Table, Annex p. 159

Transport Messages

IFTMFR / International Forwarding and Transport Message Framework

The IFTMFR framework is intended to be a hierarchical representation of all information needed to perform the forwarding and transport of goods from any origin to any destination regardless of route, modes of transport, or prevailing commercial practices. Functional messages derived from the IFTMFR framework are suitable for the arrangement of the transport of goods between all parties to the movement of the consignment (including the consignor, shipper and consignee as well as the forwarders, brokers and carriers involved) as well as providing the information necessary to perform that transport and delivery of the goods.

Functional Definition

IFTMFR as Booking, Provisional	(IFTMBP)
IFTMFR as Booking, Firm	(IFTMBF)
IFTMFR as Booking, Confirmation	(IFTMBC)
IFTMFR as Instruction	(IFTMIN)
IFTMFR as Instruction Contract Status	(IFTMCS)
IFTMFR as Arrival Notice	(IFTMAN)

Field of Application

The UN International Forwarding and Transport Message (IFTMFR) Framework may be applied for both national and international trade. It is based on universal commercial practice and is not dependent on the type of business or industry or mode of transport.

Messages in the framework and their relationship

The IFTMFR framework is designed to handle the total information necessary for the forwarding and transport of any consignment regardless of origin, destination, or mode of transport. Historically, this total activity has been handled with a number of paper documents each covering an individual activity along the route. These paper documents, however, contain much repetitive information. The theory behind the IFTMFR framework is to provide a single EDI data format that will include all of this information without redundancy.

Therefore while the IFTMFR framework is treated as as single EDI message it contains elements that will provide the information that has previously been handled with multiple paper documents.

The entire IFTMFR framework can be transmitted between all parties involved in the movement of the consignment along its route.

Derivations of the IFTMFR can be used to transmit information pertaining to specific functions which have been incorporated into the entire framework. Examples of these functional messages include, but are not limited to : provisional bookings, consignment status, responses, waybill data, changes to previously transmitted messages, etc.

Principles

- a consignment may contain several goods items
- goods items may or may not be containerized
- a goods item may be transported in one or more containers, and a single container may contain one or more goods items
- one goods item may be related to one or more customs tariff codes
- goods items related to one customs tariff code may be carried in one or more containers
- goods items may reflect either the contractual or operational description of the goods
- a party to the movement of the consignment may book or order transport for one or more goods items
- a party to the movement of the consignment may book or issue instructions of transport to be arranged for several goods items by means of one or several of the following messages : IFTMBP, IFTMBF, IFTMBC, IFTMIN, IFTMCS, IFTMAN.
- pre-carriage (advanced haulage) and/or on-carriage (destination haulage) of goods items or equipment within one booking or instruction may take place in different steps, each step specified with its own transport details group
- equipment may have other types of equipment attached to it, e.g. a temperature control unit attached to a container
- equipment and/or goods items may be attached to or transported on another load or transport device, which as such may be attached to or transported on yet another load or transport device, e.g. a container on a chassis on a railcar
- transport devices, which have the ability of powered movement on their own, are specified in the transport details group. Other load or transport devices are specified as equipment
- the expression of packaging for goods items can be expressed at up to three levels

A number of generic transport terms are used in this specification, to be described as :

* MODE OF TRANSPORT
the method of transport used for the conveyance of goods or
persons, e.g. by rail, by road, by sea.

* MEANS OF TRANSPORT
the vehicle used for the transport of goods or persons, e.g.
aircraft, truck, vessel

* TYPE OF MEANS OF TRANSPORT
the type of vehicle used in the transport process, e.g. wide
body, tank truck, passenger vessel

* EQUIPMENT
material resources necessary to facilitate the transport and
handling of cargo. Transport equipment does under the given
circumstances not have the ability to move by its own propulsion
(e.g. sea container, trailer, unit load device, pallet)

* TYPE OF EQUIPMENT
the type of material used, e.g. 40 feet container, four way
pallet, mafi trailer

See IFTMFR Segment Table, Annex p. 161

IFTMBP / UNSM - Provisional Booking Message

Functional Definition

A message from a party requesting space and/or giving brief details of a planned consignment for forwarding and/or transport services to the party providing those services. In this message, the conditions under which the planned transport should take place can be given.

Principles

Booking may be initiated by the use of the Provisional Booking Message. A Firm Booking Message should follow the provisional booking.

IFTMBF / UNSM - Firm Booking Message

Functional Definition

A message from a party definitely booking forwarding and/or transport services for a consignment to the party providing those services. The message will contain the conditions under which the sender of the messages requires the services to take place.

Principles

A Firm Booking Message will be sent, usually after an initial space booking has been made.
This means that a Firm Booking Message could be sent as the initial message.
The message must be seen as a commitment from the shipper to the carrier or forwarder to execute certain services and is used for operational purposes by the service provider.
A booking-firm can be answered by a confirmation in any form by the service provider but this is not obligatory.
A booking firm message can be updated/replaced by a new booking firm message. It contains all relevant data elements of a consignment for operational purposes and is followed by an Instruction to ascertain a contract.

IFTMBC / UNSM - Booking Confirmation Message

Functional Definition

A message from the party providing forwarding and/or transport services to the party booking those services giving the confirmation information to the booking of the consignment concerned. A confirmation might read that the booking of a consignment is accepted, pending, conditionally accepted or rejected. The conditions under which requested services take place may be given in this message.

Principles

The message can be used whenever a confirmation of the booking of a consignment is deemed necessary as an answer to a booking provisional or booking firm message concerning a certain consignment.
The use of a Booking Confirmation Message is not compulsory.

IFTMIN / UNSM - Instruction Message

Functional Definition

A message from the party issuing the instruction of forwarding and/or transport services under conditions agreed, to the party arranging the forwarding and/or transport services.

Principles

The Instruction Message will be used to notify the carrier/agent of details of the shipment, and to supply such other items of information as may be required in the transport contract.

IFTMCS / UNSM - Instruction Contract Status Message

Functional Definition

A message from the party providing forwarding and/or transport services, to the party that issued the instructions for those services giving the actual details, terms, conditions, and charges (where applicable) of the transport, and of the transported goods.

Principles

The party providing the transport services will send an instruction contract status message, usually after receipt of the instruction message. This message is not necessarily a legal contract.

IFTMAN / UNSM - Arrival Notice Message

Functional Definition

A message from the party providing forwarding and/or transport services, to the consignee (or Customs Broker) giving notice and details of the arrival of the consignment.

Principles

An Arrival Notice Message may be sent to the consignee and/or other required parties to give information regarding the arrival of the consignment.

Invoice Message

INVOIC / UNSM - Invoice Message

Functional Definition

A message claiming payment for goods or services supplied under conditions agreed between the seller and the buyer.

This message, with correct data qualification, serves also as the specification for Debit Note and Credit Note messages.

Throughout this document, the reference to 'Invoice' may be interpreted as conveying the wider meaning of 'Invoice/Credit Note/Debit Note'.

Field of Application

This message may be applied for both national and international trade. It is based on universal practice and is not dependent on the type of business or industry.

Principles

- a seller may invoice for one or more transactions
- an invoice may refer to goods, items or services related to one or more orders, delivery instructions, call-offs, etc.
- an invoice may contain references to payment terms
- an invoice for cross border transactions may contain additional information for customs and/or statistical purposes/services
- an invoice may contain transport details

See INVOIC Segment Table, Annex p. 168

([EDIFTD])

2.5. How to choose a translation software ?

2.5.1. Introduction
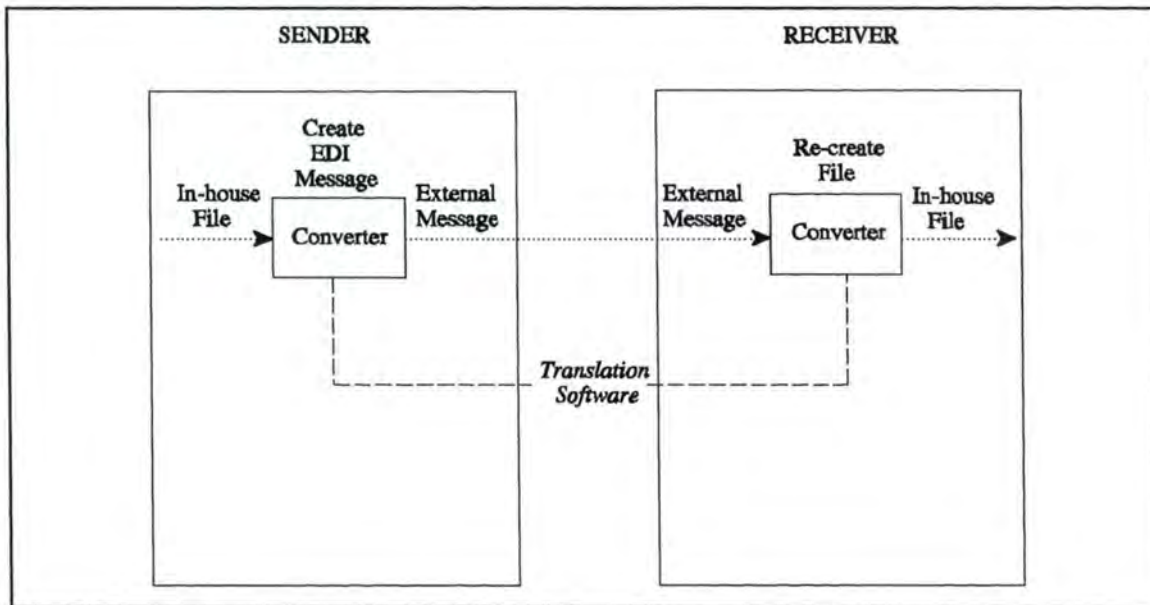
Translation Software

Once the message is constructed in an in-house format, it has to be translated in the standard format for transmission.

Then once a message is received in the standard format at the receiver, it has to be translated into an in-house format for integration in the internal applications.

These operations are performed by translation softwares at both the sending and the receiving points.

2.5.2. Characteristics

- Flexibility

  Since a company must often deal with multiple standards and telecommunication means, the translation software used should be able to support them all.
  Ideally, it should support all major public standards in multiple versions, major third-party networks, and provide support for interchange control.

- Extensibility

  Since the system will most probably grow in time, the software should provide the ability to add new partners quickly and easily.

- Compatibility

  The EDI interface must be compatible with existing applications.

Knowing this, there are basically three options for translation softwares :
- write the software in-house
- use a third-party EDI service provider
- licence a commercial package
A cost/benefit analysis should be performed to evaluate the three possibilities.

According to Hagen K.C. Pfeiffer in [PFEIFF], "(...) more than 100 commercial software packages have appeared on the market to perform some or all of the three basic interchange functions (...) :
- data extraction (storage)
- format conversion
- communications"

Although, most of EDI softwares provide with other functions like :

- management or maintenance functions
- input/output functions

2.5.3. Main Functions

"Five different main functions can be distinguished :

(1) Conversion

> *Conversion is the most important function of an EDI software as it provides for the mapping between the inhouse data format and the EDI message format. Some authors distinguish between different generations of conversion modules, depending on (a) whether EDI messages are constructed from intermediate flat-files that contain the required data, (b) whether those modules directly access one or several databases to extract that data, or (c) whether such converters are integrated into application programs. Syntactic and semantic conversion between in-house and standard format is normally a table-driven process where an editor must be used to initialize conversion tables (i.e. define format correspondences) before message construction or translation can commence. Since those tables may be regarded as converter databases, mapping by table rather than by programming instructions facilitates the*
> *maintenance task which is particularly important in situations where*
> *either format is frequently being modified or updated.*
> *Another difficulty that increases the complexity of the mapping task relates to the inherent flexibility of some EDI standards to define messages. Thus, different data elements may be required for different communication partners, which implies that tables must reflect different EDI user profiles, i.e. specific subsets of the standard applying to particular users.*
> *Furthermore, syntaxes such as EDIFACT and ANSI X12 rely on the qualifier technique to identify data elements which is rarely found in conventional databases. Thus, conversion modules should have the capability to automatically create or delete qualifiers according to the direction of the conversion process.*

(2) Internal communications (data extraction)

> *If a converter is based on intermediate flat-files, the internal communications function essentially provides an interface between internal databases/application programs and the EDI conversion process.*
> *In cases where the data pertaining to a single EDI message are processed by several application programs, the internal communications function must also have grouping and splitting capabilities to merge data from various sources into messages and to decompose messages in the reverse process.*

(3) External Communications

The external communications component defines an interface between the conversion process and the telecommunication network (e.g. VAN) utilized for exchanging messages with business partners.

It establishes (by means of one or several standard communication protocols such as e.g. X.400, X.25, remote job entry), controls, and terminates communication sessions with trading partners and, in case of direct linkages, maintains access numbers for automatic dialing.

In addition, it can possibly provide sophisticated security functions including password protection, (smart-card) data encryption and message authentication techniques.

(4) Management

The management module provides basic housekeeping and maintenance functions such as transaction logging, audit trails, error- and status-report generation, etc. Moreover, user and application profiles should be maintained by a systems administrator.

(5) Input/Output

A versatile user interface is frequently included for the purpose of exerting direct control over the other four functions and producing hardcopies of the reports generated with the management function.

Furthermore, at the beginning stage of using EDI, organizations typically resort to manual data entry to create EDI messages instead of passing messages directly between network and databases/application programs via flat-file. (...)

Depending on which of the five functional components (...) are supported, three different categories of EDI software can be distinguished :

* EDI Converters are considered the most basic type of EDI tool available as they only provide mechanisms to perform construction or translation operations and a limited amount of incidental services, such as generating error files.

* EDI Gateways provide full converter capability plus internal as well as external communication functions. Gateways can operate independent of human supervision, i.e. in unattended mode, and must therefore support a large number of the message exchange management functions (...). Frequently, the automatic handling of so called "functional acknowledgements" is desirable.

* <u>EDI Workstations</u> are defined as EDI Gateways with manual data entry functionality. Thus, EDI Workstations must provide a special user interface (e.g. data entry screens) to permit users to manually enter data for message onstruction. Those systems may occasionally lack the option to interface with existing application systems.
Moreover, they may be limited to process only a subset of the entire spectrum of existing messages in which case they are sometimes called specific workstations as opposed to generic ones that are not subject to such restrictions."

([PFEIFF])

2.6. What are the hardware options ?

Hardware
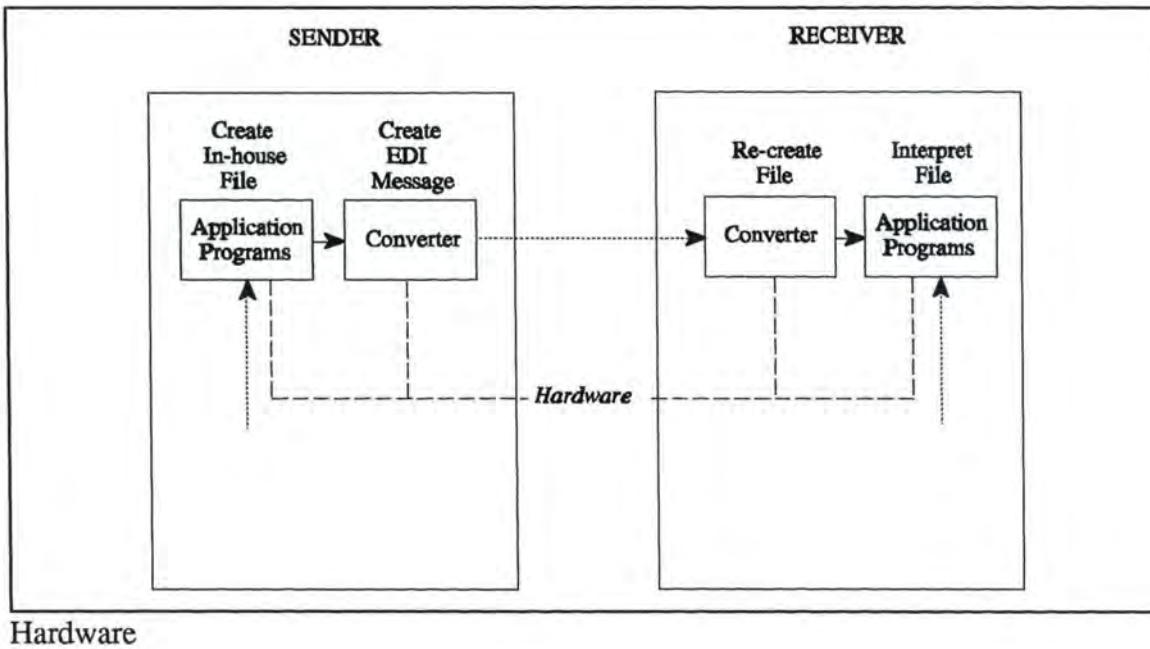
The EDI Communication Model shows us the three steps (for the sender's point of view) of exchanging data electronically :

a. Create In-house File

A specific application system extracts the necessary data from a data base and stores it in a file with predefined data format.

b. Create EDI Message

Translation of the in-house message by means of a converter.

---

c. Send Message

> Transmission of the EDI message via the telecommunication link to the addressee of the message

Organizations can use mainframes, mini-computers or micro-computers (or any combination of these) to accomplish these three steps.

That leaves us with 8 (2^3) possible configurations, plus, for two configurations involving mainframe and micro-computers, the choice to link them directly to each other (Front-end solution) or not (Stand-alone solution)

The ten possible configurations are listed in the following table:

Config.	Config.-Reference	Application	Conversion	Communic.
1)	*Full Mainframe*	*Mainframe*	*Mainframe*	*Mainframe*
2)	*Communications-PC*	*Mainframe*	*Mainframe*	*Micro*
3)	*Conversion-PC*	*Mainframe*	*Micro*	*Mainframe*
4a)	*Front-end Mainframe*	*Micro*	*Mainframe*	*Mainframe*
4b)	*Stand-alone Mainframe*	*Micro*	*Mainframe*	*Mainframe*
5)	*Communications-Mainf.*	*Micro*	*Micro*	*Mainframe*
6)	*Conversion-Mainframe*	*Micro*	*Mainframe*	*Micro*
7a)	*Front-end PC*	*Mainframe*	*Micro*	*Micro*
7b)	*Stand-alone PC*	*Mainframe*	*Micro*	*Micro*
8)	*Full PC*	*Micro*	*Micro*	*Micro*

([PFEIFF])

> *"Disregarding stand-alone solutions, the most common types of EDI systems consist of pure mainframe/micro-computer architectures as well as a set-up in which a micro-computer serves as a front-end EDI conversion and Message Handling System interface to relieve the mainframe from most EDI processing tasks."*

([PFEIFF])

2.7. What are the telecommunication options ?

2.7.1. Introduction

To transport the message between sender and receiver, we need a communication medium, the two main options being :

- connection oriented
- connection less
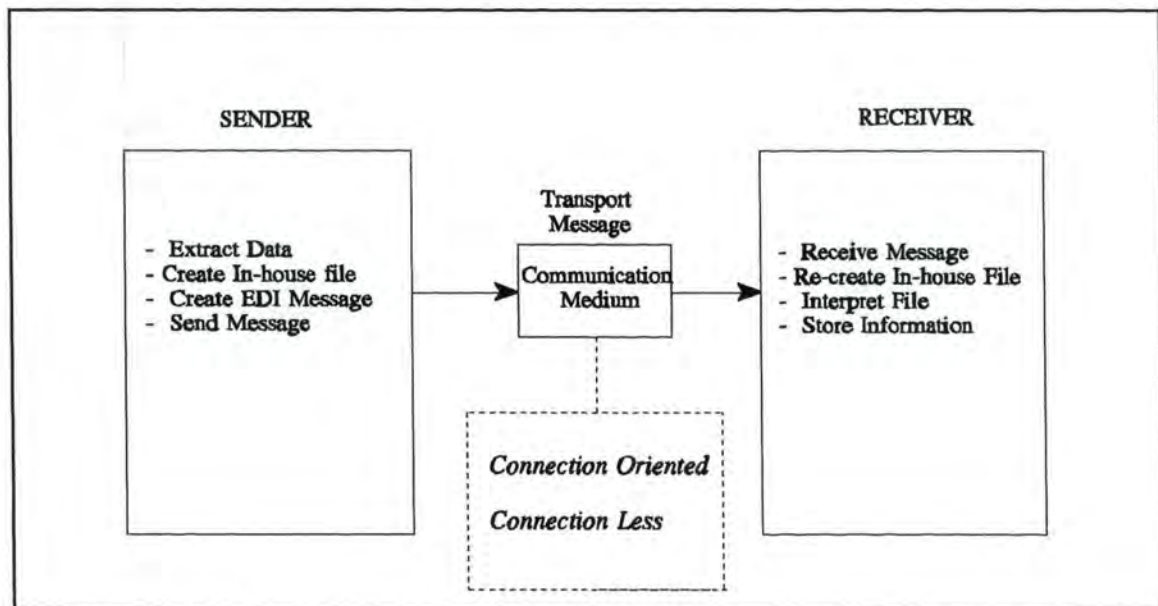
Telecommunications

What requirements does EDI place on communication services ?

- to be without error
- to take place once and once only
- to protect the message against tampering by third parties
- to offer acknowledgement of receipt
- to provide connectivity

Next to these, other requirements are dependent on the distributed processing model followed. The two main models are the VADS (Value Added Data Service) Model - connection less - and the Real-time Model - connection oriented.

> *"[The VADS Model is] based on a central Value Added Data Service (VADS) operator. Here the individual organizations subscribe to the VADS service and initiate communications with it. The VADS operator receives EDI messages destined for another customer and forwards them at a convenient time for the recepient.*
> *A variant is where the VADS operator polls the sender at regular intervals and pulls messages from a pre-prepared queue. Conversely the receiver can poll the VADS system for any messages waiting to be received.*
> *(...)*
> *[The Real-time Model] uses a network such as the public switched network. Here the two interworking organizations call each other directly. The sender will open a connection to the receiver and forward all messages. While the connection is open, the other party can send responses and messages in the other direction"*

([OSITOP])

Besides the type of business, which will often determine the model followed, there are other factors can influence the choice of a communication means :

- the availability of a particular communication means
- the distance of the transmission
- the volume of the transmission
- the security needs
- the speed of the transmission

At each model is associated a type of connection :

- direct connection is associated to the real-time model
- network services are associated to the VADS model

2.7.2. Connection Oriented Communication

When following the Real-time processing model, we will have to consider connection oriented communications.

Advantages

- faster than the store and forward technique of the VADS model (even if they can offer store and forward with X.400)
- cheaper than the VADS model because network costs are met only once

Disadvantage

Both end-systems need to be available on the same time.

We will consider two major network types suitable for direct connection :

- Public Switched Telephone Network (PSTN)
- Public Switched Data Network (PSDN)

Public Switched Telephone Network

PSTN have the advantages to be widely available, cheap to use and very easy to connect to. There are the limitations of transmitting data over voice lines
(noise, lack of security, problems with protocol differences...) so it is short-term solution involving a few partners communicating over short distances.

Public Switched Data Network

PSDNs such as France Telecom's Transpac or British Telecom's Packet Switch Stream (PSS) network are based on OSI protocols such as the X.25 packet switching and X.400 electronic messaging protocols.
They are more expensive than PSTNs, but offer a better service in terms of speed, quality and integrated error correction.
An interesting characteristic of PSDNs is they often offer both interactive and store and retrieve services.
The major disadvantages are the lack of security and the need for the company to support direct connections for several partners.

2.7.3. Connection Less Communication

Value Added Network Services - connection less - operate as shown in the VADS processing model. They are, so far, only adequate for non-interactive EDI systems.

Advantages

- both end-systems do not need to be available or to process EDI at the same time.
- the VANS acts as a unique communication partner : one connection to the VANS instead of multiple connections to the different partners
- the communication is independent of standards, protocols and hardware, because VANS can make the conversion between multiple standards and protocols (which one exactly depends on the VANS)
- there is no need for transmission management since it is taken in charge by the VANS
- security is one of the services provided by VANS
- VANS can act as a neutral third-party able to :
    - audit the passage of messages
    - ensure non-repudiation by the sender
    - ensure non-denial of receipt by the receiver

Disadvantages

- costs : the multiple services provided are very expensive, the tariffs are based on several parameters such as volume, time of connection, amount of connections...
- unique partner : as a unique communication partner, VANS are the only electronic link to all the trading partners of the company, so in case of network breakdowns, for any reason and despite all the security measures, the company is completely isolated.

Important Characteristics of VANS providers

When choosing a VANS, characteristics of the VANS provider must also be considered.
VAN providers have connections with software companies so that assistance can be provided to purchase a translation software as well as to connect to a network.
For smaller companies, the level of consultancy, training and support available are a very important consideration.
Another important consideration is the pricing structure of the
provider. The price is calculated on base of several parameters (frequency, document size, volume, time of day of transmission...). These parameters may vary from one supplier to another so that customers can determine what is the most interesting solution in terms of tariffs.

The participation (and influence) of the provider in trade associations and standards groups is an indication of the stability/credibility of the provider.

2.7.4. Conclusion

"As a rule, direct connection works best with a limited number of correspondents (less than six). It becomes increasingly difficult to coordinate direct EDI transmissions as the number of trading partners increases, particularly if multiple, proprietary formats are involved. Firms that deal with large numbers of trading partners should consider third-party VANS providers."

([DATAPRO])

2.8. Who to trade with ?

2.8.1. Actual Partners

Which trading partners could be interested in an EDI relationship with the company ?

Normally, this question has already been answered, although partially, when considering the implementation of an EDI-system.
No company starts such a project without any potential partners. Once the biggest part of the work is done - defining a general policy and implementing a pilot project - the company will try to extend it to other partners.

Not all the trading partners can justify the costs of an EDI project. So the company must define criteria to proceed to a selection between the actual trading partners.

Examples of criteria are, for instance :

- the transaction volume
- the stability of the trading relationship
- the experience of the company about EDI
- the strategic importance of the company

...

2.8.2. Potential New Trading Partners

In some cases, EDI can offer new market opportunities. Some companies already using EDI could be interested in your company because you are running EDI and their former supplier did not, or, in a way that suited them.

It is a marketing function to detect this kind of potential trading partners and to contact them with a solid business/EDI proposition.

EDI can be an argument for the company using new customer testing your services. This was the case at DHL Sweden, where EDI contributed to win a customer.

2.8.3. Approach of the Partners

How will the potential EDI partners be approached ?
Two attitudes are possible :

1. Reactive Approach

   Once the company is running EDI, it waits for interested partners to approach it and then analyse their position against the criteria defined earlier.

2. Proactive Approach

   The company goes out visiting the partners they wish to do electronic trading with. This approach supposes the selection against the defined criteria already has been made.

Both approaches are possible simultaneously.

2.8.4. Policy with Potential EDI-Partners

Will the company try to impose its standards and telecommunication means or is it ready to support any standard or telecommunication means proposed by partners ?

This will depend on the position, the importance of the potential partner but also on who initiated the project : being the first-mover can be of great importance in the negotiation.

Criteria can be set up to define for what kind of partners the company will attempt to establish a dominant position or accept the customers requirements.

For instance, for the larger customers (1000 shipments/month), DHL may support any customer standards proposed, but for the smaller customers (less than 200 shipments/month), it could propose alternatives to EDI such as Easy Ship online via DCS.
The policy for medium customers is not very clear, it depends a lot of the strategic importance of these customers.

The company should also define to what extent it is willing to provide assistance to eventual EDI-partners.

2.9. How to protect EDI relationships ?

2.9.1. Introduction

The elimination of paper documents and human intervention in business transactions brings along several questions :

- how to maintain and prove confidentiality ?
- how to establish the originality of a magnetic record ?
- how to ensure non-repudiation of a record ?
- ...

There are two linked answers to these questions :

1. Legal Answer

    Setting up an Interchange Agreement specifying both partners' responsibility

2. Technical Answer

    Devices and procedures to support the Interchange Agreement and try to make tampering with the message impossible.

2.9.2. Legal Answers

Introduction

The use of EDI generates important changes in the ways of doing business. The most important of these are the elimination of paper documents and human intervention.

As legal systems are mainly based on the use of paper documents, EDI partners will have to elaborate agreements taking care of the new kinds of situation that will arise when exchanging data electronically.

Collective organizations have developed frameworks for "Communication Agreements" : UNCID (UNiform Rules of Conduct for the Interchange of Trade Data Transmission) by the Directing Board of the International Trade Chamber and "European Model EDI Agreement" by the European Communities Commission as a part of the TEDIS program (Trade Electronic Data Interchange Systems). These documents can be found in the annex, on pp. 131 and 140.

From these frameworks can be extracted the key issues of a "Communication Agreement".

Recommendations

- Annex

Draft a Technical Annex to set out the technical procedures and rules relating to the transmission of messages.
An example of the structure of the Technical Annex can be found in annex, p. 144.

- Definitions

Remove ambiguity about the terms used in the contract (EDI, commercial transaction, interchange...).

- Object and Scope

Exchange of EDI messages.
The contract is made of two parts : the standard contract and the annexes.
Any modification of the contract, such as the adoption of an updated version of a rule, would have to be written and signed by the parties.

- Message Standards

Agree the message standards to be used.

- Systems Operation

Make sure that the different parties have and will continue to have all the infrastructure needed to effectively transmit, log and store EDI messages to protect themselves from the negligence on the part of one partner that could cause harm to the others.

- Method of Transmission

Agree a method of transmission and the contracted third party service providers.

- Specifications and Tests

For the three last points, details and specifications should be set out in the Technical Annex.

A clause about system rests on the milestone moments such as starting the system, or introducing a new or modified software. This will prevent conflicts between the parties regarding the necessity to perform these tests.

- Acknowledgement of Receipt of EDI Messages

The possible damage and conflict caused by the loss of some messages can be alleviated by specific undertakings in addition to those included in the telecommunication protocols.

The parties would have to specify these messages in annex or to agree that the sender of the message will expressly request an acknowledgement of receipt from the receiver.
A time limit for the acknowledgement determines when a message is to be considered as lost.
An acknowledgement of receipt is not a confirmation of the contents of the message.

- Confirmation of the Contents of EDI Messages

The information transmitted has to be complete and correct. If it is not, the receiver can inform te sender by means of a specific message : the confirmation.
Messages requiring a confirmation can be specified in the Technical Annex or the sender can expressly request a confirmation from the receiver.

- Processing of EDI Messages

The parties' internal systems will process the EDI messages within an agreed time limit in order to achieve time savings possible by the use of EDI.

- Security of EDI Messages

Protect the messages against :
- unauthorized access
- alteration
- loss or destruction

Ensure message verification :
- identification
- authentication
- verification of the integrity and origin of a message by use of an authentication mechanism
- verification of the confidentiality of the messages if requested.

The procedures used will be described in the Technical Annex

- Logging, Recording and Storage of EDI Messages

Keep a complete and chronological record of all EDI messages and maintain it unaltered and securely for an agreed time.

If this record is stored electronically, the parties will have to ensure that he remains readable and printable and keep any equipment necessary to guarantee these conditions.

The message should be stored in its network format to avoid translation errors.

- Intermediaries

The party using or instructing the use an intermediary in order to transmit, log or process EDI messages is responsible for the acts, failures or omissions of this intermediary against the other parties.

It is a contractual responsibility of the intermediary that no change is made to the contents of a message.

- Electronic Transactions - Formation of Contract

Transactions are validly formed by exchange of EDI messages and an action declaring the invalidity of such a transaction is excluded.

A contract made by EDI will be considered to be concluded at the time and the place where the EDI message constituting the acceptance of an offer is made available to the information system of the receiver.

- Admissibility and Evidential Value of EDI Messages

For the parties, the admissibility as evidence of messages exchanged and stored according to the agreement will not be brought into question and the messages will have a comparable evidential value to that accorded to written documents.

For order messages, the airwaybill remains a written evidence.

In some cases where law expressly request a written document, clauses of the standard contract will become invalid.

- Protection of Personal Data

According to the National Right, or if inexistent, to the Convention Nx 108 of 28.01.1981 of the Council of Europe on the protection of the individual with regard to the automatic processing of personal data.

- <u>Applicable Law and Dispute Resolution</u>

The parties will agree a law that will prevail for any conflict.

Any dispute should be settled by negotiation and, if
unsuccessful, by an arbitration decided by the parties.
Otherwise, the dispute can be referred to a competent court in
the country where the agreed law is applicable.

- <u>Effects, Term and Severability</u>

The parties have to agree when the agreement shall be effective, how to terminate the
agreement and the dispositions in case of termination for any reason.
Should any clause be deemed invalid, all other clauses shall remain in full force and effect.

- <u>Force Majeure</u>

If the terms of the contract can not be respected because of an unpredictable incident ("cas
de force majeure"), no party is responsible for the eventual damages.

2.9.3. Technical Answers

<u>Introduction</u>

The use of Electronic Data Interchange increases the complexity of maintaining and/or
proving confidentiality, originality and authenticity of a record.

Besides these problems, common to any kind of business data transmission, electronic trading
brings its particular problems such as establishing the originality of a magnetic record or
ensure non-repudiation of a record by his sender.

Furthermore, the two main characteristics of EDI - paperless and minimal human
intervention - moved the security requirements to the system.

Symmetric Crypto Systems

The application of a digital signature to a message proves its authenticity to your partners.

The digital signature is based on a "symmetric cryptographic system" : a conversion method with a secret key is applied to the message, resulting in an encrypted message which cannot be read without the secret key.
If the partner, knowing the secret key, applies it on the message and gets an intelligible version in return, he can be sure of who sent the message.

Of course, the same key serving for encrypting and decrypting the message, it is difficult for you to prove he did not make up the message himself.

Asymmetric Crypto Systems

Here two secret keys are needed : one for encryption and one for decryption.
The conversion algorithms used are so complex it is impossible to determine the value of a key even when knowing one of them.

This system allows to make one of both keys public : one is kept secret for encryption, the other is made public for decryption.

The major inconvenient of these encrypting/decrypting systems is they are very time-consuming.

Hashing Algorithms

In cases where all that needs to be achieved is authenticity, a hashing algorithm can be used.

These algorithms provide, using an agreed cryptographic key, a "checksum" of the contents of the message.
If the correspondent, using the same algorithm with the same key, obtains the same checksum, he is sure that the message has not been altered.
These algorithms are the basic component of the digital signature system.

Smart Cards

A smart-card is a plastic card with a built-in microprocessor : it can store large amounts of information (e.g. encryption software, secret keys) that can be processed by the card itself (e.g. verify sender identity, sign messages).
This provides a higher degree of security than to leave the encryption software on an open system that is very difficult to protect.

Key Management

The amount of secret keys needed increases with the amount of electronic trading users.

How to make sure these keys remain secret ?

The solution is a public key system : each user issues its own secret and public keys (no more intervention of a third party risking to reveal the key), so the only key he has to keep secret is its own secret key, all others being public.

This system should go along with access control to the public keys to keep some confidentiality.

Conclusion

Message security, even sophisticated, is only usefull if valid as evidence in court. It should conform to precise contractual agreements between trading partners.

3. Project Development

3.1. Introduction

This section provides an overview of the questions - and answers - dealt with in section II by answering the following question:

"What do we have to think about when considering a new EDI relationship ?"

This list of questions and answers is suitable for any EDI project, including the pilot project.

But, since the pilot project is vital, it is subject to specific remarks.

3.2. Pilot Project

A pilot project should be developed according to the general policy defined, and will be a test of the statements made by thecompany about standards and implementation issues.
An essential aspect of the pilot project is the choice of an appropriate partner.
The usual practice is to choose an "ideal" partner - strong business relationship, good structure, experienced in EDI - to increase the chances to succeed.

Since the pilot project is a kind of bench mark for the further development, and other potential EDI partners are rarely "ideal", the company could miss important experience by choosing a "too easy" pilot partner.
Therefore, criteria must be defined to select the "most interesting" partner according to the company's overall EDI policy.

3.3. Project Development

3.3.1. Does the potential partner fit the criteria ?

Recommendations

- Identify the strategic and functional advantages of implementing an EDI relationship with the potential partner

- Anticipate the main options in terms of standards, telecommunications, etc. according to the characteristics of the potential partner

Summary

Is the potential EDI partner already a trading partner ?
Is the relationship stable enough ?
Is it a new trading partner ?
What transaction volume does the relationship involve ?
What is the partner's experience about EDI ?
What is the strategic importance of the partner ?
Who took the initiative of the project ?
...

3.3.2. What can be gained from the project ?

Recommendations

- Draw a clear plan of the main objectives to be achieved in the project

- Stick to these objectives in the operational development of the project

Summary

- Tangible Benefits

    - increase speed
    - reduce data input
    - reduce errors
    - quicker availability of data
    - improve control on the business cycle
    - redeploy staff
    - reduce processing costs
    - eliminate language barriers
    - ...

- Intangible benefits

    - improve customer service
    - improve responsiveness
    - improve the image of the company
    - improve information about trading partners
    - increase flexibility
    - ...

3.3.3. What are the investments for the project ?

Recommendations

- Anticipate the costs and particularly the hidden costs of the project
- Define clear policies about particular investments such as staff training, assistance to the partner, etc.

Summary

- Tangible Costs

    - dedicated hardware
    - EDI software
    - communication links
    - staff investments
    - ...

- Intangible Costs

    - system development
    - organizational changes
    - negotiation
    - assistance to partners
    - system maintenance
    - ...

3.3.4. What standard will be used ?

Recommendations

> -   Try to stick to an open EDI standard such as EDIFACT
>
> -   Define a clear policy towards the requirements of the partner according to his commercial and/or strategic importance

Summary

- Types of Standards

    - National
    - International

- Industry specific
    - proprietary
    - de facto
- Non industry specific
- EDIFACT
    - open standard
    - flexible standard

3.3.5. What documents will be transmitted ?

Recommendations

- First consider the internal data structure and then the pre-requisites of the EDI messages   - Have a clear mapping of the functionalities the EDI message will bring into the company's operations and information flow

Summary

EDIFACT Messages

- Customs Messages

    - CUSCAR - Customs Cargo Report Message
    - CUSDEC - Customs Declaration Message
    - CUSREP - Customs Report Message
    - CUSRES - Customs Response Message
    - other

- Transport Messages

    - IFTMBP - Provisional Booking Message
    - IFTMBF - Firm Booking Message
    - IFTMBC - Booking Confirmation Message
    - IFTMIN - Instruction Message
    - IFTMCS - Instruction Contract Status Message
    - IFTMAN - Arrival Notice Message
    - other

- Invoice Message

    - INVOIC - Invoice Message

- Other (See list, Annex p. 175)

3.3.6. Is the translation software suitable to support the project ?

Recommendations

- Evaluate clearly the characteristics and functions needed by DHL
- Define the software policy before developing or purchasing a software according to these functionalities

Summary

- Characteristics

    - Flexibility
    - Extensibility
    - Compatibility

- Main Functions

    - conversion
    - internal communications
    - external communications
    - management
    - input/output

3.3.7. Is the hardware suitable to support the project ?

Recommendations

Stick to hardware you already know and that could be extended

Summary

What is the hardware configuration ?

Config.	Config.-Reference	Application	Conversion	Communic.
1)	Full Mainframe	Mainframe	Mainframe	Mainframe
2)	Communications-PC	Mainframe	Mainframe	Micro
3)	Conversion-PC	Mainframe	Micro	Mainframe
4a)	Front-end Mainframe	Micro	Mainframe	Mainframe
4b)	Stand-alone Mainframe	Micro	Mainframe	Mainframe
5)	Communications-Mainf.	Micro	Micro	Mainframe
6)	Conversion-Mainframe	Micro	Mainframe	Micro
7a)	Front-end PC	Mainframe	Micro	Micro
7b)	Stand-alone PC	Mainframe	Micro	Micro
8)	Full PC	Micro	Micro	Micro

([PFEIFF], p. 55)

3.3.8. Are there new telecommunication needs ?

Recommendations

- In non-interactive EDI, VANS are the way to go even if they are more expensive, specially with a large amount of partners in perspective

- Try to stick to the telecommunication media already in use in the company

---

Summary

- EDI requirements on communication services

    - to be without error
    - to take place once and once only
    - to protect the message against tampering bu third parties
    - to offer acknowledgement of receipt
    - to provide connectivity

- Distributed processing models

    - VADS (Value Added Data Service) Model
    - Real-time Model

- Determining factors

    - the availability of a particular communication means
    - the distance of the transmission
    - the volume of the transmission
    - the security needs
    - the speed of the transmission

- Types of connections

    - direct connection (real-time model)
    - value added network services (VADS model)

3.3.9. How will the project be protected ?

Recommendations

> - Set up an interchange agreement on base of the framework
>
> - Specify technical security procedures relevant to the project

Summary

- Questions

   - how to maintain and prove confidentiality ?
   - how to establish the originality of a magnetic record ?
   - how to ensure non-repudiation of a record ?
   - ...

- Technical Answer

   - Symmetric Crypto Systems
   - Asymmetric Crypto Systems
   - Hashing Algorithms
   - Smart Card
   - Key Management

- IV -

CASE STUDIES

1. Introduction

The aim of this chapter is to present some practical issues of the development of EDI relationships at DHL.

Again, the different issues will be explained according to the terms used in the EDI Communication Model described in the roadmap.

For a start, we will compare two standards that are being implemented at DHL at this stage.

Then, we will have a look at the documents that will effectively be replaced by EDI messages in a near future. Doing this we will point out the advantages and problems that did or will occur.

Before to define some new requirements for translation software, we will give some indications about the purpose and the conception of the interface between the internal system and the EDI software.

A very important issue is the designing of exception procedures : what if the EDI system breaks down and how to make sure the received data are correct.

Then its time for testing.

We will then have a look at the motivations of the partners and the problems that occurred with some partners.

At last, we will show the importance of the implication of I.T. outsiders to achieve a proper EDI implementation.

2. Implementation Issues

2.1. Standards

We will examine two standards already implementated at DHL Belgium :

> TMME Forwarder Invoice
> Toyota's proprietary layout for invoices sent by DHL
>
> IFCSUM
> Atlas Copco's subset of the EDIFACT Message to transmit Airway Bill information to DHL

2.1.1. Toyota

The EDI relationship of DHL with Toyota involves two documents

- DHL's invoice to Toyota
- DHL's delivery details to Toyota

The Toyota layout is a sequential file with predefined, all mandatory fields having a fixed length.

To show the difference with the EDIFACT type of layout, it is represented next page.

EDI Document : TMME Forwarder Invoice

1. Header Record

Name of field	Pos.	Lgth.	Pic.	Value
Record type	01-03	3	X	Constant 'GES'
Format name	04-07	4	X	Constant 'GEIS'
Version	08-12	5	X	Constant '1.000'
Sender id-code	13-14	2	X	Constant 'XX'
Sender id-name	15-29	15	X	Constant '70110bbbbbbbbb'
Receiver id-code	30-31	2	X	Constant 'XX'
Receiver id-name	32-46	15	X	Constant '94034TESTbbbbbb' in test environment or '94034bbbbbbbbbb' in production environment
Creation-date	47-52	6	9	Date of creation of interchange YYMMDD
Creation-time	53-56	4	9	Time of creation of interchange HHMM
Interchange Control No	57-65	9	X	Constant '90303bbbb'
Filler	66-80	15		

2.1. Data : Head

Name of field	Pos.	Lgth.	Pic.	Value
Data id.	01-02	2	9	Constant '95'
Forwarder code	03-09	7	X	Constant '70110bb'
Forwarder invoice number	10-19	10	X	Invoice number of DHL
Forwarder invoice date	20-25	6	9	Date of creation of invoice YYMMDD
Forwarder invoice amount	26-38	13	9	Total amount of the invoice 9(11)V9(2)
Filler	39-80	42		

2.2. Data : Line

Name of field	Pos.	Lgth.	Pic.	Value
Data id.	01-02	2	9	Constant '96'
B/L number	03-22	20	X	Airway Bill number left justified
Invoice number	23-32	10	X	TMME's invoice number (TMME's identification of shipment)
Ship date	33-38	6	9	Date of shipment YYMMDD
Freight	39-46	8	9	Amount of freight
Insurance	47-54	8	9	Amount of insurance
Duty	55-62	8	9	Amount of duty
VAT	63-70	8	9	Amount of VAT
Other charge	71-78	8	9	Amount of other charges
Filler	79-80	2		

3. Trailer Record

Name of field	Pos.	Lgth.	Pic.	Value
Recort type	01-03	3	X	Constant 'GEE'
Number of records	04-09	6	9	Total number of records including header and trailer records
Interchange control no	10-18	9	X	Constant '90303bbbbb'
Filler	19-80	62		

With an appropriated EDI translation software, it is as easy to implement a proprietary layout as a standard layout.

The major inconvenients are that :

- all fields are mandatory
- all fields have fixed length

This could represent a great loss of space that can influence the transmission as shown in the example next page.

Example

```
GESGEIS1.000XX70110           XX94034          930217161290303      0004
9570110   BRU047877 9301290000000089681
96108752954         V000005   930305   1230    0      0      0      0
96108752965         V000004   930105   4990    0      0      0      0
96108752980         V000007   930105   1950    0      0      0      0
96108753595         E000391   930120  14280    0      0      0      0
96108753746         V000137   930120   1190    0      0      0      0
96988210334         V000069   930113   2750    0      0      0      0
96988212132         V000210   930127  17435    0      0      0      0
96988212471         V000224   930128   2282    0      0      0      0
96998210065         V000049   930112   1990    0      0      0      0
96998210986         L000027   930120  10934    0      0      0      0
96998211174         L000049   930122   3550    0      0      0      0
96998211196         L000046   930122   2579    0      0      0      0
96998211266         V000165   930122  17626    0      0      0      0
96998211616         E000529   930125   6895    0      0      0      0
GEE00001715690303   0004
```

2.1.2. Atlas Copco

The aim of the EDI relationship of DHL with Atlas Copco is to enable Atlas Copco to send the Airway Bill information of a shipment through EDI.

Before EDI this information was transmitted via a paper document represented below.

As we will see in the following section, this paper document will not disappear, because it is the contractual link between DHL and the customer. We will also see how and where this document will now be produced.
The transmission of the information via EDI will allow to process the information much quicker, even before the package arrive at DHL's location.

Former Paper Document : Airway Bill

DHL Worldwide Express		FORWARDER AIRBILL - NON NEGOTIABLE		ORIGIN	DESTINATION
SHIPPER'S ACCOUNT No.	SHIPPER'S REFERENCE No.	‖‖‖‖‖‖‖‖‖‖‖‖‖‖ 6 3 4 4 4 1 0 4 3		PIECES	WEIGHT
					kg gr
SENT BY (COMPANY NAME)		CONSIGNEE (COMPANY NAME)		SERVICES	CHARGES
				DOCUMENT EXPRESS DOCUMENT	
NAME/DEPARTMENT		ATTN. NAME/DEPARTMENT		WORLDW. PARCELL EXPRESS (INTERNATIONAL DUTIABLE)	
ADDRESS		ADDRESS – DHL CAN NOT DELIVER TO A P.O. BOX		WORLDMAIL AIR MAIL PRINTED MATTER	
				INSURANCE YES NO AMOUNT	
CITY STATE/PROVINCE COUNTRY		CITY STATE/PROVINCE COUNTRY		OTHER	
ZIP/POST CODE	PHONE/TELEX/FAX	ZIP/POST CODE	PHONE/TELEX/FAX	**TOTAL**	
DESCRIPTION OF CONTENTS / COMMODITY CODE		IMPORT CHARGE		COLLECTED BY DHL	LIMITATIONS OF LIABILITY
PLEASE ATTACH 4 COPIES OF A COMMERCIAL PROFORMA FOR ALL NON-DOC. SHIPMENTS		DUTY OTHER TOTAL			THE WARSAW CONVENTION AND OTHER CONTRACTUAL EXCLUSIONS AND LIMITATIONS OF LIABILITY APPLY. SEE REVERSE OF SHIPPERS COPY FOR DETAILS
DIMENSIONS (cm) X X = LENGTH WIDTH HEIGHT VOLUME	DECLARED VALUE FOR CUSTOMS SPECIFY CURRENCY	CHARGE TO : - SHIPPER - CONSIGNEE ACCOUNT No.	DATE / /	TIME AM PM	SHIPPER'S SIGNATURE DATE

DHL Airway Bill

The EDI document corresponding to this paper formular, is a subset of the EDIFACT IFCSUM Message defined by Atlas Copco.

EDI Document : IFCSUM

Rem.: When reading the following message, "M (C)" should be read as Mandatory according to the status set by Atlas Copco Airpower and Conditional by EDIFACT standards.

IFCSUM SERVICE SEGMENTS

UNB	INTERCHANGE HEADER	M
Level	0	
Occurrences	One occurrence per interchange	

	S001	SYNTAX IDENTIFIER	M
	0001	Syntax identifier	M a4 (an4)
		Always : 'UNOA'	
	0002	Syntax Version number	M n1 (n1)
	S002	INTERCHANGE SENDER	M
	0004	Sender identification	M an..35 (an..35)
		Identification Atlas Copco Airpower	
	S003	INTERCHANGE RECIPIENT	M
	0010	Recipient identification	M an..35 (an..35)
	S004	DATE/TIME OF PREPARATION	M
	0017	Date of preparation	M n6 (n6)
		Transmission date	
		Always YYMMDD format	
	0019	Time of preparation	M n4 (n4)
		Transmission time	
		Always HHMM format	
	0020	INTERCHANGE CONTROL REFERENCE	M (M) n7 (an..14)
		Unique identification number	
	0035	TEST INDICATOR	C n1 (n1)
		'1' = test	
		'0' = productive	

UNH	MESSAGE HEADER	M (M)
Level	0	
Occurrences	One occurrence per message	

	0062	MESSAGE REFERENCE NUMBER	M an..14
		Reference number	
		Unique identification number	

	S009	MESSAGE IDENTIFIER	M
	0065	Message type identifier	M a6 (an..6)
		Always 'IFCSUM'	
	0052	Message type version number	M n1 (n..3)
		Always '1'	
	0054	Message type release number	M n3 (n..3)
		Always '911'	
	0051	Controlling agency	M a2 (an..2)
		Always 'UN'	

UNT	MESSAGE TRAILER	M (M)
Level	0	
Occurrences	One occurrence per message	

	0074	NO OF SEGMENTS IN MESSAGE	M (M) n..6 (n..6)
		Control count includes UNH & UNT	
	0062	MESSAGE REFERENCE NUMBER	M (M) an..14 (an..14)
		Must be same as 0062 in UNH	

UNZ	INTERCHANGE TRAILER	M (M)
Level	0	
Occurrences	One occurrence per interchange	

	0036	INTERCHANGE CONTROL COUNT	M (M) n..6 (n..6)
		Number of messages in an interchange	
	0020	INTERCHANGE CONTROL REFERENCE	M (M) an..14 (an..14)
		Must be same as interchange control	
		reference 0020 in UNB	

IFCSUM SEGMENT DESCRIPTIONS

BGM		BEGINNING OF MESSAGE	M (M)
	1004	Document/message number *Transport order number*	C (C) an..7 (an..35)

TDT		DETAILS OF TRANSPORT	M (M)
	8051	Transport stage qualifier *Always '20' for main carriage*	M (M) n2 (an..3)

DTM		DATE/TIME/PERIOD	C (C)
	2005	Date/Time/Period Qualifier *Always '11' for dispatch date*	M (M) n2 (an..3)
	2380	Date/Time/Period *Date of dispatch*	M (C) n6 (an..35)
	2379	Date/Time/Period Format Qualifier	M (C) n3 (an..3)

NAD		NAME AND ADDRESS	M (M)
	3035	Party Qualifier *'CZ' for Consignor or* *'CN' for Consignee*	M (M) an2 (an..3)

If CZ was coded in the 3035, you will find the following information :

	3124	Name and Adress Name and Adress line 1 *Always 'Atlas Copco Airpower'*	M (M) a20 (an..35)

If CN was coded in the 3035, you will find the following information :

3124	Name and Address			
	Name and address line 1	M (M)	an..35	(an..35)
	Name and address information for the consignee			
	Name and address line 2	C (C)	an..35	(an..35)
	Specific consignee information, i.e. the name of the contact person within the consignee's company			
	Name and address line 3	C (C)	an..35	(an..35)
	Street and number specifications			
	Name and address line 4	C (C)	an..35	(an..35)
	Country code, Zip code and city specifications concatenated			

CNI	CONSIGNMENT INFORMATION	M (M)		
1490	Consolidation Item Number	M (M)	n..4	(n..4)
	Serial number for each consignment			

GID	GOODS ITEM DETAILS	M (M)		
1496	Goods Item Number	M (C)	n..5	(n..5)
	Serial number for each package			

FTX	FREE TEXT	C (C)		
4451	Text Subject Qualifier	M (M)	an3	(an..3)
	Always 'TDT' for transportation details			
4440	Free Text	M (M)	an8	(an..35)
	Transport code			
	This code is only used if there is a specific agreement between the Forwarder and Atlas Copco			

PCI		PACKAGE IDENTIFICATION	M (M)

	7102	Shipping Marks	
		Shipping marks, line 1	M (M) an..35 (an..35)
		Shipping marks, lines 2-7	C (C) an..35 (an..35)
		These lines will contain additional package	
		specifications	

RFF		REFERENCE	M (M)

	1153	Reference Qualifier	M (M) an2 (an..3)
		Package number qualifier	
		Amways : 'cw' for package number	
	1154	Reference Number	C (C) an8 (an..35)
		Package number	

MEA		MEASUREMENTS	C (C)

	6311	Measurements Application Qualifier	M (M) a..3 (an..3)
		Contains one of the following :	
		'wt' = weigths	
		'aae' = measurements	
	6313	Measurement Dimension, Coded	M (C) a..3 (an..3)
		Contains one of the following :	
		'aag' = gross weight	
		'aal' = net weight	
		'ln' = length	
		'ht' = height	
		'wd' = width	
	6411	Measure Unit Qualifier	M (M) a3 (an..3)
		Contains one of the following :	
		'kgm' = kilo	
		'cmt' = centimeter	
	6314	Measurement Value	C (C) n..6 (n..18)
		Package net weight	

2.2. Documents

2.2.1. Generalities

What are, so far, the demands for former documents to be transmitted via EDI ?

We already had a look at two documents that already have been implementated :

> Invoice - from DHL to the partner
> Airway Bill information - from the partner to DHL

But two more messages are being implementated now :

> Delivery Details - from DHL to the partner
> Invoice - from the partner to DHL (Self-billing)

We will now have a closer look at the different documents concerned by EDI, independently of any standard.

The nature of the business of DHL - Express Delivery - makes that the company is in commercial contact with a lot of customers issued from very different sectors.
A direct consequence of this is that DHL has to be prepared to support various standards, according, most of the time, to the standard in use in the customer's sector.
These requierements can be supported by an appropriated EDI software as we will see further on.

2.2.2. Invoice

a. Description

The invoice send by DHL to his customer is produced automatically once a month. In one single file, all the shipments forwarded for that customer are listed and charged on the agreed fare, with eventual discounts.
In the traditional method, the file is then printed and sent by mail to the customer.

In the EDI environment, the file is transmitted to the EDI software that will translate it to the appropriate standard (according to the customer) and send it via the network to the customer's mailbox.

Nevertheless, in regard of legal issues, a hard copy of the invoice will still be sent.

b. Advantages

Since a hard copy is still needed for legal issues, we can not say EDI brings any improvement to the traditional business process of DHL.

Nevertheless, the advantages perceived by the customer can result in an important benefit for DHL : quicker payment.

The customer who is now receiving his invoice in a format immediately assimilable by his system : he is now able to automatize the verification of invoices and the data do not need to be keyed in for accounting anymore.

Since data are processed quicker by the customer's system, the payment can be accelerated.

c. Problems

So far, no serious problems were encountered while developing the EDI-invoice.
The only problems that did occur were due to human errors and not to the EDI environment.

2.2.3. Airway Bill

a. Description

The Airway Bill contains all information related to a shipment. DHL needs this information in order to provide the forwarding.

What information is contained on the Airway Bill ?

> Shipper's account number and reference number
> Shipper's coordinates
> Consignee's coordinates
> Origin and Destination codes
> Type of shipment (document, dutiable...)
> Weight
> Description of contents of shipment

Dimensions
Import Charges
Payer
Signatures of shipper and forwarder

This information is now transmitted via a pre-printed form filled in manually by the customer and joined to the shipment.

In the EDI environment, the information will be part extracted from the customer's system, part added manually in a file to be translated in the appropriate EDI standard and to be sent trough the network to DHL's network.

Eventually, since this information is at the origin of the service provided by DHL, a confirmation message should be sent to the initiator.

b. Advantages

For DHL :

- the information does not need to be keyed in the system, what eliminates the error-prone and time consuming activity of data entry.
- information precedes goods so it can be processed quicker (e.g. transmitted to customs) and accelerate the whole service provided by DHL.

For the customer :

In most of the cases, he can extract a great deal of the information needed from his own system and reduces data entry on his side too.

c. Problems

The major problem here is that there is no longer a paper document identifying the shipment, since the paper Airway Bill is no longer present : shipment and information follow two separate ways.

Nevertheless all the advantages of the electronic transmission of these data, some of them, such as consignee's adress, still have to remind on the shipment for delivery or legal purposes. On the other hand the Airway Bill number, that is preprinted on the paper form, is the entry key for the internal DHL information system. This number is the unique identification of a shipment and will allow to track and trace him, and finally to bill him.

According to this, the problem is to find a way to match the shipment with the information related to it, or, in other words, where should the airway bill be allocated to the shipment.

2.2.4. Delivery Details

a. Description

In the traditional environment, delivery details are entered in DHL's system once the shipment has been delivered, and are transmitted by phone to the shipper only if he asked for.

In the EDI environment, an agreement is made with a partner to transmit daily or weekly the delivery details through the network.

Considered this way, it is a new service proposed by DHL.

b. Advantages

It has all the advantages of a new service to add to the range of services offered by DHL.

Initially, this information was only requested occasionally by a customer anxious about the status of a particular shipment.

The fact that this information is now available in an "express" way and directly assimilated by the customer's system, allows him to manage his sendings automatically according to the information received through EDI.

This is a very good example of EDI enabling the communication of information which only proves to be valuable if it is transmitted and inserted in a system almost instantly.

c. Problems

One of the problems encountered during the implementation of the EDI-Delivery Details is that the customer always wants more than what you are ready, or able, to give him.

For instance, a customer wanted to receive daily delivery details of his shipments with the related invoice numbers.

DHL was incapable to provide this information since the invoice program runs only once a month.

2.2.5. Invoice - Self-billing

a. Description

This procedure will now be used by a customer in the context of EDI, it was not used in the traditional environment.

The idea of self-billing is that the customer now makes out himself the amount he think he should pay for his shipment and transmit this information to DHL for verification.

DHL verifies the received invoice agaynts its own invoice and send an acknowledgement to the customer.

b. Advantages

The main advantage of this system is perceived by the customer : he transfers the most time-consuming part of the invoicing procedure - verification - to the forwarder's side.

Nevertheless, and for the same reasons explained above for the "traditonal" invoice, this could result in a quicker payment of the invoice.

The disadvantage of having to verify the invoices on DHL's side is reduced by the use of EDI : the information is directly available in the system and can be processed automatically so that the verification becomes a lot less time consuming.

Again, in regard of legal issues, a hard copy of the traditional invoice will still be issued by DHL.

c. Problems

We still must find out what the actual problems will be since this system has not been implemented yet.

Nevertheless, we can imagine some potential problems, specially about the accuracy of the data that will have to be checked as soon as possible and confirmed to the sender. This means the all invoicing procedure could be modified according to the time frame of self-billing (cf. DHL bills once a month but the customer could want to adopt a weekly billing).

2.3. Interface

2.3.1. Purpose

The EDI message is created by translating an in-house file containing all the information needed to a standard and agreed EDI format.
In an application-to-application environment, the creation of this in-house file is made transparent by the use of an interface between the in-house application and the EDI translation software.

In order to create a correct in-house file, a precise data mapping must be executed between the data types of the EDI message and the data types of the internal system.
At this stage, problems such as, for instance, different date formats, can occur.

Next to this syntaxic check, it is also very usefull to perform a semantic check : go through the EDI layout with the partner and check the meaning accorded to each record.
This will help to avoid misunderstandings.

2.3.2. Conception

In an early stage of the EDI development, the danger is to develop an interface specifically to a partner's needs.
This has its advantages but also, and merely, its inconvenients.

If the link between application and EDI software is written as specific as possible, which means the in-house file will contain only that information that is relevant for that trading partner.
If another partner comes along, the link will, most probably, need to be re-written completely.

On the other hand, the link could be written in function of all possible - anticipated - requirements of all possible - anticipated - partners. This way, the in-house file contain a lot of fields, which are only relevant a few partners.
The advantage is that the link can be used for all trading partners.
The inconvenient is that space must be controlled since the file will most of the time contain a lot of blanks, depending from one partner to another.

Nevertheless this small inconvenient, the more generic this interface is written, the less the possibility that the development needs to be re-done to suit a new partner's requirements.

2.4. Translation software

In addition to the criteria defined in part III - Roadmap, we can add other requirements for a translation software :

- Some times, in an early stage, the EDI data are entered manually instead of extracted from the system automatically (see Interface). To facilitate this already time consuming operation, it would be interesting to be able to define customized input screens directly in the translation software.

- Since the hardware configuration may change, the software must be transportable from one configuration to another.

- The delivery time may be a determinant factor

- Organized training sessions are a valuable feature of the software package.

2.5. Exception Procedures

2.5.1. Emergency Procedures

What if the EDI system breaks down ?

Emergency procedures must be defined so that the information could be transmitted anyway. Usually, the choice is made to return to the traditional procedure in case of any disability of the EDI system.

2.5.2. Control Procedures

By control procedures, I mean procedures that make sure a message has been received by meens of acknowledgement of receipt and/or acknowledgement of contents.
The necessity and importance of these procedures vary a lot according to the concerned message.

For instance, if a delivery detail message is not received correctly or not received at all, it will not cause great harm to the usual business : the customer will have the information from the consignee and then follow the traditonal method to get the required information.
But if Airway Bill Information is not received, DHL will not be able to provide the service the customer expects. In this case, it is crucial to implement control and emergency procedures.

2.6. Tests

It is recommended to test the communication link (network transmission) first.
If these tests are positive, the application-to-application link can be tested in a test environment. In general, the data transfered via EDI are also transfered via facsimile to allow controls from both sides.
If these tests are successfull too, the EDI communication can go live.

2.7. Partners

2.7.1. Motivations

What motivates the partners to the implementation of an EDI relationship ?

- EDI relieves them from the error prone and time consuming data entry of information. Through EDI, the information is directly extracted from their system or assimilated by the system.

- EDI enables the communication of new information, information which only proves to be valuable if transmitted and assimilated almost instantly by both applications.

- Some partners rather not spend time on activities they assume not to be of their responsibility (e.g. filling in Airway Bill forms, checking invoices)

2.7.2. Problems

From the motivations above, we can deduct a first problem : partners are willing to eliminate data entry, so they are only willing to transfer information they already have in their system, information they consider to be important.
Since, in some cases, this information is unsufficient, DHL will have to negociate in order to bring the partner to do additional data entry or to modify his system.
The alternative is for DHL to find a way of getting the required information at their side.
This problem occurs mainly for codes, shipment description (weight, dimensions) etc.

Another problem is often the lack of experience, or knowledge in EDI matters.
This can lead to unreasonable project development that can bring both partners in very precareous situations.
In this case, it will save a lot of trouble to advise to use the services of a consultant, as long as the required knowledge and experience is not present in the company.

Finally, a major and frequent problem is : who should we talk to ?
In an EDI-project development, such as for any project development, it is important to have a single point of responsibility : one person responsible for the development and able to implicate other persons whenever needed.

2.8. Implicate I.T. Outsiders

2.8.1. Users

Users must be implicated and educated from the start so that they fully comprehend the impact of EDI on their day to day activity.

2.8.2. Sales Department

Who is going to be the first link with potential EDI partners : the salesman responsible for this customer.
These people should be trained properly on EDI to prevent they would too easily committ themselves to an EDI implementation, not knowing the implications of it and to maximize the positive image a company can get through EDI.

They are also a great power for negotiations since they have, generally, a stronger and older relationship with the partner.

2.8.3. Operationals

Operationals can be of a very important input when considering solutions to problems due to EDI. For instance, in the question of where to match airway bill and shipment, operationals know when the possibility exists to fit in this activity.

3. Conclusion

What are the main problem sources in an EDI implementation ?

1. Who is responsible for the EDI implementation ?
    There should be a single point of responsibility for the EDI project in order to provide the partner with the right information coming from the right persons.

2. In companies rushed into EDI under any kind of pressure, there is often a lack of knowledge about EDI itself and the implications it will have on the company's organisation.

3. Lack of comprehension between both partners about the meaning of the messages/data elements.

4. Lack of comprehension of the business practices (company spirit) from both sides.

- V -

CONCLUSION

When redacting the roadmap, I had almost no practical experience about EDI. So it was realized from a reflexion about a synthesis of the litterature on the subject.

Now I am getting more experienced every day, while following real cases at DHL, and I realize that if I would have redacted the roadmap now, it would have been quiet different, the practice enlightening the theory.

Nevertheless, it was very interesting to confront the theoretical knowledge I had to practical cases. The most important things I learned about it are the real organizational impacts in terms of modifications in the way business is done.
I also learned to relativate other impacts quoted in the litterature such as potential benefits and costs.

The roadmap does not give all the solutions about EDI, it only formalises different positions about EDI and is therefore a tool for managers considering an EDI implementation.

But, if I really believe that the practical experience of most of the managers involved with EDI cannot be performant without a solid theoretical or methodological background, it is also obvious that EDI requires strong managerial capacities since it is always question of negotiating between parties having often very different political interests.

Besides the roadmap, the study cases provide with more informal information that cannot be found in the litterature. It can also serve as an example for managers, since it also shows the problems encountered during an EDI implementation, in parallel with the advantages.
Since these problems are kind of typical, they can be an important source to perform a sort of practical costs/benefits analysis.

Finally, this roadmap is not a definitive result, I hope it will trigger many reflexions, and that it will grow in function of specific problems and answers.

ANNEXES

TABLE OF ANNEXES

TEDIS PROGRAMME

EUROPEAN MODEL EDI AGREEMENT

INTRODUCTION

The TEDIS programme is a programme of DG XIII of the Commission of the European Communities, the first phase of which commenced in 1988 and ended in 1990. One of the aims of the first phase was to encourage the use of EDI throughout the Member States and particular attention has been paid to such matters as standardization, security, telecommunications software analysis, intersectorial coordination, and the legal aspects of the use of EDI. The second phase of the programme, which is expected to commence in the Summer of 1991, has been submitted to the Council and will continue and develop work undertaken to date.

The drafting of a European Model EDI Agreement has been one of the major legal initiatives commenced during the first phase of the TEDIS programme.

The Agreement is considered to be of particular importance because it provides a standard contractual framework for parties effecting trade by means of EDI, setting out their intentions and clarifying their rights and obligations. The Agreement is intended to propose a framework of provisions to be agreed between parties who have decided to conclude transactions (generally of a commercial nature), by EDI.

It is quite separate from a contract concluded by means of EDI. Both Have their own particular functions to perform; the Agreement setsout the terms of the method by which the transaction is effected just as the contract sets out the terms of the trade transaction itself.

Many agreements known as Interchange Agreements are already in existence but the aim of the proposed Agreement is to provide a model that may be used throughout Europe. This is perceived as an important step towards harmonisation for EDI which will be of particular significance with the advent of the single market. It is hoped that an agreement at a European level will avoid duplication of work throughout the Member States and reconcile some of the obstacles to EDI which result from differing legal systems.

The intention of the Agreement is to provide a full model but one which optionally be amended. Many firms may find that this model is comprehensive and requires little alteration but the parties are free to change it to reflect their individual needs.

In particular, the Agreement is a "ready-made" solution for small and medium-sized firms who may lack the resources to develop their own agreement but who wish to use EDI or who find themselves obliged to do so in order to continue trading with larger organizations.

The Agreement, which should be signed by the parties, will incorporate a separate document, the Technical Annex, which the parties should draft to set out the technical procedures and rules relating to the transmission of messages. The Agreement is intended to be self-explanatory but a commentary is provided to explain, in some instances, why certain clauses have been inserted or to suggest alternative options.

At present, EDI is mainly used in the business sector. The Agreement has, however, been drafted in fairly wide terms and the formalities and obligations relating specifically to business may be modified for the areas of, for example, administrative law, accountancy or consumer affairs. As the use of EDI progresses, the particular needs of these fields will be re-examined.

It is hoped that the Agreement will clarify the intentions of the parties and the conditions of the contract and will avoid potential disputes and litigation. As growth in the use of EDI continues, a secure legal structure is becoming increasingly important and a model interchange agreement for Europe is an important step in that direction.

. . . .

THIS EDI AGREEMENT IS MADE BETWEEN :

A.
Organization :
Registered office :
Authorised signature :

B.
Organization :
Registered office :
Authorised signature :

C.
Organization :
Registered office :
Authorised signature :

DATE AND PLACE :

THE ABOVE PARTIES HEREBY AGREE AS FOLLOWS :

Article 1.   Definitions.

For the purposes of the European EDI Agreement, hereinafter called the "Agreement", the following definitions shall apply :

UN/EDIFACT : The United Nations rules for Electronic Data Interchange for Administration, Commerce and Transport, comprising a set of internationally agreed standards, directories and guidelines for the electronic interchange of structured data, and in particular, interchange related to trade in goods and services, between independent computerised information systems.

EDI : Electronic Data Interchange is the transmission of data structured according to agreed message standards, between information systems, by electronic means.

EDI message : A coherent set of data, structured according to agreed message standards, for transmission by electronic means, prepared in a computer readable format capable of being automatically and unambiguously processed.

Technical Annex : The handbook, sometimes known as the "User Manual", which includes the technical, procedural and organizational rules and specifications for the exchange of EDI messages.

Acknowledgement of Receipt : A message acknowledging or rejecting, with error indication, the received interchange, functional froup or message.

Business Day : Any day except Saturday, Sunday or any declared public holiday in the intended place of receipt of an EDI message.

Digital Signature : A method of authentication by means of data appended to, or cryptographic transformation of a data unit, that allows a sender or a receiver of the data unit to prove the source and integrity of the data unit and to protect against forgery.

Article 2.   Object and Scope.

The provisions contained herein shall govern the exchange of EDI messages between parties.

The provisions of the Technical Annex form an integral part of the Agreement. Accordingly, the breach of any of the provisions contained within the Technical Annex shall be a breach of the Agreement itself.

Additional or alternative provisions may be agreed by the parties to the Agreement, which, when agreed in writing and signed, will be deemed to be part of the Agreement. Unless otherwise agreed in the Technical Annex, the adoption of updated versions of any of the relevant rules, procedures or specifications of the Agreement shall also be in writing and signed by the parties.

Article 3. Message Standards, Systems Operation and Method of Transmission.

3.1. *Message Standards.*

All EDI messages shall be transmitted in accordance with the UN/EDIFACT standards (ISO 9735, ISO 7372) and recommandations and their updated versions, as approved and published by the United Nations Economic Commission for Europe (UN/ECE) in the United Nations Trade Data Interchange Directory (UNTDID).

3.2. *Systems Operation.*

The parties shall provide and maintain, to the level specified in the Technical Annex, the equipment, software and services necessary to effectively transmit, receive, log and store EDI messages.

3.3. *Method of Transmission.*

The parties shall agree between themselves, a method of transmission and, if required, the choice of third party service providers.

3.4. *Specifications.*

All specifications and details regarding 3.1., 3.2. and 3.3. shall be as set out in the Technical Annex.

The parties shall conduct such tests as may be mutually defined from time to time to establish or monitor the adequacy of the standards, equipment, software, protocols, services or any of the relevant specifications for the purpose of this Agreement.

Article 4. Acknowledgement of Receipt of EDI messages.

4.1. In addition to the acknowledgements included in the telecommunication protocols, the sender of an EDI message may expressly request, from the receiver, an acknowledgement of receipt of the message. Alternatively the parties may define in the Technical Annex, the extent to which any messages sent and received will be subject to an acknowledgement of receipt.

A message to be acknowledged must not be acted upon before complying with the request for an ancknowledgement.

4.2. The acknowledgement of receipt of an EDI message shall be sent within such time as is defined in the Technical Annex unless otherwise agreed by the parties. In the event that no specific time limits have been agreed or stated in the Technical Annex, the acknowledgement shall be sent within one business day following the day of receipt of the message to be acknowledged.

If the sender does not receive the acknowledgement of receipt that he has requested or as agreed, within the time limit, he is entitled to consider the message to be null and void on so advising the receiver.

Article 5.   Processing of EDI messages.

The parties undertake to process or ensure that their system processes the EDI messages within any time limits specified in the Technical Annex, unless otherwise agreed between the parties.

Article 6.   Security of EDI messages.

6.1. The parties undertake to implement and maintain control and security procedures and measures necessary to ensure the protection of messages against the risk of unauthorized access, alteration, loss or destruction.

6.2. In addition to te elements of control relevant for EDI messages provided by the UN/EDIFACT rules, the parties shall agree on procedures or methods to ensure message verification. Message verification includes the identification, authentication and verification of the integrity and origin of a message by use an authentication mechanism such as a digital signature and/or any alternative security means or procedures to establish that a message is genuine. The specifications relating to message verification should be set out in the Technical Annex.

When message verification results in the rejection of, or the detection of an error in an EDI message, the receiver will inform the sender thereof within the time limits specified in the Technical Annex or agreed between the parties, provided the sender is identified, and will not act upon the message before receiving instructions to do so, from the sender.

6.3. The parties shall ensure that messages containing informations specified to be confidential by the sender or agreed to be confidential between the parties, are maintained in confidence and are not disclosed or transmitted to any unauthorised persons not used for any purposes other than those intended by the parties.

Messages shall not be regarded as containing confidential information to the extent that such information is in the public domain.

The same degree of confidentiality, as specified in this clause, shall be respected on any authorised disclosure to another person.

For security purposes the parties may agree to use a specific form of protection for certain messages such as a method of encryption or any other method agreed between the parties, as long as it is permitted by law. The same method shall be respected for any subsequent transmissions or retransmissions of a protected message.

Article 7.   Logging, recording and storage of EDI messages.

7.1. Each party will keep a complete and chronological record, the "data log", to store all EDI messages. These shall be stored by the sender in the transmitted format and by the receiver in the format in which they are received.

7.2. The data log shall be maintained unaltered and securily, for such time as agreed between the parties being not less than the period required by the applicable national law in the country of each party maintaining such a data log.

7.3. In addition to any relevant national legislative or regulatory requirements, when the data log is maintained in the form of electronic or computer records, the parties shall ensure that the recorded EDI messages are readily accessible and that they can be reproduced in a readable form and, if required, can be printed.

Article 8.   Intermediaries.

8.1. If a party uses the services of an intermediary in order to transmit, log or process EDI messages, that party shall be responsible towards the other party or parties for nay acts, failures or omissions of the intermediary in its provision of the services as though they were his own acts, failures or omissions, and for the purposes of this Agreement, the intermediary shall be deemed to be acting on behalf of this party.

8.2. If a party instructs any other party to use services of an intermediary for transmitting, logging or processing a message then the instructing party shall be responsible towards the other party for such intermediary's acts, failures or omissions.

8.3. Parties shall ensure that it is a contractual responsibility of the intermediary that no change is made to the substantive data content of the EDI messages to be re-transmitted and that such EDI messages are not disclosed to any unauthorized person.

Article 9.   Electronic transaction - Formation of Contract.

9.1. The parties accept that transactions are validly formed by exchange of EDI messages, and expressly waive any right to bring an action declaring the invalidity of a transaction concluded between themselves on the sole ground that the transaction took place by use of EDI.

9.2. Unless otherwise agreed, a contract made by EDI will be considered to be concluded at the time and the place where the EDI message constituting the acceptance of an offer is made available to the information system of the receiver.

Article 10.   Admissibility and evidential value of EDI messages.

In the event of a dispute, the parties shall not bring into the question the admissibility as evidence of messages exchanged and stored according to the provisions of this Agreement.

Unless otherwise agreed, EDI messages exchanged on the basis of the Agreement and in accordance with the provisions herein, shall have, between parties, a comparable evidential value to that accorded to written documents.

(If EDI messages are transmitted in accordance with an authentication procedure such as a digital signature, they shall have, between parties, a comparable evidential value to that accorded to a signed written document.)
This clause is optionnal.

Article 11.   Protection of Personal Data.

Where EDI messages containing personal data are sent or received in countries where no data protection legislation is in force, each party agrees, as a minimum standard, to respect the provisions of the Conventions N° 108 of 28.01.1981 of the Council of Europe of the protection of the individual with regard to the automatic processing of personal data.

Article 12.   Applicable Law and Dispute Resolution.

The applicable law governing the Agreement shall, in all respects, be .... law.
<div align="right">(to be completed by the parties)</div>

In the event of a conflict of law between the law of any contract being effected by EDI and the Agreement, the law of the contract will prevail.

Any dispute arising in connection with the provisions of this Agreement shall be settled by negotiation between the parties. If unsuccessful, and unless otherwise agreed, the dispute should be settled by such arbitration as the parties may decide.

Should a dispute be referred to Court, the competent court shall be those of the country, the law of which is applicable to this Agreement.

Article 13.   Effects, Terms and Severability.

This Agreement shall be effective from the date on which it is signed.

Any party may terminate this agreement by giving not less than one month notice either by registred post or by any other means agreed between the parties. The notice shal indicate the date when the Agreement will cease. Termination of the Agreement shall only affect transactions after that date.

Notwithstanding termination for any reason, the rights and obligations of the parties referred to in clauses 6, 7 and 11, shall survice termination.

Should any clause in this Agreement be deemed invalid, all other clauses shall remain in full force and effect.

UNCID

Uniform Rules of Conduct for Interchange of Trade Data by Teletransmission

Article 1.   Objective.

These rules aim at facilitating the interchange of trade data effected by teletransmission, through the establishment of agreed rules of conduct between parties engaged in such transmission.
Except as otherwise provided in these rules, they do not apply to the substance of trade data transfers.

Article 2.   Definitions.

For the purposes of these rules the following expressions used therein shall have the meaning set out below :

a)   Trade transaction : A specific contract for the purchase and sale or supply of goods and/or services and/or other performances between the parties concerned, identified as the transaction to which at trade data message refers;

b)   Trade data message : Trade data exchanged between parties concerned with the conclusion or performance of a trade transaction;

c)   Trade data transfer (hereinafter referred to as "transfer"): One or more trade data messages sent together as one unit of dispatch which includes heading and terminating data;

d)   Trade data interchange application protocol (TDI-AP) : An accepted method for interchange of trade data messages, based on international standards for the presentation and structuring of trade data transfers conveyed by teletransmission;

e)   Trade data log : A collection of trade data transfers that provides a complete historical record of trade data interchanged.

Article 3.   Application.

These rules are intended to apply to trade data interchange between parties using a TDI-AP. They may also, as appropriate, be applied when other methods of trade data interchange by teletransmission are used.

Article 4.   Interchange Standards.

The trade data elements, message structure and similar rules and communication standards used in the interchange should be those specified in the TDI-AP concerned.

Article 5.   Care.

a)   Parties applying a TDI-AP should ensure that their transfers are correct and complete in form, and secure, according to the TDI-AP concerned and should take care to ensure their capability to receive such transfers.

b)   Intermediaries in transfers should be instructed to ensure thet there is no unauthorised change in transfers required to be retransmitted and that the data content of such transfers is not disclosed to any unauthorised person.

Article 6.   Messages and Transfers.

a)   A trade data message may relate to one or more trade transactions and should contain the appropriate identifier for each transaction and means of verifying that the message is complete and correct according to the TDI-AP concerned.

b)   A transfer should identify the sender and the recipient; it should include means of verifying, either through the technique used in the transfer itself or by some other manner provided by the TDI-AP concerned, the formal completeness and authenticity of the transfer.

Article 7.   Acknowledgement of a Transfer.

a)   The sender of a transfer may stipulate that the recipient should acknowledge receipt thereof. Acknowledgement may be made through the teletransmission technique used or by other means provided through the TDI-AP concerned.
A recipient is not authorised to act on such transfer until he has complied with the request of the sender.

b)   If the sender has not received the stipulated acknowledgement within a reasonable or stipulated time, he should take action to obtain it. If, despite such action, an acknowledgement is not received within a further period of reasonable time, the sender should advise the recepient accordingly by using the same means as in the first transfer or other means if necessary and, if he does so, he is authorised to assume that the original transfer has not been received.

c)   If a transfer received appears not to be in good order, correct and complete in form, the recepient should inform the sender thereof as soon as possible.

d)   If the recepient of a transfer understands that it is not intended for him, he should take reasonable action as soon as possible to inform the sender and should delete the information contained in such transfer from his system, apart from the trade data log.

Article 8.   Confirmation of Content.

a)   The sender of a transfer may request the recepient to advise him wether the content of one or more identified messages in the transfer appears to be correct in substance, without prejudice to any subsequent consideration or action that the content may warrant. A recipient is not authorised to act on such transfer until he has complied with the request of the sender.

b)   If the sender has not received the requested advice within a reasonable time, he sould take action to obtain it. If, despite such action, an advice is not received within a further period of reasonable time, the sender should advise the recepient accordingly and, if he does so, he is authorised to assume that the transfer has not been accepted as correct in substance.

Article 9.   Protection of Trade Data.

a)   The parties may agree to apply special protection, where permissible, by encryption or by other means, to some or all data exchanged between them.

b)   The recipient of a transfer so protected should assure that at least the same level of protection is applied for any further transfer.

Article 10.   Storage of Data.

a)   Each party should ensure that a complete trade data log is maintained of all transfers as they were sent and received, without any modification.

b)   Such trade data log may be maintained on computer media provided that, if so required, the data can be retrieved and presented in readable form.

c)   The trade data log referred to in paragraph (a) of this article should be stored unchanged either for the period of time required by national law in the country of the party maintaining such trade data log or for such longer period s may be agreed between the parties or, in the absence of any requirement of national law or agreement between the parties, for three years.

d)   Each party shall be responsible for making such arrangements as may be necessary for the data referred to in paragraph (b) of this article to be prepared as a correct record of the transfers as sent and received by that party in accordance with paragraph (a) of this article.

e)   Each party must see to it that the person responsible for the data processing system of the party concerned, or such third party as may be agreed by the parties or required by law, shall, where so required, certify that the trade data log and any reproduction made from it is correct.

Article 11.   Interpretation.

Queries regarding the correct meaning of the rules should be referred to the International Chamber of Commerce, Paris.

Example of the structure of a Technical Annex

Exhibit 1.   Adoption of Updated Versions of Rules.

    Particular agreements

Exhibit 2.   Message Standards.

    Specifications and details

Exhibit 3.   System Operations.

    Specifications and details

Exhibit 4.   Method of Transmission.

    Specifications and details

Exhibit 5.   Tests.

    Specifications and details

Exhibit 6.   Acknowledgement of Receipt.

    When ?
    Time limit

Exhibit 7.   Confirmation of Contents.

    When ?
    Time limit

Exhibit 8.   Processing of EDI Messages.

    Time limit

Exhibit 9.   Security Procedures.

    Specifications and details

Exhibit 10.   Storage of EDI Messages.

    Time limit

Exhibit 11.   Applicable Law and Dispute Resolution.

    Applicable law
    Arbitration

Exhibit 12.   Effects and Terms of the Agreement.

CUSCAR / UNSM - Customs Cargo Report Message

Segment Table

TAG	NAME	S	REPT	S	REPT
UNH	Message Header	M	1		
BGM	Beginning of Message	M	1		
DTM	Date/time/period	C	1		
CUX	Currencies	C	1		
MOA	Monetary amount	C	9		
FTX	Free text	C	9		
LOC	Place/location identification	C	99		

Segment Group 1   C   99
A group of segments specifying control numbers used by Customs related to the shipment, and related date/times.

RFF	References	M	1		
DTM	Date/time/period	C	9		

GIS   General indicator   C   9
A segment to specify processing indicators such as import/export/transit indicator, container quarantine indicator and onward movement type indicator

CPI   Charge payment instructions   C   9
A segment to specify the charge category type

Segment Group 2   C   9
A group of segments to identify details of transport, references, locations and associated date/times

TDT	Details of transport			M	1
RFF	References			C	9
LOC	Place/location identification	C	9		
DTM	Date/time/period			C	9

Segment Group 3 : NAD+4+RFF
A group of segments to identify the parties, contacts and related references

Segment Group 3		C	99

.NAD Name and address	M	1	

.Segment Group 4   C   9
 A group of segments identifying a contact and its communications related to the party

CTA Contact information	M	1
COM Communication contacts	C	1

.RFF References	C	9

Segment Group 5 : GTD+PAC+HIN+PCI+FTX+6+MEA+RFF+SGP+DGS+7
A group of segments pecifying goods item details including number and type of packages, handling instructions, quantity variances, package identification, goods decription and related references, measurements, references, indicators for split goods placement and indicator for dangerous goods.

Segment Group 5		C	99

.GID Goods item details	M	1
.PAC Package	C	3
.HIN Handling instructions	C	1
.PCI Package identification	C	9
.FTX Free text	C	9

.Segment Group 6   C   2
 A group of segments to specify the quantity manifested, quantity landed
 and reason for change

QTY Quantity	M	1
FTX Free Text	C	1

.MEA Measurements	C	99
.RFF Reference	C	9
.SGP Split goods placement	C	99
.DGS Dangerous goods	C	9

.Segment Group 7   C   9
A group of segments specifying general indicators and documentary
requirements
GIS   General indicator   M   1
DOC   Documents/message details   C   9

Segment Group 8   C   999
A group of segments to specify details of the equipment including information related to
measurements, dimensions, seals, empty container responsible party, container quarantine
indicator, as well as temperature/range and use indicator
EQD   Equipment details   M   1
MEA   Measurements   C   9
DIM   Dimensions   C   9
SEL   Seal number   C   9
NAD   Name and address   C   9
GIS   General indicator   C   9
TMP   Temperature   C   1

CNT   Control totals   C   1
A segment to specify total consignment quantity and weight

AUT   Authentication result   C   1
A segment to specify the results of the application of an authentication procedure,
including the authenticity of sender to ensure integrity of data

UNT   Message trailer   M   1
A service segment to end the message and check the completeness of the message

CUSDEC / UNSM - Customs Declaration Message

Segment Table

TAG	NAME	S	REPT	S	REPT

1. Heading Section

UNH	Message Header	M	1		
BGM	Beginning of Message	M	1		
CST	Customs status of goods	C	1		

Segment Group 1+2+3
A group of segments used to identify various references, manifest quantities and package identities relative to the whole message

.Segment Group 1				C	99
RFF	Reference	M	1		

.Segment Group 2				C	10
PAC	Package	M	1		

.Segment Group 3				C	999
PCI	Package identification	M	1		
GIN	Goods identity number	C	1		

LOC	Place/location identification	C	20		

A segment to identify a place or location relevant to the entire message

DTM	Date/time/period	C	10		

A segment to specify the dates, times or periods relevant to the whole message

TDT	Details of transport	C	5		

A segment indicating the mode, means and identification of the transport used

GIS	General indicator	C	25		

A segment to identify the various indicators required by a customs system (special programs, release certification, etc.)

DCR Documentary Requirement   C   10

A segment to identify documentary requirements where they are needed as supporting information for the entire message

Segment Group 4   C   10

A group of segments used to identify the parties relevant to the whole message, with their related references, contacts and communication numbers

NAD	Name and adress	M	1
RFF	Reference	C	10
CTA	Contact Information	C	1
COM	Communication Contacts	C	1

FII   Financial Institution Information   C   1

A segment to identify the financial and banking data where this is particular to the whole declaration

Segment Group 5   C   1

A group of segments used to identify the terms of delivery pertinent to the entire message

TOD	Terms of delivery	M	1
FTX	Free text	C	1

MEA   Measurements   C   5

Segment offering various measurement factors where these are required for the whole declaration

Segment Group 6   C   25

A group of segments offering monetary amounts and their exchange rates, when required for the whole declaration

MOA	Monetary amount	M	1
CUX	Currencies	C	1

UNS   Section Control   M   1

A service segment placed after the last user segment to indicate the end of the heading section

2.1. Commercial Group

Segment Group 7 : DMS+8+9+10+11+12+13+14+15+16+17+18+19+20+21+22

A group of segments and nested loops to provide all commercial data pertinent to the customs declaration

Segment Group 7	C	999
.DMS Document/Message summary	M	1

.Segment Group 8   C   5
A group of segments used to report various monetary amounts that pertain
to the whole commercial document

MOA Monetary Amount	M	1
CUX Currencies	C	1

.Segment Group 9   C   1
A group of segments to identify the terms of delivery pertinent to the
whole commercial document

TOD Terms of delivery	M	1
FTX Free text	C	1

.Segment Group 10   C   10
A group of segments to identify the parties and other related documentary
requirements associated with the whole commercial document.

NAD Name and adress	M	1
DCR Documentary requirements	C	10

.Segment Group 11+12
A segment group and a nested loop used to identify the number, type, and
contents of the shipping units associated with the entire commercial
document

..Segment Group 11   C   10

PAC Package	M	1

..Segment Group 12   C   999

PCI Package identification	M	1
GIN Goods identity number	C	1

.Segment Group 13   C   5
A segment group used to identify the payment terms for the whole
commercial document

PAT Payment terms basis	M	1
FTX Free text	C	1
.MEA Measurements	C	5

.Segment Group 14   C   10

A segment group used to identify allowances, charges, or adjustments for the whole commercial document

ALC Allowance or charge	M	1
CUX Currencies	M	1

.Segment Group 15   C   9999

A group of segments and nested loops used to report line item details for a commercial document

LIN Line item	M	1
MEA Measurements	C	5
QVA Quantity variances	C	5
DCR Documentary requirements	C	10

.Segment Group 16   C   10

A segment group used to identify allowances, charges, or adjustments related to the commercial document line

ALC Allowance or charge	M	1
CUX Currencies	M	1

.Segment Group 17   C   1

A group of segments to identify the terms of delivery pertinent to a commercial document line

TOD Terms of delivery	M	1
FTX Free text	C	1

.Segment Group 18   C   5

A segment group used to identify the payment terms for a commercial document line

PAT Payment terms basis	M	1
FTX Free text	C	1

.NAD Name and adress	C	10

.Segment Group 19   C   5

A segment group used to provide a commercial description for a documented commodity

IMD Item description	M	1
FTX Free text	C	1

.Segment Group 20+21
A segment group and nested loop used to identify the number, type, and contents
of the packing units associated with the commercial document line

..Segment Group 20			C	10
PAC Package	M	1		

..Segment Group 21			C	999
PCI Package identification	M	1		
GIN Goods identity number	C	1		

.GIR Goods identification related numbers	C	9999	

.Segment Group 22   C   10
A group of segments used to report various monetary amounts that pertain
to the commercial document line

MOA Monetary amount	M	1
CUX Currencies	C	1

2.2. Item Detail

Segment Group 23 : CST+24+25+26+27+28+29+30+31+32+33+34+35
A group of segments and nested loops used to provide detailed information for a single
customs line item of a customs declaration

Segment Group 23		C	9999

.CST Customs status of goods	M	1

.Segment Group 24+25
A segment group and a nested loop used to identify the number, type, and contents
of the packing units associated with the customs line item

..Segment Group 24			C	10
PAC Package	M	1		

..Segment Group 25			C	999
PCI Package identification	M	1		
GIN Goods identity number	C	1		

.LOC Place/location identification	C	5
.DTM date/time/period	C	5

.Segment Group 26   C   25
A group of segments used to report various monetary amounts that pertain
to the customs line item
MOA Monetary amount   M   1
CUX Currencies   C   1

.MEA Measurements   C   20
.TAX Duty/tax/fee details   C   10

.Segment Group 27+28
A group of segments and nested loop used to identify references, descriptions,
and monetary amounts associated with a customs line item

..Segment Group 27   C   999
 RFF Reference   M   1
 GIN Goods identity number   C   99

..Segment Group 28   C   1
 A segment group used to provide a commercial description for a documented commodity
 that is associated with this customs line item
 IMD Item description   M   1
 FTX Free text   C   5

..MOA Monetary amount   C   1
..NAD Name and address   C   5

.Segment Group 29   C   25
A segment group used to report documentary requirements of particular government
agencies, with the optional name and address of the agency involved
DCR Documentary requirements   M   1
NAD Name and address   C   5

.Segment Group 30   C   1
A group of segments to identify the terms of delivery pertinent to a customs line
TOD Terms of delivery   M   1
FTX Free text   C   1

.FII   Financial Institution Information   C   1

.Segment Group 31		C	1

A segment group used to report the customs description of merchandise entered on a customs line

GDS	Goods description	M	1
FTX	Free text	C	1

.Segment Group 32		C	25

A group of segments used to provide special indicators or value data related to the customs line item

GIS	General indicator	M	1
VLN	Customs valuation declaration	C	1

.Segment Group 33		C	1

A group of segments used to report and account for variances in the amount commercially documented and the amount entered

QVA	Quantity variances	M	1
RFF	Reference	C	1

.Segment Group 34+35

A group of segments and nested loop used to report customs data requirements associated with the reporting of a secondary tariff number

..Segment Group 34		C	10
GIR	Goods identification related numbers	M	1
GIS	General indicator	C	10

..Segment Group 35		C	10

A group of segments used to report various monetary amounts that pertain to a secondary tariff number within a customs line

MOA	Monetary amount	M	1
CUX	Currencies	C	1

..NAD	Name and address	C	1
..TAX	duty/tax/fee details	C	10
..TCR	Documentary requirements	C	5
..MEA	Measurements	C	5

UNS	Section control	M	1

End of the detail section

3. Summary Section

TAX   Duty/tax/fee details   C   15
A segment identifying the totals and duty/tax/fee levels due for the declaration and
summarizing this total by each accounting code included in the total due

CNT   Control totals   C   1
A segment giving specified control totals. For example, the number of commercial
documents, values and packages reported in the message

AUT   Authentication result   C   1
A segment permitting the verification of the authenticity of the sender and the integrity of
the data

UNT   Message trailer   M   1
A service segment ending a message, giving the total number of segments in the message
and the message reference number of the message

CUSREP / UNSM - Customs Report Message

Segment Table

TAG	NAME	S	REPT	S	REPT
UNH	Message Header	M	1		
BGM	Beginning of Message	M	1		
DTM	Date/time/period	C	9		
QTY	Quantity	C	9		
DCR	Documentary requirement	C	9		
FTX	Free text	C	9		

Segment Group 1   C   99
A group of segments to identify voyage itinerary

		S	REPT
LOC	Place/location identification	M	1
DTM	Date/time/period	C	9

MEA   Measurements   C   9
A segment to specify the conveyance's gross tonnage, net tonnage, summer dead waight tonnage, containerized/non-containerized tonnage and overall length

RFF   References   C   9
A segment to specify references

GIS   General indicator   C   9
A segment to specify the import/export/transit indicator, prohibited/ restricted goods indicator and unregistered spaces indicator

TAX   Duty/tax/fee details   C   9
A segment to specify tonnage taxes and light dues payable

Segment Group 2 : NAD+3+RFF
A group of segments to identify names, addresses, contacts and references relating to the message

Segment Group 2   C   99

.NAD   Name and address   M   1

.Segment Group 3		C	9
CTA Contacts information	M	1
COM Communication contacts	C	1

.RFF References	C	9

Segment Group 4 : TDT+5
A group of segments to indicate details related to each leg of transport

Segment Group 4		C	99

.TDT Details of transport	M	1

.Segment Group 5   C   99
A group of segments to specify locations related to each leg of transport, associated dates/times and quantity (tonnage) of cargo loaded/unloaded at each port

LOC Place/location identidication	M	1
DTM Date/time/period	C	9
QTY Quantity	C	9

Segment Group 6   C   999
A group of segments to identify equipment details and number of equipment units

EQD Equipment details	M	1
EDN Number of units	C	1

AUT Authentication result   C   1
A segment to specify results of the application of an authentication procedure

UNT Message trailer   M   1
A service segment to end the message and check the completeness of the message

CUSRES / UNSM - Customs Response

Segment Table

TAG	NAME	S	REPT	S	REPT
UNH	Message Header	M	1		
BGM	Beginning of Message	M	1		

Segment Group 1   C   50

A segment group used to identify the location and specifics of an application error condition within a message to which CUSRES is a response

ERP	Error point details	M	1		
ERC	Application error information	C	50		

NAD   Name and address   C   5

A segment to identify the parties relevant to the message (agent, importer, etc.)

LOC   Place/location identification   C   5

A segment to identify the places relevant to the message (port of entry, location of goods, etc.)

DTM   Date/time/period   C   5

A segment to identify the relevant dates and times in the message (payment date, time of arrival, etc.)

Segment Group 2+3

A group of segments identifying particular shipping or packing units reported in an earlier declaration which are now subject to customs action (examination, release, etc.)

.Segment Group 2   C   999

PAC	Package	M	1		

.Segment Group 3   C   1

PCI	Package identification	M	1		
GIN	Goods identity number	C	1		

TAX   Duty/tax/fee details   C   50

Following customs computation, this segment offers the totals for tax, fees, and duties

declared and due for payment

Segment Group 4+5
A segment group furnishing the item taxes, fees, and duties (with the associated details), following their computation by customs based on data provided by the declarant

.Segment Group 4			C	9999
RFF Reference	M	1		
.Segment Group 5			C	10
MOA Monetary amount	M	1		
CUX Currencies	C	1		
MEA Measurements	C	20		
TAX Duty/tax/fee details	C	20		

GIS   General indicator   C   10
A segment to identify the various customs processing indicators (cargo released, cargo held, examination required, etc.)

DCR   Documentary requirements   C   5
A segment to identify documentary requirements where they are needed as supporting information for customs processing

FTX   Free text   C   5
A segment permitting the transfer of unsolicited clear text

AUT   Authentication result   C   1
A segment permitting the verification of the authenticity of the sender and the integrity of the data

UNT   Message trailer   M   1
A service segment ending a message, giving the total number of segments in the message and the message reference number of the message

IFTMFR
International Forwarding and Transport Message Framework

Segment Table

TAG	NAME	S	REPT	S	REPT

1. Heading Section

UNH	Message Header	M	1		
BGM	Beginning of Message	M	1		

DTM Date/time/period   C   9
A segment to indicate a date and time applying to the whole message (date and time of document issue, etc.)

TSR Transport service requirements   C   9
A segment to identify the contract, conditions of carriage, services, and priority requirements for the transport

CUX Currencies   C   9
A segment to indicate default currencies and exchange rates

MOA Monetary amount   C   99
A segment to indicate a monetary value for entire consignments (insured value, invoice amount, disbursements, etc.)

TOD Terms of delivery   C   1
A segment to specify terms of delivery, and related locations

FTX Free text   C   99
A segment to specify free form or processable supplementary information, such as status of transport, remarks to be printed on the transport documents (where required), consignment remarks, etc., or any other additional information

CTA Contact Information   C   1
A segment to identify a person or department to whom communication should be directed

COM Communication contacts   C 1
A segment to identify the communication numbers of persons or departments to whom communication should be directed

Segment Group 1   C 99
A group of segments to specify locations and related date(s)/time(s) which apply to the entire message, e.g. place of transhipment
 LOC Place/location identification   M 1
 DTM Date/time/period   C 9

Segment Group 2   C 99
A group of segments containing a reference and constants which apply to the entire message
 RFF Reference   M 1
 DTM Date/time/period   C 9

Segment Group 3   C 9
A group of segments to identify customs and other governmental procedures and required documents
 GOR Governmental Requirements   M 1
 DOC Document/message details   C 9

Segment Group 4   C 9
A group of segments to indicate charge methodology which applies to the entire message
 CPI Charge payment instructions   M 1
 LOC Place/location identification   C 9
 MOA Monetary amount   C 1

Segment Group 5   C 99
A group of segments to specify charge associated with the transport
 TCC Transport charge/rate calculations M 1
 LOC Place/location identification   C 1
 FTX Free text   C 1
 CUX Currencies   C 1

Segment Group 6   C   99
A group of segments to indicate details of the movement of goods such as mode and
means of transport, locations, departure, and arrivale date(s) and time(s)
TDT Details of transport   M   1
RFF Reference   C   9
TSR Transport service requirements   C   9
LOC Place/location identification   C   99
DTM Date/time/period   C   9

Segment Group 7 : NAD+LOC+8+DOC+MOA+TCC+9+10
A group of segments to identify a party, related references, locations contacts, required
documents, and charges to be paid by the party

Segment Group 7   C   99

.NAD Name and address   M   1
.LOC Place/location identification   C   9

.Segment Group 8   C   9
A group of segments identifying a contact and its communications related
to the party
CTA Contact information   M   1
COM Communication contacts   C   1

.DOC Document/message details   C   9
.MOA Monetary amount   C   1
.TCC Transport charge/rate calculations   C   99

.Segment Group 9   C   9
A group of segments to specify a reference related to the party
RFF Reference   M   1
DTM Date/time/period   C   9

.Segment Group 10   C   9
A group of segments to identify the charge and its amount to be payed by
the party
CPI   Charge payment instructions   M   1
LOC Place/location identification   C   9
MOA Monetary amount   C   1

2. Detail Section

Segment Group 11 :
GID+HIN+12+LOC+MOA+TMD+PCI+PIA+FTX+13+14+15+TMP+16+17+18+20+22+23
A group of segments to describe the goods items for which transport is undertaken

Segment Group 11			C	999
.GID Goods item details	M	1		
.HIN Handling instructions	C	1		
.Segment Group 12			C	9
A group of segments to identify different places of collection and/or delivery for the goods item				
NAD Name and address	M	1		
DTM Date/time/period	C	1		
.LOC Place/location identification	C	9		
.MOA Monetary amount	C	9		
.TMD Transport movement details	C	1		
.PCI Package identification	C	9		
.PIA Additional product ID	C	9		
.FTX Free text	C	9		
.Segment Group 13			C	9
A group of segments to describe the goods item				
GDS Goods description	M	1		
FTX Free text	C	1		
.Segment Group 14			C	99
A group of segments to specify a measurement applicable to a goods item				
MEA Measurements	M	1		
EQN Number of units	C	1		
.Segment Group 15			C	99
A group of segments to specify dimensions applicable to a goods item				
DIM Dimensions	M	1		
EQN Number of units	C	1		
.TMP Temperature	C	1		

.Segment Group 16			C	9
A group of segments to identify references to a goods item				
RFF Reference	M	1		
DTM Date/time/period	C	9		

.Segment Group 17			C	9
A group of segments to specify documents and associated date(s) and time(s) for a goods item				
DOC Document/message details	M	1		
DTM Date/time/period	C	9		

Segment Group 18 : TPL+19
A group of segments to identify transport details and associated measurements for a goods item. This group may be repeated to indicate the different phases of the movement

.Segment Group 18			C	9
..TPL Transport placement	M	1		

..Segment Group 19			C	9
A group of segments to identify measurements				
MEA Measurements	M	1		
EQN Number of units	C	1		

Segment Group 20 : SGP+21
A group of segments to specify the distribution of a goods item among the transport equipment

.Segment Group 20			C	999
..SGP Split goods placement	M	1		

..Segment Group 21			C	9
A group of segments to identify measurements				
MEA Measurements	M	1		
EQN Number of units	C	1		

.Segment Group 22			C	99
A group of segments to specify charge associated with the goods item				
TCC Transport charge/rate calculations	M	1		
LOC Place/location identification	C	9		

Segment Group 23 : DGS+FTX+24+25+26
A group of segments to specify dangerous goods details related to the goods item.
One goods item may be in different dangerous goods classes

.Segment Group 23			C	9

..DGS Dangerous goods	M	1
..FTX Free text	C	99

..Segment Group 24			C	9

A group of segments to identify a contact to whom communication regarding
the dangerous goods can be directed

CTA Contact information	M	1
COM Communication contacts	C	1

..Segment Group 25			C	9

A group of segments to identify dangerous goods measurements

MEA Measurements	M	1
EQN Number of units	C	1

Segment Group 26 : SGP+27
A group of segments to specify the distribution of the dangerous goods
among the transport equipment

..Segment Group 26			C	999

...SGP Split goods placement	M	1

...Segment Group 27			C	9

A group of segments to identify dangerous goods measurements

MEA Measurements	M	1
EQN Number of units	C	1

Segment Group 28 : EDQ+EQN+TMD+MEA+DIM+SEL+TPL+FTX+TCC+29+30
A group of segments to specify equipments in which goods are transported

Segment Group 28		C	999
.EDQ Equipment details	M	1	
.EQN Number of units	C	1	
.TMD Transport movement details	C	1	
.MEA Measurements	C	9	
.DIM Dimensions	C	9	
.SEL Seal number	C	99	
.TPL Transport placement	C	9	
.FTX Free text	C	9	
.TCC Transport charge/rate calculations	C	99	

.Segment Group 29   C   9
A group of segments to identify different equipment pick-up or drop-off places

NAD Name and address	M	1
DTM Date/time/period	C	1

.Segment Group 30   C   99
A group of segments to specify the attached equipment and related number of pieces

EQA Attached equipment	M	1
EQN Number of units	C	1

3. Summary Section

CNT Control totals	C	9

A segment to specify totals for consignment

UNT Message trailer	M	1

End of message

INVOIC / UNSM - Invoice Message

Segment Table

TAG	NAME	S	REPT	S	REPT

1. Heading Section

UNH	Message Header	M	1		
BGM	Beginning of Message	M	1		

RFF	References	C	10		

A segment for referencing documents relating to the whole message (purchase orders, despatch advise, import/export license, etc.)

CTA	Contacts	C	10		

A segment for identifying contacts relevant to the whole message

Segment Group 1				C	20

A Group of segments identifying names, addresses and locations, contacts and references, and required supporting documents relevant to the whole invoice, as well as providing financial institution information for a party

NAD	Name and address	M	1		
LOC	Location identification	C	5		
RFF	References	C	10		
DOC	Documents required	C	5		
CTA	Contacts	C	5		
FII	Financial Institution Info.	C	5		

DTM	Date/time/period	C	5		

A segment specifying the date, and when relevant, the time of an activity identified by the date/time qualifier, e.g. shipped on date

Segment Group 2				C	5

A group of segments specifying tax related information, and when necessary, the location(s) to which that tax information relates

TRI	Tax related information	M	1		
LOC	Location identification	C	5		

Segment Group 3   C   5
A group of segments specifying the currencies and related dates/periods valid for the whole invoice
CUX Currencies   M   1
DTM Date/time/period   C   5

ALI   Additional information   C   1
A segment indicating special conditions related to the total invoice owing to origin, customs preference, or other commercial factors

FTX   Free text   C   5
A segment with free text information, in coded or clear form, to give further clarification, when required, to the whole invoice.

PAT   Payment terms basis   C   5
A segment indicating the payment terms, date/time basis, and additional terms valid for the invoice
PAI   Payment instructions   C   1
A segment specifying conditions of payment, guarantee and method of payment for the whole invoice

Segment Groups 4+5
Groups of segments specifying details of the mode of transport, location, and date/time of departure and destination relating to the whole invoice

.Segment Group 4   C   10
 TDT Details of transport   M   1

.Segment Group 5   C   2
 LOC Location identification   M   1
 DTM Date/time/period   C   2

TOD   Terms of delivery   C   5
A segment indicating the terms of delivery and transfer for the whole invoice

Segment Group 6   C   1000
A group of segments identifying the packaging, physical dimensions, and marks and numbers for goods referenced by the whole invoice
 PAC Package   M   1
 MEA Measurements   C   5
 PCI   Package identification   C   5

UNS	Section control	M	1	

End of section

2. Detail Section

Segment Group 7 :
LIN+RFF+PIA+IMD+8+9+10+SDQ+ACA+QVA+ALI+DTM+PAT+FTX+11+12+13+14+
GIN+GIR+TOD+15
A group of segments and nested groups providing details of the individual invoiced items

Segment Group 7			C 200 000	
.LIN	Line item	M	1	
.RFF	References	C	10	
.PIA	Additional product id	C	10	
.IMD	Item description	C	10	

.Segment Group 8			C	10

A group of segments identifying the packaging, physical dimensions, and
marks and numbers for goods referenced in the invoice line item

PAC	Package	M	1	
MEA	Measurements	C	10	
PCI	Package identification	C	10	

.Segment Group 9			C	5

A group of segments specifying tax related information, and when necessary the
locations, to which that tax information relates

TRI	Tax related information	M	1	
LOC	Location identification	C	5	

.Segment Group 10			C	20

A group of segments identifying names, addresses, and locations, contacts and references,
and required supporting documents relevant to the invoice line item

NAD	Name and address	M	1	
LOC	Location identification	C	5	
RFF	References	C	5	
DOC	Documents required	C	5	
CTA	Contacts	C	5	

.SDQ	Destination quantity	C	10	
.ACA	Alternative currency amount	C	5	
.QVA	Quantity variances	C	5	

.ALI	Additional information	C	5
.DTM	Date/time/period	C	5
.PAT	Payment terms basis	C	5
.FTX	Free text	C	5

.Segment Group 11   C   10

A group of segments specifying allowances and charges for the invoiced line item.
Where relevant, tax and alternate currency details are to be indicated in the TRI and ACA
segments

ALC	Allowances and charges	M	1
ALI	Additional information	C	5
TRI	Tax related information	C	5
ACA	Alternative currency amount	C	5
FTX	Free text	C	5

.Segment Group 12   C   20

A group of segments specifying additional pricing information used in
conjunction with invoiced line item

API	Additional price information	M	1
FTX	Free text	C	5

Segment Groups 13+14

Groups of segments specifying details of the mode of transport, location, and date/time of
departure and destination relating to the invoiced line item

..Segment Group 13   C   10

TDT	Details of transport	M	1

..Segment Group 14   C   10

LOC	Location identification	M	1
DTM	Date/time/period	C	5

.GIN	Goods identity number	C	100
.GIR	Goods id. related numbers	C	100
.TOD	Terms of delivery	C	5

Segment Group 15 :
SID+RFF+PIA+IMD+16+17+18+SDQ+ACA+QVA+ALI+DTM+PAT+FTX+19+20+21+
22+GIN+GIR+TOD
A group of segments providing details of individual sub-items to an invoiced line item

.Segment Group 15	C	200
..SID Sub-line item details (config.)	M	1
..RFF References	C	10
..PIA Additional product id.	C	10
..IMD Item description	C	10
..Segment Group 16	C	10
PAC Package	M	1
MEA Measurements	C	10
PCI Package identification	C	10
..Segment Group 17	C	5
TRI Tax related information	M	1
LOC Location identification	C	5
..Segment Group 18	C	20
NAD Name and address	M	1
LOC Location identification	C	5
RFF References	C	5
DOC Documents required	C	5
CTA Contacts	C	5
..SDQ Destination Quantity	C	10
..ACA Alternative Currency amount	C	5
..QVA Quantity variances	C	5
..ALI Additional information	C	5
..DTM Date/time/period	C	5
..PAT Payment terms basis	C	5
..FTX Free text	C	5
..Segment Group 19	C	10
ALC Allowances and charges	M	1
ALI Additional information	C	5
TRI Tax related information	C	5
ACA Alternative currency amount	C	5
FTX Free text	C	5

			C	20
..Segment Group 20				
API Additional price information	M	1		
FTX Free text	C	5		

			C	10
..Segment Group 21				
TDT Details of transport	M	1		

			C	10
..Segment Group 22				
LOC Location identification	M	1		
DTM Date/time/period	C	5		

..GIN Goods identity number	C	100
..GIR Goods id. related number	C	100
..TOD Terms of delivery	C	5

UNS Section control	M	1

End of section

3. Summary Section

TMA Total message amount	M	1

A segment giving the total amounts for the whole invoice message

ACT Altern. currency total amount	C	10

A segment specifying the summary amount and currency in a currency different from the message base currency

FTX Free text	C	5

A segment with free text information, to give further clarification, when required, for the summary section only

Segment Group 23	C	10

A group of segments specifying allowances and charges for the whole invoice. Where relevant, allowance, charge, tax, and currency details are to be indicated in the ALI, TRI and ACA segments.

ALC Allowances and charges	M	1
ALI Additional information	C	5
TRI Tax related information	C	5
ACA Alternative currency amount	C	5
FTX Free text	C	5

TXS   Tax subtotals   C   10
A segment specifying the invoice amounts subject to various tax types/rates

VAL   Valuation   C   3
A segment specifying valuation of goods or services for customs, insurance, transport etc.

Segment Group 24   C   25
A group of segments specifying amounts already invoiced and references to pre-payment
invoices or to other pre-payment instructions related to the invoice
PRP   Prepayment   M   1
RFF   References   C   1

CNT   Control totals   C   5
A segment by which control totals may be provided by the sender for checking by the
receiver

UNT   Message trailer   M   1
End of message

UN/EDIFACT Messages

September 1992

A package of changes in message status, including 48 new messages for information (status 0), was approved by the formal meeting of the United Nations Working Party which governs work on UN/EDIFACT in September 1992.

The current list of the UN/EDIFACT messages together with their statuses is given below. The messages cover all the major areas of UN/EDIFACT development, with significant messages for trade, transport, customs and finance at status 2.

Status Level of Activity

0 Draft Document - work is progressing but has not reached an advanced stage. Document issued for information only.

1 Draft Recommendation - document has been approved by WP.4 for trial use. (equivalent to Draft Standard)

2 Recommendation - document has been approved by WP.4 as a formal recommendation and registered. (equivalent to Standard)

Messages at Status 2

CREADV	UNSM - Credit Advice Message
CREEXT	UNSM - Extended Credit Adice Message
CUSCAR	UNSM - Customs Cargo Report Message
CUSDEC	UNSM - Customs Declaration Message
CUSREP	UNSM - Customs Report Message
CUSRES	UNSM - Customs Response Message
DEBADV	UNSM - Debit Advice Message
IFTMAN	UNSM - Arrival Notice Message
IFTMBC	UNSM - Booking Confirmation Message
IFTMBF	UNSM - Firm Booking Message

IFTMBP	UNSM - Provisional Booking Message
IFTMCS	UNSM - Instruction Contract Status Message
IFTMIN	UNSM - Instruction Message
INVOIC	UNSM - Invoice Message
ORDERS	UNSM - Purchase Order Message
PAYEXT	UNSM - Extended Payment Order Message
PAYORD	UNSM - Payment Order Message
REMADV	UNSM - Remittance Advice Message

Total = 18

Messages at Status 1

BANSTA	Banking Service Message
BAPLIE	Bayplan : Occupied and Empty Locations Message
BAPLTE	Bayplan : Total Numbers Message
CONDPV	Construction - Direct Payment Valuation
CONEST	Construction - Establishment of Contract
CONITT	Construction - Invitation to Tender
CONPVA	Construction - Payment Valuation
CONQVA	Construction - Quantity Valuation
CONTEN	Construction - Tender
CONTRL	Control Message (Acknowledgement/rejection Advice Message)
DELFOR	Delivery Schedule Message
DELJIT	Just in Time Delivery Schedule Message
DESADV	Despatch Advice Message
DIRDEB	Direct Debit Message
DOCADV	Documentary Credit Advice
DOCAPP	Documentary Credit Application Message
DOCINF	Documentary Credit Issuance Information
IFCSUM	Forwarding and Consolidation Summary Message
IFTSTA	International Multimodal Status Report
INVRPT	Inventory Report
ORDCHG	Purchase Order Change Message
ORDRSP	Purchase Order Response Message
PARTIN	Party Information Message (Trading partner profile data)
PAXLST	Passenger List
PAYDUC	Payroll Deductions Advice Message
PAYMUL	Multiple Payment Order Message
PRICAT	Price/Sales Catalogue Message

QALITY	Quality Data Message
QUOTES	Quote Message
REQOTE	Request for Quote Message
SLSRPT	Sales Data Report Message
STATAC	Statement of Account Message
SUPCOT	Superannuation Contributions Advice Message
SUPMAN	Superannuation Maintenance Message

Total = 34

Messages at Status 0

AUTHOR	Authorisation Message
BALANC	Trial Balance
CALINF	Call Info Message
CHACCO	Chart of Accounts
COACOR	Container Acceptance Order
COARCO	Container Arrival Confirmation
COARIN	Container Arrival Information
COARNO	Container Arrival Notice
COARRI	Container Arrival Message
CODECO	Container Departure Confirmation
CODENO	Container Customs Documents Expiration Notice
CODEPA	Container Departure Message
COEDOR	Empty Container Disposition Order
COHAOR	Container Handling Order
COITON	Inland Container Transport Order Notice
COITOR	Inland Container Transport Order
COITOS	Inland Container Transport Order Response
COITSR	Inland Container Transport Space
COMDIS	Notice of Commercial Dispute
CONAPW	Advice on Pending Works
CONRPW	Response on Pending Works
CONWQD	Work Item Quantity Determination
COOVLA	Container Overlanded Message
COPARN	Container Pre-Arrival Notice
COPDEM	Container Predeparture with Guidelines Message
COPINF	Container Pickup Information
COPINO	Container Pickup Notice
COPRAR	Container Prearrival Message

COPRDP	Container Predeparture Message
COREOR	Container Release Order
COSHLA	Container Shortlanded Message
COSTCO	Container Stuffing Confirmation
COSTOR	Container Stuffing Order
CURRAC	Current Account Message
CUSEXP	Customs Express Consignment Declaration
DESTIM	Equipment Damage - Repair Estimate Message
DIRDEF	UN/EDIFACT Directory Definition
ENTREC	Accounting Entries
FINCAN	Financial Cancellation Message
FUNACK	Secure Functional Acknowledgement
GATEAC	Gate & Intermodal Ramp Activities Message
GENRAL	General Purpose Message
GESMES	Generic Statistical Message
ICNOMO	Insurance Claims Notification Message
IFTDGN	Dangerous Goods Notification Message
IFTFCC	International Freight Costs & Other Charges
INSPRE	Insurance Premium Message
ITRGRP	In Transit Report Group
ITRRPT	In Transit Report Detail
IAPRES	Job Application Result Message
JIBILL	Joint Interest Billing
JINFDE	Job Information Demand Message
JOBAPP	Job Application Proposal Message
JOBCON	Job Offer Confirmation Message
JOBMOD	Job Offer Modification Message
JOBOFF	Job Offer Message
MEDREQ	Medical Service Request
MEDRPT	Medical Service Report Message
MOVINS	Move Instructions Message
PRODEX	Product Exchange Message
PRPAID	Insurance Premium Payment Message
REACTR	Equipment Reservation, Release, Acceptance & Termination Message
RECADV	Receiving Advice Message
RECECO	Request for Credit Cover
REINAC	Reinsurance Account Message
RESMSG	Reservation Message
SAFHAZ	Safety & Hazard Data Sheet
SANCRT	Sanitary/Phytosanitary Certificate
SLSFCT	Sales Forecast Message
SUPRES	Supplier Response (Reservation Response Message)

VESDEP   Vessel Departure Message
WKGRDC   Work Grant Decision Message
WKGRRE   Work Grant Request Message

Total = 73

GLOSSARY

AFNOR
France - Association Française de Normalisation
(National Standards Organization)
(Telecommunications Glossary - Telinfo)

ANSI
American National Standards Institute
(U.S. agent for the ISO)
(Telecommunications Glossary - Telinfo)

BSI
British Standards Institute

CCITT
Abbreviation for Comité Consultatif International de Télégraphie et Téléphonie. An
international consultative committee that sets international communication standards.
(Telecommunications Glossary - Telinfo)

DCE
Abbreviation for Data Communication Equipment. The equipment that provides the functions
required to establish, maintain, and terminate a connection, the signal conversion, and coding
required for communication between data terminal equipment and data circuit.
(Telecommunications Glossary - Telinfo)

DTE
Abbreviation for Data Terminal Equipment. Workstations and PCs are DTE. Often used in
conjunction with Data Communication Equipment. DTE must connect with DCE for a data
conversation. DCE takes the signals from DTE, converts or encodes it, and puts it on the line
for transmission. DCE and DTE may be contained in the same device.
(Telecommunications Glossary - Telinfo)

EDIFACT
Electronic Data Interchange for Administration, Commerce & Transport

IOS
Inter-Organizational System.

ISO
The International Organization for Standardization, a voluntary international group of national standards organizations, including ANSI, that issues standards in all areas, including computers and information processing, and whose technical committee also maintains liaison with CCITT. ISO has consultative status with the United Nations Economical and Social Council.
(Telecommunications Glossary - Telinfo)

JIT
Just-In-Time

OSI
Open System Interconnection established by ISO.
The idea of OSI is to provide a network design framework to allow equipment from different vendors to be able to communicate.
(Telecommunications Glossary - Telinfo)

PSDN
Public Switched Data Network

PSS
British Telecom's Packet Switch Stream network. Packet switched data network operating to X.25 standards.
(Telecommunications Glossary - Telinfo)

PSTN
Public Switched Telephone Network

TEDIS
Trade Electronic Data Interchange System

TRANSPAC
National public packet-switched data network in France. The network ensures links between or with remote computers.
(Telecommunications Glossary - Telinfo)

UNCID
UNiform Rules of Conduct for the Interchange of Trade Data Transmission

UN/ECE
United Nations Economic Commission for Europe

VADS
Value Added Data Service

VAN
Value Added Network Service

X.25
The CCITT recommendation defining the interface protocol employed between DTEs and DCEs for synchronous terminals operating in a packet mode and connected to public data networks by dedicated circuits.
(Telecommunications Glossary - Telinfo)

X.400
CCITT recommendation. A series of protocol standards for international electronic-mail interexchange.
(Telecommunications Glossary - Telinfo)

BIBLIOGRAPHY

[DATAPRO]   "An Introduction to EDI"
                 Datapro - Special Report
                 Mc Graw Hill 1990

[DHLCOR]   DHL Worldwide Express - Corporate Report 1992

[DHLIND]   DHL International Induction Training Documentation

[DHLSTD]   "Message Standards"
                 DHL- Standards Reference Document
                 Volume II - Version 1.0

[DHLUGU]   DHL Worldwide Express - User's Guide

[EDIBIR]   "EDI 92 - National Exhibition & Conference on Paperlow Trading"
                 International Convention Center Birmingham
                 6th - 8th October 1992

[EDIBLM]   "EDI : How Much Competitive Advantage ?"
                 R.I. Benjamin, D.W. de Long, M.S. Scott Morton
                 Long Range Planning Vol. 23 / February 1990

[EDICCE]   "Aspects de l'EDI"
                 Commission des Communautés Européennes

[EDIFMF]   "Introduction to UN/EDIFACT Messages and Frameworks"
                 October 1991 - 3nd Issue

[EDIFTD]   UN/EDIFACT Trial Directory 90.2

[EDIYEA]   EDI Yearbook 1993

[EURICA]   "Global Business Information Guide (Draft)"
                 EURICA Business Information Standards Project
                 JBA/DHL049 EURICA Version 4.0 September 1992

[GAESAI]   Global Air Express Service Audit - IRB International

[OSITOP]   "EDI & OSI : User Options Explained"
                 OSITOP
                 Technology Appraisals Ltd 1991

[PFEIFF]   "The Diffusion of EDI"
               Hagen K.C. Pfeiffer
               Physica-Verlag 1992

[TEDISR]   "The European Model EDI Agreement"
               An initiative of the TEDIS Programme

[UNCIDR]   "Règles UNCID : règles uniformes de conduite pour l'échange de
               données commerciales par télétransmission adoptées par le Comité
               Directeur de la Chambre de Commerce International lors de sa 51ème
               session"
               (Paris, 22 septembre 1987)

[GEVERS]   "Standards EDI de représentation des données"
               Etude réalisée aux Facultés Universitaires Notre Dame de la Paix à
               l'intention des utilisateurs belges.
               Marie d'UDEKEM-GEVERS - Avril 1993