

E-Business Environment and Architecture

Content

Part II

Chapter 4 Interoperability and Standards

- 1. Introduction to e-Business Technology**
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Learning Objective

- Describe how EDI has traditionally fit into business models
- Outline the issues that surround EDI
- Talk about how the Internet is making EDI more accessible to small and mid-sized companies
- Talk about what tools are available to implement EDI
- Talk about how an organization can be integrated into an EDI system
- Talk about how to integrate new e-business applications into an existing system.

4.1. Introduction

In a perfect world, you'd be able to buy a slew of new servers and clients, hook up an ultra-fast network, and open your e-business's virtual doors. However, this is rarely ever the case as finances and existing infrastructure force organizations to build around the technological foundation that is already in place. This is especially the case if your organization is to use electronic data interchange (EDI) to communicate with other businesses. Though EDI has traditionally been the province of big companies, the Internet is bringing it to smaller businesses as a means to streamline B2B communications.

Businesses today transact with trading partners in one of two basic ways:

1. The majority of businesses use non-automated means of communicating commerce-related information with trading partners, like mail, telephone, and fax.
2. A small number of primarily the largest companies in the world—fewer than 50,000—conduct a significant portion of their transactions in an automated fashion such as EDI.

In the past EDI was conducted via leased lines or, more commonly, through value-added networks (VANs). These media were costly and complex, keeping them out of the reach of smaller businesses. The Internet brings radical change to automation in trading. By providing an ever-present public network and standards for communication, the Internet will help businesses lower costs in EDI transactions.

More important, the Internet will make it easier for small and medium-sized businesses to participate in automated commerce transactions. Many businesses—small, medium, and large—can send and receive the majority of their purchase orders and invoices over the Internet.

EDI can best be described as the transmission and reception of documents between computers in a machine-readable form. EDI transactions are very popular because they have high integrity, are highly secure, and can scale to very large operations. These transactions routinely transport mission-critical data between cooperating organizations. In a traditional scenario, companies use VANs to transmit EDI transactions, but the growing popularity of the Internet is rapidly changing EDI.

4.2. What Is EDI?

EDI is a simple technology that maps the information from a database on one computer to the database information on a different computer. Big deal, you may be thinking, but this is what computers and B2B transactions are all about. What makes it interesting is that EDI has been used for B2B transactions since its development in the 1960s—decades before the Internet made e-business a commonplace activity.

Early electronic transfers were based on proprietary formats that were agreed upon between two trading partners. Because of differing document formats, it was difficult for a company to

exchange data electronically with different trading partners. To solve this problem, a standard format was needed.

4.2.1. Roots

In the 1960s, a cooperative effort between industry groups produced the first attempt at developing these standards. Since these were the first efforts, the formats were only for purchasing, transportation, and finance data. Further, they were used primarily for intra-industry transactions. It was not until the late 1970s that efforts began for national EDI standards that extend into the EDI we know today. At that time, both users and vendors gave their input for standards that:

- Were hardware independent
- Were able to be used by all trading partners
- Reduced the labor-intensive tasks of exchanging data (data reentry, for instance)
- Allowed the sender of the data to manage the transmission, which included knowing if and when the transmission was received

Companies traditionally use VANs, such as GE Information Services, the IBM Advantis Network, or AT&T, for EDI. Further, the VANs don't necessarily just need to connect two organizations. Some VANs can get pretty big (for instance, CE Information Services has 40,000 subscribers). In pay for access to the VAN, organizations generally pay according to how much data has been transmitted across the VAN.

4.2.2. Benefits

The benefits of EDI are seemingly endless. EDI includes electronic order placement, electronic shipping notification, electronic invoicing, and many other business transactions that computers can actually perform faster and more efficiently than people. EDI is beneficial for several reasons. It:

- Improves accuracy and speed of information exchanged between companies
- Reduces operational costs for customers, suppliers, and your organization

- Helps organizations reduce cycle time to manufacture and deliver product
- Improves customer service
- Moves customers, suppliers, and your organization toward a “paperless” environment

Furthermore, your customers may demand that you use EDI, because that’s how they do business. In the worst case, some businesses may simply refuse to do business with you if you don’t use EDI.

4.3. EDI and the Traditional Business Model

EDI is an important component in the working business model of many industries. EDI cuts down on mistakes, transmission times, and the amount of staff required to process the transactions. Using this information, the store can pass on stocking levels to its suppliers, thereby shifting the burden of stocking shelves to its suppliers, and can pay its suppliers based on how quickly their products sell at the store. By using EDI, the suppliers get instant feedback about how well their products are doing. This allows the supplier to develop a closer working relationship with their large retail customers.

Retailers often use EDI in conjunction with electronic funds transfer (EFT) so that they can credit money to a supplier as soon as that supplier’s new product arrives. EFT is a type of EDI using proprietary file formats that send payment transactions between banks.

Just as retailers rely on EDI to keep their shelves stocked, car makers use EDI as a key part of their business models to apply just-in-time (JIT) manufacturing. Each car maker gets thousands of parts from several hundred suppliers, and an assembly line might stock only two or three days’ worth of inventory. Because of the routinely low level of inventory, it would be disastrous to rely on paper invoices to keep all these parts in stock. The suppliers receive paperless EDI purchase orders from the manufacturer, and then provide parts as needed. This arrangement, like the one in the retail shop example, shifts the inventory burden from the store onto the supplier. The car maker pays its suppliers for the inventory the manufacturer uses on its assembly line, thereby shifting inventory issues to the suppliers.

4.3.1. Big Businesses

As you can probably construe from all this, EDI in its traditional form is best suited to big business. After all, the transmission form standards for an industry are largely created by whichever company is the first to need a particular form. Further, the costs related to EDI can be rather high and are only suited for larger businesses. The ability to streamline the procurement process and reduce inventory saves large organizations millions of dollars each year. Furthermore, items can be ordered, constructed, and shipped in a fraction of the time that it would take in an organization mired down in paperwork.

4.3.2. Small Businesses

In the traditional functioning of EDI, small and medium-sized businesses were ill suited for EDI. The greatest hurdle was that the cost of EDI was prohibitive for virtually every small business. But beyond the cost, manpower issues kept EDI out of small and medium-sized businesses' reach. Large companies maintain full-time EDI staff for the ongoing management of translation systems and auditing of the operation. EDI VAN-based systems, because of their complexity and cost, exclude small and medium-sized businesses from participation in automated trading communities.

But the Internet changes all that. Not only is it an omnipresent network that provides inexpensive connectivity, but EDI functions are being packaged in a large number of B2B software applications. This means that paperless, inventory-friendly ordering and supply management is within the grasp of any business—no matter how large or how small.

4.4. The Rough Side of EDI

As nice an arrangement as EDI represents, it isn't the cure-all for every business. EDI in its traditional form is truly aimed at large organizations that have the resources to manage it. Although EDI is great at reducing staffing levels, it requires its own, specialized staff for unique duties, such as:

- Managing transactions
- Negotiating the communications standards with partner organizations

- Building and maintaining the EDI infrastructure

But the biggest wall to EDI may be its cost. Clearly, EDI will not garner any revenue savings in the short term, nor is it geared toward the small or mid-sized business.

4.4.1. The Details

As much time as EDI saves on the back end, a considerable amount of time is spent developing and implementing your EDI solution. You can spend several months getting communications between you and your EDI partner up to speed. Another key issue is that there are many different proprietary and general forms of EDI transactions. Mappings between business partners can be unique and won't necessarily work with any other partner. Though EDI has grown more standardized in recent years, many proprietary forms still exist.

4.4.2. Other Issues

As with so many aspects of marrying business with technology, the day-to-day functions and operations are not solely the responsibility of the IT department. Sending EDI transactions between organizations is typically a business function. For a successful EDI implementation business managers must be involved and knowledgeable about the project. Technically speaking, EDI isn't especially complex or convoluted, but many EDI projects fail when responsibility is thrust wholly on the IT staff.

EDI can be a good solution for big businesses that can afford the investment. However, the emergence of the Internet is making paperless invoicing a much easier process to grasp.

4.5. The Internet, EDI, and Modern Business

Though VANs represented a considerable expense for an organization, the Internet provides a low-cost, far-reaching network for your EDI solution. As such, it is changing the established model traditionally used for EDI. Because of these worldwide technology enhancements, the Internet offers businesses exciting new opportunities to communicate with their partners.

4.5.1. More Availability for Small and Medium Businesses

EDI over the Internet makes EDI more accessible to small and mid-sized businesses, but it isn't likely that EDI will displace existing VANs. VANs are used to exchange high-volume information. Unfortunately, as we discussed earlier in this book the Internet proper can't guarantee sufficient bandwidth for organizations to exchange high-volume EDI traffic. Further, you can't always predict exactly when data sent across the Internet will arrive, so auditing and verification systems are needed. A mechanism is also needed to ensure good Quality of Service (QoS) across your EDI network.

In the past, EDI development was largely in the hands of the businesses developing their respective EDI solutions. In the Internet era, however, the Electronic Data Interchange-Internet Integration (EDIINT) working group, which is part of the Internet Engineering Task Force (IETF), is developing technology for implementing Internet EDI. EDIINT is addressing concerns including:

- Internet message integrity
- Confidentiality
- Digital signatures
- Non-repudiation of data transfer

In the coming years, the traditional model of EDI is expected to represent only a small part of the business conducted across the Internet. Internet commerce is expanding at a much greater rate than EDI, and the greatest potential for growth in EDI is over the Internet.

Developing an EDI solution across the Internet can be as simple and straightforward as creating Web-based forms for supply-chain partners to access and enter data. When a partner submits the form, it's a simple matter to translate the data into EDI output. The translation application is built into the software, so the only thing you need is a Web browser. The benefit of this approach to EDI is that it eliminates the need to learn and maintain complex software and the need to subscribe to a private network that is expensive and that a small or medium-sized business would use only occasionally.

For large companies, the growing popularity of the Internet is causing organizations to create Web-based EDI transactions, while leaving their legacy VAN-based EDI traffic intact. Most

companies starting from scratch are implementing linked intranets that support both Internet and VAN traffic.

4.5.2. EDI in Action

One company enabling a new way to conduct EDI business transactions is Commerce One. With its Global Trading Web -a joint venture with several international telecom companies- access is created to worldwide markets, allowing any subscribing business to buy from any other subscribing business, any time and anywhere. Trading takes place across the network and via Web browsers, which enables trading on a multitude of platforms and from any location.

The Global Trading Web is composed of many interoperating e-marketplaces which run on Commerce One's MarketSite Portal solution. Each e-business marketplace is independently owned and operated by a leading business in a region or industry. The companies use the sites for their own purchases and offer the service to their customers. The standardization of trading procedures enables the companies to interact more easily as they further develop their procurement sites.

One example of the Commerce One network in action is with computer manufacturer Compaq. The Commerce One MarketSite Global Trading Portal service enables e-business functions from purchasing to auctions.

In addition to Compaq's B2B needs, the company also will resell Commerce One's BuySite Enterprise Edition application for customers requiring an internal buying application. The arrangement also allows customers to browse, order, receive, and customize Compaq's commercial desktops notebooks, servers, and storage methods through a single site. Further, the arrangement also allows supplier catalog content and auction services to be provided through the portal1 enabling Compaq's customers to purchase products and services from hundreds of existing and future suppliers.

4.5.3. VPNs

Using a VAN is not cheap, but one of the key advantages is that the VAN can be used to secure EDI transmissions, and your supply-chain partners can encrypt and authenticate the traffic. Conversely, sending EDI transmissions across the Internet is inexpensive but the

packets are more vulnerable for a bandit to intercept and examine. To secure this information as it is sent across the Internet, many organizations encrypt and digitally sign EDI traffic. One approach to securing EDI traffic is to send it across a virtual private network (VPN).

When using a VPN, you compress and encrypt your transmitted and received data. In essence, you create a tunnel between yourself and your supply-chain partner by opening a named IP port at the receiver, but only for the duration of the transmission



4.6. What’s next for EDI?

If yours is an organization that wants to pursue EDI, you’ll find that many third-party vendors (among them Microsoft, iPlanet, and webMethods) are incorporating EDI tools into e-business packages. Further, many organizations are creating EDI traffic that crosses the Internet. Because of the Internet’s bandwidth limitations, VANs will likely be with us for quite a while, especially in established organizations. However, Internet commerce applications that support EDI are likely to afford the greatest future growth for document interchange, especially for low-volume traffic that small and mid-sized businesses would need.

4.7. Data Sharing

At the heart of alt EDI transactions is the ability to share data between two different computer systems. Whether you have a Sun workstation and your supply-chain partner uses a PC is immaterial—communications can still work if the computers are speaking the same language. By the same token, you could both be using PCs, but if they’re not speaking the same language, your efforts to share business information are stymied.

The most basic way to communicate is through a set of standards. These standards were developed decades ago but remain the cornerstone of EDI communications. However, a popular new Internet technology called Extensible Markup Language (XML) is making the process of inter-business communication more accessible. Let’s look at how standards and XML affect EDI communications.

4.7.1. Standards

For years, business data has been exchanged electronically in a number of ways, including via tapes and disks and across computer networks. And, as companies have realized the time and money savings from exchanging computer data instead of reams of requisition forms, electronic transactions between customer and supplier have become more and more popular. As serendipitous as this arrangement seems, simply transmitting a request to a supplier is complicated. Though the end result is of mutual benefit (one sells something and another gets needed inventory), each organization has different document needs and different computer and communications media.

The obvious solution is that electronic communications needed to be standardized. To that end, there are two different standards sets that are prominent in EDI: X12 and UN/EDIFACT.

4.7.2. X12

You may be thinking, “Wasn’t the X12 what Chuck Yeager used to break the sound barrier?” Actually, that was the X1. X12, on the other hand, is the most common standard used in EDI transmissions.

In 1979, the American National Standards Institute (ANSI) asked the Accredited Standards Committee (ASC) X12 to create a set of standards that would assist the electronic exchange of business information. These standards define the data formats and encoding rules required for a multitude of business transactions, including:

- Order placement and processing
- Shipping and receiving
- Invoicing
- Payment

The core of the X 12 standards is the simple data element dictionary. A simple data element represents the smallest named item in the X12 standards. It can identify a qualifier, a value, or a description. Examples of simple data elements include:

- Invoice date

- Weight
- Color
- Hazardous material classification
- A unit of measurement (pounds, dozens, cubic feet, gallons, and so on)

Industries tend to adopt a general standard such as X12 and add appropriate descriptors, unless a standard already exists. Some industries even implement several different EDI transaction sets to meet various customer demands. Companies transmitting this many transactions can contract this administrative work to another company that specializes in EDI, but many companies perform this work internally.

Most industries use a subset of the X12 standards. Most likely, when you're developing an EDI solution, the standard you will use is a subset of X12

4.7.3. UN/EDIFACT

Just as you can't go to Canada or Europe and drive in miles per hour, international EDI transactions have their own standards. In an effort to create a single international EDI format the United Nations Economic Commission for Europe Working Party on Facilitation of International Trade Procedures (you can take a breath now) drew concepts from X12 and other formats to create the UN/EDIFACT family of standards. The EDIFACT standard was adopted by the International Organization for Standardization (ISO) in 1987.

X12 and its "metric" cousin EDIFACT are very similar in the functions they perform. For instance, both define a purchase order. Although X12 is a more mature format and provides functions not present in EDIFACT (such as acknowledgments and security), many of these functions are likely to be upgraded in a future EDIFACT standard.

X12 and EDIFACT differ in their underlying structures. There is no one-to-one correlation between the X12 and EDIFACT data elements to aid translation. Often, multiple X12 data elements are needed to represent one EDIFACT data element. The differences between X12 and EDIFACT format make interoperability difficult if not impossible.

4.7.4. XML

Another approach for opening EDI standards is using XML. The XML/EDI project was proposed in mid-1998 and is picking up steam across all industries that use EDI. Because EDI depends on being able to exchange pricing and product information along a supply chain, the Extensible Markup Language (XML) is well suited for the task, since XML was designed to send data that is translated and applied to specific machines and devices—not unlike Java.

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Review Questions

1. What is VAN?
2. What is EDI?
3. Who are the major users of EDI?
4. What are some of the advantages of EDI?
5. What are the standards sets that are prominent in EDI?