

Electronic Data Interchange

Strategic tool to increase cost-efficiency and reduce errors.

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Executive summary.

Electronic data interchange (EDI) has been the primary means of transacting e-business for decades and continues to be the backbone of most businesses' e-commerce systems. It is a requirement for many companies wishing to do business with any of the larger retailers or automotive manufacturers. Government suppliers must do EDI and EDI is a fact of life for many companies in the supply chain.

EDI is also a complex, confusing, and slightly intimidating subject for many people. Whether you've been employing EDI for years or are brand-new to the subject, there are many questions to be answered.

It is the goal of this paper to take some of the mystery out of EDI and make it easier to understand. In this paper, the Fourth Shift solution for integrated EDI is discussed in detail so that potential users can make better decisions concerning their future EDI plans and determine how the Fourth Shift solution can best fit and support those plans.

EDI overview.

EDI is the exchange of business documents between companies in a standard, machine process-able format. EDI transactions make up 80% of the e-commerce traffic conducted between businesses.

EDI documents are common business documents, like a purchase order, converted to a standard format that is recognized by EDI software packages, regardless of the type of operating system or hardware being used. For example, it allows a large company running a mainframe computer with a custom software system to communicate in a common language with a small company using a Windows operating system on a personal computer.

EDI has been around for quite a long time. Starting in the 1960s, companies began exchanging documents using proprietary standard formats. Over time, standard organizations formed, starting with the transportation industry's Transportation Data Coordinating Committee (TDCC) in the US and the United Nations Economic Commission for Commerce (UN/ECE) in Europe.

In 1979, the American National Standards Institute (ANSI) chartered the X-12 committee to develop general purpose, cross-industry standards based on the TDCC's document syntax. In Europe, the UN/ECE Working Party evolved into EDIFACT. Today most EDI specifications in the US are based on the ANSI X-12 standards, while in Europe the EDIFACT standards are the basis for most documents.

EDI is often directly associated with the ANSI X-12 document standards, but this is an incorrect characterization of EDI. EDI is not a standard, but rather a concept. Whether the document standard being used is ANSI X-12, UN EDIFACT, UCS, or even XML, if it is a business document in a standard format that all parties have agreed to, it is EDI.

As technology changes and evolves, the EDI standards evolve as well. Each year the various standards committees publish new revisions that incorporate changes that users in the e-commerce community have requested. Additionally, new syntaxes and technologies emerge. EDI communications now can be done over the Internet using the World Wide Web or email. XML, or Extensible Markup Language, has emerged as an alternative format to the traditional ANSI X-12 or EDIFACT formats. New technologies and standards provide greater flexibility, allowing electronic data interchange to reach all levels of the supply chain.

Types of EDI systems.

There are different ways to implement EDI. Benefits, ease of set-up, and cost, all vary depending on which type of EDI system is used. Some of the more common systems are listed here with a brief description of the application and its pros and cons. In the chart below, EDI user is the party receiving the data; trading partner is the party sending the data.

EDI type	Features	Pros	Cons
Service bureau	EDI data is sent to a service bureau where it is translated, printed in human readable format, and faxed to the trading partner. Data is faxed back to the service bureau for translation into EDI data to be sent to the EDI user.	Very rapid implementation. No added cost of the EDI user. No software or implementation cost for the trading partner. New partners can be added quickly.	Manual data entry occurring in two locations. Limited document tracking and archiving. Time-consuming; has processing lag-time. Per document fees can be high.
Web-based	EDI data is sent to a service provider who converts it to a human readable web page that trading partners can download. Information can be entered into web-based forms and converted into EDI for transmission back to the EDI user.	No software or implementation cost for the web users. EDI users can quickly add new trading partners at little cost. Can be used by anyone with a web browser and an Internet connection.	Manual data entry. Limited document tracking and archiving. Not as secure as more traditional systems. Added cost for the EDI user.
Paper-based (“Rip ‘n’ Read”)	EDI data is received and translated by the software the trading partner has, and then printed out in a human readable format. Information can be entered into screen forms and translated into EDI for transmission back.	Software and implementation cost relatively low. Improved document tracking and archiving. Improved security.	Manual data entry. Provides little functionality over a fax machine, but cost of operation is much higher.
Integrated	EDI data is received and translated and then processed by the backoffice system. Data is extracted from the backoffice system for translation into EDI to be sent back to the EDI user.	Little or no data entry errors. Greatly reduced processing times. Increased data processing capacity.	Expensive and time-consuming to implement. Adding new trading partners is more complex.

EDI components.

EDI systems consist of several components, all of which combined make up a complete solution.

Document delivery.

EDI is the exchange of business documents between companies. There are several methods by which data can be electronically transferred between parties.

The most prevalent method is the value-added network, or VAN. The VAN acts like a postal service; your out-going messages are put into your mailbox and the VAN delivers them to your partner's mailbox. Messages for you are picked-up from your partners' mailboxes and placed into your mailbox for pickup by you.

The VAN offers several benefits to their subscribers. First, it provides greater security and protection of company data as neither you nor your trading partners directly connect your systems ever. The VAN also offers improved tracking and document storage capabilities. You can tell for certain if and when a document is picked-up, and in the event of a process failure you can have data restored and retransmitted by the network. On the downside, VANs tend to be expensive, with a minimum monthly service fee, plus fees based on the number of characters transmitted.

All VANs support connection via modem dial-up, and for some this is the only way that connections can be made. Long-distance costs must also be taken into consideration when considering a VAN service. Some larger VANs now offer connectivity via the Internet, allowing their subscribers to take advantage of high-speed data transmission.

The next most prevalent method is the private or proprietary network. These work like a VAN, but are run and supported by the trading partners themselves. Many of the large automotive industry EDI trading partners, as well as giant retailers like Walmart, run their own network.

The advantage of these networks is that usually the cost of use is only the long-distance fees associated with connecting to them. The drawback, however, is that most of these networks rely on old technology, which limits data transmission speed to 9600 baud or less, and often requires a bisynchronous modem for the connection.

A new trend in communication is the use of extranets; private, secure networks that run over the Internet backbone. Like the private network, the trading partners run the extranet network. Unlike the private network there is a subscription cost involved. To participate in an extranet you must use a certified ISP (Internet service provider), who can guarantee the security of your connection to the extranet gateway.

The above three are the most common methods for exchanging EDI data, but any means of transferring a data file can be used. Direct connection, email, FTP, download from a website, or even sending a file on a diskette could be used as a means of communicating the EDI data.

Communication software.

Once a means of communication is determined, appropriate software for communication is needed. If you are sending and receiving email you need to have an email client. If you're sending and receiving documents from a VAN you need a client capable of communicating with that VAN.

Some EDI packages include the communication software, while others rely on some external package to provide that functionality. It is important to understand what communication capabilities the software has and if additional software is required when selecting EDI software.

EDI translator.

EDI data is formatted to be compact and efficient. This is an important and appreciated feature of EDI when VAN services charge by the character, and transmission speed might not exceed 9600 baud. Unfortunately, the very features that make the EDI format so efficient, also make it mostly unusable for anything other than another piece of EDI software.

EDI translators have a variety of use. The most common is to receive data and convert it to a human readable format, and to send data in an EDI format that was entered into a human readable interface screen. Another use is to take the EDI data and convert it into a format that can be used by a specific application, or vice versa.

The EDI translator is the heart of any EDI system, and should provide support for all the current standards, versions, and documents in use by the trading partners.

EDI translation objects.

The EDI translator relies on mapping instructions to tell it how the data should be interpreted and formatted. The mapping instructions may be as simple as how the data should be arranged on a print-out to complex programs that prepare data for integration into a backoffice system.

In most cases the actual maps themselves are not supplied to the end user. Most EDI mapping software is proprietary to the translator being used, and produces a compiled file for actual use by the translator. These compiled maps are referred to by a number of names, the most common being templates, overlays, or translation objects.

Translation objects can often be purchased "off-the-shelf", especially for print or data entry use. Translation objects used for system integration purposes are generally custom developed for a specific application, but in some cases are available "off-the-shelf". It is important to understand that when purchasing a finished translation object you are getting just the compiled software, not the mapping instructions. Like any other piece of packaged software, you normally will not get the source code for the program.

Backoffice interface.

EDI documents come in a variety of configurations, and the business usage of the document will vary depending on the trading partner. Even with a translator to convert the data to a format usable by the backoffice system, it is still necessary to have some type of interface to help ensure that the data is processed according to the business rules of the backoffice system.

Data collection.

Data collection is not a part of EDI, per se. However, the use of data collection devices to scan bar coded data is very common in integrated EDI systems. Some trading partners require the use of bar coded data scanning at the time of shipment to create the advanced ship notice.

Bar coding data and scanning key data for document creation can reduce the time spent in data entry and improve overall data accuracy.

Fourth Shift EDI solution components.

The Fourth Shift EDI solution is an independent communication method, so that users are free to choose any method of data transmission that they prefer. The components of the Fourth Shift solution are as follows:

Communication software and EDI translation.

SoftBrands manufacturing has partnered with Sterling Commerce for EDI communication and translation using Sterling's Gentran product family. Currently, Fourth Shift supports two solutions: Gentran Director, which is a single-user product for Microsoft Windows workstations; and Gentran NT Server, which is a multi-user capable system designed for use on Microsoft Windows NT and 2000 platforms using Microsoft SQL Server or Oracle SQL Server. Both of these packages include built-in support for synchronous and asynchronous dial-up connections with scripting, TCP/IP connectivity, and FTP.

Some users already have EDI translation software or have a preference for a package other than Sterling's. The design of the Fourth Shift EDI solution makes its translator independent; however the cost of implementing a third party project is significantly higher, and usually far greater than the cost of the Sterling software that is recommended.

EDI translation mappings.

SoftBrands provides a library of application integration translation objects for most partners in the consumer products industries that may be purchased for a flat fee. Sterling Commerce also has an extensive library of translation objects for printing and data entry that may be purchased to support non-integrated applications.

Other industries, such as automotive, electronics, and medical, require solutions that vary from one company to the next. For EDI users in these industries, SoftBrands EDI consultants can create custom templates specific to the business needs of the user and their trading partner. They can also provide tutoring to users who wish to learn to do their own mapping.

Backoffice interface.

Fourth Shift can include the optional EDI module, which supports the integration of a number of common transactions. The EDI module includes rules-based document processing that validates and formats the data for entry into Fourth Shift. The chart on the next page shows the documents that are integrated into Fourth Shift.

Documents supported			
Customer service documents ANSI X-12 Format		Purchasing documents ANSI X-12 Format	
Inbound	Outbound	Inbound	Outbound
824 Application advice	810 Invoice		830 Forecast
830 Material release	870 Commitment response	855 Purchase order acknowledgement	850 Purchase order
850 Purchase order	855 Purchase order acknowledgement	865 PO change acknowledgement	860 PO change
824 Application advice	856 Advance ship notice		
860 PO change	865 PO change acknowledgement		
862 Ship schedule			
Customer service documents UCS format		Purchasing documents UCS format	
Inbound	Outbound	Inbound	Outbound
	880 Invoice		
875 Purchase order			
Customer service documents EDIFACT format		Purchasing documents EDIFACT format	
Inbound	Outbound	Inbound	Outbound
APERAK application error acknowledgement	DESADV dispatch advice		
DELFOR delivery forecast			
DELJIT delivery just-in-time			

Data collection.

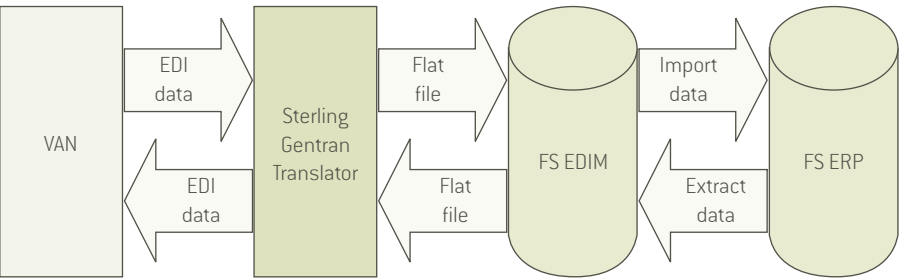
Data collection for the generation of advanced ship notices (ASN) and bar coded shipping labels is facilitated by the EDI services module, which provides bar coded data interface capabilities, and the VisiBar data collection product.

Integration overview.

While EDI documents are exchanged in an agreed upon format, there can be great differences between the specific implementation of a standard document. This is why document translation is so important; to successfully integrate you must have a constant format that the backoffice application can use. The translator's role is to convert documents to and from this constant format into the EDI format required by the trading partner.

Basic integration flowchart.

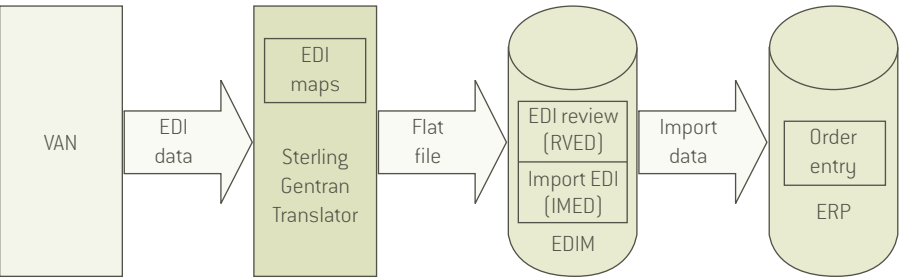
The following flowchart illustrates the basic integration used in the Fourth Shift solution.



This represents the basic data flow that all EDI data follow when integrated to the Fourth Shift ERP system. Depending on the type of document the exact flow may vary. The next sections examine various types of data flows in more detail.

Order and forecast data integration flowchart.

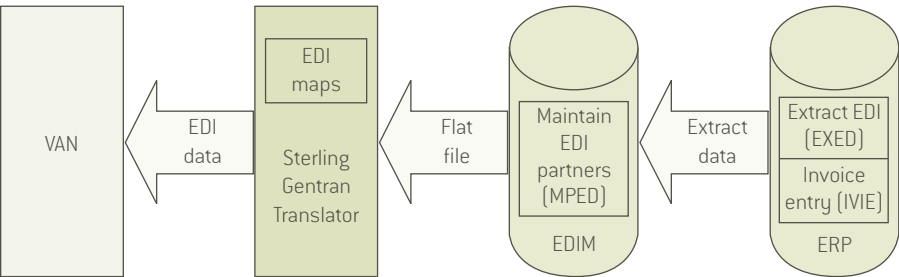
Purchase order, PO change, ship schedule, and material release demand is all processed into Fourth Shift in the same way.



In the flowchart above, EDI data is received into the translator and processed according to the mapping instructions that have been created. The output of this translation is a flat file formatted to the EDI module's specifications. The RVED process is run to bring the data into a review screen. During this process the user-defined rules are applied. Following a data review, the IMED process is run to create an import data file and import the approved transaction data into Fourth Shift as order or forecast demand using either COMT (customer order maintenance) or SOPM (sales order processing module).

Invoice data integration flowchart.

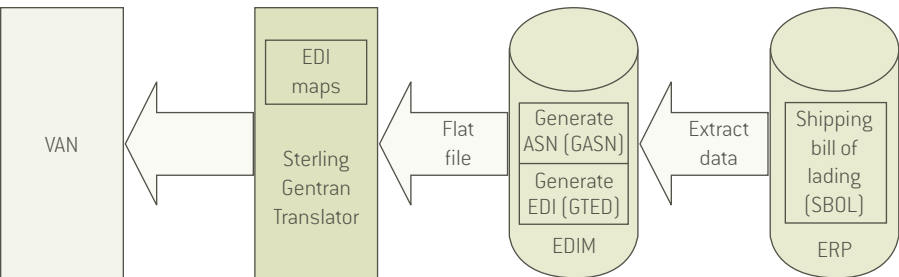
Fourth Shift supports sending invoices and credit memos via EDI. The user can specify whether to send only system-generated invoices, or include manually entered invoices as well, and can also specify whether or not to generate credit memos. The system default is to send system-generated invoices only.



In this flowchart, invoices have been created using the normal processes of invoice review (IVRV) and invoice print (IVPR). The extract EDI (EXED) process is then run to extract invoice data from the system. The EDI module tracks the last invoice sent, so only new invoices are extracted. The extracted invoices are compared to the EDI trading partner database in the EDI module and only invoice data for trading partners set-up to receive EDI invoices, is then processed.

Advance ship notice data integration flowchart.

Shipping and packaging information may be extracted to create advance ship notices (ASN). The user must supply additional information prior to the ASN being sent that is not captured in the Fourth Shift shipping module.



The shipment is processed in the normal manner using the SHIP functionality to pick inventory and package the shipment lines (packaging the shipment lines in SHIP is required to generate ASN documents). The user then completes the shipping bill of lading (SBOL) and uses a hot key (ALT+F7) to transport to the generate ASN screen (GASN). Additional ASN data such as trailer numbers and shipping label serial numbers may be added here. After completing the ASN additional data entry the user is transported back to the SBOL screen so additional shipments may be processed. When the user is ready to send the ASN they transport to the generate EDI (GTED) screen and release the ship notices they wish to send.

Advance ship notice data may also be collected using VisiBar and the EDI services module (EDSM). The data flow for that solution will be discussed later in this document.

EDI module features—review by industry.

The EDI module has several features that facilitate the complex requirements of various industries. These features are discussed in general, and then broken down by industry with highlights of features particularly beneficial to users in those industries.

All industries.

The EDI module provides full support for both customer EDI and vendor EDI. Customer forecasts, ship schedules, purchase orders, and purchase order changes may be received. Order and purchase order change acknowledgements may be sent, as well as invoices and advance ship notices.

Fourth Shift users can also use the EDI module to send forecasts, purchase orders, and purchase order changes to their vendors.

Each customer or vendor can be configured to process EDI according to parameters that are established per partner, per document. Using various mapping and set-up techniques it is even possible to have different parameters, such as transit lead-time by ship to location.

The following lists some of the basic features:

- Line status can be automatically set when data is processed based on time parameters
- Documents with line level purchase order numbers and/or ship to ID codes are supported
- Order entry by customer item and unit of measure conversion is supported using standard Fourth Shift customer item cross-reference functionality
- Customer item numbers up to 30 characters long are supported using partner item functionality in the EDI module
- Data validation during review and import processing ensures error-free imports; detailed logging allows users to pinpoint the exact problem and data in error may be corrected and reprocessed from the review screens
- Unit price may be set using mapped data, item price book (ITPB), or advanced price books (APBM)
- System maintained EDI orders—using replace order method for material release and ship schedules, and change order method for purchase orders when purchase order change documents are received
- Ability to cancel, edit, and resend ASN documents
- Ability to resend invoices

Automotive industry features.

The EDI module includes several features to optimize processing of data in the automotive industry:

- Ability to process material release documents as either forecast or order data
- Cumulative quantity accounting and maintenance
 - Automatic calculation of net quantity required from cumulative quantity ordered, using either acknowledged shipped or in-transit quantities
- Ability to automatically group multiple EDI documents into one inbound document
- Ability to automatically group order lines by item and date into a single line
- Ability to set beginning and ending processing horizons
- Automatic forecast and order updates using the replace order method
- Ability to apply contract pricing using advance price books
- Automatic adjustment of ship date by ship/delivery pattern
- Ability to suppress zero quantity order lines from importing
- Vendor EDI functionality to enable compliance with industry supply chain EDI requirements

Consumer products (grocery and retail) industry features.

The EDI module includes several additional features to optimize processing of data in the consumer products industry. These features require the use of the sales order processing module.

- Ability to process order expiration date
- Ability to process inbound header and line allowance/charge segments
- Ability to send outbound header and line allowance/charge segments

Electronics industry features.

The EDI module also allows the generation of an EDI 870 document, commitment response document, in reply to inbound 830 material release documents. This is a requirement for several electronics industry trading partners, such as IBM and Motorola.

Bar coded data collection.

Many industries strongly suggest or require that ASN documents be created through the use of scanned bar coded data at the time of shipment. Users of the Fourth Shift ERP system can meet this requirement by adding the EDI services module (EDSM) and VisiBar to their EDI solution. Here is a brief overview of how it works:

- Data is received and processed by the EDI module
- Approved data is passed to Fourth Shift and VisiBar
- Based on order requirements smart labels are created for the shipment
- As the product is shipped the smart label is scanned, creating all the shipping information needed to create the ship notice and ship in Fourth Shift
- The collected ASN data is transferred to the EDSM and the ASN sent
 - When the ASN is accepted, the EDSM module can generate import records to complete the shipment in Fourth Shift

The implementation process.

Many people fall into the trap of viewing EDI integration as the implementation of a module. This is a trap because most modules can be implemented with very little assistance and training. Many Fourth Shift modules may require only 2 to 3 days of consulting, to assist users in the best utilization of the module's features. The EDI module, on the other hand, typically requires far more time than that.

The EDI module alone has 20 unique screens. There are over three dozen configuration parameters in the trading partner set-up in the EDI module. This is in addition to the set-up parameters in the Sterling software. For this reason most EDI users find consulting services to be a necessary component of their implementation.

Typical consulting days.

A normal implementation requires at least 8 consulting days, broken down as follows:

- EDI planning workshop and overview: 1 day
- Sterling Gentran software set-up (including communications): 2 days
- Trading partner configuration training: 1 day
- EDI module walk-through: 2 days
- Advance ship notice and invoice generation training: 2 days

In addition to this, time may be needed for document mapping.

Document translation mapping.

Mapping translation objects is a programming skill that requires training and experience to perfect. While it is certainly possible for users to learn to map for themselves, the time and effort involved to become sufficiently skilled is usually more than what can be allotted for in a normal implementation project.

To be a successful EDI map developer requires four areas of expertise:

- A working knowledge of programming and programming syntax
- A thorough understanding of EDI and EDI specifications, and the trading partners' business requirements
- An excellent grasp of Fourth Shift functionality and usage
- A good understanding of your company's business requirements

Typical consulting time for map development ranges from Y2 day for simple documents like a purchase order, to 1 Y2 to 2 days for a document like an advance ship notice. This includes the time to map and to do basic unit testing.

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About Fourth Shift

Fourth Shift—a division of SoftBrands, an Infor affiliate—is an enterprise resource planning (ERP) system for midmarket manufacturers. Built on the Microsoft platform, it helps companies manage manufacturing, operations, financials, workflow, human resources, and customer and supplier relationships. Fourth Shift enables companies to streamline business processes and gain real-time visibility into key data, thereby empowering employees to take quick, appropriate action. Production is improved through quality analysis, performance checks, and role-based planning. As a result, products move faster to market, increasing responsiveness and maximizing profitability. For additional information, visit www.fourthshift.com.

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