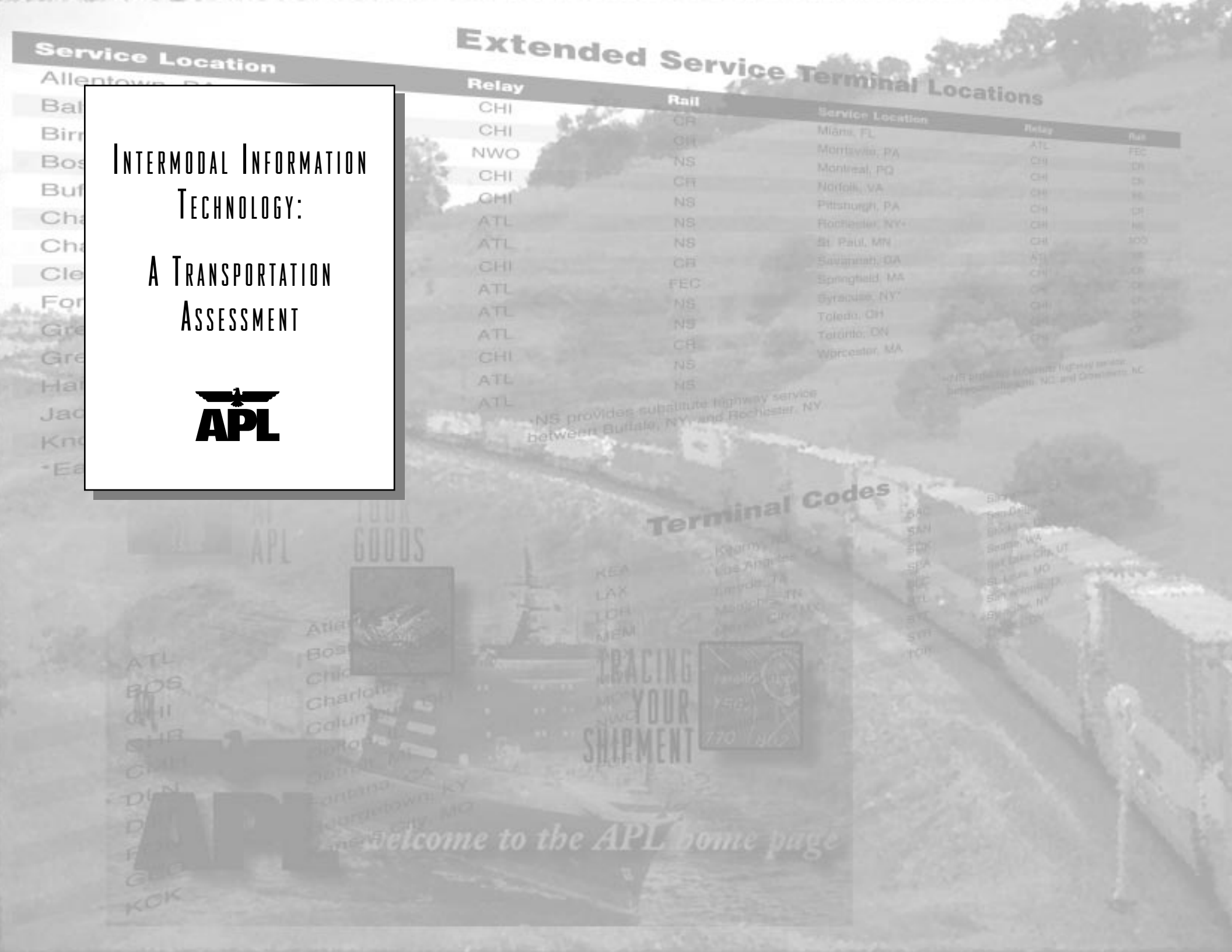
Intermodal Information Technology:

A Transportation Assessment



This report on information technology in the intermodal industry has been produced by the Stacktrain Services group of APL Limited.
May 1997

Executive Summary

A company's operating decisions these days are only as good as the information driving them. Expertise and creativity in applying it are certainly important, but the information itself is the basic building block. If the information is incomplete, late, or inaccurate, no amount of knowledge or expertise can compensate.

Advancements in computer and telecommunications technology now provide businesses with the information necessary to enter the age of "electronic commerce." This information, in turn, helps firms to control costs, manage inventory, identify new markets, and develop a competitive edge by making more efficient use of personnel, time, and other resources.

In short, the effective use of information adds value for a company in its dealings with customers, suppliers, and vendors.

Information management has come to play a key role in the delivery of transportation and logistics services. Transportation service providers rely on information systems to:

- Receive freight bookings
- Construct rate quotes
- Issue bills of lading
- Track and manage equipment
- Plan routings
- Determine load sequencing
- Manage documentation
- Trace shipments in transit
- Monitor equipment utilization
- Respond quickly to failure situations
- Coordinate consolidated loads and multiple-point distribution
- Confirm pickup and delivery
- Generate performance, accounting, and other reporting
- Issue freight bills

Shippers rely on carrier, third-party, and/or internal information systems to:

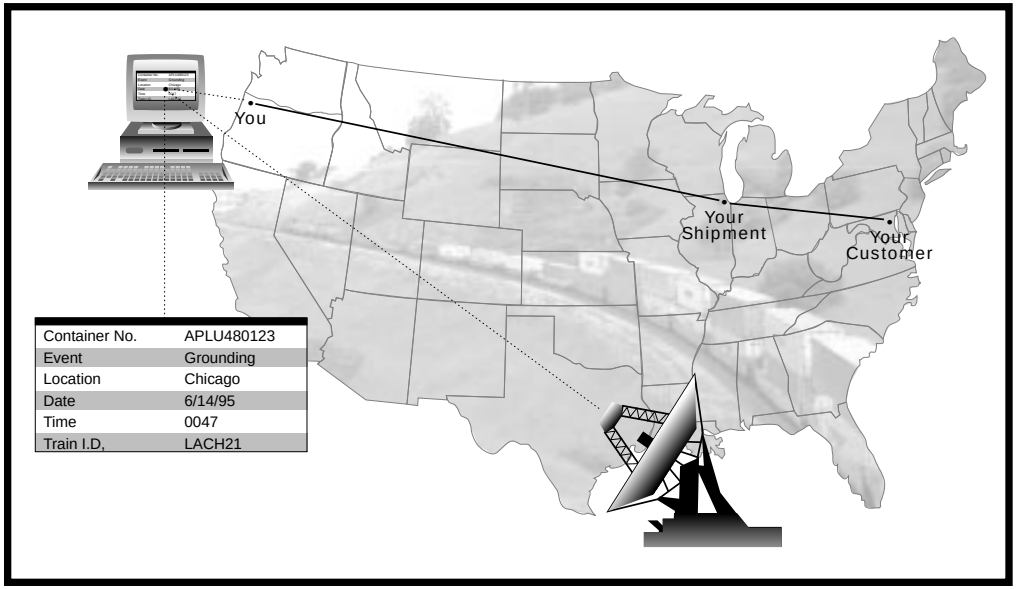
- Process orders
- Tender freight
- Shop for rate and schedule information
- Generate, transmit, and file shipping documents
- Manage inventory and multipoint distribution
- Trace shipments
- Measure carrier performance
- Identify supply-chain weaknesses
- Process and pay freight bills
- Budget and manage costs

Electronic data interchange (EDI), which in recent decades has become the standard for exchanging large volumes of information, typically refers to transfer from one mainframe computer to another. Until recently, the principal EDI users were large manufacturers, shippers, carriers, and third parties, for whom economies of scale justified significant investment in systems, software, and training.

These companies typically developed proprietary systems and would then require their vendors and suppliers to adopt their use. Proliferation of these distinct systems has led to difficulties with compatibility, as carriers and shippers attempt to form global logistics partnerships.

Carriers aiming to build super-regional and national networks through mergers and acquisitions have found it difficult and costly to bring affiliated companies under a common information management and communications network. Compatibility is a special problem, as transportation networks cover areas involving multiple providers of wireless communications service.

Programmers, meanwhile, have been under pressure to quickly add new EDI functions to the basic set of transaction protocols for which industry standards have been approved. Rather than design and propose costly new standard transaction sets, programmers often choose to cram new functions into existing sets, adding to the complexity and error potential of existing codes.



Nearly half of the respondents in a recent national logistics survey said they have been unable to reduce inventories and otherwise improve efficiencies through EDI because of the cost and complexity of integrating it into their operations.

Shippers acknowledge the potential benefits of EDI in cutting paperwork-related costs, controlling inventory, and gaining greater efficiency from their carriers' services. But they want to see development of systems that are accessible, with open architecture; that are affordable in terms of software, hardware, and employee training; that are reliable in terms of the information provided; and that are secure from competitors and computer hacking, especially in areas such as electronic funds transfers.

The past two years have seen marked progress on all of those issues. Simple, off-the-shelf spreadsheet programs have been developed to calculate and transmit rate quotes. Windows software–based, desktop PC programs now provide electronic forms for tendering freight, issuing bills of lading and other documentation, and freight billing. Third-party software developers—along with industrywide carrier, freight forwarder, shipper, and other partnerships that are developing shared systems—are helping to bring down the costs of exchanging and processing information.

The Internet—particularly the World Wide Web—is emerging as an open architecture alternative, with the potential to provide shippers with real-time rate, schedule, and shipment status information on demand, as well as order processing and documentation. Internet security has been a concern, but only a temporary one, as a once exclusive military-academic network becomes increasingly privatized and oriented toward commerce.

Intermodal traffic, both international and domestic, continues to grow at a fast pace. Where the primary constraint on growth previously resided with equipment, it now resides with information. Companies that have continuous, real-time access to cargo- and equipment-status information are able to squeeze inefficiencies and costs out of the supply chain.

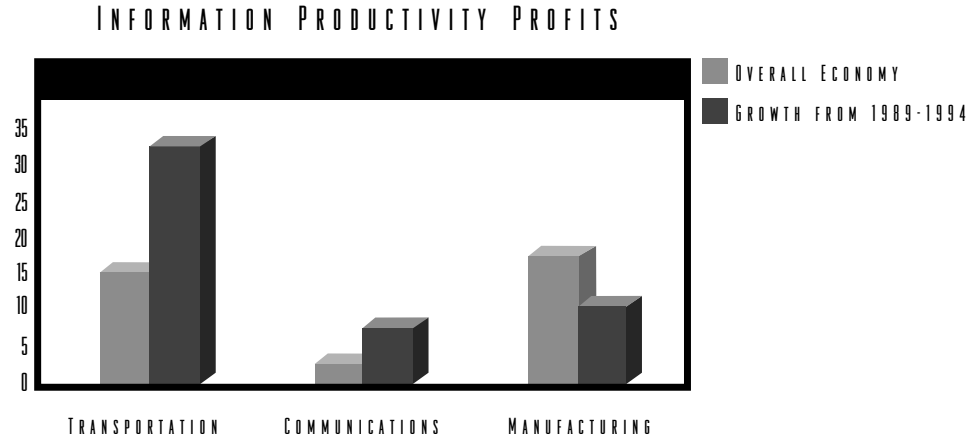
These companies can precisely match manufacturing to orders, and place the precise product and volume needed in the hands of the customer the next or second day. They can change routing or delivery schedules at a moment's notice, or offer prompt after-sales service and returns. And they can measure carrier performance and the effectiveness of their own internal systems.

Advanced technology brings efficiencies to the desktops of businesses of all sizes—efficiencies that were previously available only to the largest companies. Increasingly, the benefits are limited only by the quality and reliability of the information fed into the system. Prudent businesses that do their homework, identify reliable vendors, and invest wisely in systems that meet their special needs, are finding that better information is the key to improving both customer relations and the bottom line.

Information = Productivity = Profits

A recent *Business Week* report highlights the importance of information-based logistics services in eliminating the waste and the slack in manufacturing, wholesaling, and retailing operations throughout the U.S. economy.

Citing figures from the U.S. Commerce Department's Bureau of Economic Analysis (BEA), the report notes that distribution-related intermediary services (transportation, wholesale/retail trade) accounted for a third of total economic growth from 1989 to 1994. Communications, which represents 3 percent of the overall economy, accounted for another 8 percent of growth during that period. By contrast, manufacturing, which makes up 18 percent of the economy, added only 11 percent to overall growth during 1989 to 1994.



The overriding message: U.S. economic growth in this decade has come not so much from increased production as from smarter production—targeting customers, understanding their needs, streamlining operations, cutting cycle time, and responding more quickly to changing market trends. By using technology to reduce the costs of ordering, shipping, and inventory-holding, for example, BEA reported that wholesalers "boosted output by 23 percent without adding to employment."

Building Information Capability

Information sharing among allied carriers, third parties, and shippers entails an investment in time, money, and personnel.

Customers want to know that the shipment information they're getting is reliable and consistent. EDI and other communications software should be affordable to install, easy to learn, and simple to use, with readily available technical support. Protocols and platforms should be standardized where possible, so that shippers who use multiple carriers aren't required to invest in multiple, costly systems and training.

Shippers can benefit when customized management reports are easily obtained from reformatted documentation and status information. These reports can be important tools to help measure cost and manage performance. And customers want assurance that sensitive commercial information is secure, within a single system, across a shipment's entire journey.

To achieve these benefits, carriers have invested in a wide array of resources including telecommunications technology in the field: equipment and training for truck drivers (who are often the primary interface with the customer at the time of pickup and delivery); scanning technology for cartons and containers; car-locator tags and satellite links for tracking rail equipment; routine status-reporting procedures for all modes, especially at transfer points; and backup systems for cross-checking.

Conventional EDI itself includes a series of "transaction sets" that establish computer protocols for particular functions—processing a freight booking, formatting and submission of waybills, cargo tracing, and freight billing are some examples.

While the protocols conform to an industry standard (mainly the ANSI X12 standard in the U.S.), they may be offered within the framework of a proprietary system developed by a single transportation company; a shared system developed by a group of carriers, freight forwarders, or other transportation service providers; or a third-party system designer acting as an information broker.

Finally, the emergence of the Internet as a commercial system of data sharing and communication in the past few years—most notably through the extremely user-friendly World Wide Web—has opened up new possibilities for providing real-time access to marketing, pricing, and operational information, on request, through an ordinary desktop computer.

Basic Premise of Intermodalism

A basic premise behind intermodalism is that transportation and logistics must ultimately be door-to-door and seamless. The only way this objective can be achieved is through extensive cooperation and communication among modes and between carriers and customers.

For this reason, information sharing is at the heart of intermodalism. Carrier alliances and mergers are improving route and schedule efficiency, while maximizing utilization of systemwide assets and equipment. But the significant productivity gains and added-value from managing inventory, cutting delivery time, and lowering costs will come in the foreseeable future from better information leading to smarter processes. That is the long-term focus of the intermodal industry heading into the 21st century.

The impact of information exchange on the movement of goods, whether local or global, cannot be overstated.

Perhaps the most effective way to understand the benefits of today's technological breakthroughs is to examine how international transportation was arranged as recently as 1980. Take, for example, a hypothetical shipment at that time moving from Columbus, Ohio, to Tokyo, Japan.

The Old Days

In many cases, ocean transportation was still port-to-port, with the shipper arranging for the inland portion of the move. But let's simplify our 1980 example, and assume that the shipment was going to move under an intermodal through rate, with the ocean carrier assuming single-party responsibility from door to door.

Each leg of the shipment—pickup, intermodal transfers, delivery—was a separate transaction with its own set of paperwork. A customer phoned in for a rate quote, then relayed account and shipment information to a clerk who filled out a form, by typewriter. A carbon confirmation copy of the form was messengered, telexed, or even mailed to the account.

At each transfer point, a terminal employee or truck driver handed off documentation copies to the next party, and/or copies were telexed from carrier to carrier. The shipment and account information were re-entered on the new party's own company forms. Each re-keying opened up the possibility for clerical errors, and it was common for documentation to get delayed and/or contain errors.

Shipment tracing was done by phone or telex, with employees searching paper files by waybill number. Errors or misfiling could delay the process by a day or more. Release of the shipment for transfer or delivery could be held up if the documentation hadn't been forwarded in a timely manner.

The introduction of facsimile machines improved paper flow somewhat. But it was still paper. Errors made in the middle of the process remained errors throughout. Losses and pilferage could be caught sooner, but they could still occur easily.

Where We Are Today

Thankfully, life is somewhat easier today. Consider how our hypothetical shipment might move now, under a state-of-the-art EDI partnership between carrier and shipper or—as is becoming more common—through the Internet.

1. The shipper, using a personal computer and off-the-shelf spreadsheet software, accesses the transportation provider's system for a price quote. In the database, prices automatically adjust according to selected routing, taking into account taxes and other charges. Filling in a page format on-screen, the shipper tenders the load. If it's an established customer, typing in the customer number automatically calls up the basic account information.

2. After reviewing the information for accuracy, the transportation provider verifies space and equipment availability for the date shown and electronically converts the load tender information to a bill of lading in its system. Confirmation is transmitted to the customer.

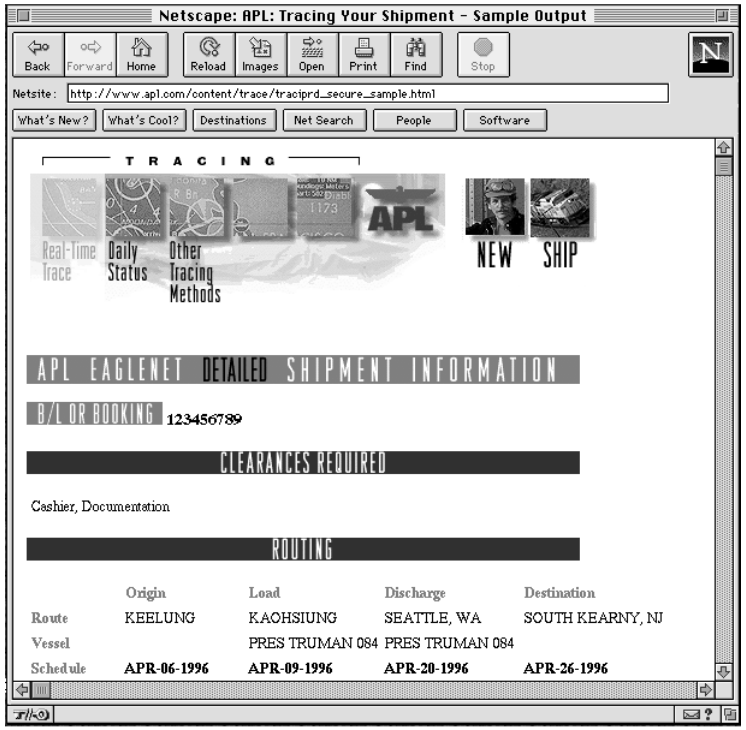
3. The transportation provider searches on-line and arranges a truck and equipment to pick up the shipment. It receives confirmation electronically and relays pickup schedule information back to the customer.

4. The trucking company's dispatcher keys in the pickup information, which is in turn automatically added to the stop sequence on the driver's hand-held terminal.

5. After the freight is picked up, vehicle tracking systems (VTS) using wireless communications continuously monitor the shipment's status while on the road. In the same way, car location messages (CLMs) track rail cars while in transit. Arrival times are continuously updated, without any need for phone check-ins. Routing choices are controlled by dispatch.

6. Shipment documents are relayed electronically among modes and transfer points. Document transfers are error-free as well as instantaneous, since there is no re-keying.

7. Each transfer of the shipment and related documents is entered in the transportation provider's tracking system. Shipment status is reported in near-real-time—a critical plus in the case of an extremely time-sensitive shipment or an emergency situation involving hazardous or dangerous cargo.



8. Commodity, shipment weight, and delivery time information help determine the shipment's position in container yards and aboard ship, for maximum loading and discharge efficiency. Truck entry and clearance at inland rail and port terminal yards are expedited, through the electronic relay of data.

9. Where possible, customs documents are submitted electronically in advance of the shipment's arrival, to permit pre-clearance. Proof of delivery to the consignee, distributor, or buyer, halfway around the world, is available in real time.

10. The transportation provider's system instantly transmits an electronic freight bill to the customer, while paying its vendors by electronic funds transfer.

How do these features translate into benefits to the shipper? Industry estimates suggest that businesses taking full advantage of efficient information technology are able to cut their cycle time by as much as 40 percent; reduce errors by 30 percent; and save $5 per document they generate.

So much for transportation. But the same EDI and other technologies also make possible many more sophisticated inventory and management reporting functions, such as:

- Automatic order replenishment
- Just-in-time transportation arrangements tied to inventory management
- Consolidation/distribution of multipoint loads
- Identification of bottlenecks in the supply chain, where freight or equipment is delayed
- Measurement of productivity and performance by the transportation provider and the manufacturer
- Analysis of per-unit logistics costs and margins

Pushing the Information Technology Frontier

A closer examination of specific shippers reveals some examples of the benefits that technologies like EDI have yielded to date in the intermodal sector.

When **Goodyear USA** switched to EDI processing of freight bills, it reduced the turnaround time of a typical invoice from two weeks to 24 hours. Goodyear saves on postage costs as well as document storage and handling. Carriers get paid sooner.

Boise Cascade sends electronic bills of lading to its carriers, who instantly load the b/l information into their EDI shipment tracing systems with no need for re-inputting and, as a result, improved accuracy. For selected forest and paper products carriers in the Northwest and Northeast, a delivery status confirmation message and invoice trigger a payment via electronic funds transfer from Boise Cascade.

Chrysler Corp., **Ford Motor Co.**, and **General Motors Corp.** jointly notified suppliers by letter in March 1996 that they would need to meet a list of six EDI criteria in order to retain their existing business. The list includes the ability to receive and process electronically advance shipment notification, material release, ship schedule, sequenced ship requirements, and release requirements, as well as transmit information electronically to subcontractors. The goal is annual cost savings of 3 to 5 percent in their individual global supply chains.

Using a third-party vendor's software package, **Ralston-Purina** processes some 11,000 freight bills each month, and has improved the efficiency of its audit and payment functions by 75 percent.

You Can't Always Get There from Here—Yet

As wonderful as it sounds, the paperless environment envisioned for the past decade or more remains elusive, for a variety of reasons.

Cost. Until recently, only the major manufacturing and transportation firms had access to state-of-the-art EDI and other advanced information/communications technologies, and only through significant investment in proprietary, custom-designed information systems. In small and mid-sized firms, the benefits of integrated logistics have not been as readily apparent, and the cost-efficiency ratios have not been as clearly favorable.

On the transportation side, the cost of providing wireless terminals for a small truck fleet, for example—up to $5,000 per truck, plus $80 to $90 per month in communications charges—can still outweigh the service advantages. This may ultimately force the company to rethink its service focus rather than invest in emerging industry standards. Railroads have the benefit of an industrywide CLM program to develop standardized rail car scanning and tracing technologies, but trucking companies have had to go it alone through commercial third-party telecommunications and software providers.

Similarly, only a small percentage of freight forwarders, customs brokers, non-vessel operating common carriers, and other third parties have until recently been able to make the leap to full EDI. Developing a proprietary system from scratch represented only a portion of total cost. Each system has its own particular hardware and communications support requirements. Once the system is in place, employees must be trained to use it—including both back-office employees and field personnel working with customers and vendors to integrate the system into their operations. All of this will soon become simpler and more affordable as new "off-the-shelf" programs enter the market, but as yet those programs are largely untested.

Large firms with older, mainframe-based systems face increased costs ahead, too, as they convert to less centralized, more flexible PC and network systems.

Complexity. Initial EDI systems were transportation focused, and were not designed for full-service, paperless, door-to-door logistics. Only a relatively small number of transaction protocols for each mode are approved and in widespread use. Demand nonetheless continues to grow for new types of automated reporting and documentation, such as pickup and delivery notification, rate bids, and manifest information.

Information systems managers often try to incorporate these functions into seemingly related, already developed transaction sets. As those sets become more loaded with functions, they become slower, more error-prone, and increasingly incompatible with customer and transportation partner systems.

System compatibility. As previously noted, initial EDI investments were made by large companies in proprietary systems. The high up-front cost was justified by potential savings and efficiency across a complex, high-volume operation.

Recent emergence of "open architecture" EDI systems doesn't diminish the stakes such firms hold in their earlier investments. Especially since EDI industry standards have grown up around those systems. Unless a company finds itself with a compelling need to modify or streamline an outmoded EDI system, the temptation is to use its leverage with suppliers and influence with customers to fully utilize its internal systems. The biggest system may not always be the best, but that may not always matter.

In any event, "compatibility" can be a highly subjective term. For example, the transaction code may conform to accepted standards, but within each company's message set—say, a carrier delivery status message or a bill-of-lading message—may reside additional, customized functions that limit, or even hinder, compatibility.

Also, EDI relies as much on interface as it does on information management and communications components—this is the ability of otherwise incompatible systems to readily "talk" to one another. At an even more basic level, many of the field communications functions that produce shipment status data (reports from the truck, train, ship, or terminal) often move via different telecommunications service providers (depending on transmission method and frequency), resulting in phone calls and fax transmissions that diminish the effectiveness of EDI.

Security. Security is a concern at many levels. The most basic level is competitive. Shippers, carriers, and third parties all acknowledge common interests, but only to a point. Beyond that, each party in a logistics transaction has distinct information needs and competitive interests.

Shippers may doubt, for example, that a shared system has sufficient shipment status and management reporting. Logistics intermediaries frequently approach documentation differently than asset-based carriers, since they are often responsible for more of the actual trade-related documentation involved in a move. A carrier's focus may be on standardization, accommodating many kinds of customers—from beneficial cargo owners to forwarders and non-vessel operators—under a single, transparent system.

All parties continue to show some hesitation in the ways they offer and utilize EDI and other shared information systems. Some firms, which have enjoyed a technology advantage over their competitors until now, may be reluctant to invest in the emerging open architecture systems and providing full accessibility to anyone with a desktop computer.

In a similar vein, retrieving rate quotes automatically from a spreadsheet program takes the human element of negotiation out of the pricing process and removes any potential advantage of either an aggressive, creative traffic manager or a long-standing carrier-shipper relationship.

Customers have been reluctant to book freight with a carrier or third party that isn't an established partner, for the same reasons: a live voice can confirm availability of equipment and discuss other terms of service.

Some companies are concerned about over-reliance on a system that may be accessed by competitors. Can, for example, a computer-literate competitor go into an on-line database, modify the off-the-shelf script, and obtain sensitive shipment information?

Finally, the security and efficiency of systems-supported logistics typically break down at the last, arguably most critical step in the move—payment of freight. Important progress has been made in this area, but industry acceptance has been slow. Until the security problems inherent in an automated billing and electronic funds transfer system are fully resolved, getting paid will remain a process of paper invoicing, mail, and phone calls.

An annual logistics survey released in November 1996 by KPMG Peat Marwick LLP and the University of Tennessee revealed that:

- Forty-three percent of U.S. companies are reporting the same or higher inventories as five years ago, despite efforts to improve inventory management through information systems.
- Nearly a fourth of the companies surveyed said the biggest competitive issue they face is effective use of EDI, in particular the effective integration of information technology into existing operations. One in five felt its information technology was not well-integrated.
- Forty percent of the companies outsource some portion of their logistics, and the same amount plan to rely more heavily on third-party providers in the future.

Light at the End of the Tunnel

The good news is that rapid progress is being made in bringing simple, accessible, and affordable information management software and systems to transportation customers of all sizes:

- Everyday, commercial spreadsheet programs are being customized to convert an initial entry of customer and shipment data to a variety of shipping documents.
- Modem, e-mail, and fax communications programs put transportation companies in constant touch with freight and equipment, while making it possible to reformat and pass along error-free documents at origin, destination, and each transfer point.
- Transportation providers are teaming up to develop shared software and systems that control costs and offer customers full compatibility over a wide choice of competing services.
- Finally, customized, proprietary systems are giving way to the Internet, where functions ranging from bookings, to bills of lading, to pickup and delivery confirmation and shipment status information, to freight billing, are available 24 hours a day and can be pulled down on demand.
- The result: seamless logistics and fast compliance with state, federal, and international customs, tax, and other regulations.

Following are some of the recent initiatives taken by various intermodal industry segments to introduce EDI and newer forms of electronic communications into their transportation and logistics operations.

Individual Initiatives

CSX Intermodal (CSXI) Truckload 2000 software is as much an internal management tool as it is a program for providing customers with timely shipment status and performance data. CSXI uses Truckload 2000 to analyze trucking performance, including loaded/empty miles, terminal activity, and tractor/terminal costs; standardize customer policies; simplify pricing; and expedite payment of contractor freight bills.

Truckload motor carrier **Contract Freighters** combines global positioning system (GPS) satellite tracking of trucks and equipment with EDI to provide customers with real-time status information on vehicles and shipments. Customized reports enable accounts to not only measure Contract Freighters' performance, but also identify weak links in the supply chain where delays and added costs appear. Those improvements have enabled the firm to reduce the number of dispatchers and fleet managers it employs, redirecting those people to driver training functions. Contract Freighters is focusing next on paperless billing.

Rollins Leasing of Wilmington, Delaware, monitors equipment diagnostic information via EDI, and reduces costs associated with driver-maintained logs and reporting. Information received from wireless terminals is used to automatically calculate driver payroll, add state taxes and fees onto billing, comply with state audits and perform other functions that formerly took up significant driver time at company expense.

Viking Freight System has installed wireless communications equipment throughout its 4,500-truck fleet, a job entailing more than a year of customizing software to achieve compatibility among affiliated regional carriers Coles Express, Spartan Express, and Central Freight Lines. The result: Viking now has ongoing, real-time communication with drivers so that it can measure performance, do centralized route planning, respond immediately to equipment problems, confirm pickup and delivery in real time, and report shipment status to customers.

Increasing use of document image scanning by companies such as **Roadway Express** and **Crowley American Transport** converts paper documentation to quickly accessible and transmittable graphics files in a central data retrieval system. More sophisticated imaging permits document information to be modified and reformatted into new documents as needed, in addition to simply being stored.

APL Limited and most other major ocean carriers use GPS satellite tracking technology and proprietary EDI software to monitor vessel voyages and provide status and arrival information to customers. APL also uses internal simulation programs to plan vessel stowage and rail car loading for optimum loading and discharge; to locate equipment in the container yard for fast pickup; to determine optimum routing based on weather conditions and other factors; and to calculate speed and fuel consumption costs in scheduling. APL affiliate American Consolidation Services (ACS) uses barcoding and advanced information technologies to help importers and retailers manage inventories, track shipments by purchase order number, and analyze overall distribution costs.

APL has also pioneered the use of Automated Equipment Identification (AEI) technology to provide real-time equipment status and location information. This radio frequency (RF) technology, which uses both stationary and mobile transponders to read tags mounted on containers, was proven fully functional by APL in 1996 during tests with U.S. Customs at the Canadian border in Blaine, Washington, to evaluate prototype automated border crossing systems using AEI.

APL is participating in additional transborder testing with U.S. and Mexico customs, the Port of Los Angeles, and the Union Pacific railroad, as part of the North American Trade Automation Prototype (NATAP) project in Southern California and Larado, Texas.

Shared Initiatives

The Information Systems Agreement (ISA), a group of 12 major ocean carriers including APL, has teamed up to develop a common, Windows software–based EDI software package called OCEAN that enables subscriber customers to book shipments electronically and to access route, schedule, shipment status, and bill-of-lading information from participating carriers via a standard format.

A group of more than 100 global logistics providers calling itself the **Hi-Tech Forwarder Network (HTFN)** has jointly developed with General Electric Information Services a shipment-tracking and purchase-order-management program for shippers called TrackNet. The program works in a Windows format or via modem-to-modem EDI. Electronic status information is provided automatically by carriers to HTFN members and copied into the central system for direct access by HTFN customers. Status information can begin with order placement, thus providing optional inventory management.

Third-Party Initiatives

Both transportation and technology third parties are getting into the act of providing shippers and carriers with information options as intermediaries. The trend is growing as software moves toward more open, less proprietary platforms and as demand increases for off-the-shelf rather than significantly more expensive customized solutions.

Intermodal marketing companies such as the **Hub Group, RISS Intermodal,** and **Alliance Shippers** have used EDI to secure themselves a continued niche in the transportation marketplace. Using their own customized programs, they offer shippers electronic booking, shipment tracing, status updates, and management reports. They simultaneously manage equipment on behalf of rail, truck, intermodal operating, and equipment leasing partners, becoming, in effect, an additional sales channel to achieve lane balance and to improve positioning and utilization.

Encompass, a North Carolina joint venture between CSX and AMR, the data services unit of American Airlines, is a developer of customized logistics and supply-chain management systems based on a common software/communications platform. Encompass links a company's national or global operations to its transportation/logistics providers, suppliers, and vendors through a common EDI network, allowing the Encompass customer to track supply-chain movements, measure performance and manage assets more efficiently.

Microsoft Corporation is becoming involved in transportation-related information on two fronts: First, the Redmond, Washington, company sees Internet and Intranet network servers as a growth market, and is investing in a software package called BackOffice, which combines database, Web publication, and networking programs. Microsoft is also specifically interested in transportation and logistics applications and has offered to finance small software developers working in that field.

Smaller service firms, such as **Loadlink, Inc.**, and **Kleinschmidt,** offer similar value-added network (VAN) services to multiple customers. **Kitimat Systems** and similar vendors provide software only. **DSI, Transettlements**, and others focus on electronic freight audit and payment.

Ocean transportation trade publications that routinely collect and publish ship arrival and departure schedules have been looking for ways to provide that information electronically. New York–based *Shipping Digest* magazine has developed an on-line information service, SHIPS, that combines the magazine's sailing schedule and directory information such as listings for terminals, warehouses, carriers, agents, and marine services, as well as shipping and trade documentation and other requirements for 175 countries.

Mariner Systems, Inc. (MSI), a San Francisco provider of tariff database and communications systems to ocean carriers and conferences, offers the Internet-based Marketing Pricing System (MPS), which focuses on pricing indices for rate comparison purposes, as well as rate quotes and the ability to tender freight to multiple carriers electronically. The service also offers sailing schedule and carrier contact information.

Fully independent service providers such as **SeaLink Information Technologies** and **OceanWide** are positioning themselves as information clearinghouses for small carriers and transportation service firms. While still in their initial stages of operation, these World Wide Web based services offer the capability to provide comparative rates and schedules, along with freight booking.

Commercial Internet applications have skyrocketed during the past few years, as the network has become more accessible. In particular, development of hypertext links and emergence of the World Wide Web have made it possible to combine real-time data from many sources at a single site, accessible on demand via a personal computer and modem.

Despite having invested in proprietary systems as well as the development of shared systems and standards such as those used in the Information Systems Agreement OCEAN program, some companies, like APL, are devoting increased attention and resources to affordable, simple, customer-driven Internet-based services. These companies see that the success of transportation and logistics management businesses will depend upon universal access to important information across modes and throughout the supply chain. The Internet holds the promise as a means to provide this access in a very economical and user-friendly way.

WHY THE WEB?

Growth of the Internet has caused forward-looking carriers to take a fresh look at information exchange objectives and assumptions. Here are some of the advantages APL has identified as part of an Internet-based system:

- Full compatibility with almost any computer/modem combination at least equivalent to a Macintosh II or PC (486 or better) system with a 14.4Kb modem.
- Demand-driven delivery of information, posted and available whenever the customer needs the information or is able to access the system—24 hours a day; less likelihood of downtime due to high demand or system maintenance or repair.
- Ability to cross-index and combine information through hypertext links, permitting intuitive, on-demand access and use of multiple information sources throughout the network.
- Simple, fast communication and information sharing across a global network of offices, terminals, vessels, and vehicles.
- No learning curve for staff or customers using the system.
- Accessible under a flat monthly rate from an Internet service provider (ISP), usually via a local phone call.

The APL Example

The Internet solution makes an attractive option for APL to offer individualized service to customers. Here are some of the benefits:

- **Information quality control.** APL generates and manages every piece of information included on its Web site. Should the customer encounter a discrepancy, APL can locate the problem quickly and address it internally. By contrast, a third-party or shared site is only as reliable and useful as the information provided by its various, unrelated, and often competing sources.
- **Compatibility.** Internet standardization and compatibility reduce the need for shared systems in nearly all areas of information exchange; to the user, accessing 10 individual carrier Web sites would be much less cumbersome than accessing the proprietary database of each of those same 10 carriers.
- **Cost.** A Web site costs far less to support and maintain than a stand-alone EDI network. A demand-driven system helps control customer service and technical support costs. As a result, the customer pays no additional access charge (beyond standard ISP charges) to make a booking, check shipment status, or perform other routine functions.
- **Worldwide information access.** The World Wide Web is international in scope. Network linkage across borders is simple and automatic. Retrieving real-time data from facilities in Jakarta, Mexico City, Seattle, and New York is all one seamless process, from one simple source.
- **Security.** Numerous precautions are designed into APL's Web site to protect sensitive customer cargo, transit, and rate information. A one-time, detailed registration process assures exclusive access to that information by the customer only. APL is currently developing added security modules that will enable electronic freight billing and even electronic funds transfer on the Web, making the entire freight transaction—from initial research and booking to payment—electronic and real-time.

A Hands-On Look at the APL Web Site

APL's information database can now be accessed via the World Wide Web at http://www.apl.com. It's easy to sample the Web site's transactional functions; simply click on the icons or hypertext (blue text) of interest. (For best results, hardware should be at least the equivalent of a Macintosh II or a PC system using an Intel 486 processor running at 75 MHz, with 8MB of RAM and a 14.4Kb modem.)

Rate and service information. Customers shopping for intermodal services can immediately access maps detailing APL's trade lanes—schedule information, including both ship and stacktrain arrival and departure times—and a simple screen form for requesting rate quotes. They can also obtain information about documentation requirements.

Shipment booking. International Shippers who want to make a freight booking can electronically submit a simple form available at a mouse-click. The booking is confirmed and a customer ID is assigned. Booking information is automatically converted to a bill of lading electronically, avoiding risk of errors from re-inputting. The customer can view and approve the bill of lading document on-line. At the customer's request, a hard copy can be obtained via next-day courier delivery.

Documentation. The same shipment information is processed at the APL data center and is formatted for all documentation necessary to complete the shipment.

Intermodal shipment tracing. At any time, 24 hours a day and 7 days a week, a customer can obtain daily shipment status reports via the APL Web site, as well as by fax or telephone. Recent improvements include 1) integration of international and domestic information so intermodal customers can view vessel and/or stacktrain status simultaneously; and 2) the ability to trace a specific shipment by bill of lading or container number, or all of the customer's shipments moving via APL, by inputting a single customer ID.

Conclusion

Intelligent and reliable information is the key to successful intermodal logistics. It integrates pickups and deliveries, equipment positioning, cargo consolidation, and mode-to-mode transfers into a single, seamless transaction with a single set of documents that follows the shipment in real time.

EDI and newer information-communications technologies, most notably the Internet, can provide a transparent information and communications layer across a business's entire operation, so that the customer can manage systemwide inventory, purchasing, and internal movement of product and inputs. In that respect, information systems become a window into the company's physical operations that allows management to identify strengths and weaknesses, improve processes, and cut costs.

Information must be accurate and reliable. It must be retrieved, stored and indexed for ease of use and flexible application. It must be current and readily accessible on demand. And the benefits of information cannot be outweighed by the difficulty of obtaining and working with it.

Reliable. Simple. Accessible. Affordable. Those are the criteria for evaluating a company's information technology options. Carriers, shippers, and third-party vendors have made enormous progress in improving communication and information-sharing among transportation modes and between shippers, their vendors, and their customers.

Advances in information technology, driven by market demand for reliable, simple, accessible, and affordable solutions, have produced a wealth of choices for shippers and service providers of all sizes and types. The evolution of a viable, thriving, commercial Internet promises to make paperless logistics a reality in the year 2000 and beyond. What's out in the future? Among other things, look for: Paperless commerce under an electronic debit system. "Smart" containers that not only report their position and the condition of the cargo, but also self-diagnose and repair problems. Third-party servers that manage supply-chain data for multiple clients. And voiceprint ID for Internet transaction security.

The Internet is global in scope. It is accessible via most personal computers and modems; in most cases, using a local telephone number from a service provider under a minimal, flat-rate pricing structure. Internet-based information is demand-driven. It is posted by the provider and accessed by the customer as needed. It is not dependent on set hours of operation or staff availability.

Internet search engines now make it just as easy to find carrier Web sites for making service and price comparisons as it is to subscribe to a fee-based "clearinghouse" function. Security features already protect sensitive information, and new features being developed will soon permit full-scale commercial transactions.

A single transportation service provider controlling its own site ultimately has better control over the reliability and distribution of information than shared or third-party systems. Additionally, as in the case of APL, it can consolidate and aggregate, for the customer's convenience, all necessary information from outside sources, such as shipping alliance partners, railroads, government agencies, and more. It is also better positioned to bring all elements of the freight transaction—schedules, rate quotes, bookings, documentation, tracing, billing, and payment—under a simple and comprehensive system that is compatible with its own operations and with customer needs.

In information technology, as in transportation, the simple solution is usually the most effective. Improvements to Internet management, capacity, and access are expected to continue at a rapid pace, bringing the capability for total supply-chain management to the average office desktop.

Still, it will be the quality of information that ultimately determines the effective management of logistics operations. The ability to translate information into the knowledge necessary to make sound business decisions depends on the internal processes that generate the information. That includes the staff, systems, and procedures for collecting information and compiling it in ways that add value, and communicating it systemwide. In choosing a logistics service provider, freight shippers will need to focus their most critical attention.

The future belongs to businesses that know their customers, know their internal operations, and listen carefully to their markets. Electronic commerce is an immensely valuable tool—to those who know how to use it.

We welcome your comments and inquiries about this report. Please contact:

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APL Limited provides container transportation and related services in Asia, North America, and the Middle East, through an intermodal system combining ocean, rail, and truck transportation.

APL pioneered dedicated container rail service in support of its international business, beginning in 1979; domestic container service on major U.S. rail corridors shortly thereafter; and double-stack intermodal service in 1984.

APL operates a systemwide fleet of containers and chassis, including 48-foot and 53-foot containers deployed in purely domestic service. Through its 68 U.S. terminals and offices, APL serves virtually every major urban and manufacturing center in the continental U.S.

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