

NATIONAL COMMUNICATIONS NETWORK FOR  
AUSTRALIA'S TRADE AND TRANSPORT SERVICES

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**ABSTRACT:**

*A national electronic data interchange (EDI) network is proposed linking organisations in the transport, handling and clearance chain. These include shipping lines, the Australian Customs Service, freight forwarders, customs agents, airlines, port authorities, banking services, exporters/importers and various other parties with an involvement in servicing overseas trade.*

*Electronic documents and messages will be exchanged on the network. The international standard, UN/EDIFACT, will be used for EDI transmissions.*

*In addition to this core network, the proposals include a range of services tailored for specific applications. Clearance advice, cargo tracking and news services are examples of this type of service to be marketed competitively through the network.*

*The establishment and operation of the network is proposed to be the responsibility of one of the specialist communications organisations, which would contract for the commercial provision of network services, with a management company representing the network users.*

## INTRODUCTION

Communications play a key role in the transport and handling of Australia's trade. Port authorities alone participate in about 50 different document flows, and documentation is a major part of the activities of shipping lines, stevedores, depots, customs agents, freight forwarders, railways, transport operators, various public authorities and, of course, exporters and importers.

Many different means are used to communicate between the participants in the transport and handling chain. Ships manifests, for example, are usually delivered to port authorities and the Australian Customs Service in the form of computer print-outs, which are then re-keyed into the authorities' computers. A small army of messengers is employed around the ports couriering documents, and information about shipping and cargo availability is obtained from a daily newspaper or by countless telephone calls, telexes, and facsimilies. Late receipt of documents and inaccurate documentation contribute to truck delays on the waterfront, adding to importers' and exporters' costs.

This communications maze is a major factor in the opaqueness of the transport and handling system both to end users, the exporters and importers, and participants in the system itself. The adoption of efficient communications would enable the users and other interested parties to keep in touch with the progress of their cargo along the chain. The whole process would become more transparent, leading to more effective application of market forces in the transport and handling chain and a more efficient service for Australia's trade.

Overseas experience indicates that between 3.5 and 7.0 per cent of transport costs can be saved by adopting modern electronic communications systems (Euromatica, 1988). The transport and handling activities servicing Australia's trade are a substantial industry, with an estimated turnover of \$1500m in 1984-85 for non-bulk sea cargo alone (BTE, 1986). Thus savings of between 3.5 and 7.0 per cent represent significant gains. Further major savings may be expected through better coordination of activities along the transport and handling chain, improving timeliness and reliability and reducing truck queuing costs.

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The Task Force on Shore-based Shipping Costs recognized the importance of the communications issue, and in its Report recommended that systems should be updated to modern electronic communications standards and technology to provide basic commercial and operational information (Task Force on Shore-based Shipping Costs, 1986).

The Task Force also recommended that a small group of industry representatives be established to facilitate the development and implementation of this communications system.

The National Communications Working Party on Cargo Movements was formed in August 1987 under the auspices of the Waterfront Industry Committee, one of the components of the Federal Government's Waterfront Strategy. Chairman was Mr. Ian Stoney, Chairman and Managing Director of the Victorian Road Construction Authority and Road Traffic Authority, who had a background in port reform issues, and its membership was drawn from the cargo transport and handling industries. Both sea and air, exporter and importer interests, and the relevant public agencies were represented. Its final report was presented in February 1989 (ISC, 1989).

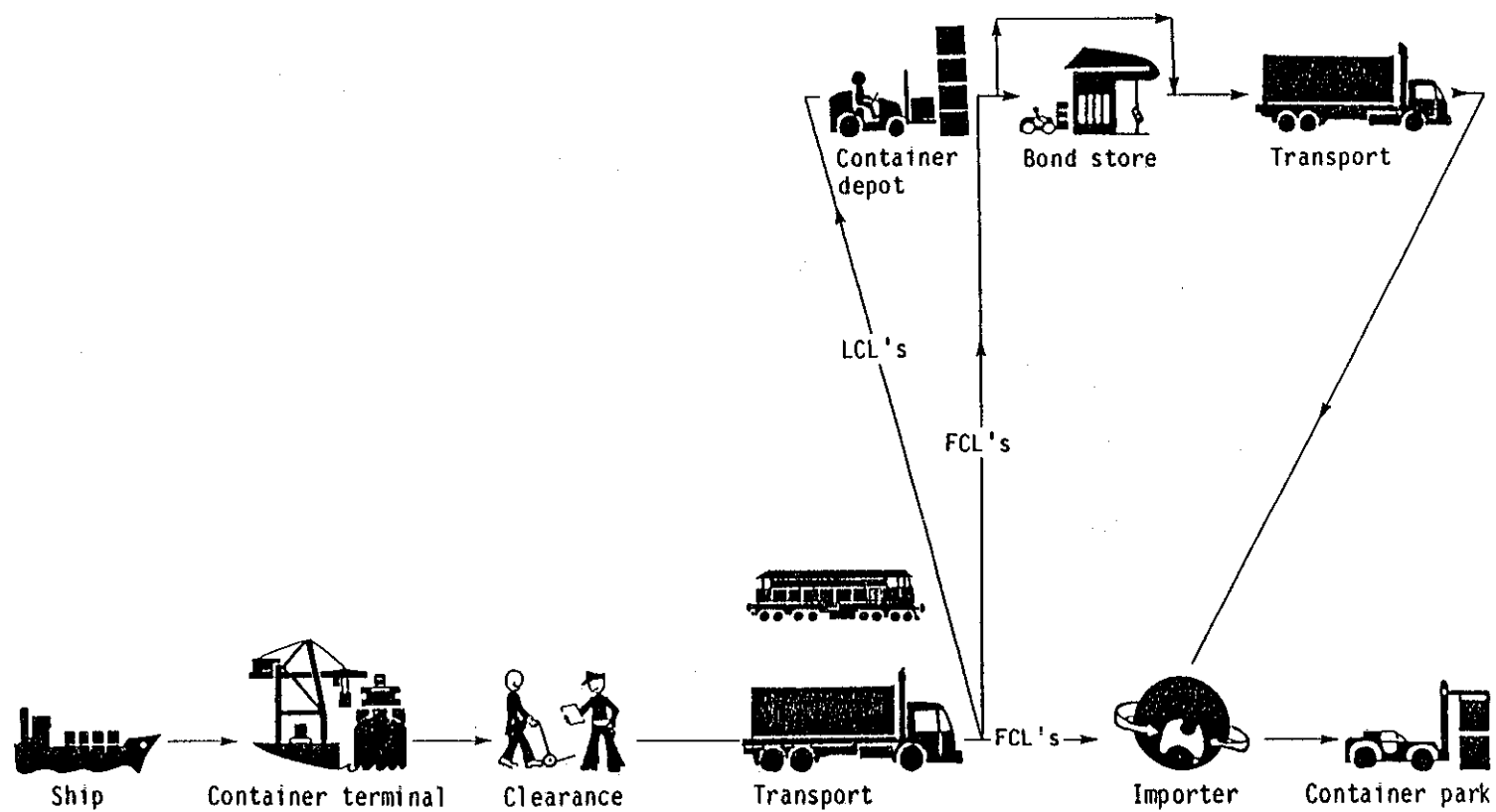
The goal of the Working Party was the establishment of an electronic communications system to service Australia's trade. Consistent with this goal the Working Party was required to do more than report its findings; its role was to actively facilitate the establishment of an appropriate communications network.

This paper outlines the transport and documentation chains, describes a communications system designed to improve the efficiency of the transactions involved, and discusses the issues involved in implementing the system and progress achieved to date.

### TRANSPORT AND DOCUMENTATION TASKS

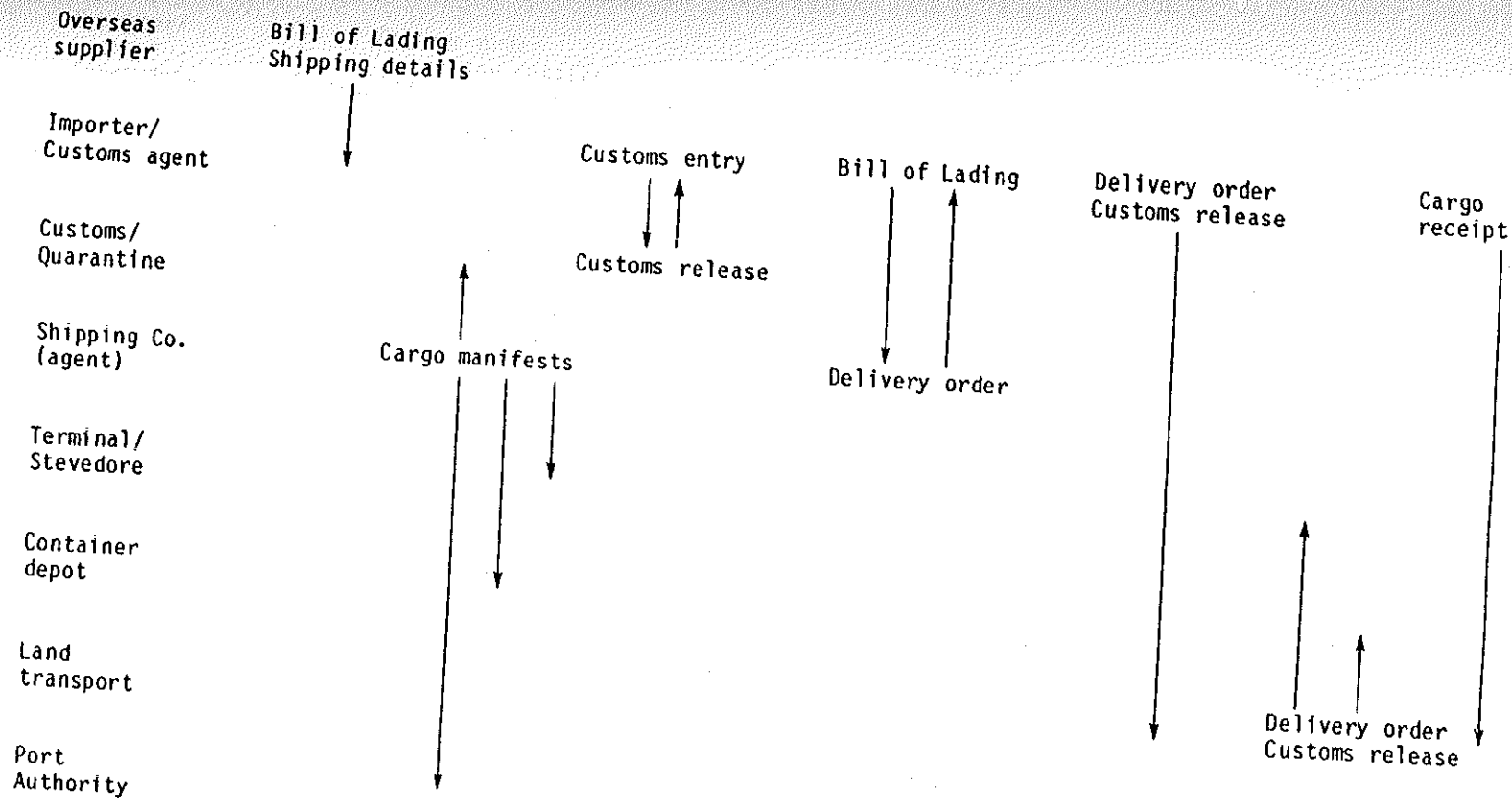
The tasks of importing and exporting include physical and administrative systems that interact and are independent. The communications links between these systems involve a range of documentation with diverse functions.

The physical transport chain for the import container trade is shown in Figure 1, and the flow of major documentation associated with imports in Figure 2. Similar descriptions for exports are shown in Figures 3 and 4.



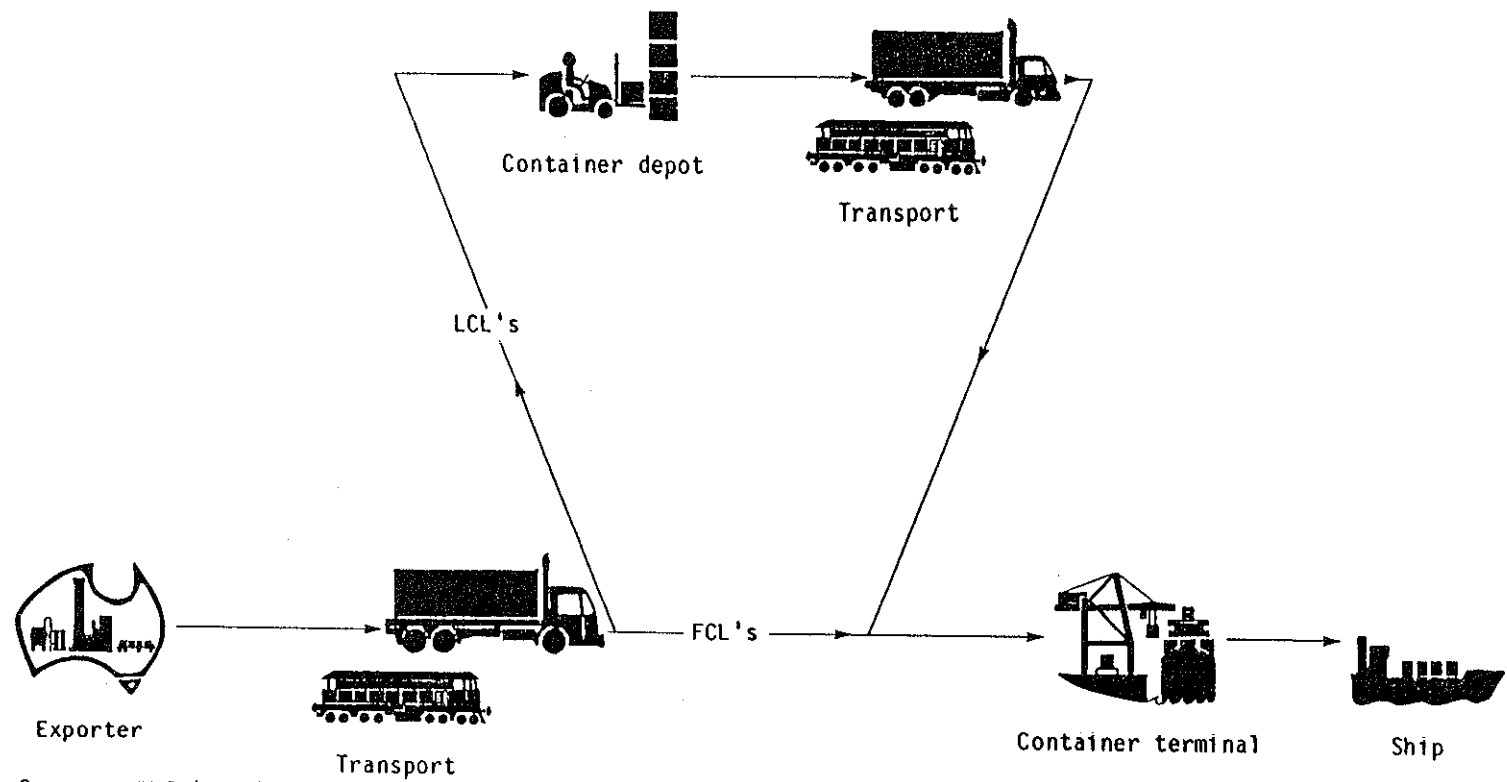
Source: BTE (1986)

Figure 1. Import container trade: physical flow pattern



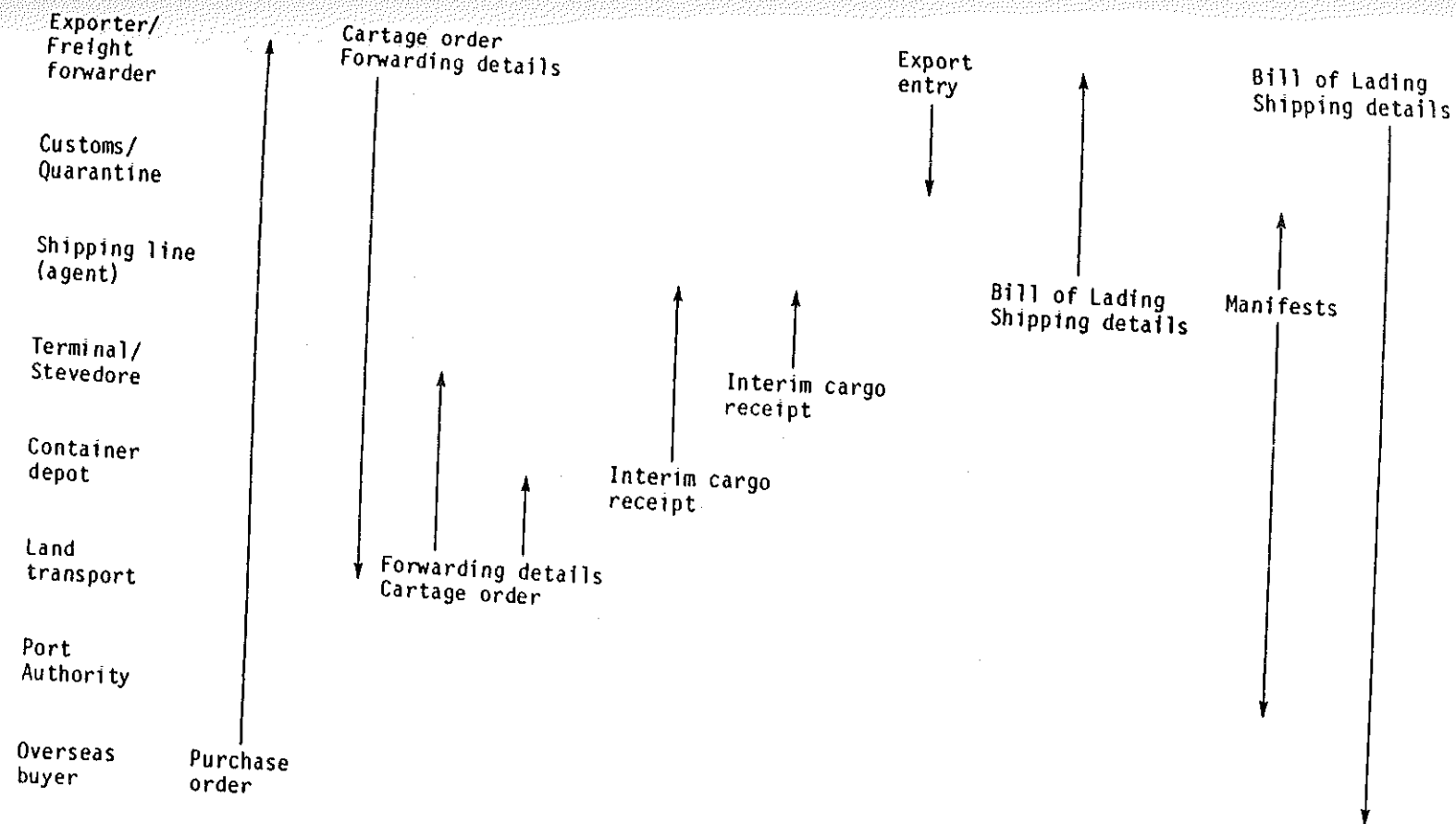
Source: BTE (1986)

Figure 2. Flow of major documentation associated with imports



Source: BTE (1986)

Figure 3. Export containers: physical flow pattern



Source: BTE (1986)

Figure 4. Flow of major documentation associated with exports

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A number of different types of organisations participate in the documentation system. The numbers in each category are estimated to be:

Government agencies	5
Port authorities	20
Airport authorities	8
Shipping lines/agents	70
Airlines	25
Containers terminals/stevedores	30
Container depots	20
Freight forwarders (sea)	100
Freight forwarders (air)	100
Customs agents	500
Railway authorities	7
Transport companies	400
Importers and exporters	Several Thousand

Many importers and exporters use customs agents and/or freight forwarders, limiting their demand for communication services. Nonetheless, even in the short term a substantial number (perhaps 100-200) may wish to avail themselves of the communications opportunities described in this paper.

The documentation flows outlined in Figures 2 and 4 are illustrative rather than comprehensive. There are many other documentary procedures involved, for example relating to dangerous goods, specific agricultural exports and ship servicing functions.

If documents concerned with regulatory and commercial procedures are termed "formal communication", there is a substantial additional set of activities which could be termed "informal communication". These comprise telephone calls, facsimilies and telexes enquiring and



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informing the different parties of cargo location, various cargo handling services, cargo clearance status, and so on.

The size of the total communications task is not easy to determine. Using information from the Australian Customs Service and from discussions with industry participants some estimates have been made and these are presented in Table 1.

Table 1

## ESTIMATED ANNUAL COMMUNICATIONS DEMAND

Consignment type	Number of Consignments (a)	Number of formal messages per Consignment	Number of informal messages per Consignment
<b>Imports</b>			
Sea freight	700 000	8	18
Air freight	700 000	8	13
<b>Exports</b>			
Sea freight	180 000	10	11
Air freight	180 000	10	5

(a) Approximation based on Customs entry numbers. In addition there are ships' manifests for 1600 port calls per year and air manifests for 13000 international flights per year.

The unit employed in Table 1, the "message" has considerable variation in length. Many of the simpler documents comprise about one thousand characters, whereas ships manifests could be measured in kilograms rather than kilocharacters!

There could also be considerable peaking of communications demand. Preliminary estimates from the Australian Customs Service indicate possible peak loads of 45 000 messages per hour for Customs related traffic. Other applications might double this load.

## ELECTRONIC DATA INTERCHANGE

This section describes a development in technology application capable of addressing the formal communication (that is, document based) requirements of the trade services community.

Electronic Data Interchange (EDI) is the computer-to-computer transmission of business data in standard format. For pure EDI, computer-to-computer means original-application-program to processing application-program.

Ultimately, for example, a retailer's inventory system will trigger the generation and transmission of an electronic purchasing order received by the supplier's computer and fed into its production control system. The required transport services will be arranged through the same process.

In the short to medium term many applications will involve substantial manual intervention for the preparation and interpretation of electronic documents, although large "hub points" such as Customs are developing automatic systems for some applications.

#### Why is EDI important?

Trade is just as dependent on information as it is on motor, rail, ocean and air carriers. Paper documents inhibit the smooth flow of goods, require redundant processing, increase the possibility of errors, and raise administrative costs substantially. This affects industries in all sectors; for example manufacturing, transport, retail, banking, insurance, construction and tourism all suffer from these problems. Paper documents exchanged between all the trading partners cannot be moved quickly and efficiently to keep pace with modern manufacturing, marketing and flight schedules (Raven, 1988). In addition, the sheer volume of paperwork inhibits the development of efficient stock control systems. For example, moving from monthly deliveries to a just-in-time system of daily deliveries involves a twenty fold increase in documentation.

EDI provides an opportunity to remove many of the administrative barriers to efficient production and distribution. It has particular application to the transport handling and clearance of international cargo where the amount of documentation and the delays associated with incorrect, incomplete or late documentation represent substantial sources of inefficiency (see, for example, the report of the Industry Committee to the Inter-State Commission (ISC, 1988)).

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International Standards

EDI relies on standardised messages so that documents from different sources can be understood by the receiving systems. Businesses do not have to change their own documents since various software products are available to convert from internal standards to the EDI standards.

Perhaps the most significant step in the past few years has come from the agreement and ratification of a standard for data exchange in international trade, defining different types of electronic documents and specifying the details of their structure and transmission. Prior to this agreement a number of standards were in use, primarily the UN/TDI (Europe) and ANSI X12 (North America) standards.

Standardisation activities in Europe and North America over the last decade have been brought together in the UN/Economic Commission for Europe Working Party for the Facilitation of International Trade in Geneva. This convergence has resulted in a set of basic EDI (UN/EDIFACT) standards, firstly for essential data elements and more recently for syntax rules. These provide the "words and grammar" for EDI developments. Further work is being done in Geneva and elsewhere on a great variety of messages, built up on potentially standard segment structures.

The Customs Cooperation Council has examined the UN/EDIFACT data elements and syntax rules and decided that it would be in the interest of Customs and those with whom they normally exchange data, to adopt these standards for all common EDI purposes (Raven, 1989).

Whilst the creation of message formats using the EDIFACT standard is under way, it may be some time before many desired messages become available and are ratified for international use. In addition, organisations using other standards will take time to convert to EDIFACT.

The ANSI X12 standards are well established in Northern America and there may be difficulties in implementing the transition to EDIFACT standards as the EDIFACT messages are developed.

Nevertheless, there is a world wide commitment to the establishment of EDIFACT as the world standard, under the auspices of the UN/ECE and the International Standards

Organisation. The National Trade Services Network is adopting the EDIFACT standards.

#### THE NATIONAL TRADE SERVICES COMMUNICATIONS NETWORK

The previous sections of this paper have outlined the communications task and some of the recent developments in technology applications. In this section, a communications system is described which addresses the needs of the transport and trading community, and thus increases the efficiency of Australia's trading activities.

This system was proposed by the National Communications Working Party on Cargo Movements (ISC, 1988). The proposal is being taken up by industry and implementation progress is described in a later section of this paper.

Having reviewed overseas developments and the needs of the Australian industry, a national trade services community network was proposed to facilitate electronic data transfer, timely identification of cargo location and notification of cargo status in the clearance and transportation chains. A diagrammatic representation of this proposal is in Figure 5.

The network is designed to help coordinate the activities of the major sectors of the industry - as well as the requirements of government authorities. It will have application for airfreight and domestic cargo movements.

Two key characteristics of the network are its national coverage and its flexibility. It is intended to be cost-effective and established incrementally through a simple distributed approach rather than a complex centralised system with major data processing functions.

Subscribers throughout Australia will be able to access the network and the services available. It is intended that the charges be the same irrespective of subscriber location.

The proposed community network can be viewed in two parts, a backbone network and value added services (VAS). The network will utilise the physical common carrier telecommunication infrastructure (currently provided by Telecom).

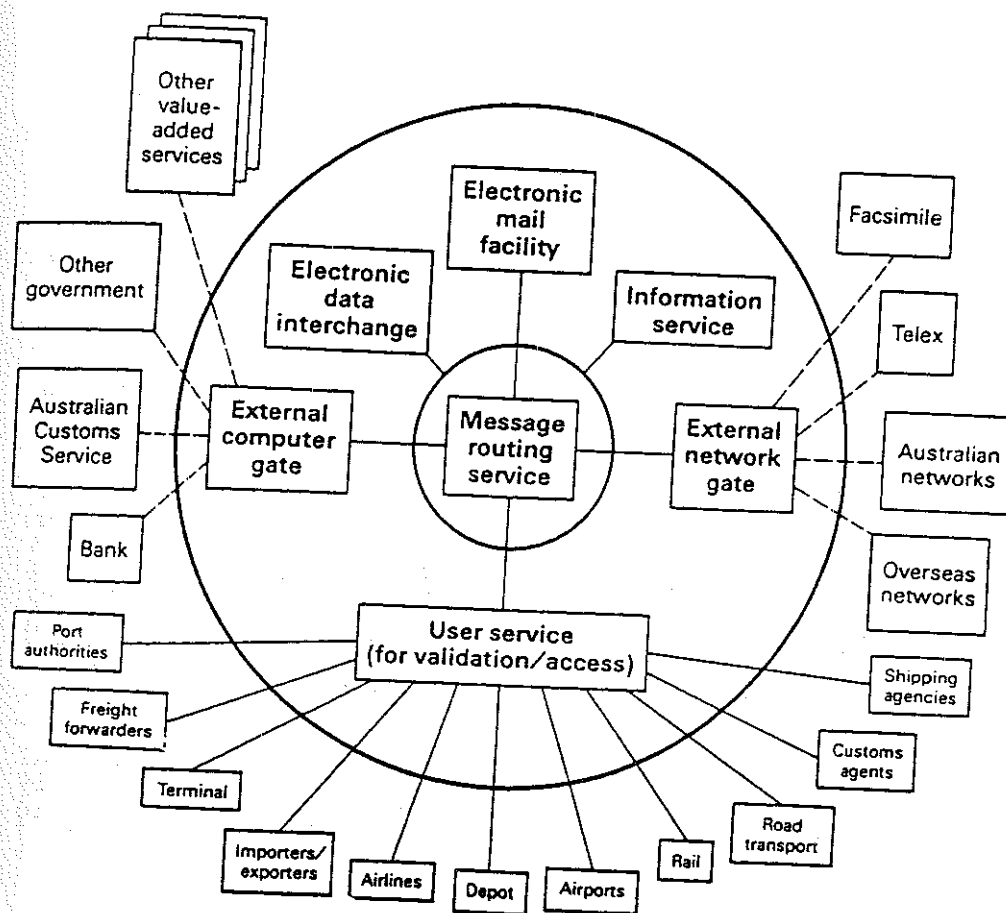


Figure 5. The Australian National Trade Services Network

Note: The large circle contains the backbone network functions.

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Backbone Network

The backbone network will provide a common infrastructure allowing subscribers with possibly different computing equipment to send messages to one another via a system of electronic mailboxes.

Initially the following basic functions are proposed to be supported by the backbone network:

- \* Message routing service  
  
To transmit messages between the different participants' electronic mailboxes - the basic switching functions supporting other functions and applications.
- \* Electronic data interchange  
Standard documents produced by network subscribers are to be switched through the network to selected destinations.  
  
These documents could be any "standard" format text but would typically be cargo manifests, invoice details and so on.
- \* Electronic mail  
  
A communications facility for informal messages.
- \* Gateway function  
  
Computer to computer communication, terminal emulation and protocol conversion are performed by the gateway. Other gateways can provide links to different Australian and international networks.
- \* Information service  
  
For network operational information, including a "help" facility.
- \* User server  
  
To provide user access and validation to ensure compliance with accreditation and security procedures.

\* Value added services access

Non-discriminatory access must be provided for VAS suppliers. This does not preclude the backbone network provider also supplying VAS.

Value Added Services

It is proposed that there be an open VAS market - any supplier would be able to offer a VAS on the network provided that, where appropriate, standards are complied with. VAS provision would be on a commercial basis. There will be a choice of VAS and subscribers will be able to select the services appropriate to their needs. In some cases similar services may be offered by more than one VAS provider on the network. In other applications with a single VAS provider the facility for a potential competitor to offer a similar service will protect subscribers' interests.

The national community network will provide an infrastructure supporting a wide range of VAS designed to meet the specific needs of industry participants including importers and exporters.

Against this background it is not appropriate to be prescriptive about the services to be provided on the network. There is, however, a set of key VAS which the network should support to meet basic communication needs for sea and air cargo movements. These include:

- \* cargo booking;
- \* cargo tracking;
- \* cargo accounting and control;
- \* electronic funds transfer;
- \* customs and quarantine functions;
- \* carrier information; and
- \* vehicle booking services at container terminals and depots.

**CONTROL AND MANAGEMENT ISSUES**

The proposed national community network has immense strategic importance to Australia. It will be able to carry the information component of Australis's trade and be used in the coordination of trade related activities. The efficiency gains would boost Australia's trading performance.

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Accordingly, the National Communications Working Party believed that the organisation and management of the network should not be left to chance or to the possible domination of any sector or interest.

While supporting the competitive provision of value added services to be marketed through the network, it was believed that a system of competing networks would have some undesirable features and in a practical sense may not be sustainable.

If there were several EDI networks servicing the requirements of the trade services community then communications between parties on two different networks (with gateways between them) would incur two network charges. Users would be billed by each of the several networks they accessed.

Companies would tend to join the network supported by most of their trading partners and so the largest network would generate more support and become dominant. Smaller networks may not attract sufficient support to become viable.

The extra charges for using more than one network, the expenses associated with the technicalities of changing from one network supplier to another and any need to attain a "critical mass" of users before becoming viable would all discourage potential competitors.

With a single network provider there needs to be a mechanism to ensure that the provider's position is not abused and the users' requirements continue to be met in an efficient manner. To fulfil this role it was proposed that a company comprising the users of the network be established. The management company would contract with the network supplier for the commercial provisions of the network services.

The role of the management company would be to:

- \* enter into a contract with a communications company for the establishment and operation of the network
- \* represent the interests of the users in the management of the network
- \* encourage the development of the services required by the network users



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- \* participate in the development of appropriate standards

IMPLEMENTATION PROGRESS

There have been two main areas of implementation activity, assessment of communications network provider organisations and assisting the potential user community to form a management company.

Network Provider

Specifications for the provision and operation of the network on a commercial basis were sent to companies in the electronic communications industry and other interested parties in July, 1988. The documents were in the form of a Request for Proposals (RFP). Their availability was advertised in the press and, in all, 70 organisations received copies of the RFP. Responses were required by early September, 1988.

There were 20 responses, although many of these addressed only particular parts of the requirement.

An Evaluation Committee was established comprising industry representatives and drawing on a balance of technical and commercial expertise. Responses to the RFP were screened and a short list of four was selected. These organisations participated in an assessment program of interviews, demonstrations and discussions, during which they had opportunity to submit additional material and develop their proposals.

The network provider assessment was completed in December, 1988 with the recommendation that the industry negotiates with Csironet for the provision and operation of the communications network.

The Evaluation Committee also recommended that an independent review of its work be undertaken. Coopers and Lybrand WD Scott were engaged to conduct this review which concluded that the procedure used was suitable and satisfactorily performed by the Evaluation Committee.

The National Communications Working Party accepted the Committee's assessment and a notice to this effect was issued to the industry in January, 1989.

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Management Company

The industry took up the proposal that the network users be represented through a management company to contract for the commercial provision of network services, ensuring that the users' requirements continue to be met in an efficient manner.

A company, Tradegate Australia Limited, is being registered and at this stage (March, 1989) its subscribers are:

Association of Australian Port and Marine  
Authorities  
Qantas (representing IATA)  
Australian Customs Service  
Customs Agents Federation of Australia  
Freight forwarders associations (combination of  
the air and sea forwarders groups)  
Australian National Maritime Association  
Australian Chamber of Shipping  
Australian Road Transport Federation  
Austrade

Participation from exporters and importers is being encouraged and it is hoped that a syndicate of importer/exporter interests will be established for representation at Board level.

The groups forming Tradegate Australia Limited have entered into contract negotiations with Csironet.

**CONCLUSIONS**

One of the most heartening conclusions that can be drawn from this project is that applied transport economics research can make a major contribution to reform and progress in the public and private commercial arenas.

The genesis of the project lay in a more general conference organised by the (then) Bureau of Transport Economics in 1984 (BTE, 1984). The resulting industry Task Force drawing on the assistance of research advice identified the communication issue which in the subsequent inquiry was referred to a specific Working Party.

In a period of eighteen months the Working Party had employed its industry knowledge and research capacity to produce a blueprint and proceed to implementation.

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Another point to note is that the process is not finished and probably never will be.

Further work is required, and the "open", community nature of the network and its management provide many opportunities for rewarding research. In particular, there are questions of international cooperation, regional coordination, applications to domestic transport and the development of a whole range of value added services.

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