Expediting Trade Through Electronic Bills of Lading

International Trade Centre

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About the paper

This paper examines increasing use of electronic bills of lading (eBLs) in global trade. It traces their evolution and explores their transformative impacts and benefits in streamlining and expediting trade and in reducing trade costs, enhance efficiency while promoting the green economy.

The paper also provides an overview of global trends and efforts by governments, industry associations and international organizations to promote the adoption of eBLs, highlighting their progress in this transition. As eBLs are poised for greater use in global trade, this paper presents a snapshot for policymakers and businesses to help them understand and prepare for the digital transition.

Publisher: International Trade Centre.

Title: Expediting Trade Through Electronic Bills of Lading

Publication date and place: Geneva, April 2025

Page count: 50

Language: English

ITC document number SPTI-25-199.E

Citation: International Trade Centre (2025). *Expediting Trade Through Electronic Bills of Lading,* ITC, Geneva.

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Foreword

Digital technologies have opened up a wealth of new possibilities for making trade easier and less expensive, especially for small and medium-sized enterprises (SMEs). One of the most notable innovations yet has been the creation of electronic bills of lading (eBLs)—a development that, if adopted on a wider scale, could make trade far more accessible, efficient, secure and sustainable.

Today, paper-based documentation still covers about 40% of containerized trade transactions. This imposes substantial costs: paper-based bills of lading alone account for 10%–30% of total trade documentation expenses. They can also create unnecessary delays in trade processes and cause adverse environmental impacts.

If these processes are moved online, traders globally could save around $6.5 billion in direct transaction costs and would have the capacity to facilitate up to $40 billion in trade flows. Beyond these cost savings, the transition to eBLs promises to revolutionize trade operations by streamlining processes, improving security and reducing environmental impact. Governments and private sector actors alike—such as major shipping companies—are seeing this potential and are increasingly taking steps to bring electronic bills of lading within reach of more firms.

The transition to digital solutions is not just an option, but a necessity for helping traders stay ahead of the curve. This is especially urgent now, as firms navigate a global economy that is regularly buffeted by crises that put their competitiveness, and even survival, at risk. That is where this paper intervenes, providing a comprehensive examination of eBLs already in place—drawing insights from their successes and their challenges—to support policymakers, industry leaders and practitioners working to make this transition happen.

Electronic bills of lading are more than just technological advancement; they are valuable tools in a bigger toolkit for ensuring global trade can contribute to resilient prosperity. Getting there, however, will require everyone--governments, international organizations and private sector stakeholders—to work together in realizing this vision so that the benefits of digitalizing trade documentation are accessible to all.

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Acknowledgements

Chuwankorn Sasanabanchakul (International Consultant, ITC) and Fabiana Fong (Associate Economic Affairs Officer, ITC) drafted this technical paper under the supervision of Quan Zhao (Senior Programme Officer on Trade Policy, ITC) and Jean-Sébastien Roure (Senior Officer, Business and Trade Policy, ITC).

The authors appreciate the review and comments from Luca Castellani (Legal Officer, United Nations Commission on International Trade Law) and Hong Xue (Law Professor, Beijing Normal University), as well as inputs from Bertrand Chen, Chief Executive Officer of the Global Shipping Business Network.

We also would like to thank Anne Griffin (ITC) for her support in editorial production; Jennifer Freedman, senior communications consultant, for editing; Iva Stastny Brosig of Design Plus, for the graphic design, and Serge Adeagbo (ITC) for printing support.

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Acronyms

Unless otherwise specified, all references to dollars ($) are to United States dollars.

BIMCO	The Baltic and International Maritime Council
BL	bill of lading
eBL	electronic bill of lading
ETR	electronic transferable record
CPTA	Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific
DCSA	Digital Container Shipping Association
FIATA	International Federation of Freight Forwarders Associations
ICC	International Chamber of Commerce
ITC	International Trade Centre
FIT Alliance	Future International Trade Alliance
MLETR	Model Law on Electronic Transferable Records
UETA	Uniform Electronic Transactions Act
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UNCITRAL	United Nations Commission on International Trade Law
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNECE	United Nations Economic Commission for Europe

Executive summary

The digital transformation of international trade documentation, particularly through electronic bills of lading (eBLs), represents a pivotal shift towards efficiency, security and sustainability in global commerce. This paper examines the multifaceted implications of eBL adoption, outlining its transformative potential, persistent challenges and collaborative efforts driving its integration into modern trade ecosystems.

EBLs offer a digital alternative to paper-based bills of lading, which underpin 40% of containerized trade transactions while accounting for 10% to 30% of total trade documentation costs. Industry projections suggest full eBL adoption could yield $6.5 billion in direct cost savings and unlock $30 billion to $40 billion in global trade by streamlining processes and reducing delays.

Beyond financial gains, eBLs improve operational efficiency through instant transmission, real-time tracking, reduced manual handling and improved documentation turnaround times – from days or weeks to mere minutes. Environmental benefits are equally compelling: each eBL eliminates 27.9 kilograms of greenhouse gas emissions, translating to 440,820 metric tons of annual carbon dioxide savings and preserving forests equivalent to 39 football fields.

EBLs also mitigate critical vulnerabilities in traditional systems through enhanced security via digital signatures, encryption and audit trails, reducing risks of forgery, loss and tampering inherent in paper documents. However, adoption barriers remain, including fragmented legal recognition, technical limitations and capacity disparities.

Interoperability and standardization is another hurdle, with fragmentation among private platforms hindering interoperability. Cybersecurity threats and limited awareness among businesses – especially small and medium-sized enterprises in developing countries – further complicate adoption.

Two primary approaches govern eBL implementation. The statute-based approach, exemplified by the United Nations Commission on International Trade Law's (UNCITRAL) Model Law on Electronic Transferable Records (MLETR), establishes principles of non-discrimination, technological neutrality and functional equivalence, enabling eBLs to replicate the legal effects of paper bills of lading. Ten jurisdictions, including Bahrain, Singapore, the United Kingdom and France, have enacted MLETR-aligned laws as of 2024 to modernize legislation, though global adoption remains uneven.

Conversely, the contractual approach relies on agreements between parties using private platforms. While pragmatic, this method lacks universal recognition, binding only consenting parties. Some other economies, such as China and Germany are amending laws to allow and facilitate the use and operation of the eBLs.

It should be noted that UNCITRAL also started a project in 2019 that works on a new convention on negotiable cargo documents. The initiative aims to create a document of title called a 'negotiable cargo document' that would function similarly to maritime bills of lading but for all modes of transport, including air cargo, in both multimodal and unimodal contexts. The convention addresses the issuance, transfer and legal effects of these documents in connection with the international transport of goods.

The private sector also plays a key role in promoting eBLs. For instance, the Digital Container Shipping Association — representing 70% of containerized trade — announced a transition to fully standardized eBLs industry-wide by 2030, offering open-source data models to harmonize carrier systems. The Future International Trade Alliance launched a global eBL declaration in 2023 endorsed by more than 100 entities, committing to fully digitizing bills of lading to advance container trade digitalization. Service providers such as Global Shipping Business Network have established networks that account for more than half of the containers handled in the world and are fostering collaboration to enabling paperless, accessible and sustainable global trade.

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International organizations complement these efforts. The United Nations Economic and Social Commission for Asia and the Pacific has introduced initiatives to support the uptake of eBLs as part of its efforts to promote paperless trade, including the MLETR Tracker, monitoring global legislative progress.

The transition to eBLs demands coordinated multilateral action across legal, technological and capacity-building domains. Legal harmonization must expand MLETR adoption, while aligning regional frameworks to resolve cross-border recognition challenges. Domestic legal reforms require modernization to address gaps in e-signature validity, e-transaction protocols, e-invoices, data protection standards and cybersecurity mandates. Technological investment in interoperability and cybersecurity will build stakeholder trust and accelerate the cross-border use of eBLs.

The success of eBLs hinges on sustained public–private–international coordination, ensuring the benefits of digitalization – operational efficiency, supply chain transparency and sustainability – are equitably realized across all countries. Technical assistance, such as targeted capacity-building programmes, remains crucial for bridging digital divides in developing countries, where supportive policies and infrastructure investments can unlock the full potential of paperless trade.


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CHAPTER 1

Understanding electronic bills of lading

Understanding electronic bills of lading

What is a bill of lading?

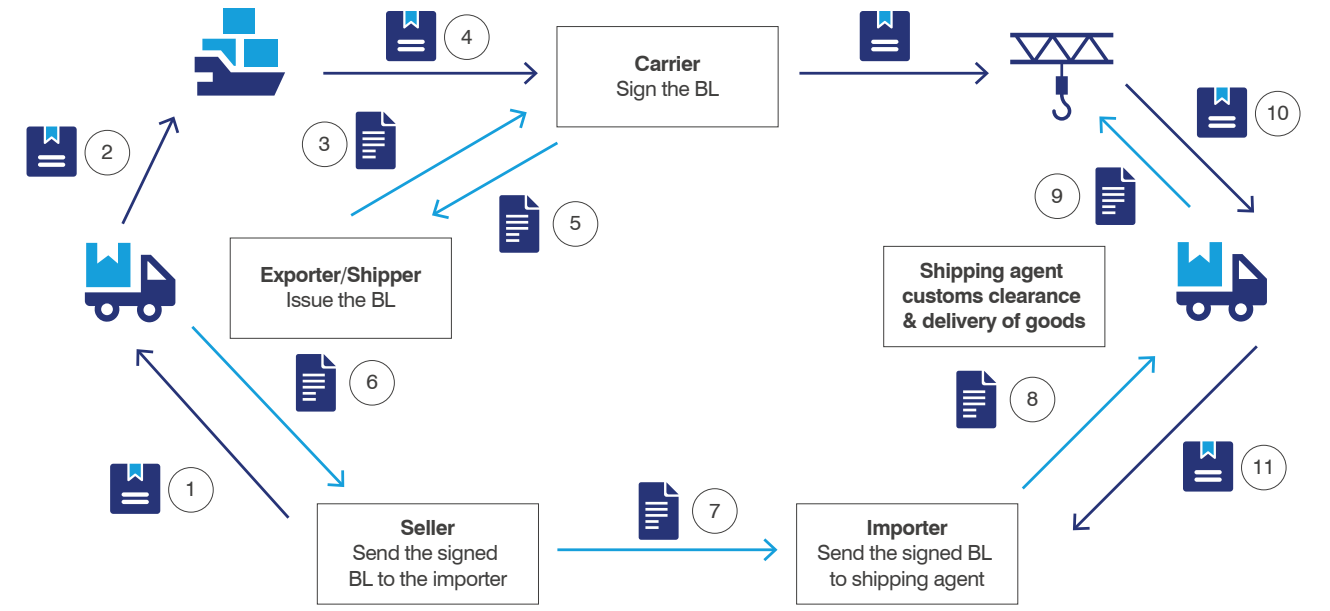
A bill of lading (often abbreviated as BL or B/L) is a legally binding transferable or negotiable document used in the shipping industry. It is issued by a carrier to a shipper and contains details on the type, quantity, origin and destination of the goods being transported, along with a description of the goods and shipping costs.

The BL can facilitate international trade by acting as a tool to create trust and transparency among trade parties while goods are in transit. Sellers can ship goods to buyers without prepayment, knowing that banks will proceed with the payment when buyers present BLs upon obtaining the goods. A BL is also a financial instrument that helps sellers secure payment from banks through letters of credit. Therefore, the significance of a BL lies in its ability to interconnect stakeholders involved in the trade process to ensure the smooth transportation and delivery of traded goods.

These stakeholders may include the following:[1,2]

- The **shipper** is the party supplying the goods being transported. A shipper is responsible for arranging the shipment of goods, including packaging and preparing them for transport. This could indeed be the seller if the seller is directly involved in handling the logistics of getting the goods to the buyer.
- The **carrier** transports goods from the origin to the destination on behalf of the shipper.
- The **consignee** is the party designated to receive the shipment. Generally, consignees own the shipped goods. Unless there are other instructions, the consignee is the entity or person legally required to be present to accept the shipment. A consignee in shipping is listed on the bill of lading.[3]
- Other pertinent parties such as banks and insurers.

Figure 1 Overview of a bill of lading used in shipping operations



Source: International Trade Centre (ITC)[4]

The process typically starts with the carrier issuing the BL to the shipper/seller upon receiving the goods. The shipper/seller then sends the original bill of lading to the buyer, often through a bank, to ensure that the seller receives the payment before the goods are released to the buyer. Finally, the consignee/buyer presents the original bill of lading to the carrier at the destination port to take possession of the goods.

Throughout the shipping process, a bill of lading serves multiple important functions:[5,6]

- It acts as **a contract of carriage** between the shipper, carrier and consignee, defining the agreed terms and conditions of transportation.
- It acts as **a receipt of goods**, confirming that the carrier has received the goods from the shipper.
- It acts as **a document of title**, representing ownership of the goods while they are in transit. Possession of the original bill of lading allows the holder to claim the goods upon their arrival or arrange transfer ownership of the cargo to another party in the supply chain.
- It acts as **proof of shipment**, which is particularly important for use in customs clearance and insurance.
- It acts as **a financial instrument** or collateral for trade financing transactions. A bill of lading is often required for the shipper/seller to receive payment from the buyer.

> **Fun fact:** 'Lading' means 'loading' and specifically the loading of cargo on board a ship. Though originally 'bill of lading' referred only to ocean freight, today the term is used to refer to any type of bill of lading for transport of goods by ocean, air or ground.[7]

The contents of a BL may differ based on the applicable laws and regulations. These requirements are complemented by terms and conditions agreed upon by the parties, as well as operational requirements necessary for efficient shipping processes such as insurance coverage, limitation of liability, transport time-frame and other special instructions. The standard-form bill of lading contains the following key information:[8,9]

- **Shipper (sender) and consignee (recipient) information** such as full names, addresses and contact details. These details are vital for the shipping of goods as they determine the origin and destination of the shipment.
- **Carrier information** including the business name, address and signature to confirm receipt of the shipment.
- **Freight forwarder information** including business name and addresses, if applicable.
- **Date of shipment**, which is the date the shipment is loaded onto the vessel or the expected departure date from the shipper's facility.
- **Ports of loading and destination** (i.e. where the cargo was loaded and the destination port).
- **Description of goods** that includes a full and detailed description of the shipped goods such as type, quantity, packaging, weight, dimensions and hazardous classification (if applicable).
- **Reference numbers** such as purchase order numbers, invoice numbers or other reference numbers to identify the shipment.
- **The agreed Incoterms and payment terms**, clarifying the responsibilities and costs between the shipper and consignee.
- **Any special handling instructions or requirements** for the shipped goods, especially for fragile or hazardous items.
- **Signature and date** of the shipper, carrier and freight forwarder (if applicable) to confirm the accuracy of the information.
- **The declared value** of the shipped goods, which is relevant for insurance purposes and potential liability.

Figure 2 Example of a bill of lading

BILL OF LADING

SHIP FROM	**Bill of Lading Number:**
Name: Street Address: City/State/Zip: SID#: FOB: ☐	BAR CODE SPACE
SHIP TO	**CARRIER NAME:**
Name: Location #: _____ Street Address: City/State/Zip: CID#: FOB: ☐	Trailer number: Serial number(s):
THIRD PARTY FREIGHT CHARGES BILL TO	**SCAC:**
Name: Street Address: City/State/Zip:	Pro Number: BAR CODE SPACE
SPECIAL INSTRUCTIONS:	Freight Charge Terms: *(Freight charges are prepaid unless marked otherwise)*: Prepaid _____ Collect _____ 3rd Party _____
	☐ (check box) Master Bill of Lading: with attached underlying Bills of Lading.

CUSTOMER ORDER INFORMATION

CUSTOMER ORDER NUMBER	# PKGS	WEIGHT	PALLET/SLIP (CIRCLE ONE)		ADDITIONAL SHIPPER INFO
			Y	N	
			Y	N	
			Y	N	
GRAND TOTAL					

CARRIER INFORMATION

HANDLING UNIT		PACKAGE				**COMMODITY DESCRIPTION**	LTL ONLY	
QTY	TYPE	QTY	TYPE	WEIGHT	H.M. (X)	Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation with ordinary care. See Section 2(e) of NMFC item 360	NMFC#	CLASS
						GRAND TOTAL		

Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property as follows: 'The agreed or declared value of the property is specifically stated by the shipper to be not exceeding _____ per _____.'

COD Amount: $ _____

Fee terms: Collect: ☐ Prepaid: ☐ Customer check acceptable: ☐

Note: Liability limitation for loss or damage in this shipment may be applicable. See 49 USC § 14706(c)(1)(A) and (B).

RECEIVED, subject to individually determined rates or contracts that have been agreed upon in writing between the carrier and shipper, if applicable, otherwise to the rates, classifications, and rules that have been established by the carrier and are available to the shipper, on request, and to all applicable state and federal regulations.

The carrier shall not make delivery of this shipment without payment of charges and all other lawful fees.

_____ Shipper Signature

SHIPPER SIGNATURE/DATE	**Trailer Loaded:**	**Freight Counted:**	**CARRIER SIGNATURE/PICKUP DATE**
This is to certify that the above-named materials are properly classified, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the DOT.	☐ By shipper ☐ By driver	☐ By shipper ☐ By driver/pallets said to contain ☐ By driver/pieces	Carrier acknowledges receipt of packages and required placards. Carrier certifies emergency response information was made available and/or carrier has the DOT emergency response guidebook or equivalent documentation in the vehicle. ***Property described above is received in good order, except as noted.***

Source: Investopedia.com[10]

Digitalizing the bill of lading

Several organizations (e.g. Digital Container Shipping Association) and companies (e.g. Bolero International and WAVE BL)[11] sought to digitalize traditional paper-based bills of lading to improve the shipping process and address the challenges associated with physical BLs, such as slowness, cost and fraud. The outcome of those attempts was the adoption of an electronic bill of lading (eBL), also called a paperless bill of lading, which is the digital version of the traditional paper document.

Adopting the eBL is crucial for international trade, especially to facilitate trade. The International Chamber of Commerce (ICC) estimates that paperless trade facilitation could generate $267 billion of additional exports for big economies by 2026.[12] More small players would also be enabled to trade internationally, as digitalization would help close trade finance gaps by improving efficiency and reducing costs.[13]

The World Trade Organization recognizes the benefits of eBLs and calculates that full implementation of the Trade Facilitation Agreement, including turning paper trade documents into digital ones can boost global trade by up to $1 trillion a year.[14] According to McKinsey, the digitization of bills of lading processes – which represent 10% to 30% of trade documentation costs – could yield savings of $6.5 billion in direct transaction costs and facilitate $30 billion to $40 billion in global trade.[15] In addition, carriers stand to gain up to $2.1 billion in benefits from more direct interaction with shippers as well as streamlined and digitalized workloads.[16]

What is the process of shipping with electronic bills of lading?

Shipping with eBLs mirrors the traditional paper-based process, albeit with significant enhancements in efficiency, security and simplicity through digitalization. Like their paper counterparts, eBLs serve as crucial documents throughout the trade process, from loading shipments to customs cross-border clearance. They act as evidence of the delivery of the goods to the carrier, facilitate the transfer of ownership of goods and serve as proof of the contract of carriage.

The main difference between an eBL and its traditional paper counterpart lies in their respective medium: the eBL process operates entirely in the digital realm, facilitating swift and streamlined transactions.

The process for an eBL transaction starts with the carrier electronically creating the eBL, which contains all the standard information found on a paper bill of lading such as shipper, consignee and cargo details. The master (captain of the vessel),[17] authorized agent or carrier's headquarters signs the eBL electronically and then the eBL is transmitted electronically to the shipper or freight forwarder via a secure online eBL platform.

The shipper or eBL title holder can endorse the eBL electronically to transfer ownership – for example, to another consignee or a bank. This is done via the secure eBL platform and replicates the physical endorsement/transfer of a paper BL. Through the eBL, the title to the goods (ownership) or to the delivery of goods – depending on whether the BL transfers property or not – can be transferred multiple times while the goods are in transit, with each transfer recorded digitally on the eBL platform.

The electronic chain of transfer ensures there is a clear record of each transaction.[18] With paper BLs, endorsement is done by physically signing the original BL. Transferring title requires physically passing the paper BL to the new owner. With eBLs, this can all be done instantly via the digital platforms.

At the destination, the final consignee electronically surrenders the eBL back to the carrier via the platform to complete delivery of the goods. The carrier verifies that this consignee is the rightful owner of the eBL in the digital system. Once confirmed, the carrier updates the eBL to show that it has been completed, and the goods are released to the consignee.

With paper BLs, the consignee must physically surrender one original paper BL to the carrier's agent at destination in exchange for the goods. Delays often occur if the paper BLs have not arrived at the destination by the time the shipment arrives.[19] To mitigate these delays, parties often issue letters of indemnity, which allow cargo delivery without presenting the original BL. However, this practice carries legal and financial risks, as these letters may not effectively protect shipowners against claims resulting from misdelivery.

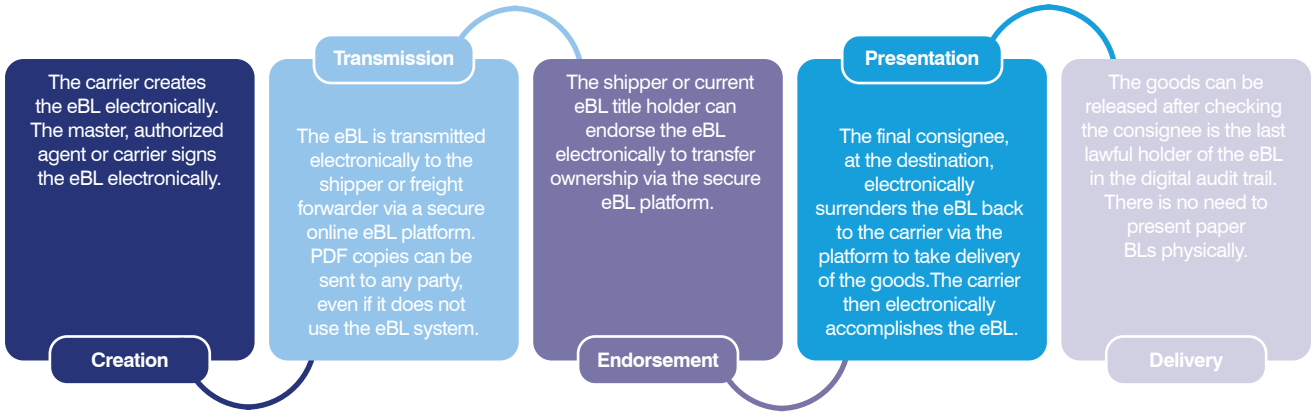
Throughout the process, the eBL is managed via secure platforms using technologies including data encryption, audit trails and digital authentication to prevent fraud and ensure there is only one single record of the eBL at any time. This system ensures the eBL data are accessible only to parties involved in that specific shipment. Commercially sensitive data that have competitive value and are not intended to be public remain confidential. [20] This is often achieved via distributed ledger technology, even though other technological solutions may also be envisaged.

In the eBL trade process, the eBL data can also be shared if the parties decide to do so. These data can be shared not only among the parties involved, but also among those who are not users of the eBL system, in multiple formats such as PDF copies (for parties outside the electronic system) and structured data formats like JSON or XML formats[21] (for system-to-system communication).

This flexibility in data sharing enables faster transmission of information compared to couriering paper documents. It also ensures that all relevant parties can access and use eBL information, regardless of their technological capabilities or system preferences.

It is crucial to distinguish between information sharing and legal transfers of the eBL. PDF copies and data extracts can be shared widely for informational purposes, even with parties outside the eBL system. However, all binding actions – including endorsements, amendments and transfers – must be conducted solely through the designated electronic platform.[22]

Figure 3 Process of shipping with eBLs



Source: ITC[23]

CHAPTER 2

The pros and cons of using eBLs

The pros and cons of using eBLs

Benefits of eBLs

Compared with paper BLs, eBLs have the benefits of saving trade costs, instant transmission, enhancing security, reducing fraud risks as well as decreasing carbon footprints. As more countries digitalize their trade processes for greater efficiency, eBLs are expected to eventually replace paper BLs and become a dominant form of documentation in international trade.

The main advantages of eBLs are as follows:

- **Time and cost savings**

By adopting the eBL, businesses can reduce costs and time throughout the entire shipment process. The eBL is generated, signed and transmitted electronically, eliminating the need for paper documents and potentially reducing the resources required for document handling (such as printing, keeping or sending). This accelerates the creation and distribution process from days or weeks with paper bills to mere minutes, resulting in expedited shipment turnaround times.

The eBL also improves data visibility across the supply chain and subsequently streamlines its operations.[24] Delays in these documents can lead to goods being stuck at the border or in storage, causing additional and unnecessary costs for businesses.[25]

- **Enhanced security and reduced fraud risk**

Electronic bills of lading use digital signatures, encryption, audit trails and other security measures to make them tamper-proof and more secure than paper bills of lading. As digital documents, eBLs eliminate the risk of physical loss, damage, forgery, manipulation and duplication associated with paper bills of lading. This prevents fraud schemes that rely on lost or stolen documents.

In addition, eBLs can increase transparency in the shipment process by providing accurate, complete, real-time and authentic information, and eliminate human errors in handling information. All parties involved in the shipment can access information in eBLs via a secure online portal at any time, which allows for the real-time tracking of the shipment.[26] The eBL platform typically requires authorized personnel to gain access through secure logins, user roles and digital identifications. This ensures that only verified parties can view and manage sensitive data, minimizing the risk of unauthorized tampering.[27]

It should be noted that, as in any digitalization scenario, eBLs may face digital risks such as cybersecurity and data privacy concerns. However, technological solutions are constantly being developed to boost the security of eBL systems and costs related to such security enhancements can be spread across transactions. This leads to a virtuous cycle that the more users of the system, the more investment will be made to make the systems secure.

- **Promoting the green economy**

The shift from traditional paper BLs to eBLs offers considerable environmental benefits and contributes to a more sustainable and eco-friendly shipping industry.[28]

Adopting eBLs drastically reduces paper consumption and the carbon footprint of each shipment. By eliminating the need to print and physically transport paper documents, companies can cut waste generated from paper documentation and storage costs, as eBLs are transmitted and stored digitally. Additionally, instant digital transmission of documents helps circumvent delays and disruptions in shipments, thereby optimizing shipping processes and curbing unnecessary emissions from idle ships and vehicles.

According to a recent study,[29] every electronic bill of lading could save 27.9 kilograms of greenhouse gas emissions.[30] Extrapolating that figure over the industry's 15.8 million paper bills yields a potential carbon dioxide emissions saving of 440,820 metric tons per year.[31] In addition, enabling paperless trade with 100% eBL adoption can save some 28,000 trees annually. This is equivalent to preserving an area of forest roughly the size of 39 football fields.[32]

Challenges of promoting eBLs

While eBLs have existed for some time and offer major benefits, they accounted for just 2.1% of all bills of lading used in the container trade in 2022.[33] The challenges to adoption of eBLs include the following:

Insufficient legal recognition and enforceability

Clear recognition of the legal status of eBLs and granting eBLs the equivalent legal effect as their paper versions are prerequisites for adoption of electronic bills of lading. However, only a few countries currently have legal frameworks that formally acknowledge eBLs. As a result, possessing an eBL in a jurisdiction without clear recognition of the legal status of eBLs may have the risk of no legal guarantee of confer the rights of ownership or entitlement, or ensuring the enforcement of obligations typically associated with traditional paper bills of lading.[34]

Examples of the legislation that granting eBLs the equivalent legal effect as their paper versions include the Singapore Electronic Transactions (Amendment) Bill,[35] the United Kingdom's Electronic Trade Documents Act[36] and Bahrain's revised Electronic Transferable Records Law.[37] Most of these examples stemmed from implementation of the United Nations Commission on International Trade Law's (UNCITRAL) Model Law on Electronic Transferable Records (MLETR), which is addressed in the next chapter.

Examples of key provisions in the current legislations

Singapore Electronic Transactions Act (ETA) was amended in 2021 to adopt the UNCITRAL MLETR, to enable the creation and use of transferable documents or instruments such as electronic bills of lading. The key changes to the ETA that reflect the acknowledgement of the electronic version of the BLs and their use include:

- Section 2(1) on Interpretation: the 'electronic transferable record' has the meaning given by section 16A;
- Section 2(3)(c)(i) on Location '...or the creation or use of electronic transferable records',
- Section 3 on Purposes and construction, a paragraph (h): to adopt the UNCITRAL Model Law on Electronic Transferable Records adopted by the United Nations Commission on International Trade Law on 13 July 2017 in its application to an electronic transferable record, whether the electronic transferable record is issued or used in Singapore or outside Singapore.

The primary focus of Section 16A is to provide definitions crucial for understanding and applying the provisions related to electronic transferable records. Key terms related to eBLs defined in this section include:

- 'Electronic record' means a record generated, communicated, received or stored by electronic means, including (where appropriate) all information logically associated with or otherwise linked together so as to become part of the record, whether generated contemporaneously or not;
- 'Electronic transferable record' means an electronic record that complies with all the requirements of section 16H;
- 'Electronic transferable records management system' means an information system for the issuance, transfer, control, presentation and storage of electronic transferable records.

The UK Electronic Trade Documents Act 2023 provides for certain electronic trade documents, including electronic bills of lading, to be accorded the same legal status as their paper equivalents if they meet the relevant criteria. It is clearly stated in Article 3(2) on Possession, indorsement and effect of electronic trade documents that 'an electronic trade document has the same effect as an equivalent paper trade document'.

Bahrain has enacted the Model Law on Electronic Transferable Records through law no. (55) of 2018 with respect to electronic transferable records. Bahrain's recognition of the use of electronic bills of lading is clearly stated in Article 5(1) on Legal Recognition of Electronic Transferable Records, which says '[a]n electronic transferable record may not be denied legal effect, validity or enforceability on the sole ground that it is in electronic form' and provides the requirements for the use of electronic transferable records in Article 6.

Source: ITC[38]

The absence of legal clarity hinders the use, validity and enforceability of eBLs, leading to uncertainty and hesitation among stakeholders across countries.[39] UNCITRAL developed MLETR in 2018 to enable the adoption of electronic transferable records, including eBLs. MLETR overcomes the limitation of inadequate enabling laws, as eBLs issued before 2018 were based on contractual agreements whose effect was limited to system participants.

MLETR provides a legal framework for countries to incorporate into their domestic legislation a mechanism to recognize electronic transferable records. Numerous countries had adopted MLETR-compatible laws by 2024.[40] These include France, the United Kingdom and Singapore, which adopted the model law; Canada, Colombia, Germany and the Philippines, which based their laws on UNCITRAL texts; and the United States and the Republic of Korea, which have developed similar and aligned models.

However, international trade involves multiple parties in a single transaction. If even one party is located in a country with insufficient eBL laws, it can block the use of eBLs for the entire shipment. Therefore, the more countries recognize or enable the use of eBLs (i.e. adopting MLETR or establishing regulatory frameworks that support the use of eBLs), the sooner it will reach a point when those without such domestic frameworks will have to adopt them to enable digitalized cross-border transactions with other countries.

Lack of standardization and interoperability

Private firms use digital platforms to provide the services to issue, transfer and store eBLs. While many companies and platforms offer these services, standardization and interoperability need to be addressed to enable wider adoption of eBLs.

As with other emerging markets and technologies, the initial phase often sees a surge of firms offering diverse and competing options to customers. This rapid expansion can inadvertently create gaps in interoperability as businesses work to develop their own platforms, standards and technologies – and these are usually not interoperable. These gaps lead to practical issues when eBLs are passing through different platforms that are unable to communicate with each other.

For example, the International Group of P&I Clubs of recognizes a dozen eBL providers, including Bolero, essDOCS (now called ICE Digital Trade), CargoX and TradeGo. These providers have their own platforms, rules and customer bases. While they aim to work together to improve interoperability, customers of one eBL system sometimes cannot take part in transactions handled by another eBL system.[41]

Similarly, large shipping companies such as COSCO, Evergreen Line, Hapag-Lloyd, Maersk and MSC offer digitalization solutions to streamline shipping processes, but interoperability remains a challenge. One reason is the use of blockchain as distributed ledgers are designed to be self-contained, not interoperable.

This lack of interoperability between different eBL platforms presents a key obstacle to its adoption, as users must connect to multiple systems, which could increase costs and reduce efficiency.[42] In a June 2022 survey by the Future International Trade (FIT) Alliance, respondents cited interoperability difficulties between systems as one of the main challenges of using eBLs. The survey said better technical interoperability would eliminate duplicate efforts with multiple platforms and alleviate concerns about vendor lock-in.[43]

More effort is needed to promote common standards and communication protocols, which would foster interoperability and seamless connectivity among platforms. This would enable eBL systems to effectively exchange information across diverse platforms. This can reduce frictions and encourage adoption of eBLs.

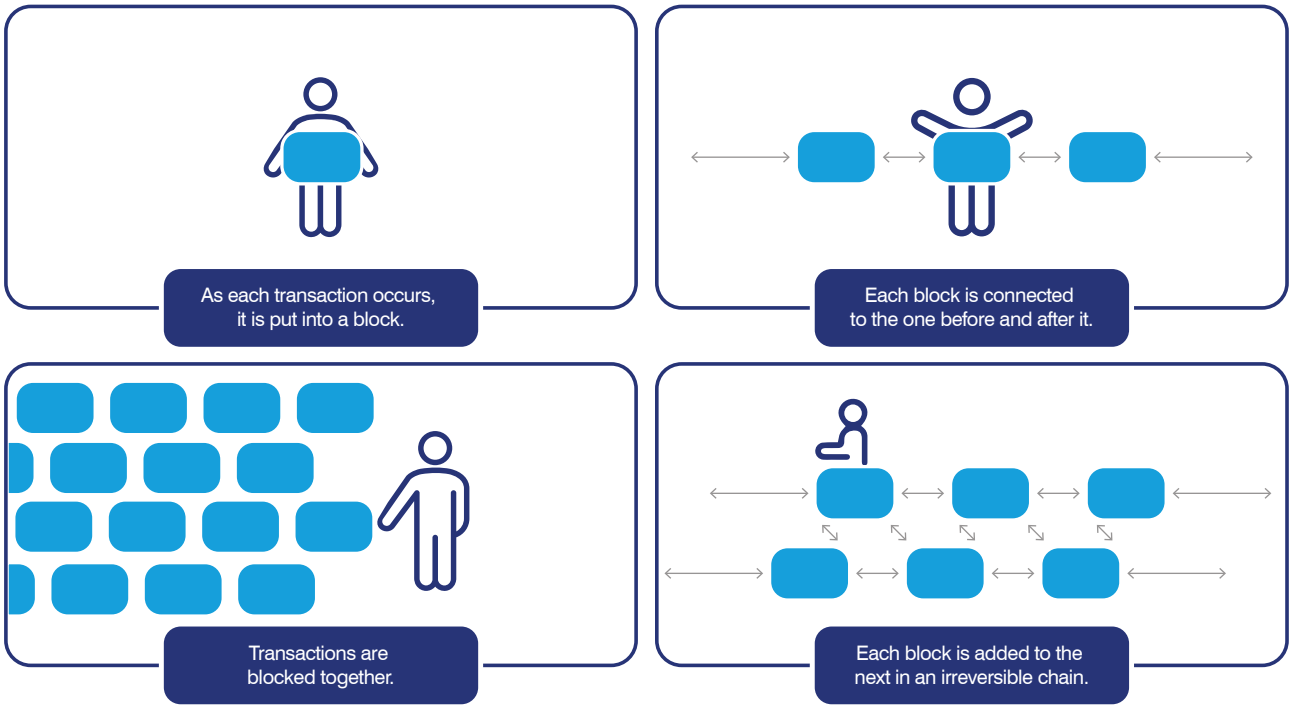
Authentication and data security

Concerns about the authentication and security of digital documents in the digital realm remain a major challenge. Unlike physical documents, digital documents of titles including eBLs are vulnerable to new forms of fraud and manipulation, such as hacking, tampering and data breaches.[44] Robust authentication mechanisms, encryption technologies and e-signature standards are needed to mitigate these risks and boost trust among users.

The use of blockchain, for example, could satisfy MLETR criteria vis-à-vis eBLs. This would give all parties access to an electronic transferable record to verify the authenticity of the eBL or other electronic document and confirm that the transferee controls it in real time, while preserving the confidentiality of commercially sensitive information.[45]

Blockchain technology is a decentralized digital ledger system that records and verifies transactions across a network of computers in a secure and transparent manner. It consists of a chain of blocks, each containing a list of transactions that are linked and secured using cryptographic techniques. Once a block is added to the chain, its data become immutable through a distributed ledger system, ensuring the integrity and permanence of the transaction records. This immutability and transparency enable blockchain to facilitate the exchange of anything of value, whether tangible assets including physical goods or intangible items such as digital assets.

Figure 4 Building a blockchain



Source: s-pro[46]

Awareness and knowledge among businesses

It is crucial to raise awareness among businesses about the benefits of eBLs and the practical solutions they offer to encourage their adoption. Many companies continue to rely on traditional paper-based bills of lading simply because they are unaware of the advancements in digital trade documentation or unsure of the benefits and challenges, as well as processes related to the use of eBLs.

Infrastructure and skills

Developing economies – especially low-income countries – lack the technical infrastructure to support eBL implementation. This includes secure access to the internet, a reliable power supply and availability of skilled professionals to operate eBL systems. Companies could support greater use of eBL systems in developing countries through user-friendly platforms, with intuitive interfaces and streamlined workflows to make it easy for businesses to use electronic bills of lading in their daily operations.

Blockchain technologies and limited cryptocurrency integration

Some eBL solutions – that is, tools or software that help create, manage and send electronic versions of bills of lading – are implemented on blockchain platforms (i.e. online space or systems where eBL solutions are used). The adoption of eBLs on these platforms, particularly those using cryptocurrencies, may present challenges and considerations that need to be addressed to facilitate broader acceptance and use.

One of the top challenges is that not all countries recognize cryptocurrencies as a valid form of payment. This can complicate transactions on blockchain platforms that require cryptocurrency payments to access the platforms.

Second, the fees can fluctuate considerably depending on the cryptocurrency used. For example, issuing a document on the popular Ethereum network could cost more than $11, which may not be economically viable in some cases, but still more economically efficient than mailing physical paper bills.

In contrast, newer and less established networks such as Polygon and XDC have much lower fees of around $0.012 and $0.00000231 per transaction, respectively.[47] However, the long-term scalability of these newer networks is still uncertain.[48]

CHAPTER 3

Enhancing the use of eBLs

Enhancing the use of eBLs

The private and public sectors have undertaken various initiatives to promote the adoption of eBLs. This chapter explores different approaches to promote the use of these instruments.

Two approaches stand out as the main methods to address the legal and regulatory challenges of using eBLs: (i) the statute-based approach – such as adoption of MLETR-compatible laws, which provide a legislative framework to enable the use and recognition of eBLs – and (ii) the contractual approach, which relies exclusively on contractual arrangements between parties to govern the use of electronic documents that perform similar functions to an eBL.

Statute-based (MLETR) approach

UNCITRAL's Model Law on Electronic Transferable Records aims to provide a legal framework for countries to enable the electronic use of documents of title without changing their substantive law. It seeks to facilitate the interchangeability of an electronic transferable record with a transferable document and seamless transferability across borders. MLETR builds on three key principles that underpin all UNCITRAL texts on electronic commerce:[49]

1. **Non-discrimination against the use of electronic means:** This principle ensures that an electronic record is not denied legal effect, validity or enforceability solely because it is in electronic form. This makes an electronic transferable record legally (and functionally) equivalent to a paper-based transferable document or instrument.
2. **Technological neutrality:** This principle ensures that the law does not mandate or favour the use of any specific technology or method. It enables the use of modern technologies, thereby ensuring that legislation based on MLETR does not become obsolete. In this respect, MLETR does not prescribe a specific technology for implementing electronic transferable records. Rather, it accommodates the use of all technologies and models including emerging technologies such as those based on distributed ledgers or blockchain technology.[50]
3. **Functional equivalence:** This principle lays out criteria for electronic communications that satisfy requirements applicable to paper-based documents, such as 'writing', 'original' and 'signed'. For example, when the law requires a signature, that requirement is met by an electronic record if a reliable method is used to identify the party and to indicate that party's intention in respect of the information contained in the electronic record.[51]

   In addition, it provides guidance on assessing the reliability of the method used to manage the electronic transferable record, on change of medium (electronic to paper and the reverse) and on cross-border issues, among others.

As of August 2024, 10 jurisdictions had incorporated MLETR texts into their national laws: Bahrain, Belize, France, Kiribati, Papua New Guinea, Paraguay, Singapore, Timor-Leste, United Arab Emirates (Abu Dhabi Global Market) and the United Kingdom.[52] By enacting legislation that aligns with the principles and guidelines set forth by MLETR, these jurisdictions amended or updated laws to grant electronic records the same legal status as paper documents.

In addition to MLETR, countries that have adopted Articles 16 and 17 from UNCITRAL's Model Law on Electronic Commerce[53] – which provide the enabling legal framework for bills of lading to be created and used in electronic form, with the same validity as paper versions – are considered in sync with MLETR because they share similar basic principles and common elements.[54] The same applies to countries that have enacted national laws based on the Rotterdam Rules.[55] On the other hand, some MLETR provisions could be preempted when countries already have relevant laws in place, such as on digital signatures.

Both advanced and emerging economies – notably China, Germany and Japan – have expressed interest in adopting

MLETR. In August 2023, for instance, China's Ministry of Commerce collaborated with the Asian Development Bank to convene a capacity-building session attended by more than 50 government officials and private-sector representatives to promote understanding of MLETR and exchange experiences.[56]

Thailand has also approved including MLETR in the Electronic Transactions Act in October 2021.[57] As more countries adopt MLETR, eBL users will benefit from a more unified global regulatory framework, enabling broader adoption and recognition of this instrument.

Private-sector initiatives that support the adoption of MLETR include the ICC's Digital Standards Initiative,[58] while the Digital Container Shipping Association has committed to 100% adoption of a DCSA standard-based eBL by 2030.[59] These initiatives seek to promote uniformity and compatibility among various electronic platforms and technologies.

Adopting MLETR could facilitate streamlined compliance, improve governance and enable the integration of environmental, social and governance considerations into the supply chain. However, technical assistance is essential to unlock the benefits of paperless trade, particularly for developing countries that lack legal and technical capabilities.

Relevant domestic legal and regulatory instruments

The use of eBLs may intersect with other domestic legal and regulatory frameworks, such as e-signature laws, e-transaction regulations, data protection and privacy policies, and cybersecurity standards. While these frameworks may not be strictly necessary to establish the legal status and functionality of eBLs, their presence is highly encouraged to improve the certainty, security and reliability of eBL systems.

Electronic signature and transactions law

In the absence of legislation, the courts may not accept an electronic form of authentication as fulfilling the legal requirement of a 'signature', especially in a common law jurisdiction. While Article 7 of MLETR addresses this constraint, countries should enact laws to acknowledge the legal effect of electronic signatures also outside the context of electronic transferable records. Conversely, enacting MLETR needs to take into account existing laws on e-signatures. Similar considerations may be made for the notion of 'writing' and its online functional equivalence requirements.

Data protection and privacy law

Depending on the jurisdiction, data protection and privacy laws may impose specific requirements and obligations on entities handling eBLs and associated data. In the European Union, for instance, the General Data Protection Regulation sets stringent standards to protect personal data, requiring businesses to take appropriate technical and organizational measures to safeguard the privacy and security of individuals' information.

Compliance with these laws may entail obtaining the explicit consent of data subjects to process their personal data, adopting robust security measures to prevent unauthorized access or data breaches, and ensuring the lawful transfer of data across borders.

Cybersecurity law

The technology must enable the secure transfer of e-bills to combat the increased sophistication of cybersecurity threats, which is one of the main areas of resistance to digitalization. While blockchain and other distributed ledger technologies offer promising solutions, they could also introduce new cybersecurity challenges that demand careful consideration.

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Contractual approach

In this approach (often called the Bolero approach), eBLs are created and managed electronically using platforms developed by private companies that provide services such as digital signatures, encryption and audit trails to verify the authenticity and integrity of eBLs. The legal status of the eBLs is secured through contractual arrangements among the parties to the transaction. This approach is used in a closed system among participating parties that have agreed to its terms for shipping operations.

Autonomy is crucial role in this approach, as it allows parties to define the legal framework governing their eBL transactions and specify how the eBL operates in their agreement, including transfer mechanisms and rights of the holder.

Established in 1998 by SWIFT and the global logistics and insurance industry, Bolero International was one of the first providers to develop eBL initiatives recognized by the International Group of P&I Clubs.[60] This not-for-profit association of 12 protection and indemnity clubs collectively providing marine liability cover for 90% of the world's ocean-going tonnage has taken a proactive stance in supporting the transition to digital documentation. The group endorses the contractual approach and has indicated that it has scrutinized the terms of use for 12 approved eBL systems.

The approved platforms include industry leaders such as Bolero, CargoX and ICE Digital Trade reflecting a diverse ecosystem of eBL providers. The International Group of P&I Clubs has said that eBLs issued through these systems will be handled in the same manner as its paper bills of lading for protection and indemnity insurance purposes.[61]

It is important to note that in this context, eBLs bound by contracts are only legally binding between the parties that agreed to them. In other words, a contract-based eBL is not fully transferable to and negotiable with everyone, because it binds only its parties.

For an eBL to replicate the functions of a paper bill of lading, especially as a document of title, it needs to be recognized as such under the applicable laws of the relevant jurisdictions. Without this, the eBL may not be treated as a valid document conferring rights of ownership and control over the goods in the jurisdictions that do not recognize the status of eBLs.

The lack of international uniformity in the legal status of eBLs presents a challenge. As one article noted, eBLs 'can only be used effectively if they are recognised as transferable documents across all the jurisdictions through which they pass' during the carriage of the goods.[62]

CHAPTER 4

National and international practices to promote eBL adoption

National and international practices to promote eBL adoption

The transition from paper to digital formats in the adoption of eBLs requires the collaboration of numerous stakeholders, making joint efforts indispensable. This chapter explores the initiatives and practices used by countries, international organizations and the private sector to encourage the widespread adoption of eBLs. These collaborative efforts encompass a range of activities, including legislative reforms, the establishment of digital infrastructure, awareness-raising campaigns, technical assistance and industry partnerships.

These practices underscore how different countries have chosen to embrace and adapt to this innovation, facilitating their international trade with global markets while overcoming barriers to transition from traditional paper-based systems to digital solutions in the shipping and logistics industry.

Country-level examples

Singapore

Following Bahrain, Singapore was one of the first countries to adopt MLETR. In 2021, Singapore adopted the Electronic Transactions (Amendment) Act, an amendment based on existing legislation and MLETR, to enable the creation and use of eBLs that are legally equivalent to paper BLs.[63]

The features of MLETR incorporated into the act include the capability to add information to electronic records. This allows records to contain dynamic data, such as the fluctuating price of publicly traded commodities or the real-time position of a vessel. The act also stipulates that a 'reliable method' must be used for signatures to verify the identities of signatories and their intent regarding the information contained in the record.

Fun fact: The first reported eBL issued under the amended act was made using CargoDocs, a software product of essDOCs, now part of ICE Digital Trade. This milestone transaction involved the shipment of nickel matte from Australia to China on an Ocean Network Express vessel, marking the first-ever eBL transaction governed by Singaporean law. The parties collaborated online in real-time to draft and approve the eBL and relevant supporting documents. The digital files were then signed, issued, transferred and electronically presented, completing the end-to-end documentation process in under 48 hours.

Source: essdocs.com

The bill was accompanied by a practical proposal[64] to implement eBLs. This was an initiative of the Maritime and Port Authority of Singapore to accelerate the adoption of electronic bills of lading for cross-border trade and to increase industry adoption by supporting development of eBL solutions. The objective was to identify an eBL solution that met one of the following criteria:

- achieve title transfer interoperability across different digital ecosystems
- comply with MLETR and leverage legislative frameworks of jurisdictions that have adopted MLETR
- adopt industry standards where applicable

To be selected, the port authority requires the proposed system to be compatible with frameworks such as TradeTrust (developed by the Infocomm Media Development Authority of Singapore, a statutory board under the Singapore Ministry of Communications and Information) or others that allow eBLs to be transferred across different digital systems.

Importantly, the eBL solution must comply with a set of legal standards provided under MLETR and use widely accepted standards from organizations such as the International Organization for Standardization, the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT),

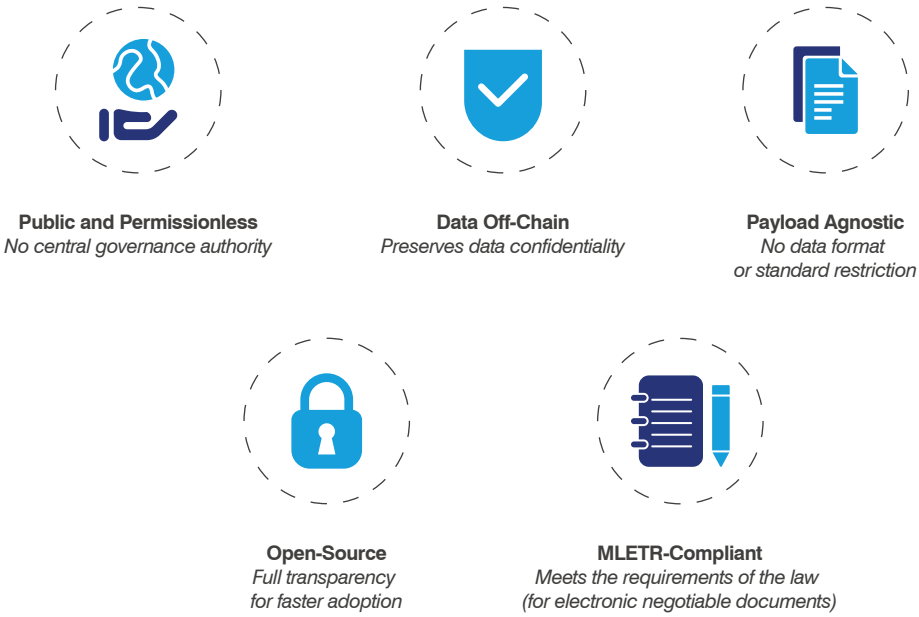
or the DCSA for container shipping. This emphasizes interoperability between systems.

The port authority's objective is to create an environment where different eBL solutions can communicate and work together easily, instead of relying on just one system. This would allow for more flexibility for the users and collaboration among providers in the industry.

TradeTrust aims to accelerate and streamline the digitalization of global trade by providing a framework that enables secure creation, exchange and verification of credible documents for both governments and businesses. It facilitates the digital transfer of ownership rights for electronic documents, such as eBLs, across different digital platforms. This is achieved by using blockchain technology and globally accepted standards that ensure the interoperability and legal validity of these documents.

The features offered through the TradeTrust platform include: token registry deployment (one time set-up), issuance of document, transfer ownership, transfer holdership, nominate ownership, endorse ownership, surrender document, restore document and burn document.[65]

Figure 5 TradeTrust design principles

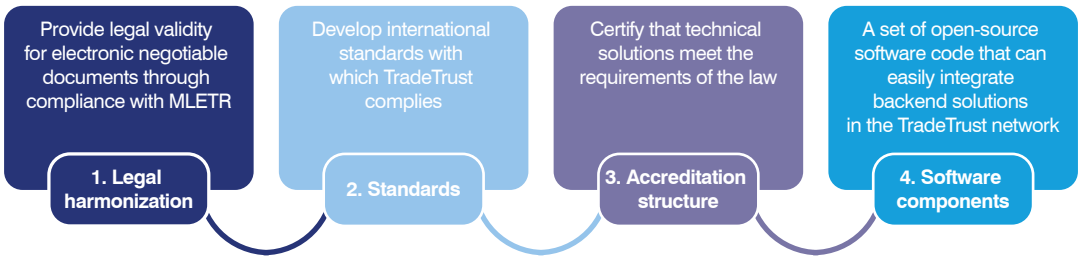


Source: Infocomm Media Development Authority of Singapore[66]

The TradeTrust platform was designed to enable developers and businesses to integrate its framework into their systems. It provides open-source code that developers can use to create, verify and transfer digital trade documents. By adopting TradeTrust, users can independently issue and revoke electronic documents; verify documents' proof of source and authenticity; and transfer titles for transferable documents.[67]

TradeTrust uses blockchain technology to ensure the authenticity and integrity of documents. The verification process can be done by scanning a QR code in a TradeTrust document or uploading the document to a TradeTrust-enabled platform.[68] The platform streamlines trade documentation processes, converting hours of manual paperwork into tasks that can be completed in minutes.

Figure 6 TradeTrust has four key components



Source: Infocomm Media Development Authority of Singapore[69]

In January 2021, Singapore and Rotterdam successfully completed a trial using an eBL to shadow a live shipment. Ocean Network Express carried out the trial in collaboration with Olam, using two different digital platforms: #dltledgers and NaviPorta. Both platforms leveraged the TradeTrust framework as the underlying technology to facilitate the digital transfer of title for the eBL.[70]

This trial, coordinated by the Maritime and Port Authority of Singapore and the Port of Rotterdam, demonstrated that an eBL issued on one platform could be verified and processed by another platform. The results showed that using an eBL for digital transfer of ownership cut end-to-end documentation processing time from an average of 6–10 days using paper documents to less than 24 hours.

While further enhancements to the technology and wider industry adoption are still needed, this pioneering trial marks an important step in accelerating the digitalization of global trade documentation using eBLs built on common legal and technical standards.

Singapore also announced the world's first digital trade financing pilot between MLETR-harmonized jurisdictions with the United Arab Emirates in November 2021.[71] The framework harmonizes the legal recognition of digital documents including eBLs across both jurisdictions and complements the larger global trade initiative by the Group of 7 economies on adopting electronic transferable records in international trade.

United Kingdom

The United Kingdom's Electronic Trade Documents Act 2023 gives electronic trade documents such as eBLs and electronic bills of exchanges the same legal status and functionality as their paper equivalents under British law. The act allows eBLs to be possessed, endorsed and transferred, enabling them to serve the three primary functions of a bill of lading: as a receipt for goods, evidence of the contract of carriage and document of title.[72]

To ensure the uniqueness and negotiability of eBLs, the act requires them to be subject to exclusive control and fully divested on transfer using a 'reliable system'.[73] Rather than prescribing a specific system, the act follows the approach of Article 12 of MLETR, which provides a non-exhaustive list of relevant circumstances. This flexible approach leaves it to the courts to interpret what constitutes a reliable system, should a dispute arise.[74]

This feature also allows for the adoption of industry standards such as those developed by the DCSA. By providing legal recognition of eBLs and other electronic trade documents under British law, the act is expected to facilitate and encourage wider adoption of eBLs. It enables private industry initiatives to complement the legal framework and drive the transition from paper-based to digital trade documentation, offering increased efficiency, cost savings and environmental benefits.[75]

The United States

The application of eBLs in the United States is still evolving. While the country has not yet adopted MLETR, the federal Electronic Signatures in Global and National Commerce Act, known as ESIGN, and the state-level Uniform Electronic Transactions Act (UETA) have established a legal framework for the use of electronic records and signatures in commercial transactions in the United States.

ESIGN and the UETA go hand-in-hand in governing how electronic agreements are handled and recorded. These two acts establish that electronic records and signatures have the same legal validity as their paper and ink counterparts. A contract or record cannot be denied legal effect solely because it is in electronic form.

To date, 49 states, the District of Columbia and the US Virgin Islands have adopted the UETA. New York has not adopted it but has enacted the Electronic Signatures and Records Act as an alternative to govern the use and authentication of electronic signatures and the use of electronic records. This means nearly all US jurisdictions have laws enabling electronic transactions, ensuring digital records have the same legal effect as their paper counterparts.[76]

However, unlike the UETA, the Electronic Signatures and Records Act does not specifically address the use of electronic transferable records as it is addressed in Article 16 of the UETA on transferable records.

In addition, Article 7 of the Uniform Commercial Code was revised in 2023 to establish the legal equivalence of electronic documents of title with their paper counterparts. The Uniform Commercial Code is a body of laws adopted by all US states to facilitate commercial transactions across state lines.

The revision provides for the use of electronic records and signatures to fulfil requirements for documents of title such as bills of lading. This enables eBLs to function as transferable records in commercial transactions.[77] In other words, Article 7 on documents of title is explicit in recognizing the use of eBLs. This article also inspired some core provisions of MLETR.

The combination of state laws, ESIGN, UETA, the Uniform Commercial Code and ongoing reform efforts increasingly enable the use of eBLs in the United States.[78]

European countries

Several major European countries are taking steps to provide a legal framework for eBLs and other electronic trade documents. France adopted a law aligned with MLETR on 5 June 2024, joining other major economies that recognize digital title documents including eBLs.

The law introduces the concept of *titre transférable électronique* (electronic transferable record) into French legislation. Article 6 specifically addresses the legal recognition of *titre transférable électronique*, ensuring these electronic documents have the same legal standing as paper-based equivalents.

Germany is working to extend its existing legal framework for electronic transport documents to align with MLETR.[79] The Netherlands has not yet fully incorporated MLETR into its domestic laws but is actively working to develop and promote the use of eBLs through various initiatives and pilot projects.

For example, DELIVER, a blockchain-based platform launched by the Port of Rotterdam in 2019 (now known as Naviporta), aims to promote the use of eBLs and other digital solutions in the logistics industry.[80] The platform, a joint initiative among the port authority, the municipality of Rotterdam and various industry stakeholders, facilitates the transparent, efficient and secure exchange of logistics and financial data, including the issuance, transfer and storage of eBLs.

BRICS countries

BRICS[81] nations are at various stages of adopting MLETR-aligned legislation to provide legal recognition for electronic bills of lading, though recognition of electronic transferable records is gathering momentum.

Brazil has made progress on digitizing trade documents with its electronic bill of lading system called *Conhecimento de Transporte Eletrônico* – CT-e, which is mandatory for domestic transport.[82] This document, electronically issued and stored, contains information regarding transport services and circulation of goods in Brazil. It acts as evidence of the contract of carriage, receipt of cargo delivery by the shipper to the carrier and an invoice. This document does not function as a document of title to the goods, however, meaning that after it is issued, it cannot be transferred or endorsed to third parties.[83]

Another development is the *Documento Eletrônico de Transporte* – DT-e. The federal government approved Law 14, 206 introducing this electronic transport document in 2021. This system is expected to be a one-stop platform to reduce bureaucracy by merging dozens of tax and transport documents into a single digital platform.

The Russian Federation issued its first test electronic bill of lading in June 2024. The FESCO Group, one of the country's largest transport and logistics companies, led this initiative, with one of the Russian Federation's leading electronic document management operators overseeing the process.[84] The document was created in the test system of the country's State Information System for Electronic Transport Documents, developed by FSUE ZashchitaInfoTrans for the Ministry of Transport.

During the test of intermodal cargo transport, the consignment note, waybill and – for the first time – an eBL were successfully issued through the system. To facilitate the use of digital documents in maritime transport alongside paper documents, the Federal Tax Service of Russia approved the modalities for electronic contracts of carriage by sea, including eBLs, and they took effect on 1 September 2024.[85]

India had implemented an electronic Port Community System that is designed to facilitate the use of eBLs by integrating service providers such as CargoX and BOLERO. These providers are part of the P-CaSo services marketplace – an integral part of the system – allowing stakeholders in India's shipping industry to access, create and transact with eBLs seamlessly. The electronic Port Community System connects major ports and 16,000 stakeholders, streamlining maritime operations and enhancing efficiency in the logistics sector.[86]

Still, Indian laws – such as the Indian Bills of Lading Act, 1856 – require updating to fully recognize and legally validate eBLs. The Bills of Lading Bill, 2024, was introduced in the Lok Sabha (the lower house of India's parliament) to replace the outdated 1856 Act.[87] This proposed legislation seeks to modernize and streamline the legal framework governing BL, aligning it with global practices and digital advancements. The bill emphasizes the need for a robust legal structure to support the adoption of electronic documentation in maritime trade.

Despite the absence of a specific legal framework exclusively for eBLs, India has made significant strides in adopting electronic documentation in trade practices. A notable development occurred in 2024 when India and Republic of Korea initiated the electronic transfer of BL between their customs authorities. This pilot initiative eliminates the need for physical record submissions and expedites cargo clearance processes. The initiative is expected to be fully implemented in 1 to 1.5 years.

China's Electronic Signature Law significantly facilitates international trade by providing a legal framework that supports the use of electronic signatures and documents, thereby facilitating more efficient and secure transactions. The law, enacted in 2004 and revised in subsequent years, ensures that electronic documents and signatures have the same legal validity as their paper counterparts, provided that the parties involved agree to their use.

China recently took an important step on eBLs, aligning its laws to MLETR. The Standing Committee of the National People's Congress submitted the Maritime Law of the People's Republic of China (Draft Amendment) for initial review on 4 November 2024 and the draft was open for public comment from 8 November to 7 December.

The draft amendment incorporates legislative approaches such as 'functional equivalence' and 'technology neutrality' from MLTER, introduces the concept of 'electronic transport records' and adds Section 5 Electronic Transport Records to Chapter 4. It recognizes electronic transport records that meet legal requirements as having equal legal effect as paper documents and provides regulations for their issuance, endorsement and circulation.

Additionally, the Ministry of Commerce after consulting with relevant firms, confirmed that there have been no cases where Chinese laws or regulatory authorities have denied the validity of electronic bills of lading.

South Africa does not yet have laws that fully recognize electronic bills of lading as legally equivalent to paper BLs. However, several initiatives are underway to promote the use of eBLs.

In February 2023, the International Federation of Freight Forwarders Associations introduced said eBLs could be used for the South African Association of Freight Forwarders.[88] The latter then introduced eBLs as a standard for its members and exporters across the supply chain in South Africa. This initiative is expected to improve supply-chain efficiencies and improve South Africa's competitive position in global logistics.

Other Group of 7 countries

Japan has launched an investigation to revise its laws on eBLs, including the Commercial Code and the Act on the International Carriage of Goods by Sea, to review provisions on bills of lading and other aspects of the Commercial Code, and to develop a bill on e-B/L legislation.

The Republic of Korea allows eBLs to replace conventional paper BLs issued by the carrier (shipping company or forwarder) provided that a registration authority designated by the Ministry of Justice has issued an electronic document in the country. This is in line with the amended Commercial Act and the Provision on the Enforcement of the Electronic Bill of Lading Provision of the Commercial Act (which entered into force in August 2008), recognizing the legal effect of the issuance and distribution of the electronic bill of lading.[89]

However, this system faces challenges that prevent its practical implementation. These include the registry agency model, which operates as a closed system, limiting interoperability and global acceptance; mandatory use of Korean laws regarding the issuance of eBLs and digital signatures (this system does not recognize eBLs issued or used abroad); and the absence of provisions on control of eBLs.[90]

Australian legislation recognizing the use of electronic bills of lading through its Sea-Carriage Documents Act has been enacted in states such as New South Wales, Victoria and Queensland. These acts recognize the use of electronic and computerized sea-carriage documents including bills of lading, for example, as stated in section 4(1) and (2) of Queensland's Sea-Carriage Documents Act 1996.[91]

Australia is actively weighing whether to implement MLETR principles to modernize its trade documentation processes. Two key developments indicating movement in this direction include i) an online consultation process regarding the potential adoption of MLETR that Australia launched in January 2024[92] and ii) Australia's proposal at the Asia-Pacific Economic Cooperation to analyse the legal gaps and economic benefits of adopting or maintaining a legal framework that takes into account the UNCITRAL Model Law on Electronic Transferable Records among APEC economies.[93] According to Bolero, Swire Shipping became the first company to use an electronic bill of lading on the Australia to New Zealand trade route in 2018.[94]

Overview of regulatory environment on eBL adoption across the world

The DCSA's 2024 report on eBL adoption[95] identifies the legal and regulatory barriers, as well as best practices, related to adopting eBLs. The report shows that the legal status of eBLs in some jurisdictions remains uncertain when compared to traditional paper bills of lading. Electronic bills of lading are not recognized as legally equivalent to paper bills in commercial disputes in some countries and even in those that technically permit eBLs, legislation often lacks explicit provisions that mention and enable their use.

Table 1 Chinese Taipei, Germany and United Kingdom have top scores

Scores per Economy	Economy	Score
Economies were scored on their commercial environment based on the following four factors: ■ Whether the use of the eBL is possible (the main factor) ■ To what extent the use of the eBL is made explicit ■ Balance between clarity of the conditions versus restrictiveness and prescriptiveness of the conditions ■ Interoperability in the international environment (i.e. to what extent the specific jurisdiction has considered other jurisdictions' initiatives)	Chinese Taipei	10
	Germany	10
	United Kingdom	10
	Singapore	9
	China	8
	Hong Kong, China	7
	Korea, Republic of	7
	United States	7
	Belgium	6
	Canada	6
	Israel	6
	Italy	6
	Japan	5
	France	2
	Netherlands	2

Note: France adopted MLETR on 5 June 2024, after the initial release of this publication on 25 May 2024. Consequently, the information in this table about France's status does not reflect its current stage in the adoption and use of eBLs.

Source: DCSA, 2024

The DCSA's assessment give top marks to Chinese Taipei, Germany and the United Kingdom for their commercial legal environments. Although none has adopted MLETR in full, they have made the use of eBLs explicitly possible while maintaining a balanced approach to regulatory conditions. China and Singapore follow closely behind in rankings. China's score is slightly lower as it doesn't explicitly permit eBL use, while somewhat stricter regulatory conditions affect Singapore's score.

EBL-related initiatives by international organizations

Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific and the MLETR Tracker

The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) has introduced several initiatives to support the uptake of eBLs as part of its efforts to promote paperless trade. UNESCAP introduced the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific (CPTA) in 2021 to promote paperless trade among member countries in the Asia-Pacific region.[96] It encourages the adoption of electronic documentation like eBLs and electronic certificates of origin, aiming to harmonize legal frameworks and facilitate interoperability among electronic trade platforms.

The CPTA text contains provisions on the adoption of relevant international standards and tools such as the MLETR,[97] while acknowledging the importance of capacity building and technical assistance to help member countries implement paperless trade measures and streamline cross-border trade processes.

To date, 14 parties have ratified the CPTA (Azerbaijan, Bangladesh, China, the Islamic Republic of Iran, Kyrgyzstan, Mongolia, Philippines, Republic of Korea, Russian Federation, Tajikistan, Timor-Leste, Turkmenistan, Tuvalu and Uzbekistan) and 5 are signatories (Armenia, Bangladesh, Cambodia, China and the Islamic Republic of Iran).[98]

UNESCAP also collaborated with the ICC's Digital Standards Initiative to introduce an MLETR Tracker portal under the Cross-Border Paperless Trade Database.[99] This platform aims to track and showcase the global adoption status of legal frameworks supporting electronic transferable records (MLETR), such as eBLs. This collaboration seeks to promote transparency and awareness regarding the implementation of MLETR-related measures worldwide.

UNECE – FIATA Multimodal Bill of Lading

The United Nations Economic Commission for Europe (UNECE) and FIATA jointly introduced the electronic FIATA Multimodal Bill of Lading data standard in March 2022 as a standardized contract of carriage for multimodal transport.[100] This standard was developed by aligning the Negotiable FIATA Multimodal Transport Bill of Lading with the UN/CEFACT multimodal transport reference data model.

The standard facilitates standardized exchange of BL data, promoting interoperability across different modes of transport including sea, air, road and rail and industry stakeholders. It aims to facilitate smoother cargo movement, reduce administrative burdens and enhance efficiency in multimodal logistics operations.

Asian Development Bank

The Asian Development Bank actively promotes digital trade and paperless transaction through its Trade and Supply Chain Finance Programme. This programme seeks to make global trade and supply chains green, resilient, inclusive, transparent and socially responsible. The bank works closely with key international organizations, including the ICC, the Digital Standards Initiative and UNCITRAL, to advocate for the adoption of MLETR.

The bank has also initiated discussions with government agencies in several of its developing member countries to help them align their regulatory frameworks with international laws that enable paperless trade. This includes raising awareness among public and private stakeholders about MLETR's benefits, facilitating national-level discussions and providing capacity-building support for its adoption.

Additionally, the programme offers targeted technical assistance to countries including China and Georgia as part of the Central Asia Regional Economic Cooperation Integrated Trade Agenda 2030.[101] The Asian Development Bank, along with the ICC and the Government of Singapore, have formed the Legal Reform Advisory Board as part of the Digital Standards Initiative to help harmonize legislative frameworks across countries.[102]

ICC Digital Standards Initiative

ICC launched its Digital Standards Initiative in 2020 to promote harmonized and interoperable digital standards for seamless digital trade. The key activities include i) promoting policy reform and regulatory alignment by encouraging adoption of MLETR and tracking progress on adoption through the Trust in Trade Progress Tracker and ii) developing frameworks and standards such as a complete framework for end-to-end supply chain digitalization, based on an analysis of 36 key trade documents.

The ICC also produces a report to identify country-level legislative gaps in the Association of Southeast Asian Nations and Central Asia Regional Economic Cooperation regions.[103] The initiative is headquartered in Singapore and operates under the guidance of a governance board that includes leaders from international organizations such as the ICC, Enterprise Singapore, the Asian Development Bank, the World Trade Organization and the World Customs Organization.

Private-sector eBL initiatives

The private sector plays a key role in promoting eBLs, as private companies issue them. Businesses can join forces to advance eBLs by developing mutually recognized and interoperable solutions that can link all players in the eBL value chain to ensure seamless transactions.

The Future International Trade Alliance

The Future International Trade Alliance (FIT Alliance) was formed in February 2022 by five leading industry associations: the Baltic and International Maritime Council (BIMCO), representing the general shipping community; DCSA, representing container carriers; FIATA, representing freight forwarders; ICC, representing the trade community; and SWIFT, representing the banking sector.

The top goals of the alliance are to raise awareness and accelerate the adoption of standards-based eBLs across all sectors of the shipping industry, with the aim of establishing a universal eBL. The FIT Alliance works to generate awareness about the benefits of digitalization and the importance of common, interoperable data standards and harmonized legal frameworks across international jurisdictions and platforms. It aims to facilitate the acceptance and adoption of eBLs by shippers, carriers, regulators, banks, insurers and other stakeholders involved in international trade transactions.[104]

In September 2023, the FIT Alliance launched the Declaration of the Electronic Bill of Lading to secure commitments from all international trade stakeholders to collaborate on driving digitalization – starting with eBLs. The declaration calls for trade participants to adopt eBL standards and eBL solutions, support eBL standard development, participate in promotional activities and use eBL standards from FIT Alliance members to establish new digital partnerships.[105]

Almost 100 organizations – encompassing carriers, shippers, freight forwarders, banks and technology providers – signed up to this declaration in the first month.

The FIT Alliance also encourages governments to adopt MLETR-based laws and engage in awareness building and advocacy on legal reforms.[106]

Digital Container Shipping Association

The DCSA, a not-for profit that leads ocean freight carriers representing 70% of containerized trade, intends to transition to fully standardized eBLs industry-wide by 2030. The DCSA has developed data and process standards for eBLs that the major carriers have agreed to adopt.[107] The association commits to converting 100% of original bills of lading to digital by 2030 to accelerate the digitalization of container trade.[108]

DCSA developed a comprehensive set of standards to provide a common framework for the data format and transmission of electronic bills of lading, enabling seamless communication between stakeholders such as carriers, shippers, forwarders and customs authorities. By adopting DCSA standards, all parties involved in a transaction can exchange eBL data efficiently and securely, reducing errors, delays and costs associated with paper-based processes.

The DCSA standards define the data model and structure for the electronic bill of lading and provide both industry definitions (for users) and in-depth technological definitions (for creating eBL systems). Their track-and-trace model sets business standards and Application Programming Interface standards to enable communication between two or more computer programmes or components and to ensure that track-and-trace data definitions are consistent for all users across any system.[109] This model also allows for the creation of new unified standards that can be integrated into third-party reference models.

All industry terms included in the DSCA standards have technical definitions that facilitate the development of Application Programming Interface standards. The models include definitions from third parties such as the UN/CEFACT Multimodal Transport Reference Data Model.[110] DSCA standards can work as a standalone product and be used as a sort of translator between different standards.

Comparing the DSCA models to existing standards can help users identify gaps and issues in the models for further improvement. In addition, these standards are open source. In theory, this should allow for participation, reuse and editing of the standards based on those gaps and issues. The main challenge of this open-source nature is that if the standards are 'forked' and appropriated by different organizations, the lack of consensus by nature would prevent the standards from operating.

On the other hand, a unified model language does not require each country or company to implement the standards the same way. Each local framework has to be translatable to, and from, the model. Importantly, the countries or entities need not comply with the standards. In practice, however, translation alone can be difficult and may require regulatory changes. It is important to note that the main purpose of the bill of lading part of the DCSA project is to simplify the exchange of information between shippers and carriers.[111]

To ensure interoperability and standardization across the shipping industry, key players including regulatory bodies and private-sector stakeholders will need to develop their own applications that align with the DCSA's data model and standards for eBLs. Each DCSA member has created applications that translate their internal systems to fit these standardized models.[112] However, challenges may arise when adapting existing frameworks to the DCSA standards.

For example, compatibility issues may arise if a government agency requires additional mandatory fields that are not part of the standard model – such as the colour of the ship in the 'vessel entity' field. In such cases, the government agency would need flexibility to find ways to integrate its specific requirements within the DCSA's standardized framework. While the DCSA's eBL standards are primarily industry-focused, the organization recognizes the importance of coordinating with government authorities and other relevant stakeholders to ensure the successful implementation and acceptance of eBLs in global trade.

Table 2 provides an example of standardized model data (or code) that eBL solution providers could use to ensure consistency and interoperability across different systems.

Table 2 Standardized model data

Attribute	Definition	Data type
Vessel ID	Unique identifier for the vessel	UUID
Vessel IMO number	The unique reference for a registered vessel. The reference is the International Maritime Organization (IMO) number, also sometimes known as the Lloyd's register code, which does not change during the vessel's lifetime.	Text (7)
Vessel name	The name of the vessel given by the vessel operator and registered with the International Maritime Organization.	Text (35)
Vessel flag	The flag of the nation under whose laws the vessel is registered. This is the ISO 3166 two-letter country code.	Text (2)
Vessel call sign	A unique alphanumeric identity that belongs to the vessel and is assigned by the International Telecommunication Union. It consists of a three-letter alphanumeric prefix that indicates nationality, followed by one to four characters to identify the individual vessel. For instance, vessels registered under Denmark are assigned the prefix ranges 5PA-5QZ, OUA-OZZ and XPA-XPZ. The call sign changes whenever a vessel changes its flag.	Text (10)
Vessel operator carrier ID	Links to the carrier entity containing the SCAC and/or the SMDG code to specify the operating carrier.	UUID
Is dummy	Indicates that the vessel is a dummy vessel, which means that no physical vessel is assigned and the vessel can be used as a placeholder.	Boolean (true or false)
Vessel type code	The code specifying the vessel type	Text (4)
Length overall	The overall length of the vessel. If length is defined using feet, then the numbers after a decimal should be considered as a fraction of a foot – not as a number of inches. For instance, 120.5 feet means 120 and a half feet (which would be 120'6")	Number
Width	The width of the vessel. If width is defined using feet (FOT) then the numbers after a decimal should be considered as a fraction of a foot – not as a number of inches. E.g., 120.5 feet means 120 and a half foot (which would be 120'6")	Number
Dimension unit	The unit of measure for the width and length overall, which can be expressed in either metres or feet.	Text (3)

Source: ITC[113]

Global Shipping Business Network

EBLs act as 'data containers' to reduce friction in global trade

Contribution from Bertrand Chen

Chief Executive Officer of the Global Shipping Business Network

Adam Smith argues in *The Wealth of Nations* that trade is the lifeblood of nations. With the advent of containers in the last 70 years, shipping costs have declined dramatically. The lowering of barriers to participate in global trade has helped accelerate the development of many economies. In fact, world trade values have ballooned by almost 370 times from 1950 levels.

With greater volatility and disruption today, however, it is impossible to manage the movement of containers without timely and trusted data to coordinate actions across the supply chain. Paradoxically in this modern age, it is often easier to move goods internationally than to move data seamlessly across borders. What is needed is a digital equivalent of the physical container: a so-called data container: the eBL.

"EBLs act as 'data containers' to reduce friction in global trade"

It has three important properties:

First, as a digital single source of truth about a shipment. The eBL could contain all data related to the shipment throughout its international journey. This includes data such as certificate of origin, packing list and commercial invoices, as well as visibility information.

Second, as a digital tool to control data access rights of a shipment. The eBL could control what each party in the supply chain can see. With clear access rights, the data for a single shipment can be shared securely through a unique data container, with the right parties accessing their needed data. Write once and share many times.

Finally, as an immutable up-to-date timeline of the lifecycle of a shipment. By providing the proper context, the eBL could merge the physical supply chain, the financial supply chain and the regulatory supply chain. Payment flows can be directly matched with the transfer of rights and the relevant declarations to customs or tax departments as captured within the timeline of the data container.

These properties can also reduce friction in global trade. Trusted and connected data reduce fraud, helping businesses build trust with cross-border trading partners. Faster information flow, settlements and quicker customs processes facilitate new trade corridors. Furthermore, by tokenizing the eBL and thus the shipment, new liquidity could be brought to fill the world's $2.5 trillion trade finance gap, helping small businesses grow their operations. These benefits can enhance the participation of developing economies in global markets and reduce barriers to trade.

Like its cousin, the physical container, the eBL by itself provides little value. It is through the imagination of pioneers like Malcolm McLean, the inventor of the modern shipping container, who knew how to leverage the new abilities made possible by this new technology, to create unique value propositions for specific customer segments.

The opportunity today is for the whole industry – including shipping lines, customs, banks, customers and freight forwarders – to figure out how best to put eBLs to use and, in doing so, potentially create significant economic benefits for decades to come.

The Baltic and International Maritime Council

BIMCO launched the 25 by 25 Pledge initiative to drive the adoption of eBLs in the bulk shipping sector. The initiative is part of a broader push towards trade digitalization in the shipping industry. It aims for 25% of annual seaborne trade volume for at least one commodity to use eBLs by 2025.[114] Several major bulk shipping companies and mining firms have committed to this pledge, including:

- Vale, BHP, Rio Tinto and Anglo American (major mining companies)[115]
- COSCO Shipping Bulk, Oldendorff Carriers and Star Bulk (bulk carrier operators)[116]

The mining companies supporting the 25 by 25 Pledge have already made significant progress, with more than 20% of their annual iron ore trade volumes now using eBLs, up 80% in 2021–2022. This demonstrates the momentum building behind eBL adoption in the bulk commodity trades.

The 25 by 25 Pledge represents a major step forward in accelerating the digital transformation of the bulk shipping sector through industry-wide collaboration to adopt eBLs as a secure, efficient alternative to paper documentation. As of July 2024, the campaign had already surpassed its initial target in its first year. The four initial participating shippers – BHP, Rio Tinto, Vale and Anglo American – achieved an average adoption rate of 25.1% in their iron ore trade. The next step for the campaign is to broaden its scope to include other bulk trade beyond iron ore.[117]

In addition, BIMCO is collaborating with other organizations through the FIT Alliance to develop and promote relevant standards to facilitate eBL adoption. It has also published its own eBL standard to establish common industry standards for electronic bills of lading in the bulk sector.

The International Group of P&I Clubs

As already noted, the International Group of P&I Clubs has approved 12 eBL systems since 2010.[118] This means IG clubs insure liabilities related to marine risks arising from the use of approved eBL systems to the extent that these liabilities would also have arisen under paper bills of lading.

However, insurance does not extend to some information technology-related issues associated with the use of eBLs, such as cyber risks and contractual liabilities to maintain certain information technology standards and confidentiality. These risks are considered non-marine risks and may be categorized as cyber risks or business risks. Additional business insurance must be arranged separately to cover these specific risks.[119]

Table 3 Twelve eBL systems have been approved by the International Group of P&I Clubs

Company	Year of approval
Bolero International Ltd	2010
essDOCS/ICE Digital Trade Management Ltd	2010
E-Title Authority Pte Ltd	2019
edoxOnline/Global Share S.A.	2019
WAVE (WAVE Application)	2019
CargoX	2020
IQAX Limited (IQAX eBL)	2022
Secro Inc. (Secro)	2022
TradeGo PTE. Ltd (TradeGo eBL)	2023
eTEU Technologies Ltd (eTEU eBL Platform)	2023
BRITC ETRADE SOLUTION Co., Ltd (BRITC eBL)	2024
Enigio AB (trace: original)	4 April 2024

Source: ITC[120]

CHAPTER 5

Recommendations

Recommendations

Compared to paper bills of lading, eBLs offer cost savings, instant transmission, better security, fewer fraud risks and smaller carbon footprints. As trade processes become more digitized, eBLs are expected to replace paper BLs as the dominant documentation method.

Despite many benefits attached to eBLs, their adoption remains low due to several challenges that need to be addressed. These include insufficient legal recognition and enforceability; lack of standardization and interoperability, authentication and data security; limited awareness and knowledge among businesses; and inadequate infrastructure and digital skills.

For eBLs to fully replicate the functions of their physical format, especially as a document of title, their use must be recognized as such under the applicable laws of the relevant jurisdictions.

A supportive policy environment is essential for eBLs to be adopted widely and successfully. Domestic requirements and legal foundations must be considered when adopting MLETR.

While not prerequisites, having domestic legal and regulatory instruments — such as those for e-signatures, e-transactions, data protection and cybersecurity — can enhance the certainty and security of eBLs. The regulatory framework should be technology-neutral, allow for interoperable solutions, facilitate data submission to national trade windows and align with strategies for resilient cross-border supply chains, integrated with broader frameworks for international trade and trade financing.

Technical assistance and capacity building are essential for developing countries to support greater adoption of eBLs. Such initiatives could include the following:

- Undertake **regulatory assessments** (e.g. UNCITRAL legal framework readiness assessment) to help governments and policymakers review existing legislation, identify gaps and assess their needs for domestic reforms for the adoption of eBLs.
- Conduct **private–public consultations** to identify bottlenecks and formulate recommendations for regulatory reforms.
- Provide **policy advisory services** on the review or drafting of domestic legislation to adopt MLETR-compliant legal texts.
- Encourage collaboration on **enhancing interconnection and interoperability of the platforms** among the private sector players.
- Develop **capacity-building workshops** for policymakers to improve their **understanding and the implementation** of eBL systems and industry standards, and create coordination mechanisms, including **exchange of best practices** from other jurisdictions.
- Organize **aware-raising events** and **public–private dialogues** for relevant stakeholders to facilitate buy-in and support the engagement of micro, small and medium-sized enterprises.

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