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## **Stocktaking of UNCITRAL texts referring to electronic aspects**

### **Note by the Secretariat**

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## **I. Introduction**

1. At its fifty-seventh session, in 2024, the Commission requested the secretariat to conduct a stocktaking exercise to examine UNCITRAL texts on electronic commerce and other substantive law texts that include provisions on electronic aspects. It also requested that the stocktaking exercise include a survey of the incorporation of UNCITRAL texts on electronic commerce into domestic legislation and the inclusion of such texts in international commitments concerning paperless trade. The secretariat was requested to circulate a questionnaire inviting States to provide information on the enactment or adoption of UNCITRAL texts on electronic commerce and to submit copies of their laws based on those texts, in particular those relevant to paperless trade.
2. On 8 January 2025 the secretariat circulated a questionnaire to States (the “survey”), requesting responses by 17 March 2025.<sup>1</sup> In parallel, the secretariat started mapping provisions in UNCITRAL texts relevant for the stocktaking exercise. The secretariat also organised or co-organised a series of meetings (Vienna, 24 January 2025; New York, 26 March 2025; and Bangkok, 12 June 2025) on the stocktaking exercise. The International and Comparative Law Research Center (ICLRC), a non-governmental organisation, conducted a parallel exercise whose outcome was presented at the above events as well as at a dedicated event on “End-To-End Trade Digitalization: Future Models” (Moscow, 3 June 2025).
3. This note provides an overview of the stocktaking exercise (chapter II), analyses the responses to the survey (chapter III), and outlines how UNCITRAL texts can support paperless trade (chapter IV).

## **II. Overview of the stocktaking exercise**

### **A. UNCITRAL texts on electronic commerce**

4. The UNCITRAL texts on electronic commerce are: the UNCITRAL Model Law on Electronic Commerce (1996) with additional article 5 bis as adopted in 1998 (MLEC); the UNCITRAL Model Law on Electronic Signatures (2001) (MLES); the United Nations Convention on the Use of Electronic Communications in International Contracts (2005) (ECC); the UNCITRAL Model Law on Electronic Transferable Records (2017) (MLETR); the UNCITRAL Model Law on the Use and Cross-border Recognition of Identity Management and Trust Services (2022) (MLIT); and the UNCITRAL Model Law on Automated Contracting (2024) (MLAC).
5. These UNCITRAL texts share key concepts and principles, such as the enabling nature (as opposed to regulating) and the reference to “data message” to encompass all types of electronic and related technologies. However, as they aim to address evolving business needs, their focus has shifted from contracts in electronic form to electronic documents, and, eventually, to data quality assurance and transactions in data. The interest for cross-border aspects has also increased over time.
6. Similarly, these UNCITRAL texts, while maintaining the same fundamental principles, have accompanied the transition from electronic commerce to digital trade that typically involves new forms of trading, new assets being traded and new actors.<sup>2</sup>

#### **1. Key concepts and principles**

7. All UNCITRAL texts on electronic commerce rely on the fundamental principles of non-discrimination against the use of electronic means, technology neutrality and functional equivalence.

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<sup>1</sup> The questionnaire is available at <https://uncitral.un.org/e-commercequestionnaire>.

<sup>2</sup> Digital trade is a term more recently used for referring to electronic commerce, although one that invites a focus on frontier technologies that facilitate new ways of transacting, new items of trade and new services.

8. The principle of non-discrimination (or legal recognition) dictates that information shall not be denied legal effect, validity or enforceability solely on the grounds that it is in the form of a data message. It is drafted in negative form as validity of data messages and other electronic means may be affected by other elements, e.g., the use of unreliable methods.

9. The principle of technology neutrality provides that the law should not mandate or favour the use of any specific technology or method, ensuring that legal frameworks remain adaptable to evolving technologies

10. The principle of functional equivalence guides establishing the criteria by which electronic transactions are deemed to satisfy form requirements applicable to paper documents, such as a requirement that a document be in writing, original or signed. Under such principle, the law identifies basic functions of paper-based form requirements, and provides requirements that, once met, enable data messages to enjoy the same level of legal recognition as paper documents performing the same function.

11. The formulation of the principles of non-discrimination and of technology neutrality is consistent throughout UNCITRAL texts, though their application has been reinstated to different contexts, and sometimes terminology and its definition have evolved. For instance, article 9(1) MLEC applies the principle of non-discrimination to the admissibility of electronic evidence in legal proceedings, and article 5 MLIT applies the principle of non-discrimination to electronic identification.

12. Moreover, the definition of “data message”, which is a cornerstone of UNCITRAL texts as it preserves technology neutrality, was first formulated in the MLEC and later slightly revised in the MLAC to omit references to outdated technologies. As “data message” may be seen as related to the use of electronic data interchange, it was replaced by the term “electronic record” in the MLETR, whose definition, although based on that of “data message”, was revised to encompass information stored on distributed ledgers.

13. Likewise, functional equivalence rules have changed progressively, being first applied to contract law form requirements such as writing, signature, original and retention (or archiving) of data messages in the MLEC, MLES and ECC. Those rules were eventually expanded to cover electronic documents in the MLETR, namely, to address the functions of possession, endorsement and amendment in transferable documents and instruments.

14. Requirements for functional equivalence have also evolved over time: for example, article 8 MLEC refers to any change occurring from the time a document was first generated in the final form as a condition for achieving functional equivalence with the paper-based notion of “original”; however, article 10(2) MLETR refers instead to maintaining all information included during the lifecycle of the transferable record as complete and unaltered for the same purpose.

15. Recent texts, for example the MLIT in its article 21 on website authentication and the MLAC, have abandoned the functional equivalence principle, recognizing that certain features of electronic communications (e.g., automation) may not be found in paper-based documents. Providing a comprehensive illustration of functional equivalence provisions could help in understanding the reach of the principle and facilitate its application.

16. Some UNCITRAL legislative texts, namely the United Nations Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea (2008) (“Rotterdam Rules”) and the UNCITRAL – UNIDROIT Model Law on Warehouse Receipts (2024) (MLWR), as well as the forthcoming instrument on negotiable cargo documents, are drafted according to the “medium-neutral” principle, which treats equally electronic and paper medium. In these cases, there is no paper-based law to be used as a reference, and therefore the instrument must contain also the substantive law provisions. However, the content of functionally equivalent provisions is useful also in medium-neutral legislation. Since future uniform law texts necessarily deal

with the use of electronic means and therefore must be drafted in a medium-neutral manner, it is particularly useful to explain how provisions based on functional equivalence may be adapted to medium-neutral drafting.

17. Both the functional equivalence and the medium-neutral principles require the use of a reliable method. Standards for the determination of reliability vary, e.g., by identifying different relevant circumstances. Moreover, all UNCITRAL texts on electronic commerce refer to ex post (i.e., after the use of the method) determination of reliability by a judge or arbitrator in case of dispute. However, MLES and MLIT introduce the designation of reliable methods before their use by a competent authority, thus combining both ex ante and ex post approaches. The designation of a method presumed reliable is associated with legal presumptions of the functions of the method being fulfilled. The result is to preserve flexibility in choice of methods while increasing predictability of legal effects.

18. Some UNCITRAL texts contain the safeguard clause on “reliability in practice” first formulated in article 9(3)(b) ECC, which prevents repudiation of methods that have achieved in practice their function. This variety of solutions, though all compatible, may pose challenges when consolidating different UNCITRAL texts in a single law.

19. Party autonomy is another fundamental principle that has received different treatment in each UNCITRAL text on electronic commerce. Legislative treatment of this principle ranges from allowing derogation from all provisions, subject to rules of mandatory application, to leaving the matter entirely to enacting States. While these texts make it clear that party autonomy cannot derogate rules of mandatory application, the interaction between party autonomy and provisions on electronic transactions, in particular functional equivalence rules, has not yet been fully explored.

## **2. Electronic contracts**

20. Enabling the formation and performance of contracts in electronic form was one of the first goals of UNCITRAL’s work on electronic commerce. The fundamental principles, including legal recognition of contracts in electronic form, may be found in the MLEC, together with provisions aimed at adapting contract law to the features of electronic means, such as rules on time and place of dispatch and receipt of electronic communications. While keeping fundamental principles, the ECC has updated certain MLEC provisions and introduced new rules. Given their importance, the ECC provisions on electronic contracts have been enacted as domestic law in States that have not adopted the Convention.<sup>3</sup> Moreover, dedicated provisions on the legal recognition of automation were introduced in the ECC and further developed in the MLAC.

21. Rules on electronic signature, which are particularly relevant for contract law, are contained in every UNCITRAL text on electronic commerce, and were originally developed as the functional equivalent of handwritten signatures. The first formulation of this rule, contained in article 7 MLEC, was eventually modified in article 2(a) MLES and again, more substantially, in article 9(3) ECC. Moreover, some UNCITRAL substantive law texts contain rules on electronic signatures (sometimes referred to as “authentication” procedures), for instance in the areas of mediation, transport of goods and payments.

22. Eventually, functional equivalence rules on electronic signature, on retention and on integrity have been reconsidered from the perspective of a trust service providing assurance of origin and integrity of a data message in articles 16, 17 and 19 MLIT. The relevance of identity management and trust services has become evident in all areas of work of UNCITRAL, including for asset tracing and recovery in insolvency proceedings.

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<sup>3</sup> For a list of those States, see the MLEC status webpage on the UNCITRAL website, footnote (e).

### 3. Electronic documents

23. UNCITRAL texts have traditionally avoided referring to electronic documents on the understanding that the notion of document is intimately linked to the use of paper (A/CN.9/390, para. 46; A/CN.9/387, para. 31). UNCITRAL has on the contrary stressed that a data message “is of a different nature and does not necessarily perform all conceivable functions of a paper document” (MLEC Guide to Enactment, para. 17). Instead, UNCITRAL has referred to the notion of “electronic record” in the MLETR, which is a text that deals specifically with documents.

24. There is increasing awareness that a document is a structured representation of data, regardless of the medium used. Moreover, the understanding that distinguishes electronic and paper-based documents is based on functional equivalence, which aims at establishing requirements for fulfilling the functions pursued with the use of paper, and not at establishing equivalence between electronic and paper-based documents as such. However, such reasoning does not apply under medium neutrality. For these reasons, guidance on the use of electronic documents remains a strong business need.

### 4. Cross-border recognition

25. Several legal mechanisms have been devised for cross-border recognition of electronic documents and data (also referred to as “legal interoperability”), including upholding the choice of applicable law. Other recognition mechanisms may operate only between certain jurisdictions, and limited to certain types of documents, and may impose specific requirements. Elements relevant for identifying the most adequate mechanism include the type of recognition (unilateral, bilateral or plurilateral), the legal basis (treaty, statutory or contractual), and the legal effect (to be determined under national or foreign law).

26. UNCITRAL texts on electronic commerce contain provisions on cross-border recognition of electronic transactions, notably electronic communications, signatures, transferable records, as well as identity management and trust services. The gateway to cross-border recognition lies in the application of geographic non-discrimination provisions to determination of reliability, so that methods may be considered reliable regardless of their place of origin or use both in ex ante and in ex post assessment of reliability.

27. Some UNCITRAL provisions refer to private international law rules. For instance, article 12(5) MLES recognises parties’ agreements for cross-border recognition of electronic signatures. In other cases, those provisions need to be complemented with private international law rules. The Hague Conference on Private International Law is carrying out work on private international law matters applied to electronic transferable records, thus complementing article 19 MLETR.

## B. Substantive law texts that include provisions on electronic aspects

28. UNCITRAL has also prepared substantive law texts that include provisions on electronic aspects.

Table 1

### UNCITRAL substantive law texts that include provisions on electronic aspects

<i>Area of work</i>	<i>Relevant provisions</i>
Arbitration	Article 7, Option I of the UNCITRAL Model Law on International Commercial Arbitration (1985, with amendments as adopted in 2006) (MAL) sets the requirements to achieve functional equivalence between written and electronic form of an arbitral agreement.
Mediation	Article 2(2) of the United Nations Convention on International Settlement Agreements Resulting from Mediation (2018) (the “Singapore

<i>Area of work</i>	<i>Relevant provisions</i>
	Mediation Convention”) and article 16 of the Model Law on International Commercial Mediation and International Settlement Agreements Resulting from Mediation (2018) (MLM) contain functional equivalence rules to satisfy the written requirement of settlement agreements with electronic means. In addition, functional equivalence rules for signatures may be found in article 4(2) of the Singapore Mediation Convention and article 18 MLM.
International payments	These texts foresee the use of authentication methods that may involve the use of electronic means, including electronic signatures. Relevant provisions include article 5(k) of the United Nations Convention on International Bills of Exchange and International Promissory Notes (1988) (on authentication methods used instead of a signature); article 7(2) of the United Nations Convention on Independent Guarantees and Stand-by Letters of Credit (1995) (on authentication of an undertaking); and article 5(2) of the UNCITRAL Model Law on International Credit Transfers (1992) (on authentication of a payment order).
Transport of goods	The United Nations Convention on the Carriage of Goods by Sea (1978) (the “Hamburg Rules”) and the United Nations Convention on the Liability of Operators of Transport Terminals in International Trade (1991) (the “OTT Convention”) contain provisions enabling the use of electronic signatures and electronic documents. However, these texts foresaw the use of electronic documents without elaborating details. For instance, article 14(3) of the Hamburg Rules refers to the use of an electronic signature, without elaborating on the dematerialization of the bill of lading, and a first formulation of a medium neutral rule is found in article 4(3) of the OTT Convention. Moreover, the Rotterdam Rules contain several provisions, including articles 8, 9 and 10, dedicated to the use of electronic means, that have been used as models for domestic legislation.
Public procurement	The UNCITRAL Model Law on Public Procurement (MLPP) enables the use of electronic means of communication, transmission and recording of information in the various phases of the public procurement procedure, including (a) tenders (articles 40 and 41); (b) direct solicitation and communication of information between suppliers or contractors and the procuring entity (articles 7(2), 16(1)(d), 17, 18(6) and (9), 41(2)(a), and 50(2) and (4); (c) virtual meetings and (d) submission of challenge proceedings (articles 64-69). Further, the enactment of specific provisions of the Model Law enables the use of procurement methods that requires the use of electronic means, namely a) electronic reverse auctions (articles 53-57) and b) electronic framework agreements (articles 58-62).
Security interests	A provision establishing functional equivalence between written and electronic form may be found in article 5(c) of the United Nations Convention on the Assignment of Receivables in International Trade (2001) and in article 2(nn) of the UNCITRAL Model Law on Secured Transactions (2016) (MLST). Moreover, the MLST foresees the possibility of implementing the security interests’ registry in electronic form. This option may raise questions about the application of general electronic transactions law to the registry, or the adoption of dedicated provisions.

29. The possibility of enabling the use of electronic means in substantive UNCITRAL texts is not limited to the above texts. One of the main goals of the ECC is to apply core provisions of electronic transactions law to other treaties, especially those prepared by UNCITRAL (article 20 ECC). Those core provisions include the principles of non-discrimination and technology neutrality, and functional equivalence rules for the notions of “writing”, “signature” and “original” (article 9

ECC). However, the ECC is in force in a limited number of States, and some issues are not addressed in that Convention.

### C. Conclusions and recommendations

30. UNCITRAL texts on electronic commerce, which form the backbone of digital trade law, have been particularly successful, having been adopted in more than 100 States, and enacted to apply not only to international trade but also to domestic trade and to non-commercial transactions. This broad application complements the comprehensive approach to digital trade (understood as all trade conducted with electronic means) that envisages the full, i.e. end-to-end, trade digitalization. The increasing inclusion of references to UNCITRAL texts in trade agreements (see Chapter III.C) strengthens that practice.

31. However, the preparation of texts addressing different aspects of electronic commerce over time has led to different formulations while addressing the same or similar aspects. The table in the Annex to this note provides an overview of such provisions, and their detailed description is available in document A/CN.9/WG.IV/WP.182, Annex I. These differences may pose challenges to legal predictability and uniformity.

32. One challenge may arise from the need to harmonise texts UNCITRAL in the same subject area but adopted at different times, which would occur when a State wishes to consolidate UNCITRAL texts in a single comprehensive law or complement and supplement existing laws based on UNCITRAL models with more recent UNCITRAL texts.

33. Another challenge may arise when a State wishes to enact legislation in different specific areas (e.g., electronic commerce and transport law) which risks introducing different treatment of the same legal notion (e.g., electronic signature). Additional delicate issues may arise when other organisations rely on UNCITRAL texts to enable digital trade, including by preparing complementary or regional legislation.

34. For these reasons, the relevant UNCITRAL provisions, and, possibly, those developed by other organisations may need to be consolidated and presented in a systematic manner, also with a view to facilitating cross-border paperless trade (see Chapter IV).

## III. Analysis of the survey responses

35. By 5 June 2025, 23 States had responded to the survey: Armenia, Australia, Chile, Colombia, Croatia, Czechia, El Salvador, Germany, Guatemala, Honduras, Japan, Lithuania, Malaysia, Mexico, Oman, Russia, Singapore, Sweden, Switzerland, Tajikistan, Thailand, Tunisia and the United Kingdom. Not all States responded to all questions.<sup>4</sup>

36. The survey exercise aimed at collecting information on the level of adoption of UNCITRAL texts on electronic commerce and their underlying principles, any notable deviation from them, and their interconnection with free trade agreements. It also aimed at measuring the level of adoption of other substantive law texts that included provisions on electronic aspects, and how they interacted with the general law on electronic transactions. The questions were organized into three main parts: (a) legislative framework for electronic transactions and electronic signatures; (b) enactment of UNCITRAL texts on electronic commerce and other UNCITRAL texts containing provisions on electronic commerce; and (c) references to UNCITRAL texts in trade agreements.

<sup>4</sup> The information provided may be supplemented with the study carried out by the ICLRC, which covers Belarus, Brazil, China, India, Indonesia, Kazakhstan, Kyrgyzstan, Russia, Saudi Arabia, United Arab Emirates, United Kingdom, United States and the European Union.

## **A. Legislative framework for electronic transactions and electronic signatures**

### **1. General features**

37. The first question of the survey regarded the legal status of electronic transactions and allowed for an open answer. While most States responded that a comprehensive legislative framework, often based on UNCITRAL texts, was in place, some States indicated having dispersed legislative provisions. Other States referred to general legal principles such as freedom of form, instead of dedicated legislation, to recognize the use of electronic means.

38. Sixteen States replied positively to the question whether an electronic transactions and electronic signatures law was technology neutral. Fifteen States indicated that their law was based on UNCITRAL texts, with three States qualifying the reply as “mostly” or “partly”. All States enacting UNCITRAL texts on electronic commerce confirmed adopting the principles of non-discrimination, technology neutrality and functional equivalence, and 13 States reported adopting the principle of party autonomy. One State responded that it had adopted the general principles without enacting the UNCITRAL texts. Generally, responding States considered themselves to have implemented UNCITRAL texts more than as reflected on the UNCITRAL website, which suggests reviewing and updating that status information.<sup>5</sup>

39. Twenty-one States replied that they applied the functional equivalence principle to the form requirement of “writing”, 20 States to that of “signature” and 17 to that of “original”. Other form requirements to which the principle of functional equivalence was applied included “retention”, “seal or witness”, and “prescribed form”. Only two States reported adopting the functional equivalence principle for transferable records, but ten States reported adopting special rules on the use of electronic transferable records. The status of adoption of provisions on the use of automation in contracts varied, with six States responding affirmatively, seven States partly, eight States negatively, and one State reporting unclear legal status.

### **2. Electronic signatures and trust services**

40. The second set of questions regarded specifically electronic signatures and other trust services law. All States reported having a law that addressed electronic signatures, which in 17 States was based on UNCITRAL texts.<sup>6</sup> Eleven States indicated that such law on electronic signatures required the use of a specific technology or method. However, most States clarified that this requirement included instances where legal presumptions were attached to the use of technology that met additional requirements expressed in technology neutral terms under the “two-tier” approach.<sup>7</sup> This information is complemented by 17 States stating that their law foresaw the ex-ante mechanism for reliability assessment of electronic signatures. Finally, 20 States reported recognising foreign electronic signatures.

41. With regard to trust services other than electronic signatures, 17 States reported legal recognition of time-stamping, 16 States reported legal recognition of electronic seals, and 11 States reported legal recognition of other trust services, namely

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<sup>5</sup> The UNCITRAL website has dedicated pages for each UNCITRAL legislative text, including a status of adoption page maintained by the secretariat.

<sup>6</sup> As noted, all UNCITRAL texts on electronic commerce contain a provision on electronic signatures.

<sup>7</sup> Under this approach, all electronic signature methods have legal recognition and effect, subject to judicial confirmation in case of dispute (“first tier”). Moreover, methods offering higher levels of security are associated with certain presumptions such as reversing the burden of proof on the origin and integrity of the message, provided certain requirements are met (“second tier”). Article 6 MLES is based on this approach.

electronic registered delivery services, besides those trust services listed in the eIDAS Regulation<sup>8</sup> and hence recognized in European Union (EU) member States.

42. In some jurisdictions, and, possibly, limited to some regulated trading activities, there is a link between preservation of electronic records (or retention of data messages) and the use of trust services. Nine States indicated that their law required use of specific trust services such as qualified archival services, or of specific service providers for preservation of electronic records generated, stored or collected domestically.

### 3. Electronic evidence

43. All States reported that electronic evidence was admissible in judicial and other proceedings. The responses confirmed that in some jurisdictions a link existed between the use of trust services to preserve electronic records and the admissibility of these records in evidence.

44. Six States indicated that the same rules applied to evidence generated, stored or collected domestically and evidence generated, stored or collected abroad. In the other States various conditions applied to such foreign evidence, with eight States reporting that those conditions were set in national substantive or procedural laws; ten States requiring satisfaction of conditions on authenticity, reliability or origin; four States requiring the use of international legal cooperation mechanisms; and four States requiring recognition of foreign certificates or electronic signatures under dedicated international agreements

## B. Enactment of relevant UNCITRAL texts

45. The survey responses generally coincide with the status information available on the UNCITRAL website. Moreover, several judicial decisions illustrating the application of UNCITRAL texts have been shared, which may be used for publication in the Case Law on UNCITRAL Texts (CLOUT) database.

46. *Electronic commerce*: The MLEC and the MLES are the most widely enacted texts. Moreover, States reported enacting MLETR and the MLIT more than as indicated in the UNCITRAL website, which suggests additional research.

47. *Arbitration and mediation*: The MAL is the most enacted text. However, the replies did not clarify which option of article 7 MAL had been enacted. Information on arbitral practices and form requirements for using electronic means may be found in documents [A/CN.9/1200](#) and [A/CN.9/WG.II/WP.240](#). No specific replies were provided for texts on mediation.

48. *International payments*: The responses, which reflected the low level of adoption of these UNCITRAL texts, referred to the use of electronic signatures and other trust services offering a sufficient level of reliability, on the one hand, and to laws on the use of electronic promissory notes and bills of exchange, though not necessarily based on the MLETR, on the other hand.

49. *Transport of goods*: Responses did not show that a practice for using electronic transport documents had developed under the Hamburg Rules or national enactments of the Rotterdam Rules, pending entry into force of that Convention. States expressed interest for developing solutions that addressed both commercial needs and regulatory requirements, such as submission of declarations to single windows for customs

<sup>8</sup> Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC ("eIDAS Regulation"), OJ L 257, 28.8.2014, p. 73–114, ELI: <http://data.europa.eu/eli/reg/2014/910/oj>, as amended by Regulation (EU) 2024/1183 of the European Parliament and of the Council of 11 April 2024 amending Regulation (EU) No 910/2014 as regards establishing the European Digital Identity Framework, OJ L, 2024/1183, 30.4.2024, ELI: <http://data.europa.eu/eli/reg/2024/1183/oj>.

operations and other trade facilitation facilities, which lie at the core of paperless trade.

50. *Public procurement*: Replies generally indicated a widespread use of electronic means, including the exclusive use of electronic public procurement systems, without specific reference to MLPP enactments. Some replies noted the application of the general law of obligations to form requirements in public procurement, and other replies stated that the general law on electronic transactions, which is often based on UNCITRAL texts on electronic commerce, applied to electronic public procurement. The need to comply with international and regional texts, such as the World Trade Organization Agreement on Government Procurement, and the EU Public Procurement Directive,<sup>9</sup> was also noted.

51. *Security interests*: States generally reported having implemented electronic registries for recording security interests, including based on the MLST. One State indicated that its law recognized the possibility of taking security over electronic transferable records.

52. Overall, the responses confirmed the desirability of increasing awareness of how different UNCITRAL texts may interact. For instance, States that have adopted both the Hamburg Rules and the MLETR may benefit from additional guidance on the interaction of those texts. Similarly, an illustration of the interaction between UNCITRAL texts on electronic contracts and the United Nations Convention on Contracts for the International Sale of Goods (1980) (CISG) may be beneficial for the application of those texts.<sup>10</sup>

## **C. References to UNCITRAL texts on electronic commerce contained in trade agreements**

### **1. Survey results**

53. Almost all States reported having concluded preferential trade agreements containing provisions on electronic commerce (or digital trade) and paperless trade, whether in the form of dedicated chapters of free trade agreements, or stand-alone agreements such as digital economy agreements.

54. About half of the responses indicated that trade agreements contain an explicit reference to UNCITRAL texts, split evenly between (a) those containing commitments to adopting or maintaining an UNCITRAL text on electronic commerce and (b) those encouraging consideration of adoption. The MLEC was the most referenced text, followed by the ECC and the MLETR.

55. Eleven States indicated that trade agreements include additional provisions influenced by UNCITRAL texts on electronic commerce. Such provisions relate to legal recognition of electronic communications, to their acceptance by public authorities, and to preserving technology neutrality, particularly for electronic signatures.

### **2. Comparison with TAPED dataset**

56. The responses are generally consistent with the TAPED (Trade Agreement Provisions on Electronic-commerce and Data) dataset, which compiles the content of 465 international agreements, dating back to 2000, with provisions on digital trade and contains indicators relevant to UNCITRAL texts and principles.<sup>11</sup>

<sup>9</sup> Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC, OJ L 94, 28.3.2014, p. 65–242, and subsequent amendments.

<sup>10</sup> See the analysis contained in CISG Advisory Council Opinion No. 1 (Revised 2024): Electronic Communications under CISG.

<sup>11</sup> Mira Burri, Maria Vasquez Callo-Müller and Kholofelo Kugler, TAPED: Trade Agreement Provisions on Electronic Commerce and Data, available at: <https://unilu.ch/taped>.

(a) TAPED indicator 1.5.2 relates to the inclusion of a reference to the consistency of the domestic legal framework with the MLEC, which is found in 42 trade agreements, 28 of which in a binding manner.

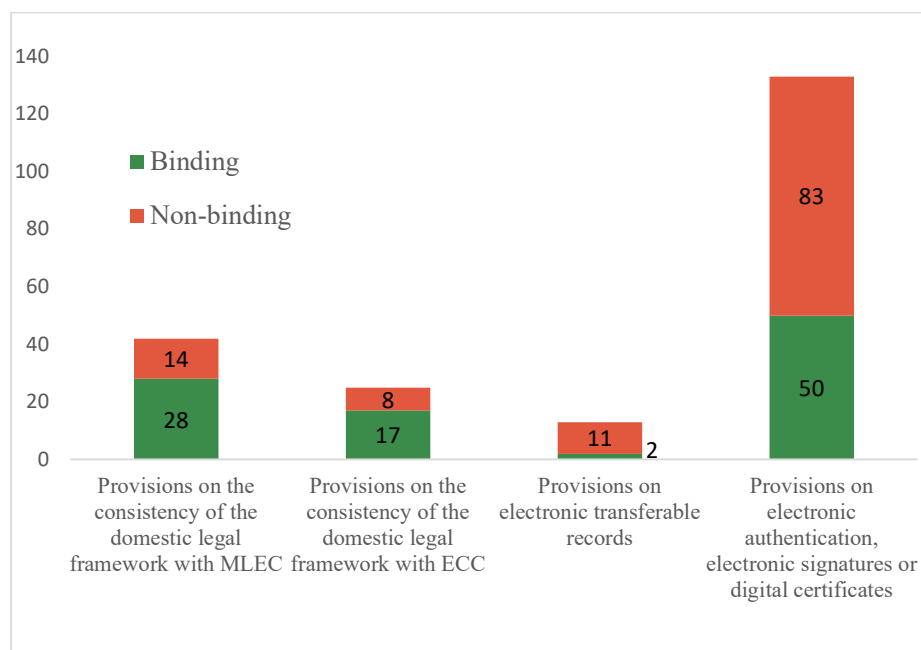
(b) TAPED indicator 1.5.3 relates to the inclusion of a provision on the consistency of the domestic legal framework with the ECC, which is found in 25 trade agreements, 17 of which in a binding manner.

(c) TAPED indicator 1.6.2 relates to provisions on electronic transferable records, defined as electronic records that satisfy the requirements set out in article 10 MLETR. Such provision is found in 13 trade agreements, two of which in a binding manner.

(d) TAPED indicator 1.5.6 refers to provisions on electronic authentication, electronic signatures or digital certificates, which are found in 133 trade agreements. About 50 trade agreements contain binding provisions, which are often drafted in technology-neutral terms.

57. More recent trade agreements contain a higher level of commitment to adopting UNCITRAL texts. The inclusion in a trade agreement of a provision related to UNCITRAL texts should be understood as proactively supporting the underlying goal, but its absence should not be understood as lack of support.

58. The following chart visualizes the number of UNCITRAL-related provisions contained in the trade agreements, as compiled in the TAPED dataset.



#### D. Case for consolidating UNCITRAL texts on electronic commerce

59. UNCITRAL texts on electronic commerce have been successful in establishing an enabling legislative framework for electronic transactions. However, their historical development in response to business needs led to variations, including in similar provisions, to the possible detriment of legal uniformity and predictability.<sup>12</sup> A small but increasing number of cases applying UNCITRAL texts on electronic commerce is available in the CLOUT and may be used to illustrate how the provisions

<sup>12</sup> The relevant provisions are identified in A/CN.9/WG.IV/WP.182, Annex I.

operate and are being interpreted. However, overall guidance on how to navigate these variations is limited.

60. In some instances, different UNCITRAL texts on electronic commerce deal with similar subjects. Both the MLES and the MLIT, for example, deal extensively with electronic signatures. There are, however, significant differences between those two texts, which have not been discussed in detail. Generally, it is useful to explain how UNCITRAL texts relating to contract in electronic form and to electronic documents could interact with UNCITRAL texts dealing with data quality assurance and other aspects of data management.

61. In other cases, more recent UNCITRAL texts may replace previous texts. For example, articles 16 and 17 MLEC have been expanded in the MLETR so that the latter may replace the former.<sup>13</sup> Additional guidance may assist States in selecting the most appropriate solution for their needs.

62. Moreover, as noted, there is an increasing favor for medium-neutral drafting, which entails a departure from the functional equivalence principle. The cross-cutting and pervasive use of electronic means in national and international trade requires a modern, consistent and comprehensive enabling legal framework. Such framework should clarify also how digital trade law interacts with other law and could be used as the basis for texts produced by other organizations to complement UNCITRAL texts.

63. Greater harmonization and consolidation of UNCITRAL texts on electronic commerce could provide useful guidance to States, to other standard-setting organizations wishing to enact those texts. The secretariat has previously outlined to the Commission (A/CN.9/1065, para. 17) and to Working Group IV (A/CN.9/WG.IV/WP.182, para. 57) how the current patchwork of existing texts on electronic commerce can create an obstacle to the adoption of those texts. Such work would also provide guidance to ongoing and future UNCITRAL legislative work that necessarily has a significant digital trade component and ensure consistency across texts and areas of work with a view to ensuring consistent references and use in texts developed by other organisations.

64. When tasking the secretariat with the preparation of this note, the Commission had already foreshadowed possible future work on consolidating UNCITRAL texts on electronic transactions, with a particular focus on supporting paperless trade (A/79/17, para. 299). Accordingly, the Commission may wish to consider assigning the compilation, updating or and consolidation of UNCITRAL texts relevant for digital trade to a working group for substantive deliberations and requesting the secretariat to carry out preparatory work.

#### **IV. UNCITRAL texts and paperless trade**

65. Paperless trade has been a component of the work of UNCITRAL on electronic commerce for some time. At its forty-fourth session, in 2011, the Commission welcomed the cooperation between the secretariat and other organisations on legal issues relating to electronic single-window facilities, and asked the secretariat to contribute, as appropriate, with a view to discussing relevant matters at the working group level when the progress of joint work offered a sufficient level of detail (A/66/17, para. 240). At its fifty-seventh session, in 2024, the secretariat was further requested to coordinate with other relevant organizations work on paperless trade (A/79/17, paras. 18(g) and 299).

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<sup>13</sup> This was done in Bahrain, where the Legislative Decree No. 54 of 2018 Promulgating the Electronic Communications and Transactions Law, which enacted the MLETR, replaced article 20 of the Legislative Decree No. 28 of 2002 in respect of the Electronic Transactions Law, corresponding to articles 16 and 17 MLEC.

66. This line of work was also recognized by the General Assembly, which, when endorsing the MLETR, appealed specifically to the relevant bodies of the United Nations system and to other international and regional organizations to coordinate their legal activities in the area of paperless trade facilitation, to avoid duplication of efforts and to promote efficiency, consistency and coherence in the modernization and harmonization of legislation (A/RES/72/114, para. 5). This is part of the central and coordinating role that UNCITRAL plays within the United Nations system in addressing legal issues related to the digital economy and digital trade (A/74/17, para. 211).

## **A. What is paperless trade?**

67. Paperless trade is a notion that is commonly associated with electronic commerce (or digital trade), and sometimes those terms are used interchangeably. Article 3(a) of the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific (CPTA), for instance, defines “Cross-border paperless trade” as “trade in goods, including their import, export, transit and related services, taking place on the basis of electronic communications, including exchange of trade-related data and documents in electronic form”. If such a broad approach is taken, paperless trade is hardly distinguishable from digital trade, especially when this is understood as encompassing all phases of commerce under the “end-to-end trade digitalization” approach.

68. In a narrower sense, paperless trade relates to trade-related exchanges involving private sector and government entities, particularly those involved in the import, export and transit of goods. That approach seems to underpin the World Trade Organisation Trade Facilitation Agreement, which, according to its Preamble, aims to “further expediting the movement, release and clearance of goods, including goods in transit”, and is reflected in commitments in trade agreements. This understanding had been used in the proposal submitted by Russia to the fifty-seventh session of UNCITRAL on “Possible future work on legal aspects of paperless trade” (A/CN.9/LVII/CRP.6), which emphasized the desirability of using UNCITRAL texts as the basis for such work.

69. The narrower approach is reflected, among others, in commitments found in recent trade agreements to develop systems for submission and exchange of trade-related data and documents in electronic form is (e.g., article 2.2 of the Digital Economy Partnership Agreement). These commitments may be accompanied by the encouragement to harmonize applicable technical standards. However, current pilot projects aimed at implementing those commitments often focus on ad hoc solutions for specific documents and trade corridors.<sup>14</sup> This fragmentation may hinder the goal of data exchange under uniform rules and common standards that promote technology neutrality and technical interoperability.

70. Paperless trade is about submission of information in electronic form. The information is needed to satisfy regulatory requirements set out in international trade agreements, customs and import–export regulations, etc. Customs documentation requirements may be particularly prominent. Harmonizing these requirements is a task for intergovernmental organizations other than UNCITRAL, such as the World Customs Organization.

## **B. How UNCITRAL texts support paperless trade**

71. As UNCITRAL texts on electronic commerce commonly apply to commercial and non-commercial settings, they are directly applicable to paperless trade in the narrow sense. This is recognised in articles 5, 6, 8 and 10 CPTA, and explained in the

<sup>14</sup> Cha, S. H. (2023). “Electronic Certificate of Origin Implementation”, UNNExT Working Paper Series No. 5, September 2023, Bangkok, ESCAP.

CPTA Explanatory Notes and in guidance documents on this topic.<sup>15</sup> CLOUT cases illustrate the application of UNCITRAL texts in business-to-government and purely governmental contexts.

72. However, the use of UNCITRAL texts in paperless trade is still limited. Even in jurisdictions enacting UNCITRAL texts and applying them to all types of electronic transactions, legal recognition of electronic documents and data submitted to public authorities may be subject to additional requirements. Broader awareness of how UNCITRAL texts apply to paperless trade may ensure their application in business-to-government transactions, thus significantly contributing to achieving end-to-end trade digitalization and harmonization of international trade law.

73. At one level, UNCITRAL texts give domestic legal recognition to paperless trade. For example, there is limited predictability on the legal value of electronic communications exchanged with a single window for customs operations without a law saying that those communications are equivalent to paper.

74. Moreover, the possibility to use certain key documents in electronic form may facilitate exchange of electronic records and data. In a paper-based model, importers and exporters, with the help of customs brokers, freight forwarders, and other logistics operators, submit declarations to customs authorities. This model has been replicated online without taking full advantage of the use of electronic means, namely the ability to reuse data, compile it and analyse it in aggregate form. Such comprehensive and modern approach could help guaranteeing origin and nature of goods and ensuring information consistency across jurisdictions and throughout supply chains.

75. For instance, bills of lading contain comprehensive and accurate information on the cargo. Customs need best quality data to use predictive and selective models for cargo control. Having access to information contained in electronic bills of lading provides customs with data that is more complete, accurate, up-to-date and authentic. However, the dematerialisation of bills of lading has posed significant legal challenges. The MLETR addressed many of those challenges, and its increasing adoption and use effectively increases the quantity and quality of data available for paperless trade. The forthcoming instrument on negotiable cargo documents is designed to have a similar effect as that document's commercial function is similar to that of a bill of lading. The MLIT complements those texts by offering assurance on data quality such as origin and integrity.

76. At another level, UNCITRAL texts facilitate legal recognition of electronic documents and data across borders. The importance of facilitating cross-border legal recognition for paperless trade is acknowledged in article 8 CPTA, which foresees that the State Parties to that agreement “shall provide for mutual recognition of trade-related data and documents in electronic form originating from other Parties on the basis of a substantially equivalent level of reliability”. Foreign documents relevant for paperless trade submitted to public entities and originating abroad include certificates of origin and, as supporting documents, bills of lading.

77. However, the legal recognition of electronic documents and the legal recognition of data engage different legal mechanisms. In this regard, it may be useful to recall that a document is a structured representation of data, and that once the data quality is assured, it may be possible to generate the document with sufficient level of trust for its use.

78. On the one hand, legal recognition of documents may rely on mechanisms such as those contained in the ECC, including functional equivalence rules. On the other hand, enabling cross-border recognition of data means providing assurance of data qualities such as origin, integrity, and time associated with significant events.

79. Article 8 CPTA aims at addressing the issue by leveraging the notion of “substantially equivalent level of reliability”, which was first used in article 12

<sup>15</sup> John Gregory (2024). “Legal Implementation Guide for Cross-border Paperless Trade”, UNNExT Working Paper Series No. 12, October 2024, Bangkok, ESCAP.

MLES. Article 8 CPTA further indicates that such level “would be mutually agreed upon among the Parties through the institutional arrangement established under the present Framework Agreement”.

80. Legal mechanisms for cross-border recognition of data quality assurance may significantly contribute to paperless trade, especially when accompanied by the adoption of interoperable technical standards. For example, provisions of the MLIT could be adopted not only as general law for assessing data quality, but also as core element of a unified policy for data sharing among government entities.

81. The MLIT, which builds on regional experiences to provide a comprehensive framework for domestic and international recognition of documents and data, has built on the “substantially equivalent level of reliability” approach, allowing for multilateral and plurilateral mechanisms for cross-border recognition based on identical or substantially equivalent levels of assurance and of reliability.

82. Articles 25 and 26 MLIT are provisions directly actionable by the enacting jurisdiction. Moreover, the MLIT foresees the application of *ex ante* and *ex post* mechanisms for determining reliability regardless of the place of use or origin of the identity management or of the trust service. Additional guidance on institutional mechanisms, for instance at the bilateral and plurilateral levels, may be provided with a view to promoting MLIT adoption and implementation.

83. While the MLIT addresses main legal issues arising from the use and cross-border recognition of trust services, it does not provide guidance on matters relevant for its practical effect, such as how to operationalise cross-border recognition; apply trust services to each type of trade document; and evidentiary effects.

84. Moreover, the MLIT is a recent instrument that has yet to be broadly enacted and accepted by business practice, as States and other stakeholders are still working on adapting their legal frameworks to the new needs of digital trade. The availability of only national or regional technical standards for cross-border recognition may pose a challenge to global MLIT implementation as it is not yet possible to have a global mutual recognition scheme despite the availability of adequate legal tools.

85. Another challenge may be the absence of a universal institutional mechanism supporting cross-border recognition, although regional ones are emerging, e.g. in the EU or under the CPTA. In other words, there is no single entity in charge of establishing technical equivalence across levels of assurance and of reliability, akin to what ICAO does for ePassports.<sup>16</sup>

86. To advance the matter, increased support to MLIT adoption and implementation focusing on paperless trade use cases seems desirable. Better understanding of paperless trade needs may also lead to develop new legal mechanisms and dedicated uniform legal texts.

### C. Way forward

87. Building on existing mandates, the Commission may wish to consider whether substantive guidance on how existing UNCITRAL texts can support paperless trade should be developed and the form that such guidance could take. Possible outcomes useful to support States wishing to advance paperless trade include explanatory materials, guidance materials and the development of a specific and focused instrument. In particular, the Commission may wish to consider whether such guidance should initially focus on illustrating and promoting the use of existing UNCITRAL texts for cross-border recognition of electronic documents and data, and eventually on the desirability and feasibility of preparing dedicated instruments.

<sup>16</sup> See for additional information ICAO, “ePassport Basics”, at <https://www.icao.int/Security/FAL/PKD/Pages/ePassport-Basics.aspx>.

## Annex

### Overview of UNCITRAL electronic commerce texts and substantive law texts that include provisions on electronic aspects

<i>Text</i>		<i>General principles</i>			<i>Functional equivalence rules<sup>17</sup></i>							
		<i>Rule on non-discrimination</i>	<i>Rule reaffirming technology neutrality</i>	<i>Rule recognizing party autonomy</i>	<i>Writing</i>	<i>Signature</i>	<i>Originality</i>	<i>Retention</i>	<i>Timestamp</i>	<i>Amendment</i>	<i>Delivery</i>	<i>Possession</i>
Electronic commerce	MLEC (1996)	Arts. 5 and 5 bis; <sup>18</sup> Arts. 11(1) and 12(1) <sup>19</sup>	-	Art. 4	Art. 6(1)	Art. 7(1)	Art. 8(1)	Art. 10(1)	-	-	-	Art. 17(3)
	MLES (2001)	-	Art. 3	Art. 5	-	Art. 6(1)	-	-	-	-	-	-
	ECC (2005)	Art. 8(1) <sup>20</sup> Art. 12 <sup>21</sup>	-	Art. 3	Art. 9(2)	Art. 9(3)	Art. 9(4)	-	-	-	-	-
	MLETR (2017)	Art. 7 <sup>22</sup>	-	Art. 4	Art. 8	Art. 9	Art. 10(1)(b)(iii) <sup>23</sup>	-	Art. 13	Art. 16	-	Art. 11
	MLIT (2022)	-	Art. 3	Art. 3	-	Art. 16; Art. 17 (seal)	-	Art. 19	Art. 18	-	Art. 20	-
	MLAC (2024)	Art. 5; <sup>24</sup> Art. 6 <sup>25</sup>	Art. 4	Art. 4	-	-	-	-	-	-	-	-

<sup>17</sup> Provisions marked with “\*” are drafted in a medium-neutral manner.

<sup>18</sup> Information in electronic form.

<sup>19</sup> Contracts formed and performed using electronic means.

<sup>20</sup> Communications and contracts in electronic form.

<sup>21</sup> Contracts formed using automation.

<sup>22</sup> Transferable document or instrument in electronic form.

<sup>23</sup> While not formulated as such, this provision bears similarity to the functional equivalent rule for an “original” insofar as it requires an assurance of integrity (of an electronic transferable record).

<sup>24</sup> Contracts formed and performed using automation.

<sup>25</sup> Contracts in computer code and using dynamic information.

		General principles			Functional equivalence rules <sup>17</sup>							
		Rule on non-discrimination	Rule reaffirming technology neutrality	Rule recognizing party autonomy	Writing	Signature	Originality	Retention	Timestamp	Amendment	Delivery	Possession
<i>Text</i>												
International transport of goods	Hamburg Rules (1978)	-	-	-	-	Art. 14(3)*	-	-	-	-	-	-
	OTT Convention (1991)	-	-	-	Art. 4(3)*	Art. 4(4)*	-	-	-	-	-	-
	Rotterdam Rules (2008)	-	-	-	Art. 8*	Art. 38*	Art. 9* <sup>26</sup>	-	-	-	-	Art. 8*
	Judicial Sale of Ships (2022)	Art. 5(7)	-	-	Art. 5(6)(a)	Art. 5(6)(b)	Art. 5(6)(c)	-	-	-	-	-
Payments and trade finance	Convention on International Bills of Exchange and International Promissory Notes (1988)	-	-	-	-	Art. 5(k)*	-	-	-	-	-	-
	Model Law on International Credit Transfers (1992)	-	-	-	Art. 2(b)*	Art. 5(2)*	-	-	-	-	-	-
	Convention on Independent Guarantees and Stand-by Letters of Credit (1995)	-	-	-	Art. 7(2)*	Art. 7(2)*	-	-	-	-	-	-
	MLWR (2024)	-	-	-	Art. 1(2)*	Art. 6(1)(a)*	Art. 6(1)(c)* <sup>27</sup>	-	-	-	-	Art. 2(3)*
International commercial arbitration	MAL (2006)	-	-	-	Art.7(4)	-	-	-	-	-	-	-

<sup>26</sup> While not formulated as such, this provision bears similarity to the functional equivalent rule for an “original” insofar as it requires an assurance of integrity (of a negotiable electronic transport record).

<sup>27</sup> While not formulated as such, this provision bears similarity to the functional equivalent rule for an “original” insofar as it requires an assurance of integrity (of an electronic warehouse receipt).

		General principles			Functional equivalence rules <sup>17</sup>							
		Rule on non-discrimination	Rule reaffirming technology neutrality	Rule recognizing party autonomy	Writing	Signature	Originality	Retention	Timestamp	Amendment	Delivery	Possession
Text												
International commercial mediation	Singapore Mediation Convention (2018)	-	-	-	Art. 2(2)	Art. 4(2)	-	-	-	-	-	-
	MLM (2018)	-	-	-	Art. 16(6)	Art. 18(2)	-	-	-	-	-	-
Procurement and Public-Private Partnerships	Model Law on Procurement of Goods, Construction and Services (1994)	Art. 9(3)	-	-	-	-	-	-	-	-	-	-
	MLPP (2011)	-	-	-	Art. 7 <sup>28</sup> ; Art. 40(2) <sup>29</sup>	Art. 40(2)	-	-	-	-	-	-
Security interests	Assignment of Receivables (2001)	-	-	-	Art. 5(c)	Art. 5(c)	-	-	-	-	-	-
	MLST (2016)	-	-	-	Art. 2(nn)	-	-	-	-	-	-	-

<sup>28</sup> Communications in electronic form.

<sup>29</sup> Tenders in electronic form.