MARITIME NETWORK

MRN.AI

Maritime Token Whitepaper

Intercontinental logistics payments
and electronic trade documents

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Connecting shipping documents, payment conditions and trade finance across intercontinental trade corridors.

Purpose and scope

This paper explains a maritime operating network that connects logistics execution, electronic bills of lading, conditional payments and trade-finance coordination. It is written for shipping and logistics executives, technology teams, commercial counterparties, finance providers and network participants. It follows five main chapters and a financial appendix, adapting a capital-markets whitepaper structure to a maritime service business.

The central design decision is to keep three different interests clear. An electronic bill of lading records legally significant rights in a shipment. A payment asset carries monetary value under its issuer's terms. The MRN token provides defined network utility. Combining their workflows is useful; treating them as interchangeable creates avoidable legal and financial uncertainty.

Executive summary

MRN.AI operates an intercontinental trade network with a commercial centre in Rotterdam and an operations centre in Copenhagen. We connect the people responsible for moving cargo with the people responsible for controlling its documents and settling its commercial obligations. A shipment has a persistent transaction identity, a documented chain of authority and a shared record of the actions that remain outstanding. This is the basis of our operating model.

Our customers use MRN.AI to prepare shipment documentation, obtain eBLs issued by carriers or authorised agents, transfer control under the applicable permissions, reconcile invoices, coordinate payment conditions and assemble evidence for trade finance. The network makes it possible to move an authorised document between participating platforms while preserving a single operative record. It also allows finance providers to see which party controls the relevant document and which conditions must be satisfied before funds are released.

For the twelve months ending 30 September 2026, we served 240 paying enterprises, processed 1.2 million paid shipment-workflow bundles and coordinated EUR 1.2 billion of eligible commercial settlements. These are three separate measures: only a subset of document workflows uses our payment orchestration service. Service revenue totalled EUR 14.4 million, with EUR 4.38 million in cash operating surplus after the specified variable and fixed cash costs. Taxes, capital expenditure and token-grant accounting are outside that surplus measure.

The MRN token supports access to operator-delivered services, defined service incentives and accountable participation by network operators. Its maximum supply is one billion units. Customers can pay in conventional currency, and cargo-payment principal moves through bank rails or separately issued settlement assets that satisfy the relevant legal and operational requirements. MRN has no currency peg and gives its holder no claim to cargo, company equity, debt repayment or profit distributions.

Our commercial advantage comes from a connected workflow. An invoice discrepancy can be identified before financing is drawn. A surrendered bill cannot continue to circulate as an operative original. A finance provider can inspect the history of the document it relies upon. A receiving platform can accept control without leaving an independently transferable copy behind. These capabilities reduce avoidable coordination work when participants adopt the same operating rules and reliable interfaces.

The architecture retains accountable decision-makers. Artificial intelligence assists with document extraction, reconciliation and exception detection. Authorised parties approve legally significant transfers, credit decisions and disputed releases. Code records and executes

approved steps; the applicable law and transaction documents determine the resulting rights and obligations.

Success means repeat paid usage and a service business that covers its stated cash costs. Further expansion depends on enforceable document arrangements, reliable payment connections and disciplined operating costs. These results do not imply token appreciation.

Network and token overview

Table 1 Network and token terms

Item	Specification
Brand	MRN.AI Maritime Network
Platform operator	MRN.AI Network B.V. in the Netherlands
Operations unit	Copenhagen based Danish operating unit
Geographic scope	Europe with Asia, the Americas and Africa
Core services	Logistics workflow, eBL interchange, payment orchestration and finance coordination
Token	MRN with 18 decimal places
Maximum supply	1,000,000,000 MRN
Token economics	Service utility and participation with capped allocations; no promised return
Payment principal	Bank money or separately issued eligible settlement assets
Historic company capital	EUR 12 million of sponsor equity, not token proceeds
Public token sale	None; no subscription terms

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Chapter 1 Introduction and market context

The coordination problem in international trade

International maritime trade depends on a sequence of legally and operationally distinct decisions. A seller prepares cargo. A carrier receives it under agreed terms. A document records receipt and the carriage relationship and may also function as a document of title. Banks or other financiers assess documents and credit exposure. Customs and terminal operators apply their own release requirements. The buyer pays and receives the goods through the applicable delivery process.

Each participant can perform its own task correctly while the overall shipment remains delayed. An invoice can disagree with a packing list. A bank can hold a document while a container arrives. A carrier's amendment may fail to reach another system. A payment confirmation may be available to one participant and still need manual verification by another. The resulting cost is partly administrative and partly financial: employees repeat checks, working capital stays committed and exceptions take longer to resolve.

The scale makes these frictions commercially significant. UN Trade and Development states that around 80 percent of international trade in goods by volume moves by sea. That figure describes physical trade, not a revenue opportunity available to a token issuer. A realistic service market is limited by the documents, counterparties, jurisdictions and transactions a provider can actually serve. [1]

Industry adoption is already moving toward electronic documents. In February 2023, nine DCSA member carriers committed to move 50 percent of original bills of lading to digital within five years and 100 percent by 2030. These are stated targets rather than proof that every carrier has achieved them. In June 2026, DCSA announced a common interoperability framework adopted by five eBL providers with International Group of P&I Clubs approval. Both developments support the commercial relevance of document connectivity without establishing any particular token's value. [2, 3]

The MRN.AI operating proposition

We organise a trade around a shared transaction workspace. The workspace links the contractual parties, shipment milestones, authoritative document identifiers, payment instructions and financing references. Within the permissioned workspace, participants see only the information and actions their role permits. Public token balances and ledger commitments remain separately observable. The network records who authorised a change, what evidence supported it and which version of the transaction rules applied.

This creates a practical improvement for each participant. The exporter can identify documentary exceptions before presenting a financing request. The carrier can distinguish a draft, an issued original and a surrendered record. The importer can see the outstanding release conditions. The finance provider can inspect the document-control history and the agreed payment priority. Operations staff can resolve an exception without rebuilding the entire chronology from email.

Our intercontinental service model recognises that different corridors have different requirements. A workflow approved for one governing law, payment provider and receiving platform cannot be assumed valid everywhere. Each corridor has an operating profile covering document law, customer eligibility, currencies, payment cut-off times, authorised recipients,

evidence requirements and dispute escalation. Scaling means adding supported profiles and reliable integrations, rather than removing those distinctions.

What each digital instrument represents

The electronic bill of lading is a legally significant trade record. Its treatment depends on its terms, the governing law and the quality of the system used to identify and transfer control. A record can prove receipt or identify a consignee without being a negotiable document. MRN.AI therefore records document type explicitly and does not call every shipping PDF an eBL.

The settlement asset is the means of discharging a monetary obligation. For a bank transfer, the relevant account records and payment arrangements govern settlement. For an eligible tokenised monetary instrument, its issuer, redemption rights, custody arrangements and applicable rules matter. The software records the agreed settlement event instead of assuming that any blockchain transfer discharges every payment obligation.

MRN is the service token. It provides the utility defined by the operator's published terms, including access to issuer-delivered services and specified network participation mechanisms. Its function differs from a security token, which represents rights under a financial instrument. Trade-finance lenders in the examples hold contractual credit rights; buying MRN does not give a holder a share of their loans or interest receipts. The legal classification of any token must follow its substance and distribution arrangements. [10, 11]

Comparison with conventional arrangements

Table 2 Conventional and coordinated trade workflows

Attribute	Paper and separate systems	Standalone eBL platform	MRN.AI operating model
Document handling	Physical originals and manual reconciliation	Electronic originals within supported arrangements	Electronic originals linked to transaction conditions
Payment coordination	Bank confirmations and separate checks	Usually handled by separate services	Provider confirmations connected to an agreed workflow
Access	Existing commercial and bank relationships	Platform onboarding and counterparties	Verified role based access and supported corridors
Legal rights	Carriage and commercial contracts	Same rights subject to electronic recognition	Same legal analysis plus an interchange rulebook
Technology costs	Couriers manual work and existing systems	Platform charges and integration	Subscription workflow charges integration and oversight
Transfer restrictions	Physical possession contractual restrictions and law	Platform rules and governing law	Legal eligibility controls and one operative record
Financing	Credit and collateral assessment	Electronic evidence can support assessment	Coordinated evidence and financing workflow
Liquidity	Determined by credit terms and funding	Not created by digitisation alone	Dependent on willing lenders and enforceable rights

Source for Table 2: analytical comparison. Outcomes depend on participant adoption and the chosen legal arrangements.

Conventional systems remain effective where counterparties already have inexpensive, reliable processes. MRN.AI must earn its integration cost by reducing work that customers actually perform or by enabling a transaction they can otherwise complete only with greater difficulty. The relevant comparison includes training, data migration, custody, legal review, recurring support and exception handling. An electronic process that creates a second reconciliation task can be more expensive than the process it replaces.

Commercial model and measures of success

Our business earns enterprise subscriptions, fees for completed shipment-workflow bundles and a net orchestration charge on eligible commercial settlements. A bundle represents one contracted workflow service and can contain several documents and status events. We count that bundle once. The stated settlement principal is money moving between trading parties and is not company revenue.

We judge adoption by paid repeat usage, successful completion of eligible workflows, customer retention, support burden and the rate of exceptions requiring manual intervention. Token transfers and token market prices are separate indicators.

Table 3 Operating year ending 30 September 2026

Measure	Value	Interpretation
Paying enterprises	240	All 240 subscribe for the full operating year
Paid workflow bundles	1,200,000	Counted once per contracted workflow
Eligible settled principal	EUR 1.20 billion	Subset of workflows using orchestration
Service revenue	EUR 14.40 million	Subscriptions workflows and orchestration
Cash operating surplus	EUR 4.38 million	After cash costs before exclusions
Public token proceeds	EUR 0	No public token sale

Source for Table 3: calculations in Appendix A. The surplus excludes tax, capital expenditure, financing cash flows and token-grant accounting and is not net profit.

Our service business operates without requiring trading parties to pay in a volatile asset or distributing lender interest to service-token holders. Token utility is evaluated on its own merits: whether it improves participation and accountability sufficiently to justify custody, valuation and governance complexity. Where a deployment cannot demonstrate that benefit, conventional service credits and contractual performance bonds remain credible alternatives.

Chapter 2 The operating network and transaction lifecycle

We operate MRN.AI through a defined allocation of responsibilities between the network operator, its Copenhagen operations team and the parties to each transaction. This chapter explains how those responsibilities govern token allocation, document control, payment instructions and exceptions in our operating model.

Three stages two distinct lifecycles

MRN issuance and shipment processing have separate lifecycles. Issuance creates a utility token and establishes its distribution, custody and governance arrangements. Shipment processing manages documents, participants and payment instructions. Creating or transferring MRN never creates a bill of lading, assigns an invoice or transfers cargo rights.

During pre-issuance, the operator defines permitted services, jurisdictions, participant roles and financing boundaries. Counsel assesses token classification and documents the service rulebook; tax advisers assess issuance and cross-border charges. Financial advisers review capital requirements and distribution arrangements. Cargo due diligence and any independent collateral valuation support the lender's transaction decision, rather than establishing a redemption value for MRN. Providers, approvals and deployment costs require transaction-specific confirmation.

Table 4 Issuance and operational lifecycle

Stage	Activity	Responsible party	Required output	Dependency or decision
Pre-issuance	Define token rights and service scope	Operator; counsel	Rights schedule; classification analysis	Permitted jurisdictions and activities
Pre-issuance	Design treasury, tax and distribution arrangements	Finance; tax and financial advisers	Funding plan; distribution controls	Approved documentation and providers
Pre-issuance	Establish document and payment architecture	Technology; counsel; providers	Rulebook; architecture; recovery plan	Legal recognition and provider acceptance
Issuance	Verify participants and authority	Administrator; compliance	Entity and signatory records	Identity, eligibility and account checks
Issuance	Create and allocate MRN	Treasury; contract administrator	Supply proof; allocation reconciliation	Approved release controls
Issuance	Allocate approved grants and deliver custody balances	Treasury; administrator; custody provider	Allocation ledger; delivery receipt	Eligibility vesting and custody controls
Post-issuance	Process shipments and service obligations	Carrier; customers; operations	Controlled eBL; event and fee records	Valid instructions and funded payments
Post-issuance	Report, vote and maintain services	Operator; administrator	Financial and operating reports; decisions	Defined governance and review rights

Stage	Activity	Responsible party	Required output	Dependency or decision
Post-issuance	Resolve exits, disputes or termination	Contractual counterparties; counsel	Released collateral; settled accounts; retained records	Legal authority and reconciliation

Source: MRN.AI operating design.

Participant onboarding verifies the legal entity, beneficial owners where applicable, authorised signatories, account ownership and the permissions attached to each user. Checks are refreshed after material changes. The administrator records whether the organisation is acting as carrier, shipper, consignee, lender, payment provider or document custodian; one company may hold several roles with separated permissions. Wallet possession alone confers none of these operational authorities.

The supply of 1,000,000,000 MRN units, with 18 decimal places, is created once; no additional minting authority remains. Allocations and any vesting reconcile with the financial appendix. A public EVM-compatible token ledger records MRN balances, while operational access remains permissioned. Any public token distribution requires a separately confirmed legal route. Network admission is not automatically obtained by purchasing MRN, and ordinary customers can pay fiat service fees.

Post-issuance servicing covers vesting releases, treasury reconciliation, service-collateral return and permitted governance proposals. MRN carries no equity, debt, dividend, cargo entitlement or currency peg. There is no promised maturity payment or redemption at par. Optional collateral secures defined service obligations only; its valuation, release conditions and any deductions require explicit terms. Governance cannot rewrite a carrier's obligations or a lender's security agreement.

MRN service utility and supply controls

MRN.AI Network B.V. is the Netherlands operating company, supported by a Danish operations unit. Its business sells enterprise software, shipment-workflow execution and payment orchestration. The MRN token supports service access, accountable network participation and bounded governance. Ordinary customers can contract and pay in euros without owning MRN. Enterprise contracts establish their service rights; token possession does not replace onboarding or those contracts.

MRN confers no equity, debt, profit participation, dividend, interest, cargo ownership, bill-of-lading entitlement or claim against settlement funds. A negotiable electronic bill of lading is a separate legal and technical record. Banks and independently contracted payment or escrow providers move trade principal through bank rails or separately issued eligible settlement assets under separately confirmed arrangements. MRN is not used as a stablecoin, unit of account or financing principal. No price peg, redemption value, public token sale, exchange listing or passive yield is assumed.

The supply is **1,000,000,000 MRN with 18 decimal places**, created once into documented allocation and vesting contracts. No further minting is permitted. Representations on additional networks must be backed by locked canonical tokens; they cannot enlarge aggregate supply. The operating company has no right to fund expenses by selling treasury tokens. Its sponsor equity and euro service receipts finance operations.

Permitted governance concerns bounded operating matters such as integration priorities and technical parameter proposals. It cannot redistribute cargo, vary lender rights, release escrow, amend customer contracts or override applicable law. Verification, conflict controls, treasury-

vote exclusions and published decision procedures remain necessary. Service agreements define any participation privileges; neither a token balance nor a governance vote assures availability, discounted pricing or financial return.

The service token connects a participant to operator-delivered functionality under published terms. Service bonds are collateral for specified operating duties and are not consensus staking or a passive investment product. Changes to bonding requirements require notice, a valuation method and an appeal process for disputed deductions. A volatile bond can fall short during stress, so euro service budgets and separate financial resources remain necessary.

Authority and accountability

The operator administers workflows but does not become the carrier, cargo owner or lender. A lender's asset manager monitors its financed exposures. An independent auditor would review financial or technical matters only within an agreed engagement. Custody providers, distributors and trading venues require separate diligence and applicable permissions. No exchange listing is assumed.

Table 5 Sensitive-action authority matrix

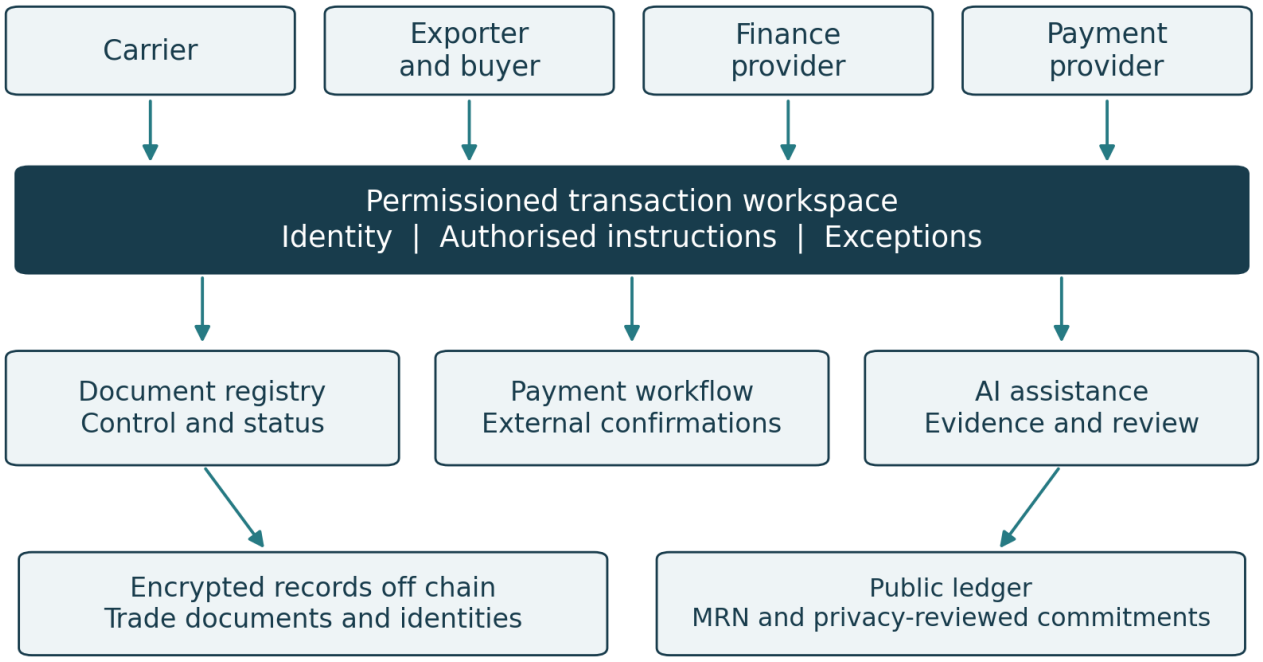
Action	Authorised decision-maker	Operational check	Required evidence
Issue or amend an eBL	Carrier or authorised agent; affected parties as required	Valid mandate; version and duplicate checks	Signed instruction; preserved document history
Transfer document control	Current controller under the rulebook	Recipient eligibility; absence of hold	Authorised transfer and acceptance
Release payment principal	Account holder and payment/escrow provider	Conditions satisfied; finality confirmed	Provider acknowledgement and reconciliation
Release financed documents	Lender or designated controller	Repayment or agreed substitution	Recorded contractual instruction
Recover an operational key	Designated recovery officers	Identity; dual approval; old-key revocation	Recovery record preserving one controller
Upgrade or pause software	Designated technical governance	Scope, notice and approval controls	Change record; impact assessment

Source: MRN.AI control design. MRN tokenholder votes do not replace transaction-party consent.

AI extracts document fields, compares versions and flags inconsistencies, attaching source evidence and confidence indicators. It does not issue legal opinions, determine disputed ownership or authorise sensitive transfers. Human approvers remain accountable for signing, financing approval, payment release and exceptions. Conflicting or insufficient evidence produces a review queue rather than an inferred clearance.

Architecture custody and records

Figure 1 Transaction architecture and distinct responsibilities



Trade principal stays with the separately contracted payment provider.

Source: MRN.AI network design. Operational access is permissioned; neither token ownership nor an AI result authorises cargo release.

Encrypted off-chain repositories hold commercial documents and personal information, with role-based access, retention rules and access logs. The public chain holds MRN and only privacy-reviewed cryptographic commitments. Personal identifiers and raw document hashes are excluded from public postings where they could identify an individual; hashing alone does not establish anonymity. A commitment can help establish whether a document changed; it cannot prove that the underlying cargo, signature authority or commercial statement was accurate.

The canonical document registry records the unique document identifier, issuer, current version, controller and lifecycle status. It is authoritative for the agreed technical workflow; its legal significance depends on applicable law and the parties' instruments. MRN balances are not the ownership register for goods. The design follows the distinction between record integrity and exclusive control reflected in UNCITRAL's Model Law on Electronic Transferable Records, without treating a model law as universally enacted legislation. [4]

Separated keys govern treasury, document issuance and software administration. Material upgrades require documented approvals, compatibility review and notice. Emergency powers are limited to defined containment actions; a software administrator cannot legitimately create a replacement cargo entitlement.

Backups, recovery exercises, transaction replay protection and independent contract review form deployment gates. Failed connectivity queues instructions without presenting them as completed. Recovery rotates credentials against the existing controller record and invalidates compromised authority; it does not mint a second eBL. Insurance review must identify insured entities, covered events, deductibles and exclusions.

Shipment state machine and interexchange

A carrier validates shipping instructions and issues the eBL after its required checks. The registry prevents another active issuance under the same canonical identity. Participants then transfer control, request amendment, surrender the record or raise a dispute under their agreed authorities.

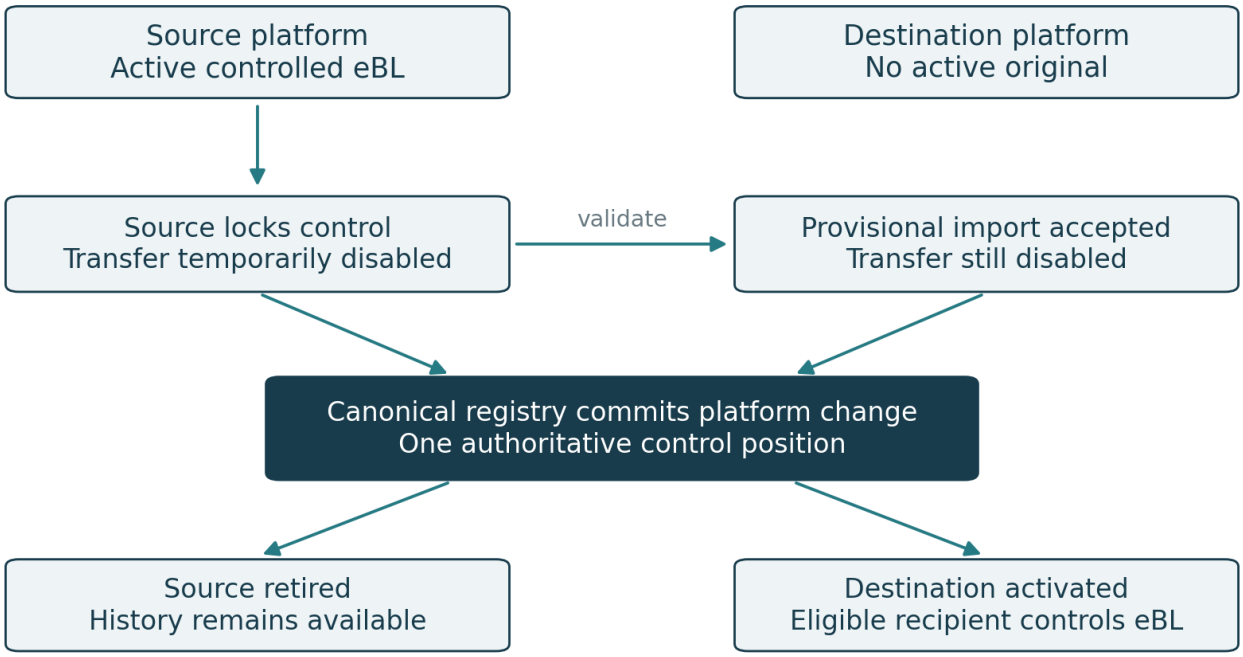
Table 6 Document state transitions

Path	Permitted transition and control
Creation	Draft → Validated → Issued/Controlled; carrier authorisation required
Transfer	Controlled → Transfer locked → Controlled by recipient; acceptance and finality required
Amendment	Controlled → Amendment locked → Revised version controlled; old version superseded, history retained
Delivery	Controlled → Surrender pending → Surrendered → Closed; carrier acknowledges surrender and delivery status
Dispute	Any eligible active state → Dispute hold → Authorised resolution; original controller remains identifiable
Migration	Controlled → Migration locked → Destination acknowledged → Migration committed; one active authoritative instance

Source: MRN.AI technical specification. An exception hold suspends execution without itself resolving legal rights.

“Interexchange” means continuity across document platforms and coordination with payment systems. It does not mean exchange listing. Migration starts with an acknowledged source lock. The destination checks the document identity, controller, legal framework and history, then acknowledges a provisional import that cannot yet be transferred. The canonical record commits the platform change, retiring source authority before destination activation. A failed handover leaves a reconciled lock; source release requires proof that destination activation did not occur or was validly reversed. Unrestricted wrapped copies are prohibited.

Figure 2 Controlled handover between document platforms



Source: MRN.AI protocol specification. Provisional import is non-transferable until the canonical handover commits. Failure paths require reconciliation.

Payment principal moves through bank accounts or separately authorised stablecoin or tokenised-money arrangements, subject to their own conditions. Same-ledger conditional delivery-versus-payment may provide technical atomicity when both assets and permissions support it. A bank transfer coordinated with an eBL platform uses escrow, acknowledgements and reconciliation; it must not be described as an indivisible on-chain swap. Technical interoperability also does not establish cross-border legal recognition.

Chapter 3 Intercontinental trade structures and worked examples

The cases examine financing, document control and network services. All amounts are euros, excluding taxes and unspecified bank, insurance, foreign-exchange and enforcement costs. The MRN holder supplies none of the financing principal merely by holding the token.

Case A a Europe Asia shipment financed against trade receivables

A European machinery exporter sells a shipment to an Asian importer for EUR1,000,000, payable after 60 days. The exporter needs working capital before collection. A lender advances 80% under a separate facility, supported by the agreed receivable assignment and document-control arrangements. Their effectiveness and priority require local legal confirmation. The exporter remains responsible for its sale and financing obligations; the carrier's carriage responsibilities remain separate.

Table 7 Case A transaction terms and calculated amounts

Item	Term or amount
Commercial invoice	EUR1,000,000
Financing advance	80% = EUR800,000
Term and interest	60 days; 8% annual simple; actual/365
Interest	EUR800,000 × 8% × 60/365 = EUR10,520.55
Arrangement fee	1% of advance = EUR8,000
Payment orchestration	4 basis points of EUR1,000,000 invoice principal = EUR400
Shipment workflow fee	EUR8
Lender maturity payment	EUR810,520.55

The EUR400 fee is charged once for the commercial invoice settlement; the financing draw is not counted again.

Before funding, the lender verifies the buyer, contractual payment obligation, shipment evidence, existing claims and the enforceability of its financing documents. MRN.AI reconciles quantities and counterparties across the invoice, packing list and eBL. A discrepancy is escalated; a matching dataset is evidence for the lender's decision, not a credit guarantee.

At origination, the lender transfers EUR800,000. The exporter separately pays the EUR8,000 arrangement fee and EUR408 network fees, leaving **EUR791,592 of usable liquidity**. The lender's authorised controller receives the agreed eBL control position. The network records the approvals but does not receive the loan principal as operating cash.

At day 60, the importer pays EUR1,000,000 into the contractually specified collection account. The base-case waterfall pays the lender EUR800,000 principal plus EUR10,520.55 interest, leaving **EUR189,479.45 for the exporter**. Document release follows the lender's authorised instruction and the carrier's applicable process. Across both dates, the exporter's receipts net of the listed finance and network charges total EUR981,071.45. The **EUR18,928.55 total cost** comprises interest, arrangement fee and network charges; only EUR408 is network service revenue.

The lender's rights arise from its facility and security documents: information covenants, payment claims and agreed enforcement remedies. The exporter retains the residual economics after satisfying those claims. MRN holders have no participation in either. Optional MRN discounts, if separately offered, would affect service pricing under published terms; none is assumed in these calculations.

If payment is delayed, additional interest depends on the facility, not a token vote. If cargo is damaged or the buyer defaults, the lender follows its security and dispute procedures. A registry entry does not guarantee recovery or defeat competing liens. The appendix's recovery sensitivities deduct enforcement costs before paying the assumed senior claim; uncovered losses remain with the contractually exposed parties.

Conventional receivables finance could support the same shipment, rate and advance. MRN.AI's potential contribution is shared document status and coordinated instructions. The case assumes no lower interest rate, guaranteed faster collection or automatic improvement in collateral priority. Duplicate platforms, legal review and integration costs could outweigh the stated service benefits.

Case B a EUR500,000 documentary escrow trade

A second exporter sells industrial components for EUR500,000. The parties want payment conditional on authorised eBL-control handover and independently verified physical delivery, without a trade-finance loan. They appoint a separate escrow or payment provider operating under an appropriate legal arrangement. The provider's appointment, permissions and customer-money protections must be checked before funding. MRN.AI itself does not take the buyer's purchase principal into an operating account.

Table 8 Case B sources and uses

Buyer funding	Allocation
Purchase principal placed with provider	EUR500,000
Orchestration fee paid separately	EUR200
Workflow fee paid separately	EUR8
Total buyer outflow	EUR500,208
Seller payment after conditions satisfied	EUR500,000

Fees do not reduce the protected purchase principal.

The agreement identifies acceptable documents, authorised approvers, inspection requirements, release conditions and a long-stop date. The buyer funds EUR500,000, and the provider confirms receipt and availability. The carrier issues the eBL; the seller presents the agreed evidence. AI flags inconsistencies, while authorised reviewers determine whether the specified conditions are met.

Cleared escrow is confirmed before the seller authorises the eBL-control handover. This allows the buyer to complete the carrier delivery process without waiting for the seller payment. After independently verified physical-delivery evidence satisfies the agreed conditions, the provider releases the purchase principal to the seller. The workflow closes only after document status, delivery evidence and payment outcome reconcile. The seller receives EUR500,000 and the

network earns EUR208. Using bank rails leaves timing and provider-performance exposure between systems; escrow reduces specified risks without eliminating them.

The buyer obtains the contractual document position needed for the carrier's delivery process. It does not acquire MRN as a proxy for goods. The seller's right to payment arises under the sale and escrow arrangements. Neither party receives an equity or yield entitlement from the network.

Exceptions default and orderly exit

An ambiguous bank response remains pending until reconciled, preventing a duplicate instruction. A rejected document returns to amendment review before release. A sanctions or authority alert suspends affected execution for authorised assessment. A missed long-stop date triggers the agreed cancellation or extension process; any principal refund is made by the provider under its terms. Treatment of already-earned service fees is expressly contractual.

A lost key invokes credential recovery against the existing control record. A platform outage preserves the last acknowledged state. A disputed migration remains locked until both platforms establish which record, if any, became active. None of these events permits issuing a second transferable eBL to keep operations moving.

Where bank settlement is already final, subsequent rescission requires an agreed return payment or legal remedy; software cannot undo it by changing document status. Likewise, terminating MRN.AI service requires completion or authorised migration of active documents, reconciliation of fees and collateral, and continuing access to retained evidence. These controls make exceptions visible without promising that technology can remove counterparty, insolvency or legal risk.

Chapter 4 Legal commercial and operational considerations

Legal context is researched as at 27 October 2026; classification, permissions and enforceability remain subject to qualified review.

Legal profile and separation of rights

MRN.AI organises its operations around three distinct relationships: customers purchase workflow services from MRN.AI Network B.V.; cargo interests use separately documented carriage and electronic bill-of-lading arrangements; lenders provide credit under conventional finance documents. The Copenhagen operations unit supports service delivery.

Table 9 Legal profile

Element	Operating position	Legal conditions
Contracting entity	MRN.AI Network B.V., Netherlands	Incorporation, substance and contracting authority must be documented
MRN token	Fixed supply of 1,000,000,000; access to the operator's own services	Regulatory classification and distribution terms require separate assessment
Financial entitlements	No equity, debt, interest, yield, profit participation or equity-style liquidation surplus; contractual service claims remain	Binding documentation must match these limitations
Cargo and payment rights	MRN grants neither cargo ownership nor payment-principal rights; no currency peg	eBL rights, payment services and credit assessed separately
Governance	Advisory input on network services and product parameters	No corporate shareholder vote; operator retains responsibility
Distribution and approvals	No public sale	Required opinions, authorisations and independent assurance depend on the activities performed

A token holder's service rights arise from the applicable contract; the absence of shareholder rights does not remove contractual remedies or mandatory protections. A unique eBL control record is separate from the fungible MRN token.

Issuer considerations and FAQs

Classification follows substance

MiCA distinguishes utility tokens from other crypto-assets, while financial instruments remain within the securities-law framework. The relevant utility concept concerns access to goods or services supplied by the issuer. MRN's intended use is therefore limited to MRN.AI's own workflow services; freight charges and trade-payment principal remain separate. Calling the token “utility” is a design intention, not a legal conclusion. [10, 11]

ESMA's classification guidance requires assessment of actual characteristics and rights. Tokenisation does not alter the treatment of an instrument that is substantively a share, bond or other financial instrument. Adding financial rights later would require a new assessment; advisory product feedback is not a shareholding vote. [11]

Does “no public sale” remove regulatory obligations? No automatic conclusion follows. Distribution, marketing, possible trading admission, custody, transfer and exchange activities require separate assessment. An applicable exemption needs a documented basis. [12, 13]

Is publishing a whitepaper regulatory approval? No. The Dutch AFM states that Title II whitepapers are notified, not approved. Promotional materials must match enforceable rights, explain restrictions and avoid guaranteed savings, liquidity or appreciation claims. [12]

Who handles money and regulated services? MRN.AI provides document-workflow services and connects customers with separately contracted providers. Client-asset custody, token exchange, payment execution or regulated intermediation requires a service-by-service analysis. AFM guidance explains that providing payment services alongside crypto-asset services can require separate payment-law permissions or an appropriately authorised provider. [13]

How does management control conflicts? The board oversees treasury allocations, release schedules, service pricing and related-party transactions. Advisory network voting cannot appropriate customer documents, change cargo rights or discharge the operator's legal duties. Operational funding must support service delivery without depending on token appreciation. Enterprise contracts specify responsibilities, service limits, change notices, complaints and orderly termination.

Enterprise user and token holder FAQs

What is acquired? Contractually specified access to MRN.AI services. Holding MRN does not confer ownership of the operator, a vessel, inventory, an invoice or cargo represented by an eBL. The service agreement identifies the responsible counterparty and the conditions for consumption, suspension and any applicable refund or remedy.

Is there an investment return or guaranteed exit? No financial distribution is promised. Fixed supply does not create price support or liquidity. MRN.AI does not guarantee an exchange listing, market-maker arrangement, redemption price or buyback. A later market, if lawfully established, could be illiquid or unavailable; operational users should budget for service consumption rather than assume resale proceeds.

What happens after a lost key or compromised account? The recovery process requires identity checks, independent authorisation and a preserved incident record. Recovery of a service credential does not automatically replace the lawful controller of an eBL. Document correction or replacement follows the document's applicable legal and contractual procedure, with controls against simultaneous valid originals. [4, 6, 7]

Can a lender rely on a token as collateral? Not solely because it exists on a blockchain. Lenders rely on conventional credit, security and enforcement documents. Applicable law determines creation, perfection, priority and insolvency effects. A registry event or eBL-related token is not, by itself, evidence of perfected security against all third parties. MLETR expressly leaves substantive law and conflict-of-laws rules unaffected. [4]

What requires individual advice? Tax treatment, accounting, enforceability, eligibility, sanctions exposure and cross-border obligations depend on the participant, service and transaction. MRN participation does not itself establish a VAT, capital-gains or other tax exemption.

Maritime law and electronic document recognition

MRN.AI uses a route-specific legal decision record rather than a universal “maritime-compliant” designation. Technical interoperability supports exchange; legal agreements and applicable law determine its consequences.

Table 10 Maritime law and document recognition

Framework	Verified position at the research date	Consequence for MRN.AI
Hague / Hague-Visby	Carriage regimes address carrier duties and liability; mandatory rules constrain contractual exclusions. [14]	Identify the applicable regime and preserve mandatory protections. Software does not adjudicate liability.
Rotterdam Rules	UNCITRAL lists five parties; 20 actions are required for entry into force. Denmark and the Netherlands have signed but show no ratification. [8]	Do not present the convention as currently operative treaty law.
MLETR	A technology-neutral model law supports electronic transferable records through reliable control, integrity and identification. It is not automatically national law. [4]	Evidence exclusive control and relevant enactment or contractual basis.
Netherlands	The Act of 1 April 2026 introduced eBL provisions in Civil Code Book 8; commencement was 1 July 2026. Reliable authenticity, control and integrity methods are required. [6, 7]	Assess the actual system and document against the statute; no blanket blockchain approval follows.
Denmark	Maritime Act section 296(3) permits mechanically or electronically produced signatures. This alone does not establish every proprietary or negotiability consequence. [15]	Danish enforceability and cross-border effects remain matters for transaction-specific review.
United Kingdom	The Electronic Trade Documents Act 2023 recognises qualifying electronic documents using a reliable system and exclusive control. [5]	It is a useful enacted-law example, not automatic recognition in every destination country.

The service preserves access to courts or agreed arbitration, lawful correction, emergency suspension and execution of binding orders. A technical pause records an incident; it does not extinguish accrued rights. Cargo delivery requires the authorised party's lawful instructions and the carrier's release procedure. DCSA standards and P&I criteria do not themselves establish certification, insurance cover or carrier endorsement. Any insurance cover remains subject to its terms and exclusions. [16]

Privacy screening and operational accountability

MRN.AI keeps trade documents, identity evidence and commercially sensitive records in access-controlled systems outside the public ledger. It does not equate hashing with anonymisation. EDPB's final blockchain guidance, adopted 7 July 2026, explains that hashed personal data can remain personal data and that an off-chain architecture still requires GDPR compliance. MRN.AI therefore assigns controller/processor responsibilities, retention periods, rights-handling procedures and cross-border transfer controls, with a data-protection impact assessment where processing is likely to create high risk. [17]

Customer onboarding, beneficial-owner checks and sanctions screening are designed around the actual service and jurisdiction. They support risk management without purporting to confer

a licence or establish universal compliance. The operator retains escalation and human-review procedures; payment or document automation cannot remove legally applicable rights to challenge a decision.

Risk matrix

Table 11 Principal risks and responsibilities

Risk	Potential impact	Control	Remaining exposure	Responsible party
Classification / permissions	Restricted or discontinued service	Legal assessment before each distribution or service change	Regulatory interpretation can differ	Board; legal lead
eBL recognition / priority	Cargo disputes; ineffective security	Route-specific opinions; documented control chain	Foreign courts and insolvency law	Legal lead; lender
Counterparty / cargo	Default, loss, misdescription	Contract allocation; evidence checks; separate insurance review	Physical loss and fraud remain	Carrier; customer; lender
Token valuation / liquidity	Holding losses; unpredictable access cost	No price guarantee; disclose supply and releases	Demand and market liquidity uncertain	Treasury; holder
Governance / concentration	Insider advantage; service changes	Conflicts register; disclosed permissions; review	Operator retains significant power	Board
Code / integration / oracle	Wrong or duplicate instruction	Segregated approvals; reconciliation; incident pause	Software and external-data errors	Technology lead
Custody / key recovery	Unauthorised control; unavailable documents	Access separation; recovery evidence; continuity plans	Compromise and recovery disputes	Security lead; customer
Privacy / confidentiality	Disclosure; claims; regulatory action	Off-chain records; minimisation; documented access	Metadata and re-identification risk	Privacy lead
Operations / provider failure	Delays; loss of service	Exportable records; alternative procedures; wind-down plan	Failover depends on counterparties	Operations lead
Tax / accounting	Unexpected liabilities; misstatement	Jurisdiction-specific professional review	Treatment may change	Finance lead; participant

Chapter 5 Growth outlook and implementation roadmap

Growth through supported trade corridors

MRN.AI operates a common model across its European and intercontinental network. Expansion focuses on repeat trade corridors whose participants can agree document responsibilities, payment conditions and exception procedures. Each corridor must demonstrate retained customers, reliable integrations and sustainable service economics.

Carrier eBL commitments, cross-platform interoperability and enacted recognition of qualifying electronic records support adoption. The Netherlands' 2026 eBL legislation is especially relevant to our Rotterdam-centred operations. These external developments do not establish MRN.AI customer demand, margins or token value; each corridor still requires its own commercial and legal assessment. [2, 3, 6, 7]

Implementation sequence

The first two stages are complete. Later stages remain subject to the stated conditions.

Table 12 Implementation and expansion roadmap

Period and status	Deliverable	Accountable owner	Dependency and decision criterion
Before Y0 completed	Transaction identifiers document states and enterprise onboarding	Product and operations	Contract roles and recovery procedures documented
Y0 completed	Paid workflow service and settlement orchestration	Commercial and finance	Revenue and costs reconcile with activity
Next 6 months planned	Independent security review and recovery exercises	Security lead	Critical findings resolved before expanded access
Months 6 to 12 planned	Additional eBL platform adapters	Integration lead	Cross-platform single-control tests pass with counterparties
Months 6 to 12 contingent	Additional payment currencies and finance providers	Treasury and legal	Authorisation scope settlement finality and recourse confirmed
Months 12 to 24 contingent	New corridor operating profiles	Regional operations	Local legal analysis customer demand and support capacity validated
Months 18 to 36 planned	Broader AI assistance and reporting	Product and risk	Measured accuracy human escalation and privacy requirements met

Time periods in Table 12 are measured from the Y0 baseline; future stages remain conditional on their stated dependencies.

Evidence required to justify expansion

Commercial expansion is justified by retained customers and paid usage after incentives expire. A corridor with large announced trade values but little completed activity is not treated as mature. We evaluate revenue after discounts, direct service costs, support requirements and

losses caused by refunds or disputes. Finance-provider participation is measured by executed facilities and funded transactions under signed documents rather than expressions of interest.

Technical expansion requires more than a successful demonstration. It includes migration during an outage, disputed instructions, a compromised credential, failed payment confirmation, delayed receiving-platform acknowledgement and a legally required correction. Independent testing must verify that these events do not create a second operative eBL or release funds outside the parties' instructions.

AI expansion follows the same discipline. A model that identifies invoice discrepancies must be evaluated on representative trade documents and supported languages, including uncommon formats and poor scans. We measure false approvals as well as false alerts. New models enter a controlled release process with rollback and an accountable owner. Reported performance must identify the test set and period.

Financing capacity and the limits of network growth

Digital documents can improve the evidence available to a lender, but they cannot make an uncreditworthy obligor creditworthy by themselves. Funding capacity depends on lenders' balance sheets, loss experience, concentration limits, pricing and enforceable recourse. Our network supports that assessment and records the agreed instructions; it does not represent an unlimited pool of liquidity.

Similarly, an efficient payment interface does not remove capital controls, banking cut-off times, foreign-exchange exposure or restrictions on particular transactions. A corridor can support document transfer while a payment remains delayed. The correct operating response is to preserve control, communicate the unresolved condition and follow the agreed escalation process.

The three financial sensitivities in Appendix A change activity and enterprise counts while holding the stated pricing and cost assumptions constant. These sensitivities do not constitute market forecasts. Expansion can raise fixed costs, require reserves and alter the commercial terms offered to larger customers. Growth is approved only when the additional service obligation and the resources needed to deliver it are understood.

Appendix A Token supply and project economics

Measurement basis

Y0 covers the **completed twelve months ending 30 September 2026**. The tables present the operating model for that period. Downside and upside columns change annual activity at unchanged unit prices and fixed cash costs; they are sensitivities, not forecasts.

The model counts 240 full-year paying enterprises, 1.2 million paid shipment-workflow bundles and €1.2 billion of separately measured settled commercial principal. Settlement is optional and applies to a subset of workflows. A bundle covers its document lifecycle; issuance, transfer and surrender do not generate additional modelled per-document revenue. Financing advances and later repayments are not added to commercial principal to multiply reported volume.

The retained orchestration fee is 4 basis points, or 0.04%, of eligible commercial principal, before the separately modelled 1-basis-point variable payment cost. Subscription revenue pays for enterprise access and support; the bundle charge pays for execution. All modelled invoices are collected, with no working-capital movement. Taxes, capital expenditure, debt service and noncash token-grant accounting are outside the model.

Table 13 Annual operating assumptions and sensitivity (€ millions unless indicated)

Measure	Downside	Y0 result	Upside
Paid bundles	600,000	1,200,000	1,800,000
Full-year enterprise subscriptions	180	240	300
Settled commercial principal	600.00	1,200.00	1,800.00
Bundle revenue at €8	4.80	9.60	14.40
Subscription revenue at €18,000	3.24	4.32	5.40
Orchestration revenue at 4 bp	0.24	0.48	0.72
Total revenue	**8.28**	**14.40**	**20.52**
Delivery cost at €2 per bundle	(1.20)	(2.40)	(3.60)
Payment cost at 1 bp	(0.06)	(0.12)	(0.18)
Gross cash contribution	**7.02**	**11.88**	**16.74**
Contribution / revenue	84.78%	82.50%	81.58%
Fixed cash operating costs	(7.50)	(7.50)	(7.50)
Cash operating surplus / (deficit)	**(0.48)**	**4.38**	**9.24**

Source: MRN.AI operating model and calculations; parenthesised figures are costs or deficits. Principal is transaction value, never company revenue.

For bundles B, subscriptions N and eligible principal P, revenue equals **8B + 18,000N + 0.0004P**. Variable cash costs equal **2B + 0.0001P**. Gross cash contribution equals **6B + 18,000N + 0.0003P**; cash operating surplus deducts €7.5 million. Y0 therefore reconciles €14.40 million − €2.52 million − €7.50 million = **€4.38 million**.

The surplus measures the stated cash operating model **before tax, capital expenditure and token-grant accounting**. It is not net profit, distributable cash or a tokenholder return. Higher throughput lowers the contribution percentage slightly because zero-variable-cost subscriptions

form a smaller revenue share. The model also assumes spare capacity: extra staffing or infrastructure would reduce the upside.

At 240 retained subscribers and the aggregate settlement mix P/B = €1,000, cash contribution per incremental bundle including its associated settlement mix is €6.30. Break-even is (€7.5 million − €4.32 million) / €6.30 = **504,762 bundles**, rounded up. That ratio does not mean every bundle settles €1,000; lower settlement participation, churn or higher delivery costs changes the result.

Historic sponsor funding

Historic sponsor funding totals **€12 million of sponsor equity**, issued through ordinary corporate instruments. MRN token proceeds are zero. Sponsor corporate rights and MRN participation rights remain separate.

Table 14 Funding-close sources and uses (€ millions)

Sources	Amount	Uses and allocated reserves	Amount
Sponsor equity	12.00	Product engineering	3.60
		Legal architecture and document assurance	1.20
		Security and interoperability testing	1.20
		Enterprise implementation	1.80
		Working-capital and operating reserve	3.60
		Contingency reserve	0.60
Total sources	**12.00**	**Total uses / allocations**	**12.00**

Source: MRN.AI funding-close budget and calculations. Reserve allocations are not expenditure and do not establish the cash balance remaining at Y0.

Historic expenditure is not deducted again from Y0 revenue. No valuation, sponsor ownership percentage, exit multiple or equity IRR is inferred. The operating model excludes the dated balance sheet, cash-flow roll-forward, asset accounting, tax and debt schedules needed for complete statutory reporting.

Worked transaction A Europe Asia trade finance

A seller ships €1 million of goods, with payment due on day 60. An independent lender advances 80%, or €800,000, on day 0 under separately executed financing and receivables-security documents. Interest is 8% annually on a simple actual/365 basis. The 1% arrangement fee applies to the advance. The waterfall assigns first priority to the lender claim over designated recoveries, subject to the financing and security documents being effective and perfected.

Table 15 Performing transaction cash waterfall (€)

Item	Calculation	Amount
Lender advance	1,000,000 × 80%	800,000.00
Arrangement fee to lender	800,000 × 1%	8,000.00
Orchestration fee to MRN.AI	1,000,000 × 0.0004	400.00

Item	Calculation	Amount
One workflow bundle	1 × 8	8.00
Seller usable day-0 liquidity	800,000 − 8,000 − 400 − 8	**791,592.00**
Interest due on day 60	800,000 × 8% × 60 / 365	10,520.55
Buyer payment	Commercial invoice principal	1,000,000.00
Lender repayment	800,000 + 10,520.55	810,520.55
Residual released to seller	1,000,000 − 810,520.55	**189,479.45**
Seller total after stated costs	791,592 + 189,479.45	981,071.45

Source: MRN.AI transaction model and calculations. Fees are paid separately at origination; the €400 charge covers the one commercial settlement, without charging the €800,000 financing flow again. Intermediate calculations use full precision.

The seller's stated financing and platform cost is **€18,928.55**: €10,520.55 interest, €8,000 arrangement fee and €408 network fees. The lender's €18,520.55 gross income precedes its funding, servicing and credit losses. MRN.AI receives €408, incurs €100 payment cost plus €2 delivery cost, and earns **€306 transaction contribution** before fixed costs. Annual subscription fees are excluded from this transaction-level calculation.

The same advance, interest and arrangement fee apply in a conventional-financing comparison. The comparison applies identical borrowing spreads and collateral requirements and includes no unmeasured administrative savings. Evidence of operational savings would have to justify the additional platform charge. Holding MRN provides no entitlement to either lender income or seller proceeds.

Default recovery sensitivity

Default stress case: default on day 60, €20,000 enforcement cost paid before creditors, no subsequent interest, no additional recourse and a lender claim of €810,520.55. Actual recoveries would depend on contractual rights, cargo condition, priority and enforcement; software cannot assure them.

Table 16 Recovery waterfall (€)

Item	40% invoice recovery	70% invoice recovery	100% invoice recovery
Gross recovery	400,000.00	700,000.00	1,000,000.00
Enforcement cost	(20,000.00)	(20,000.00)	(20,000.00)
Lender recovery	380,000.00	680,000.00	810,520.55
Lender contractual shortfall	430,520.55	130,520.55	0.00
Seller residual	0.00	0.00	169,479.45

Source: MRN.AI default stress inputs and calculations. "Shortfall" includes unpaid principal and accrued interest; upfront fees are not refunded. MRN holders receive none of this waterfall.

Distributable recovery is max(gross recovery − €20,000, 0). Lender recovery is the lesser of that amount and its claim; the seller receives any remainder. Even full invoice recovery leaves the seller €20,000 worse off than the performing case because enforcement has a cost.

Worked transaction B payment against documents and delivery

A buyer places **€500,000** with an independently contracted escrow provider and pays €200 orchestration plus €8 workflow fees separately. The provider releases principal only after authorised eBL-control handover and independently verified physical delivery have satisfied the agreed conditions. MRN.AI supplies authenticated workflow instructions and evidence; the provider controls funds under its contract. The provider confirms cleared escrow before eBL-control handover; purchase principal is released to the seller only after the agreed physical-delivery evidence. Disputed evidence follows a stop-and-review procedure.

Buyer outflow is **€500,208**; seller receipts are €500,000. MRN.AI revenue is €208, variable cost is €50 payment processing plus €2 bundle delivery, and contribution is **€156**. There is no loan, interest, MRN-denominated principal or platform revenue equal to the escrow balance. A failed transaction is refunded or resolved according to its escrow terms; no principal guarantee or automatic fee refund is assumed. Token governance cannot change the release conditions.

Supply allocation and reproducible release

Month 0 denotes the allocation origin. All quantities below are millions of MRN. Scheduled releases occur at month-end; a 12-month cliff means the first team release occurs at the end of month 13. Treasury availability does not equal distribution or circulating supply.

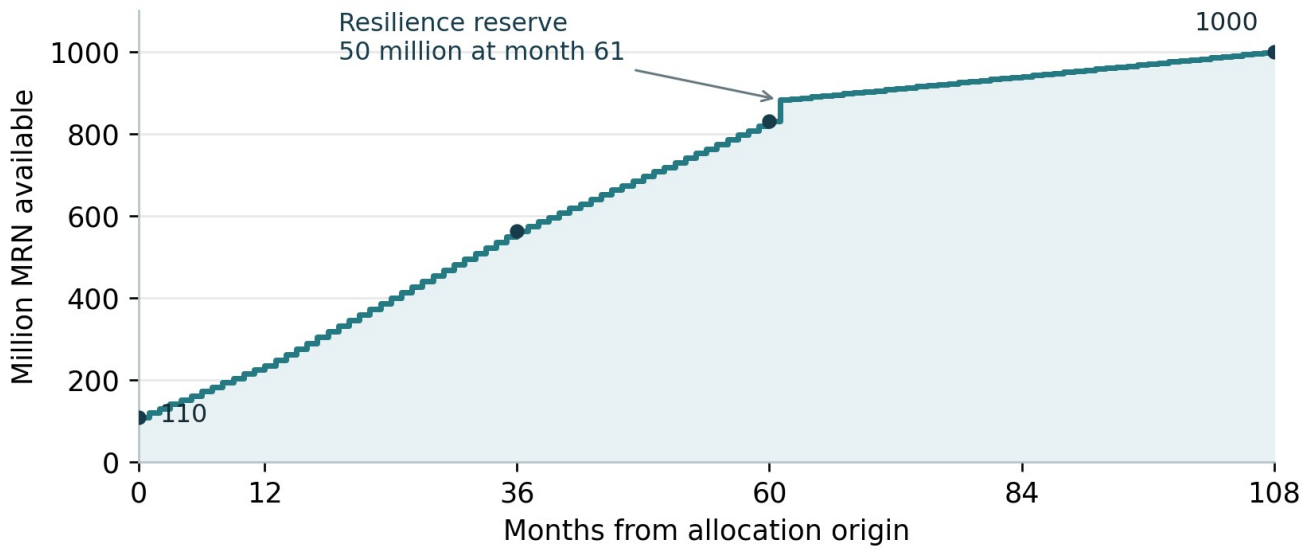
Table 17 One-billion-token allocation

Allocation	Share	Total	Available at month 0	Subsequent release
Verified-service incentives	30%	300	30	2.5 monthly, months 1-108
Ecosystem integrations	20%	200	20	3 monthly, months 1-60
Operating treasury	20%	200	50	2.5 monthly, months 1-60
Team and contributors	15%	150	0	3.125 monthly, months 13-60
Founding-enterprise programmes	10%	100	10	2.5 monthly, months 1-36
Resilience reserve	5%	50	0	50 at end of month 61
Total	**100%**	**1,000**	**110**	**Final release at month 108**

Source: MRN.AI allocation policy and supply calculations. Recipient grants and service conditions may impose additional restrictions after reserves become available.

For any tranche with initial availability L, monthly amount q and inclusive release months a through b, cumulative availability at month m equals **L + q × max(0, min(m, b) − a + 1)**. The single resilience release uses a = b = 61. Aggregated checkpoints at months **0 / 12 / 36 / 60 / 61 / 108** are **110 / 236 / 563 / 830 / 882.5 / 1,000 million MRN**. These figures reconcile fully without rounding or inflation.

Figure 3 Scheduled token availability over 108 months



Source: token allocation schedule in Table 17. Availability is different from distribution, circulating supply or market liquidity.

Service incentives and accounting boundaries

Earned token grants are capped at **30 million MRN annually**, drawn solely from available verified-service reserves. An approved measurement period allocates its disclosed pool in proportion to independently checked service-contribution scores; zero eligible contribution earns zero. Allocations round down to 18 decimals, with residual fractions retained. Unawarded balances remain reserves. Scheduled unlocking does not itself create rewards, and holding or locking tokens alone earns nothing.

Separately, the annual cash budget includes **up to €120,000 for verified operator services**, already within the €7.5 million fixed-cost assumption. This is remuneration for completed work, not interest. There is no conversion rate between that euro budget and MRN, no promised APR and no assumed market value for grants.

Token grants may require a measured accounting expense even when they require no cash payment. Accordingly, the €4.38 million Y0 surplus excludes token-grant accounting; an unpriced token allocation cannot be presented as costless compensation or statutory profit. Reproducible reporting must reconcile minted supply, vesting reserves, released inventory, grants, operational locks and actual circulation separately. The supply reconciliation establishes arithmetic consistency; it does not determine market value, liquidity or legal classification.

Appendix B Glossary

Table 18 Glossary of terms

Term	Meaning in this paper
Advance	Funds provided before the underlying trade receivable is paid
Basis point	One hundredth of one percentage point; 4 basis points equals 0.04 percent
Bill of lading	Maritime document that can record receipt and carriage terms and function as a document of title
Cash operating surplus	Model revenue less specified variable and fixed cash operating costs before stated exclusions
DCSA	Digital Container Shipping Association; a source of shipping data and interoperability standards
eBL	Electronic bill of lading managed under applicable law and an agreed reliable system
EVM	Ethereum Virtual Machine compatible execution environment for smart contracts
Interchange	Transfer between supported document platforms while preserving the operative record and control history
MLETR	UNCITRAL Model Law on Electronic Transferable Records; a model for legislation rather than universally operative law
MRN	Service and participation token described in this whitepaper
Orchestration	Coordinating authorised actions and external confirmations across systems
P and I	Protection and indemnity insurance covering specified maritime liabilities under policy terms
Settlement finality	The agreed legal and operational point when a payment is treated as completed
Service bond	Collateral securing defined operator obligations; distinct from a debt security
Smart contract	Software that records or executes specified instructions on a ledger
STO	Security token offering; issuance of a security represented through token technology
Tokenised document	A document whose operative control is associated with a digital registry entry or token
Unlocked supply	Tokens released from scheduled restrictions; not necessarily circulating or available for sale
Workflow bundle	One billable shipment service that can include multiple documents and events

Appendix C References and source notes

External sources below support the identified industry and legal context. All web references were reviewed on 27 October 2026. The financial model, allocations, diagrams and transaction calculations use the stated inputs and assumptions.

[1] UN Trade and Development. Review of Maritime Transport. Current topic overview; accessed 27 October 2026. Sea transport share is expressed by goods trade volume, not value or token-market size. Official source

[2] Digital Container Shipping Association. Member carriers commit to a fully standardised electronic bill of lading by 2030. 15 February 2023. Carrier adoption targets, not achieved adoption rates. Official source

[3] Digital Container Shipping Association. Five eBL platforms adopt DCSA Standard Annex v2 with IGP&I approval. 4 June 2026. Industry interoperability milestone. Official source

[4] UNCITRAL. Model Law on Electronic Transferable Records. Adopted 13 July 2017. Reliable methods, control, integrity and preservation of substantive law. Official source

[5] United Kingdom. Electronic Trade Documents Act 2023. 2023 chapter 38; sections 2 and 3. Reliable systems and the legal treatment of qualifying electronic documents. Official source

[6] Kingdom of the Netherlands. Act introducing the electronic bill of lading in Civil Code Book 8. Act of 1 April 2026; Staatsblad 2026 86; published 22 April 2026. Articles 400 to 402 address reliable methods, control and replacement. Official source

[7] Kingdom of the Netherlands. Commencement decree for the electronic bill of lading legislation. Decree of 8 June 2026; Staatsblad 2026 140. Sets commencement at 1 July 2026. Official source

[8] UNCITRAL. Status of the Rotterdam Rules. Treaty status accessed 27 October 2026. Five parties listed; twenty actions required for entry into force. Official source

[9] International Group of P&I Clubs. Requirements for electronic trading system providers. 4 February 2025. Preservation of applicable laws and contractual legal recourse. Official source

[10] Central Bank of Ireland. Markets in Crypto Assets Regulation. Current regulator guidance; accessed 27 October 2026. Utility tokens and other crypto-asset categories. Official source

[11] European Securities and Markets Authority. Guidelines on qualification of crypto-assets as financial instruments. 19 March 2025; ESMA75453128700 1323. Classification follows characteristics and rights rather than token technology. Official source

[12] Dutch Authority for the Financial Markets. White papers. Current supervisory guidance; accessed 27 October 2026. Title II notification is not regulatory approval; marketing must be consistent. Official source

[13] Dutch Authority for the Financial Markets. Contact and frequently asked questions for crypto companies. Current supervisory guidance; accessed 27 October 2026. Service perimeter and the separate treatment of payment services. Official source

[14] United Kingdom. Carriage of Goods by Sea Act 1971. 8 April 1971; Schedule Article III. Original enactment used for carrier duties and prohibited liability exclusions, not current monetary limits. Official source

[15] Denmark. Bekendtgorelse af soloven. Consolidated Act 776 of 18 June 2025; section 296 subsection 3. Narrow provision permitting mechanically or electronically produced signatures. Official source

[16] International Group of P&I Clubs. Electronic Bills of Lading Notification of New Process. 4 February 2025. Revised approval approach and continuing insurance conditions. Official source

[17] European Data Protection Board. Guidelines 02 2025 on personal data through blockchain technologies. Version 2.0 adopted 7 July 2026. Hashed data, privacy by design, rights and high-risk processing assessment. Official source