Book 3

Netting Rules

Title	Book 3 Neting Rules
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ORCID	0009-0007-8894-8902
Release / date	1.1; 23 September 2026
Landing page	www.osnias-clearing.com/rules/
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URL DOI	https://zenodo.org/records/22922199

Abstract

Osnias Clearing defines a multilateral clearing framework based on deterministic and auditable rules. The architecture strictly separates clearing calculation, risk controls and settlement execution. Positions are calculated from EVM escrow states and the canonical Sei clearing register. Node operators remain responsible for settlement escrow control, custody of funds and execution of settlement. Controls rely on temporal oracles, a chamber-level integrity and conservation oracle and post-clearing reconciliation.
The paper benchmarks the architecture against PFMI, ISO 20022, settlement finality and applicable regulatory requirements.

keywords
Multilateral clearing · Netting · Settlement · PFMI · ISO 20022 · Time Oracle · Solvency · Escrow · Sei · EVM · Finality · Auditability

Summary
Osnias Clearing defines a multilateral clearing framework based on deterministic and auditable rules. The architecture strictly separates clearing calculations, risk controls and settlement execution. Positions are calculated from EVM escrow states and the Sei clearing register. Node operators remain responsible for settlement escrow, funds and settlement. Controls rely on time oracles, a chamber integrity and conservation oracle and post-clearing reconciliations. The document assesses this architecture against PFMI, ISO 20022, finality principles and applicable regulatory requirements.

Keywords
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I Position within the document framework and status

Book 6 is a standalone document in the logical sequence of the Osnias Clearing document framework. It explains how the principles defined in Books 1 to 5 become an operational client journey for the participant and its node operator. It does not supersede any preceding rule; it brings those rules together at the operational entry point, from admission through offboarding.

Document	Function	Contribution to the onboarding journey	URL
Book 1	Osnias-ID	Participant identity and crosschain linkages.	https://www.osnias-clearing.com/osniasid/
Book 2	Architecture	Separation of clearing, settlement and collateral.	https://www.osnias-clearing.com/architecture/
Book 3	Clearing Rules	Obligations, netting, governance and responsibilities.	https://www.osnias-clearing.com/rules/
Book 4	Cycles and Calendar	Time synchronization and transaction states.	https://www.osnias-clearing.com/cycle/
Book 5	Security	Domains A B C, composite condition and threat model.	https://www.osnias-clearing.com/security/
Book 6	Onboarding	Admission, EUR/EURC gateway, escrow and exit.	https://www.osnias-clearing.com/onboarding/

Document status

This document sets out a functional architecture and design requirements. It is not an independent audit, a formal verification, a penetration test, a security certification or an authorization for production deployment.

II Executive Summary

Osnias separates clearing calculations from settlement execution. Osnias calculates and records clearing obligations; each NNN node operator retains exclusive authority over settlement escrow, custody of funds and payment execution. This page summarises the main invariants, the cycle-end clearing window, solvency controls and the evidence framework for external stakeholders.

Core invariant	Operational scope
Clearing ≠ settlement	Osnias calculates and records obligations; node operators execute monetary settlement.
No custody by Osnias	Osnias has no ownership, custody or unilateral disposal rights over settlement funds.
Single canonical snapshot	All calculations for a cycle use the same identified EVM/Sei reference states.
Fail-closed controls	Missing authorisation, an unresolved material exception or stale/failed solvency evidence prevents the relevant action.

Core invariant	Operational scope
Node autonomy	Each NNN node operator controls its accounts, settlement escrow workflow and banking/payment relationships.
Contractual membership and topology	Each member is admitted by contract with its local node; a node is identified by the network-node pair (KK, NNN); Osnias-ID provides the addressing and topology layer.

II.a Sequence of the 24-hour clearing window (at the end of the selected 1W / 4W / 13W cycle)

UTC	Phase	Responsible party
00:00:00	P2P closure	Time Oracle
00:00–03:00	Snapshot and end-user calculations	Osnias Clearing Engine
03:00	Send timestamped clearing statements to end-users	Osnias Clearing Engine
03:00–15:00	End-user dispute window	End-users
15:00–21:00	Verification, finalisation and paying nodes' escrow availability checks	Clearing Engine / Node operators
From 21:00	Inter-node settlement	NNN node operators / banks / payment rails
Before the next 00:00	Receipt confirmation, mirror reconciliation, closure or exception	Node operators / Clearing Engine
Start of the next cycle	P2P reopens; validated fee orders from the completed cycle enter the new cycle	Time Oracle / clearing token contract / Clearing Engine

II.b Solvency and supporting evidence

Every five minutes, the Chamber Integrity and Conservation Oracle attests to the chamber-wide 1:1 conservation invariant, without controlling funds or the cycle schedule. Node positions may be positive or negative during normal P2P activity. End-user statements, fee invoices, disputes, settlement references, post-clearing mirror checks and oracle attestations are retained as auditable evidence.

Time Oracle = timing authority

Chamber Integrity and Conservation Oracle = chamber-level financial attestation | Clearing Engine = calculation | NNN node operator = control of settlement escrow and execution of settlement.

II.c Separation of clearing and settlement

Osnias Clearing is based on a structural separation between clearing and settlement. Osnias calculates, records and communicates clearing statements and settlement obligations. It does not hold, control, transfer or dispose of settlement funds. Each NNN node remains under the exclusive authority and responsibility of its owner/operator for settlement escrow control, custody, banking relationships and execution of inter-node payments.

The clearing process blocks P2P activity, locks a reproducible blockchain snapshot, calculates the difference between each end-user's EVM escrow state and their clearing token state on Sei, aggregates those differences by node, opens a dispute window, finalises node positions, confirms that paying nodes' settlement escrow is available, and only then releases settlement obligations to node operators.

International standards are used as design reference frameworks, not as a self-declaration of legal status or regulatory compliance. Regulatory classification is a matter for the competent authority in the relevant jurisdiction.

II.d Structural invariants

Invariant	Rule
Clearing ≠ settlement	Osnias calculates and records clearing obligations; node operators execute settlement.
No custody by Osnias	Osnias has no ownership, custody or unilateral disposal rights over settlement funds.
Node operator autonomy	Each NNN node owner/operator controls its accounts, settlement escrow arrangements and payment execution.
Fail-closed P2P	Without explicit authorisation, the P2P order is rejected.
Single snapshot	All clearing calculations for a cycle use the same canonical block reference.
Deterministic aggregation	Each node position is the exact algebraic sum of the final differences for end-users assigned to that node.
Settlement escrow availability before settlement	No paying node instruction is released until the corresponding amount has been demonstrated to be available in escrow under the node operator's control.
Receipt before receiving-node allocation	A receiving node performs its internal allocation only after actual receipt of settlement funds.
External settlement rail	Monetary settlement takes place through the payment rail selected and controlled by node operators.
UTC-only cycle	All operational clearing deadlines are defined in UTC.
Permissioned contractual membership	A wallet does not become a chamber member merely by connecting technically; membership requires a signed contract with the relevant local node.

II.e Member admission and network topology supported by Osnias-ID

Osnias Clearing operates as a federated, permissioned network. An end-user becomes a member of a clearing chamber only under a client/clearing agreement signed with the relevant local node. The member is therefore contractually attached to the local node; connecting a wallet alone does not constitute admission.

Each local node is a local operating entity acting within its applicable regulatory and supervisory perimeter. It remains responsible for member relationships, onboarding, local controls, settlement escrow arrangements and settlement execution.

Network governance rules (Rulebook, technical standards, clearing rules, interoperability requirements and node admission) are maintained by the network governance entity, which does not hold members' or nodes' settlement funds. The legal structure and contractual topology are addressed in Book 5 – Legal Classification Memorandum.

Node identity: a node is identified by the network-node pair (KK, NNN) of its Osnias-ID. Since a clearing chamber may bring together nodes from several networks (up to 99 networks × 999 nodes), a node's identity is never determined by the NNN field alone.

Osnias-ID is more than a technical identifier. It is the clearing network's addressing and topology layer: the namespace used to locate and connect clearing chambers, networks, nodes, currencies, cycle profiles and members. Functionally, its role for Osnias Clearing is analogous to TCP/IP addressing in a communications network.

II.f Regulatory perimeter and classification

This document deliberately neither classifies Osnias as a payment system, financial market infrastructure, central counterparty (CCP), settlement system or other regulated category, nor rules out such a classification. Classification depends on applicable law, the facts, jurisdiction, contractual arrangements and the role actually performed by each entity.

For the Swiss analysis, FINMA identifies payment systems, in particular, as arrangements that clear and settle payment obligations. Accordingly, the functional separation described in this document must be presented as an architectural fact, not as a legal conclusion regarding the regulatory perimeter.

Recommended wording: regulatory classification is deliberately left to the competent authority. Osnias functionally separates the calculation of clearing positions from the execution of monetary settlement through external payment rails. The preliminary classification analysis is set out in Book 5 – Legal Classification Memorandum.

III INTERNATIONAL STANDARDS AND REFERENCE FRAMEWORKS

III.a CPMI-IOSCO PFMI principles

Reference	Control objective	Osnias response
P1 — Legal basis	Clearly defined rules, rights, obligations and enforceability.	Rulebook, Node Agreements, dispute rules and definitions of finality.
P3 — Risk management	Identify and manage material risks.	Separate clearing, settlement escrow, settlement, oracle and operational controls.
P4 — Credit risk	Control participant exposures.	No paying node instruction is released before settlement escrow availability is confirmed.
P7 — Liquidity risk	Monitor and manage the liquidity required for settlement.	Confirmation of the paying node's settlement escrow availability before settlement.
P8 — Settlement finality	Define final settlement and the point of irrevocability.	Distinguish calculation finality, instruction irrevocability, settlement finality and cycle closure.
P9 — Money settlements	Control risks associated with the settlement asset and settlement bank.	Use external payment rails under node operators' responsibility.
P13 — Default	Establish clear rules for participant default.	Unavailable settlement escrow / payment failure places the node in a fail-closed exception state.
P17 — Operational risk	Resilience, recovery and operational controls.	Replayable snapshot, logs, oracle controls and exception management.
P22 — Communications	Use or support recognised international standards.	ISO 20022 where supported by the selected settlement rail.
P23 — Transparency	Clear and comprehensive rules and procedures.	Published cycle schedule, fee calculation basis, dispute rules and exception rules.

III.b CLS as an operational benchmark

CLS is used solely as an operational benchmark for step sequencing, settlement readiness discipline and finality concepts. Its legal and economic architecture is not equated with that of Osnias.

The relevant lesson concerns sequencing: a calculated obligation must not automatically become an executable settlement instruction before the required settlement escrow availability has been confirmed.

Calculated obligation → settlement readiness confirmed → payment instruction → settlement confirmation

III.c ISO 20022 — Messaging, not settlement finality

ISO 20022 is a financial messaging standard. It does not itself execute a payment, provide liquidity, set banking cut-off times or guarantee settlement finality by a specified deadline.

Message	Name	Potential use in Osnias
pacs.009	FinancialInstitutionCreditTransfer	Primary candidate for institutional node-to-node payment instructions, subject to the settlement rail's implementation guidelines.
pacs.002	FIToFIPaymentStatusReport	Status reporting, acceptance or rejection.
pacs.004	PaymentReturn	Return flow where supported by the relevant payment community.
pacs.028	FIToFIPaymentStatusRequest	Payment status request when confirmation is delayed or missing.

The exact message version and usage profile MUST comply with the Rulebook and implementation guidelines of the selected settlement rail or banking community. Osnias must not independently impose a message version incompatible with the receiving rail.

III.d Human-readable statements and machine-to-machine messages

End-user and node clearing statements may be generated as PDFs for human review. These PDFs do not, by themselves, constitute ISO 20022 settlement messages.

Recommended architecture: the clearing statement PDF is linked to the structured clearing record by the cycle identifier, Osnias-ID, document identifier and cryptographic hash. ISO 20022 is then used for machine-to-machine messaging related to funding and settlement where supported by the payment rail.

Clearing statement = PDF + structured record + cryptographic hash link

Settlement messaging = selected rail's ISO 20022 profile

III.e Accounting offsetting and operational clearing

Operational clearing netting must remain distinct from accounting offsetting in financial statements. An Osnias clearing result does not automatically determine how a participant presents its assets and liabilities for accounting purposes.

Each participant remains responsible for its own accounting treatment under the applicable reporting framework, including the conditions for accounting offsetting.

IV APPLICATION TO THE OSNIAS NETWORK

IV.a Functional roles

Actor / layer	Responsibility
Sei clearing register	Canonical clearing token state.
EVM escrow layer	Escrow/settlement availability state associated with end-users and nodes.
Time Oracle	External timing authority. The clearing token contract consults it before MINT, BURN, CLEAR and P2P actions. It applies the chamber's cycle profile (1W, 4W or 13W) and returns the applicable OPEN/CLOSED or ALLOW/DENY state; the token contract does not itself embed the cycle schedule.
Clearing Engine / Oracle	Reads states, calculates differences, aggregates node positions, applies clearing rules and produces obligations.
End-user	Reviews the calculated statement and may dispute it within the prescribed window.
NNN node operator	Holds/controls node accounts and settlement escrow arrangements; executes node-level netting and settlement.
Node operator (KK, NNN) — MINT/BURN authority	Exclusive MINT and BURN authority over the clearing accounts attached to its network-node pair only, exercised through a key or multisignature arrangement under its exclusive control. This authority is bounded by the protocol controllers: Osnias-ID / escrow / chamber consistency, Time Oracle authorisation, chamber conservation invariant and node integrity check. Osnias holds no MINT or BURN role.
Bank / settlement rail	Executes actual monetary transfers.
ISO 20022 interface	Carries payment/status messages where supported by the settlement rail.
Clearing Chamber Integrity and Conservation Oracle	Chamber-level observation and attestation layer. Every five minutes, it verifies that aggregate eligible funds held in escrow across all participating nodes equal the aggregate clearing token balances of all members of that chamber. It does not assess solvency on a node-by-node basis and does not move any funds.

IV.b Time Oracle and standard clearing cycle profiles

The clearing token contract is deliberately minimal. It does not calculate calendar dates or itself determine the current cycle phase. Before any action subject to a timing condition, the contract consults the external Time Oracle and executes the action only if the oracle returns the required authorisation.

The standard chamber profiles are 1W, 4W and 13W. The selected profile defines the relevant chamber's operating cycle. The 24-hour UTC sequence described in I.1 and Part IV is the cycle-end clearing window at the end of the selected cycle; it is not a daily economic cycle.

Token action → Time Oracle(profile) → ALLOW / DENY → execution / rejection

This separation keeps the token contract compact and allows timing rules to evolve independently of the token's execution logic.

IV.c P2P freeze and canonical snapshot

At 00:00 UTC on the clearing date determined by the Time Oracle's 1W, 4W or 13W profile, the clearing token contract consults the Time Oracle. Once the oracle returns DENY for P2P, the contract rejects new P2P orders and the 24-hour clearing window begins. The contract does not itself determine this date.

Snapshot = (block height, block hash)

The freeze ensures that the state used for end-user and node calculations cannot be altered by new P2P activity.

IV.d Calculation of each end-user' s statement

For each end-user u, Osnias calculates the difference between the escrow principal eligible for clearing attributable to that end-user on EVM and the clearing token state on Sei.

$\Delta u = \text{EligibleEscrowEVM}(u) - \text{TokenSei}(u)$

For the avoidance of doubt, the "eligible escrow" value used in the clearing equation must exclude any buffer, reserve, fee amount or collateral component that is not part of the clearing principal being reconciled. This prevents structural overcollateralisation from creating a false clearing imbalance.

The exact taxonomy of EligibleEscrow components MUST be defined in the technical Rulebook. Each included or excluded component must be identifiable from a deterministic contract state or signed source data, and reproducible from the cycle's audit evidence package. At a minimum, buffers, reserves, fee balances and collateral not attributable to clearing principal must be classified separately and excluded from EligibleEscrow, unless the Rulebook expressly provides otherwise.

EscrowTotal = EligibleEscrow + Buffer + Reserve + FeeBalance + OtherNonClearingAmounts

Δu may be positive, negative or zero. The clearing process records the difference; it does not require each end-user to be individually balanced.

IV.e Node aggregation and chamber-wide conservation

$RN = \Sigma\ \Delta u$ for all end-users u assigned to node N

RN is the node's aggregate clearing position under the convention $\Delta u = \text{EligibleEscrowEVM}(u) - \text{TokenSei}(u)$. $RN > 0$ identifies a paying node; $RN < 0$ identifies a receiving node; $RN = 0$ requires no inter-node settlement.

The chamber-wide conservation check uses the same clearing scope and the same definition of eligible escrow principal.

$\Sigma\ RN = 0$

A non-zero result is a reconciliation exception. The cycle must not produce final settlement instructions until the difference has been identified and resolved.

IV.f Node-level escrow integrity check

The Chamber Integrity and Conservation Oracle verifies chamber-wide 1:1 conservation. Separately, each node is subject to an escrow integrity check, without requiring its RN to be zero during the P2P phase.

$\text{EscrowN}(t) = \text{EscrowN}(t0) + \text{MintN} - \text{BurnN} + \text{SettlementInN} - \text{SettlementOutN}$

Any unexplained change in a node's escrow outside authorised MINT, BURN or settlement movements constitutes an integrity exception. This check locates the source of a discrepancy without creating a false node-level solvency failure.

Execution and frequency. The check is performed by the Clearing Engine / attestation controller every five minutes and immediately after each relevant MINT, BURN or settlement event affecting the node's escrow.

Control effect. Any unexplained escrow change places the affected node in EXCEPTION, blocks all new MINT for that node and retains calculation and event evidence in the audit trail. This node-level integrity exception is distinct from the chamber's overall solvency status.

IV.g Important clarification — internal netting alone does not change RN

Redistribution or netting among end-users within the same node does not, by itself, change the algebraic sum RN. It changes the internal allocation of positions, not the node's aggregate exposure to the network.

Accordingly, a paying node's internal netting is a local allocation step. It does not, by itself, change RN. The inter-node amount to be transferred remains RN for a paying node (RN > 0), unless a new external economic event changes the node's position.

Internal redistribution ⇒ RN unchanged

This distinction is essential to prevent double counting or the impression that a node shortfall could disappear through internal entries between its end-users alone.

IV.h Disputes and finalisation

All end-user statements are distributed before 03:00 UTC. The dispute window runs from 03:00 UTC to 15:00 UTC.

From 15:00 to 21:00 UTC, disputes are reviewed, final end-user statements are established and node positions are recalculated.

An unresolved material dispute affecting the node's position at the settlement cut-off prevents the relevant settlement instruction from being treated as final. The affected obligation enters an exception state.

The Rulebook must provide for a clear audit trail of the disputed calculation, supporting data, decision and resulting state.

IV.i Paying nodes' settlement escrow availability

The paying node operator (RN > 0), rather than Osnias, is responsible for keeping the corresponding settlement amount available under its own control or through its authorised banking/custody provider.

Osnias has no unilateral authority to move these funds. The Clearing Engine may record or receive evidence that the settlement escrow availability condition is satisfied before releasing the corresponding settlement obligation.

For RN > 0: AvailableSettlementEscrowN ≥ RN

IV.j Inter-node settlement

At 21:00 UTC, final settlement obligations may be released to the relevant NNN node operators. This time marks the release of obligations arising from clearing and is not a universal guarantee that every external rail will achieve settlement finality before 00:00 UTC. Each operator instructs its bank/payment provider through the available rail and, where applicable, using the ISO 20022 profile supported by that rail.

Osnias does not execute the transfer. It records the clearing obligation and may record the payment reference and settlement status provided by the node operator or external rail.

The 21:00 UTC timestamp marks the release of final settlement obligations arising from clearing, not a universal guarantee of payment finality. The Time Oracle may adjust the clearing date in accordance with the business-day calendar and availability rules of the settlement rail selected by the relevant nodes.

IV.k Internal netting by the receiving node

A receiving node (RN < 0) performs its internal allocation/netting for its end-users only after actual receipt of the corresponding settlement funds has been confirmed.

$$\text{FundsReceived}_N = \text{TRUE} \rightarrow \text{ReceivingNodeInternalCompensation}_N = \text{AUTHORIZED}$$

IV.l Network fees

Network fees are calculated on the gross volume of clearing tokens received by each end-user during cycle N−1. They are not collected during that cycle's clearing freeze window.

$$\text{Feeu}(N-1) = 0.0015 \times \text{GrossVolumeReceivedu}(N-1)$$

The 0.15% fee is not a discretionary charge created by the smart contract. Its basis, calculation method and deferred P2P workflow are set out in the clearing agreement signed between the member and its local node. The smart contract workflow technically implements a pre-existing contractual rule.

At the close of cycle N−1, the fee amount is crystallised as a fee obligation and communicated to the end-user through a separate invoice and the clearing statement. This gives the participant a documented basis to verify and, where appropriate, dispute the amount before any P2P fee order is entered.

At the start of cycle N, when P2P reopens, the corresponding fee order is created from the end-user to the relevant node manager. The order then follows the ordinary P2P lifecycle and is included in cycle N clearing.

The node manager is treated as an ordinary clearing participant for balance calculation and netting. The fee order therefore enters the same end-user calculation, node aggregation and netting process as any other eligible P2P order.

For PFMI mapping and control purposes, fee collection does not confer any preferential accounting status on the node manager: its clearing token position is included in the same node-level aggregations, reconciliations and audit controls as other end-user positions.

The fee invoice, fee obligation and P2P fee order MUST be linked by the cycle identifier, end-user Osnias-ID, node manager Osnias-ID, amount, currency/unit, calculation basis and an immutable reference/hash.

Fee lifecycle: cycle N−1 activity → fee calculation → invoice/notification → dispute → start of cycle N → P2P fee order → cycle N clearing

ISO 20022 may be used for structured institutional notifications, workflow status and reconciliation where supported by the participant's environment. The actual transfer of fees in clearing tokens remains an Osnias P2P order and is not executed by ISO 20022 itself.

IV.m Four distinct finality states

State	Meaning	Authority / evidence
Calculation finality	End-user and node calculations are final following dispute review.	Before settlement obligations are released.
Instruction irrevocability	The point beyond which the node/payment instruction can no longer be revoked under the applicable rail's rules.	Defined by the external settlement rail / its Rulebook.
Settlement finality	The payment is final under the applicable banking/payment system.	Confirmed by the external rail or node operator.
Cycle finality	The Osnias cycle is closed and the relevant P2P scope may reopen.	After the required controls and settlement conditions have been satisfied.

Acceptance of an ISO 20022 message does not equate to settlement finality. A pacs.002 status, for example, must be interpreted in accordance with the relevant settlement community's Rulebook and cannot generically be treated as proof of final settlement.

IV.n Exception and node default management

The normal sequence from 21:00 to 00:00 assumes that the selected payment rail can complete settlement and provide evidence within the required operational window. If settlement is not final by the cycle deadline, the affected obligation enters an exception state.

Exception	Fail-closed treatment	Control principle
Settlement escrow unavailable at cut-off	The affected node's settlement instruction is not released.	The node remains restricted; another node's funds cannot cover the shortfall.
Payment rejected	Record the rejection and keep the obligation outstanding.	The node operator must remedy the failure through the applicable payment process.
Payment pending at the deadline	Do not represent the obligation as settled.	The affected node(s) remain in an exception state.
Unresolved material dispute	The affected settlement obligation is not finalised.	Keep the relevant instruction on hold until resolution.
Settlement finality not demonstrated	No internal netting by the receiving node solely on the basis of expected funds.	Await final receipt/confirmation.

The Rulebook must specify whether only the affected node(s) remain blocked for P2P or the entire network remains closed. Any selective reopening must be demonstrably isolated so that no unresolved obligation can contaminate the new cycle.

Exit from an exception state MUST be evidence-based, not discretionary. The affected scope may return to ELIGIBLE only after the underlying discrepancy has been reconciled, the relevant solvency or settlement evidence is valid and current, and the Clearing Engine has reproduced the corrected state using the same Cycle ID and audit references. A manual status change without supporting evidence is insufficient.

Any selective reopening MUST rely on objective isolation criteria defined in the Rulebook. The relevant node must be demonstrably isolated from any unresolved obligation, and the next cycle must neither import nor net an unresolved balance from the previous cycle.

IV.o Post-clearing mirror reconciliation

After inter-node settlement and node-level internal netting steps have been completed, the Clearing Engine MUST re-read the relevant EVM escrow states and Sei clearing token states used for the closing reconciliation.

$$\text{EligibleEscrowEVM},\text{post}(u) = \text{TokenSei},\text{post}(u)$$

Reconciliation is performed at end-user, node and clearing chamber levels. Any material discrepancy places the affected scope in EXCEPTION and prevents it from being represented as fully reconciled.

This closing mirror check is distinct from five-minute solvency monitoring and forms part of the evidence supporting cycle finality.

V 24-HOUR CYCLE-END CLEARING WINDOW: WHO DOES WHAT, WHEN

UTC	Actor	Action	Expected outcome
00:00	Time Oracle / clearing token contract	Close P2P for clearing.	Clearing scope frozen.
00:00–03:00	Clearing Engine	Read the Sei RPC state and EVM escrow state; lock the snapshot.	Canonical dataset.
00:00–03:00	Clearing Engine	Calculate Δu and provisional RN.	End-user statements and provisional node positions.
Before 03:00	Notification service	Send the clearing statement PDF + structured record reference/hash.	The end-user receives verifiable evidence.
03:00–15:00	End-users	Review and dispute if necessary.	Accepted or disputed statements.
15:00	Clearing Engine	Close the dispute window.	Set of disputes frozen.
15:00–21:00	Clearing Engine	Resolve disputes; finalise Δu; recalculate RN; verify ΣRN = 0.	Final clearing positions.
15:00–21:00	Paying node operator	Perform internal allocation/netting and verify settlement escrow availability.	Local positions allocated; RN unchanged in the absence of an external event.
Before 21:00	Paying node operator	For RN > 0, make |RN| available in settlement escrow under node control and provide evidence of availability.	Settlement escrow availability condition satisfied.
21:00	Clearing Engine	Release final settlement obligations arising from clearing to the relevant node operators; this step does not itself constitute payment finality.	Settlement obligations communicated to the responsible node operators.
From 21:00	NNN node operators / banks	Execute inter-node payments through the applicable rail and ISO 20022 profile where supported.	External settlement in progress.
After final receipt	Receiving node operator	Confirm receipt and perform the receiving node's internal netting.	Receiving node's internal allocations completed.
Before 00:00	Clearing Engine	Verify settlement evidence, exceptions and cycle controls.	Normal closure or exception state.
00:00 / start of the next cycle	Time Oracle / clearing token contract / Clearing Engine	Reopen P2P and create validated P2P fee orders from the completed cycle.	The next cycle begins; fee orders enter the ordinary P2P workflow and will be included in that cycle's clearing.

The following UTC sequence applies to the final 24-hour clearing window at the end of the chamber cycle selected by the Time Oracle (1W, 4W or 13W). Outside this closing window, P2P remains governed by the Time Oracle according to the active cycle phase.

V.a Chronological workflow

Figure — Chronological Osnias Clearing workflow for the 24-hour cycle-end clearing window.

V.b Architecture and controls overview

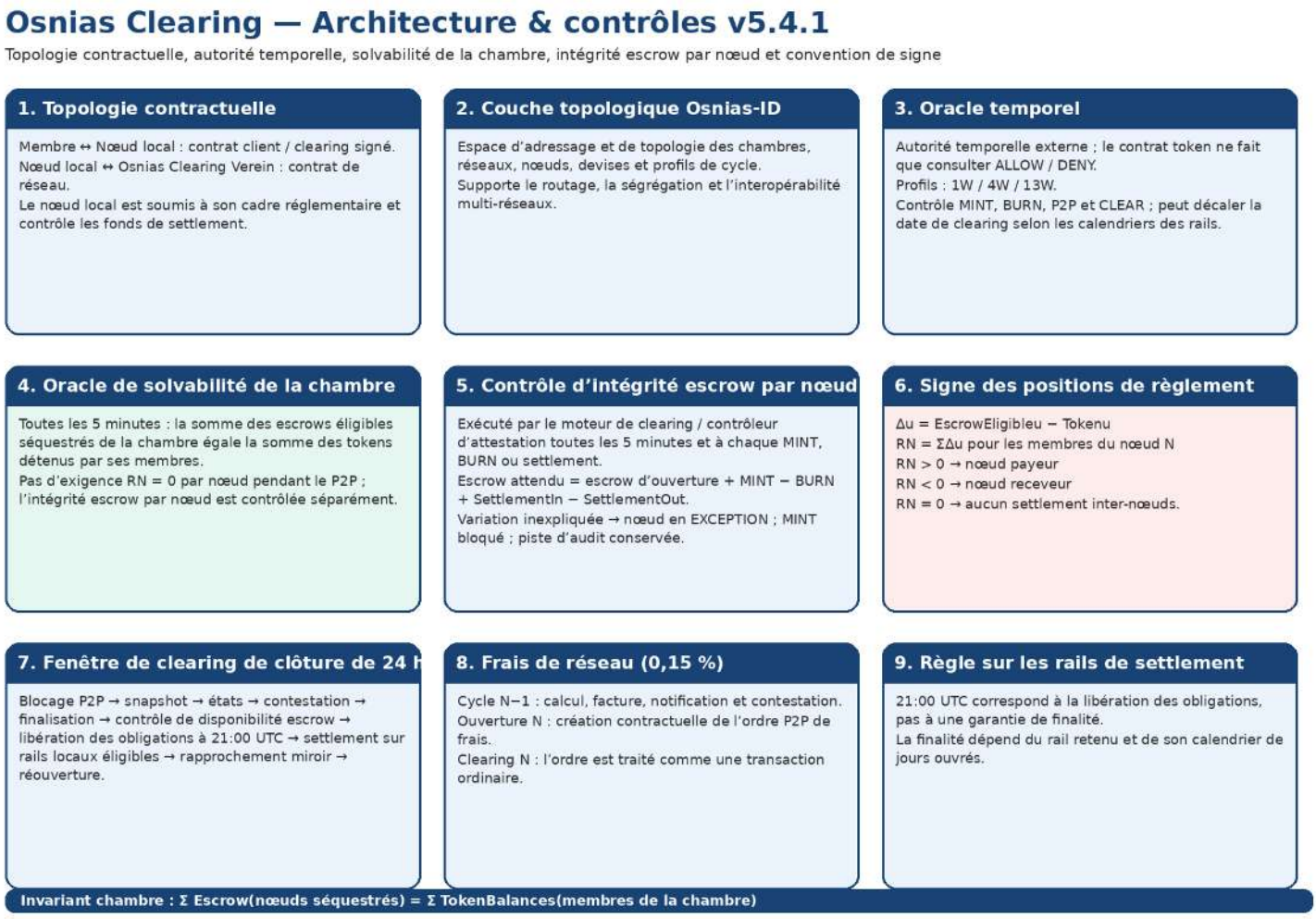

Figure — Osnias Clearing architecture and controls overview — Release 1.1.

VI REGULATORY AND TECHNICAL CONTROL MAPPING

Reference / topic	Regulatory issue	Osnias rule	Evidence / wording
PFMI 8	Settlement finality	Four-state finality model.	Separate timestamps/evidence for calculation, irrevocability, settlement and cycle closure.
PFMI 13	Default procedures	Fail-closed node exception.	Log of escrow unavailability/payment failures; no mutualisation of the amount due.
PFMI 17	Operational resilience	Snapshot replayability and exception states.	Block hash, logs, deterministic calculations.

Reference / topic	Regulatory issue	Osnias rule	Evidence / wording
PFMI 22	Recognised communications standards	Use ISO 20022 where supported by the settlement rail.	Message identifiers linked to the Cycle ID.
FINMA perimeter	Classification as a payment system depends on functions and facts.	No self-classification; functional separation explicitly documented.	Subject to legal/regulatory analysis.
Node autonomy	Responsibility for custody/payment control must be clearly assigned.	The node operator controls accounts and settlement.	Osnias has no power of disposal.
Accounting	Operational clearing ≠ automatic accounting offsetting.	Each participant is responsible for its accounting treatment.	No accounting conclusion is embedded in the Osnias result.

VI.a Audit evidence package

• Cycle identifier and UTC timestamps.

• Sei block height and block hash.

• End-user population and node assignments.

• Eligible EVM escrow principal and Sei token state used for each Δu.

• Node-level escrow integrity records: expected escrow, observed escrow, authorised MINT/BURN/settlement movements, discrepancy, status and timestamp.

• Generated clearing statement PDF identifier and cryptographic hash.

• Evidence that statements were sent before 03:00 UTC.

• Dispute log and evidence of resolution.

• Final RN by node and evidence that ΣRN = 0.

• Record of the paying node's internal allocation/netting.

• Evidence of settlement escrow availability under node control.

• Settlement obligation issued by Osnias.

• External payment instruction/reference and ISO 20022 identifiers, where applicable.

• Evidence of settlement finality/receipt.

• Record of the receiving node's internal netting.

• Gross volume received and calculation of the 0.15% fee.

• Cycle closure or entry into an exception state.

• Cycle N−1 fee calculation, separate invoice, dispute status, fee obligation identifier and corresponding P2P order identifier in cycle N.

• Evidence that no P2P fee order was created during cycle N−1's frozen clearing window.

Version history

Release 1.1 — 23 September 2026: exclusive MINT/BURN authority per node (KK, NNN), bounded by protocol controllers; node identity defined by the (KK, NNN) pair; legal-structure content removed and referred to Book 5; Oracle renamed Chamber Integrity and Conservation Oracle; Part III numbering corrected.

Release 1.0 — 23 September 2026: consolidation of the clearing rules from the v5.x drafts: sign convention (RN > 0 paying; RN < 0 receiving); chamber-level 1:1 conservation invariant; node-level escrow integrity check; 1W / 4W / 13W cycle profiles and 24-hour cycle-end clearing window; settlement escrow availability; deterministic definition of EligibleEscrow; objective exception-exit criteria; contractual basis of the 0.15% fee.

VII CLEARING CHAMBER INTEGRITY AND CONSERVATION ORACLE AND PARTICIPANT TRANSPARENCY

VII.a Purpose and scope of the Chamber Integrity and Conservation Oracle

The Clearing Chamber Integrity and Conservation Oracle is a chamber-level observation and attestation layer. It does not determine an individual node's solvency or require each node to have a zero clearing position during normal P2P activity. Positive and negative node positions are normal and are precisely what clearing addresses.

Its purpose is to verify the chamber-wide conservation invariant: aggregate eligible escrow principal held across all participating nodes must equal the aggregate clearing token balances held by all members of that same chamber.

The Integrity and Conservation Oracle has no custody function, no authority to move funds and no timing authority. It reads states, calculates the chamber-level invariant, timestamps the result and publishes an attestation. Timing authority remains exclusively with the Time Oracle.

ChamberSolvency = AggregateEligibleEscrow − AggregateMemberTokenBalances

Expected invariant: ChamberSolvency = 0

VII.b Chamber-level 1:1 conservation invariant

For a chamber C comprising participating nodes N and admitted members u, the invariant is:

$\Sigma_N \text{EligibleEscrow}_N = \Sigma_{u \in C} \text{TokenBalance}_u$

This is a chamber-level conservation check. It must not be confused with $RN = \Sigma \Delta u$, which represents the node's clearing position calculated by the Clearing Engine. RN may be positive, negative or zero during the cycle, while the chamber-wide solvency invariant remains exactly balanced.

Buffers, reserves, fee balances or collateral amounts that are not part of clearing principal must be accounted for separately and excluded from the eligible escrow value used in this invariant, in accordance with the technical Rulebook.

VII.c Five-minute verification frequency and freshness

The Chamber Integrity and Conservation Oracle performs this aggregate check every five minutes during normal operation and throughout the clearing window. Each run produces a new timestamped attestation.

t0, t0 + 5 min, t0 + 10 min, …

Age(LatestValidAttestation) > 5 minutes + tolerance ⇒ STALE

A stale attestation is never interpreted as a valid confirmation. The Rulebook defines which actions require a current chamber solvency attestation in addition to timing authorisation from the Time Oracle.

VII.d VI.4 Interaction with the Time Oracle and token contract

The Time Oracle and Chamber Integrity and Conservation Oracle have distinct functions. The Time Oracle determines whether MINT, BURN, CLEAR and P2P are OPEN/CLOSED for timing purposes under the selected 1W, 4W or 13W profile. The clearing token contract consults the Time Oracle before execution; it does not itself embed the cycle schedule.

The Chamber Integrity and Conservation Oracle attests only to aggregate 1:1 conservation. Where the Rulebook requires both conditions, execution is permitted only if both the timing authorisation and the required current solvency attestation are valid.

Timing permission = Time Oracle state $\wedge$ required chamber solvency condition

VII.e Transparency on the end-user platform

The latest chamber solvency attestation must be visible on the Osnias end-user platform on a read-only basis. The display must show chamber status, the time of the latest check, aggregate eligible funds held in escrow, aggregate member clearing token balances, the chamber-level discrepancy, state/block references and the attestation identifier.

The platform must not disclose other members' individual balances or positions. Transparency concerns chamber-level conservation evidence and its audit references.

Attestation field	Minimum content
Chamber identifier	Identifier of the clearing chamber covered by the attestation.
UTC timestamp	Time of the oracle calculation.
EVM state references	Block/state references used to aggregate participating nodes' eligible funds held in escrow.
Sei state reference	Block/state reference used to aggregate the chamber members' clearing token balances.
Aggregate eligible funds held in escrow	Total clearing principal included in the chamber-level check.
Aggregate member token balances	Total clearing token balances included within the same chamber scope.
Discrepancy	ChamberSolvency.
Status	OK / WARNING / FAIL / STALE.
Attestation identifier	Unique persisted/signed reference for audit and replay.
Node integrity check reference(s)	References to separate node-level escrow integrity records for the same observation window; these checks are not node solvency attestations.

VII.f Oracle failure model

Failure condition	Required behaviour
EVM data source unavailable	Do not issue a new positive attestation; retain the last attestation only as historical evidence and transition to STALE after the freshness threshold.
Sei data source unavailable	Apply the same fail-closed treatment; do not assume conservation remains valid.
Divergence between RPC/state sources	Do not publish OK until the reference state has been resolved deterministically.
Inconsistent cross-chain references	Reject the attestation and recalculate under the defined reference policy.
Non-zero chamber invariant	Publish FAIL for the chamber and apply Rulebook controls that depend on the 1:1 conservation invariant.
Oracle process unavailable	Transition to STALE after the freshness threshold; never silently continue on a cached OK status.

Failure condition	Required behaviour
Unexplained change in a node's escrow	Place the affected node in EXCEPTION, block all new MINT for that node, persist expected escrow, observed escrow and the discrepancy, and require reconciliation before restoring normal eligibility.

VII.g Audit and PoC testing requirements

• The chamber invariant is validated when aggregate eligible funds held in escrow exactly equal aggregate member clearing token balances.

• An unauthorised withdrawal or unexplained change in a node's escrow is located by the integrity check, places that node in EXCEPTION and blocks its MINT even if the chamber aggregate remains balanced.

• Inter-node P2P activity may generate non-zero RN positions without triggering a chamber solvency failure, provided that the chamber-wide aggregate remains conserved.

• Any discrepancy in the chamber-level aggregate is detected and produces FAIL status.

• STALE status is produced when no valid attestation is available within the freshness window.

• The same defined EVM/Sei reference states reproduce the same chamber attestation result.

• Data displayed on the end-user platform match the latest persisted/signed chamber attestation without exposing third parties' individual balances.

• A node operator can neither MINT nor BURN on an account attached to another (KK, NNN) pair, including where the same NNN exists on two different networks (e.g. node 01-042 on account 07-042); Osnias holds no role allowing it to MINT or BURN.

VII.h Updated control chain

Chamber Integrity and Conservation Oracle → Time Oracle authorisation → P2P/MINT/BURN activity → 24-hour cycle-end clearing window → end-user calculations → RN aggregation by node → settlement executed by nodes → post-clearing mirror reconciliation

This architecture preserves structural separation: the Time Oracle governs calendar-based permissions; the Integrity and Conservation Oracle attests to chamber-wide 1:1 conservation; the Clearing Engine calculates positions; node operators control settlement escrow and execute settlement; Osnias does not hold settlement funds in custody.

VIII Open questions for legal counsel

• Enforceability of multilateral netting and node-level obligations in each relevant jurisdiction.

• Legal point of irrevocability and settlement finality for each external payment rail used by node operators.

• Legal nature of RN and the settlement obligation generated from the finalised clearing result.

• Governing law, competent jurisdiction, default remedies and insolvency treatment under the Node Agreements and Rulebook.

• Treatment of unresolved disputes, suspended nodes and selective reopening within the contractual framework.

• Accounting presentation of clearing positions, including conditions for any accounting offsetting under the applicable reporting framework.

• Legal and tax treatment of the 0.15% network fee invoice and its deferred P2P payment from cycle N−1 to cycle N.

• Classification of the clearing token under MiCA, particularly under the definitions of an e-money token, asset-referenced token or another category of crypto-asset. A preliminary analysis is set out in Book 5 – Legal Classification Memorandum.

• Application of Directive 98/26/EC on settlement finality and, where applicable, the French Monetary and Financial Code to multilateral netting, transfer orders and the effects of insolvency proceedings.

• Impact of the federated contractual topology (end-user <-> local node <-> network governance entity; see Book 5) on the regulatory perimeter, potential system designation, participant status or local authorisation/supervision requirements.

IX Regulatory Bibliography

Issuing body	Reference	Official source
CPMI-IOSCO	Principles for Financial Market Infrastructures (PFMI)	https://www.bis.org/committees/cpmi/pfmi/overview
FINMA	Swiss financial market infrastructures / payment systems	https://www.finma.ch/en/authorisation/financial-market-infrastructures-and-foreign-market-participants/swiss-financial-market-infrastructures/
FINMA	Supervision of financial market infrastructures	https://www.finma.ch/en/supervision/financial-market-infrastructures/
ISO 20022	Message definitions — Payments Clearing and Settlement	https://www.iso20022.org/iso-20022-message-definitions
IFRS Foundation	IAS 32 — Financial Instruments: Presentation	https://www.ifrs.org/issued-standards/list-of-standards/ias-32-financial-instruments-presentation/
European Union	Regulation (EU) 2023/1114 on markets in crypto-assets (MiCA)	https://eur-lex.europa.eu/eli/reg/2023/1114/oj
European Union	Directive 98/26/EC on settlement finality in payment and securities settlement systems	https://eur-lex.europa.eu/eli/dir/1998/26/oj
France — Légifrance	French Monetary and Financial Code — provisions on payment/settlement systems and finality	https://www.legifrance.gouv.fr/codes/id/LEGITEXT000006072026/
CPMI-IOSCO (CPSS-IOSCO in 2012)	Principles for financial market infrastructures: disclosure framework and assessment methodology (2012)	https://www.bis.org/cpmi/publ/d106.pdf
CPMI-IOSCO	Recovery of financial market infrastructures — Revised report (2017)	https://www.bis.org/cpmi/publ/d162.pdf
CPMI-IOSCO	Guidance on cyber resilience for financial market infrastructures (2016)	https://www.bis.org/cpmi/publ/d146.pdf
CPMI	Glossary of payments and market infrastructure terminology	https://www.bis.org/committees/cpmi/glossary
CPSS / CPMI	The interdependencies of payment and settlement systems (2008)	https://www.bis.org/cpmi/publ/d84.pdf

Issuing body	Reference	Official source
Financial Stability Board (FSB)	Key Attributes of Effective Resolution Regimes for Financial Institutions (revised version 2024)	https://www.fsb.org/uploads/P250424-3.pdf

These six references are presented as complementary international reference frameworks, without prejudging Osnias's legal classification or constituting a declaration of compliance.

Technical and functional recommendation document. It does not constitute legal, regulatory, accounting or audit advice. Formal regulatory classification, enforceability of netting/finality and obligations relating to settlement rails must be confirmed within the relevant jurisdiction and contractual framework.