

ENV-005d — Emulate Time and Clock Conditions

[Go to ENV-005 — Emulate Distributed Systems](#)

Statement

The [DIDO-TE](#) SHALL emulate time and clock conditions in accordance with the applicable [Test Definition](#).

Derived From

- [ENV-005 — Emulate Distributed Systems](#)
- [ENV-005b — Emulate Participating Nodes](#)
- [ENV-005c — Emulate Communication Behaviour](#)
- [\[DTE5\] DIDO-TE Requirements Register](#), source requirement identifier and obligation to be assigned
- [\[DTE6\] Structured Information Processing Reference Architecture \(SIP-RA\)](#)
- [\[DTE7\] Federated Data Interpretation Systems Reference Architecture \(FDIS-RA\)](#)

Rationale

Distributed-system behaviour depends on the time sources and clock conditions observed by participating [Nodes](#).

Relevant conditions include clock identity, reference time, time zone, resolution, precision, offset, drift, skew, synchronisation, discontinuity, rate, and availability. These conditions affect ordering, timeout processing, leases, expiration, scheduling, coordination, event correlation, and [Evidence](#) timestamps.

Differences in time and clock conditions may produce different results even when all other [Test Environment](#) conditions remain unchanged. Controlled emulation permits the DIDO-TE to reproduce nominal conditions and specified variations.

Applies To

- [Test Environment](#)
- [Test Definition](#)
- [Test Execution](#)
- [Test Object](#)
- [Node](#)
- [Test Resource](#)

- [Configuration](#)
- [Constraint](#)
- [Evidence](#)

Verification

Verification confirms that:

- The applicable Test Definition identifies each time source and clock subject to emulation.
- Each time source and clock has a unique identity.
- The Test Definition identifies each participating Node and Test Resource governed by each time source or clock.
- The Test Definition specifies the required reference time, time zone, resolution, precision, offset, drift, skew, synchronisation, rate, discontinuity, and availability, as applicable.
- Each specified condition identifies its required value, state, range, sequence, or tolerance.
- The DIDO-TE establishes the specified time and clock conditions before Test Execution.
- The DIDO-TE applies each scheduled change to a time or clock condition during Test Execution.
- The DIDO-TE measures actual time and clock conditions during their applicable periods.
- The DIDO-TE detects a time or clock condition outside its specified criteria or tolerance.
- Evidence timestamps identify their applicable time source.
- The DIDO-TE records time-source identities, clock identities, configurations, measurements, scheduled changes, actual changes, and detected deviations as [Evidence](#).
- The DIDO-TE maintains [Traceability](#) among each time or clock condition, affected Node, Test Definition, Test Execution, Evidence, and [Test Results](#).
- A missing, incorrect, uncontrolled, unmeasured, unsupported, or untraceable mandatory time or clock condition constitutes nonconformance with this requirement.

Verification includes:

- Inspection of the time sources and clocks identified by the Test Definition
- Inspection of time-source identities, clock identities, affected Nodes, configurations, values, and tolerances
- Comparison of specified and emulated time and clock conditions
- Observation of time and clock measurements during Test Execution
- A negative assessment using a clock offset or skew outside the specified tolerance
- A negative assessment introducing clock drift, loss of synchronisation, or time-source unavailability
- A negative assessment introducing a specified time discontinuity or rate change
- Confirmation that the DIDO-TE applies scheduled changes
- Confirmation that the DIDO-TE detects and records each unpermitted deviation
- Inspection of time-related Evidence and Traceability records
- Confirmation that each mandatory time or clock deviation produces a nonconformance result

Referenced By

- [ENV-005l — Record Distributed-System Emulation](#)
- [ENV-005m — Validate Emulation Fidelity](#)

Related Architecture Sections

- Add links to the architecture sections governing time sources, clock control, synchronisation, distributed execution, Evidence timestamps, and Traceability.

Delivery Phase

Assign the applicable delivery phase.

Requirement Status

Draft

Statement Reference

Use the following syntax to reference this requirement's Statement section from another DokuWiki page:

```
{{section>dido:03-dido-te:99-annexes:annex-c-requirements:02-test-environment-requirements:env-005-emulate-distributed-systems:env-005d-emulate-time-and-clock-conditions#Statement&noheader&nofooter&noeditbtn}}
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