

C.3.5 State and Time Control Requirements

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This section identifies the requirements governing controlled state and time within a [Test Environment](#).

State and Time Control allows a distributed test to begin from defined conditions, reproduce those conditions across repeated executions, control the temporal context in which test activities occur, and associate test behavior and results with the corresponding test time.

The requirements distinguish **State Control** from **Time Control**. **State Control** establishes or restores the conditions from which a test begins. **Time Control** establishes and manages the temporal context against which test activities occur.

The DIDO-TE source material describes virtualized environments that may be repeatedly initialized from a desired starting point with a preconfigured context. It further describes **test time** that is independent of **wall-clock time**, configurable timeline starting points, execution at rates equal to or different from real time, and resetting a test timeline when repeating a test.

Controlled **state** and controlled **time** support repeatability and deterministic testing by allowing separate [Test Executions](#) to begin from equivalent conditions and progress through equivalent temporal contexts.

State and Time Control remains distinct from [Test Definition](#), Test Execution, Record and Playback, Baseline and Comparison, and Validation. The governing Test Definition specifies the required state and time conditions. This requirement family establishes the capabilities required to realize and control those conditions.

A State and Time Control requirement may be represented by an individual leaf requirement or by a non-leaf requirement group containing subordinate independently verifiable obligations.

Requirements

Requirement ID	Requirement Title	Primary Source Basis
STC-001	Establish Initial Test State	[DTE1], repeatable initialization and preconfigured context; [DTE2], controlled initial states; [DTE3], controlled initial states
STC-002	Restore Test State	[DTE1], repeated initialization from a desired starting point and restart using an unmodified baseline state
STC-003	Establish a Test Timeline	[DTE1], defined and artificial timelines for testing, simulation, and training
STC-004	Set the Test Timeline Starting Point	[DTE1], configurable starting point for the test timeline
STC-005	Control Test Timeline Rate	[DTE1], execution at real-time, accelerated, or decelerated rates
STC-006	Reset the Test Timeline	[DTE1], resetting the test timeline to its starting point for repeated execution

Requirement ID	Requirement Title	Primary Source Basis
STC-007	Associate Test Events with Test Time	[DTE1], recorded points-in-time, defined timelines, and time-sensitive test behavior

Contents

- [STC-001 — Establish Initial Test State](#)
 - [STC-002 — Restore Test State](#)
 - [STC-003 — Establish a Test Timeline](#)
 - [STC-004 — Set the Test Timeline Starting Point](#)
 - [STC-005 — Control Test Timeline Rate](#)
 - [STC-006 — Reset the Test Timeline](#)
 - [STC-007 — Associate Test Events with Test Time](#)
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- [STC-001 — Establish Initial Test State](#)
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 - [STC-007 — Associate Test Events with Test Time](#)

Source

- [\[DTE1\] U.S. Patent Application US20220237111A1](#), repeatable initialization, preconfigured test context, virtual system time, configurable timelines, timeline starting points, execution-rate control, timeline reset, and recorded points-in-time
- [\[DTE2\] Non-Traditional BAA Submission](#), controlled initial states and State Control
- [\[DTE3\] Broad Agency Announcement White Paper](#), controlled initial states and State and Time Control
- [\[DTE5\] DIDO-TE Requirements Register](#), State and Time Control source requirements

Rationale

Repeatable distributed testing requires control over both the conditions from which a test begins and the temporal context in which test activities occur.

A [Test Environment](#) may contain [Nodes](#), [Twin Realizations](#), data, [Configuration](#), and other resources whose condition affects test behavior. Establishing and restoring a known **starting state** allows repeated Test Executions to begin from controlled conditions.

Distributed-system behavior may also depend upon **time**. Time-sensitive transactions, cryptographic operations, scheduling behavior, event ordering, and other activities may produce different results when executed at different points in time or at different rates.

The DIDO-TE source material therefore separates **test time** from **wall-clock time**. A **test timeline** may begin at a configured point, may progress at a rate equal to or different from real time, and may

be reset when a test is repeated.

This separation permits tests to reproduce temporal conditions without requiring the physical execution environment to experience the same real-world timing conditions.

State and Time Control provides controlled conditions for Test Execution. It does not define the test actions themselves, the recording of those actions, the criteria used for comparison, or the decision used for Validation.

Applies To

- [DIDO-TE](#)
- [Test Environment](#)
- [Test Definition](#)
- [Test Execution](#)
- [Node](#)
- [Twin Realization](#)
- [Configuration](#)

Traceability

- [STC-001 — Establish Initial Test State](#)
- [STC-002 — Restore Test State](#)
- [STC-003 — Establish a Test Timeline](#)
- [STC-004 — Set the Test Timeline Starting Point](#)
- [STC-005 — Control Test Timeline Rate](#)
- [STC-006 — Reset the Test Timeline](#)
- [STC-007 — Associate Test Events with Test Time](#)
- [C.3 Functional Requirements](#)
- [Annex C: Requirements](#)

ConOps Relationship

This requirement family supports preparation and control of the **state** and temporal context used during Test Execution.

The ConOps describes how a Test Environment is placed into its required **starting state**, how **test time** is established and controlled, and how those conditions are used during repeated Test Executions.

State and Time Control supports Record and Playback, Baseline and Comparison, and Validation by making the starting conditions and temporal context of repeated Test Executions reproducible.

Delivery Phase

TBD

Requirement Status

Draft

Notes for Editors

State and Time Control requirements use the STC requirement prefix.

The explicit links under Contents remain while the State and Time Control requirement pages are being created and reviewed. After all planned requirement pages exist, you may remove the explicit links because the indexmenu automatically discovers them.

Apply the requirement identification, decomposition, source and derivation, normative-language, quality, status, and page-structure rules defined by Annex C.

Do not equate **test time** with **wall-clock time**. DIDO-TE source material explicitly permits test time to be independent of real time and to progress at a rate different from real time.

Do not combine initial-state establishment, state restoration, timeline establishment, timeline starting point, timeline rate, or timeline reset into a single normative requirement. These capabilities are independently verifiable.

Do not prescribe a particular clock service, time-synchronization protocol, simulation engine, snapshot mechanism, storage technology, or virtualization technology in canonical State and Time Control requirement Statements unless an authoritative source requires that technology.

Record and Playback requirements govern capture and replay of test activity. Baseline and Comparison requirements govern comparison of results. Validation requirements govern conclusions derived from those results. State and Time Control establishes the state and temporal conditions under which those activities occur.

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Last update: 2026/08/23 12:39

