Test Case Design: Lennart Olsson, Pitch Technologies, lennart.olsson@pitch.se

# NETN – TMR

## Test Purpose

The test shall verify that the System under Test (SuT) has implemented and can manage the NETN TMR pattern (Transfer of Modelling Responsibility). The TMR pattern is described in AMSP-4.

The test case includes requirements for the three levels of capability at the NETN TMR Badge.

## Overview

[Ref 1], chapter 5.1.1: “The type of control of entities in a federation can be of two kinds, entity control and attribute modelling responsibility. A federate with entity control, controls the actions and behaviour of simulated entities. A federate with attribute modelling responsibility, updates a set of attributes at simulated entities.

The TMR pattern is used to transfer modelling responsibility between federates. The reason for transfer of modelling responsibility can be to get the most suitable model do the updating of the attributes that covers the capability and characteristic of simulated entities. The TMR pattern can also be used for fault management, load balancing and multi resolutions models; such as aggregation and disaggregation, movement behaviour models, and damage assessment.

The transfer of ownership can be triggered either from an external source or by the requesting federate. The pattern has methods both for acquiring and divesting of instance attribute ownership. There is a correlation between TMR interactions and HLA Ownership services to ensure that the expected federates are involved in the transfer.”

## Conformance Statement

The owner of the SuT shall submit a Conformance Statement for the SuT, it will identify the required scope of testing in the Test Protocol column.

## Test Environment

The test requires that two system of the SuT are executing, these systems shall transfer the modelling responsibility between each other. The SuTs shall execute in the IVCT framework. The framework will stimulate the SuTs with data to consume according to the Conformance Statement. The framework will listen to provided data from the SuTs and analyse the interactions required by the pattern.

# General Requirements

Required declaration shall have been done for the specific level of the badges.

Correct uses of HLA Ownership services and TMR interactions.

Correct Pattern Sequence shall be used.

Interaction parameter values and the user-supplied-tag values shall be semantic correct.

Correct attribute ownership transfer shall be verified during and after the test sequence.

# Badge Requirements

## Bronze Badge:

The SuT shall respond to a TMR-initiate from an external source (IVCT framework) with a negative offer, i.e. it is not willing to participate in a transfer of modelling responsibility.

The SuT shall respond to a TMR-request from another SuT with a negative offer, i.e. it is not willing to participate in a transfer of modelling responsibility, neither as the acquiring or divesting part.

## Silver Badge:

In addition to the requirements for the Bronze Badge shall the SuTs manage the situations that the transfer of modelling responsibility between the SuTs is started by:

* One of the SuTs (requesting SuT)
* Initiated by an external source (IVCT framework)

The requesting SuT shall divest attributes. After the transfer shall the modelling responsibility be restored with the TMR pattern, i.e. the requesting SuT shall acquire the attributes. The transfer shall include at least two instances and at least two instance attributes at each instance.

## Gold Badge:

In addition to the requirements for the Bronze and Silver Badge shall the SuTs manage the situations that include a cancellation of the transfer.

The requesting federate cancels the transfer when it does not receive any offer due to a timeout.

The requesting federate responds with a cancelation after a positive offer, the cancelation can be sent after the positive offer or after receiving the HLA callback service requestAttributeOwnershipRelease.

# References

[Ref 1] AMSP-04.

[Ref 2] SISO-STD-001-2015, Standard for Guidance, Rationale, and Interoperability Modalities for the Real-time Platform Reference Federation Object Model, Version 2.0, 10 August 2015.