

Conformance testing service for NoTA subsystems

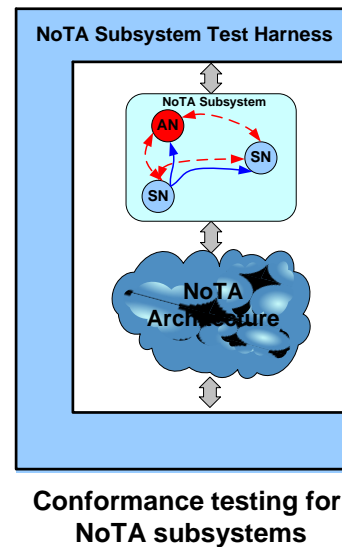
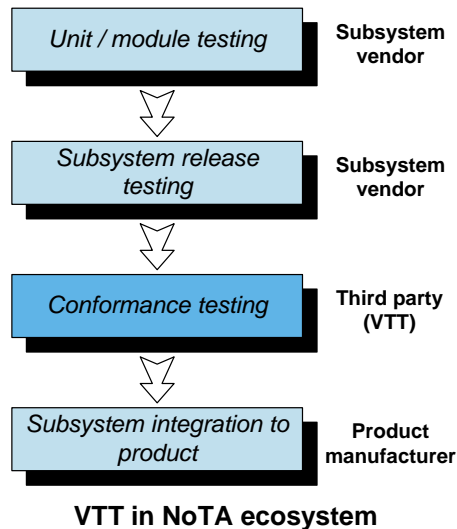
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Summary of the conformance testing service for NoTA subsystems



Business problem

- Due to many independent subsystem vendors and computing platforms in the NoTA ecosystem, the interoperability of NoTA subsystems is not self-evident

What we have

- VTT has specified a testing process for NoTA subsystems, identified the testing targets of NoTA subsystems, researched testing approaches for the testing targets, and developed a highly customizable tool chain for NoTA subsystems testing

What we offer

- VTT offers vendor independent conformance testing service to assure that the NoTA subsystems conform to the NoTA specification, and are interoperable with other NoTA subsystems

Added value for NoTA subsystem vendor

- Proof that the NoTA subsystem conforms to the NoTA specification
- Proof that the NoTA subsystem meets its functional requirements

Added value for NoTA subsystem buyer

- Confidence that the NoTA subsystem is interoperable with other NoTA subsystems
- Faster time-to-market* due shortened integration & testing

Introduction

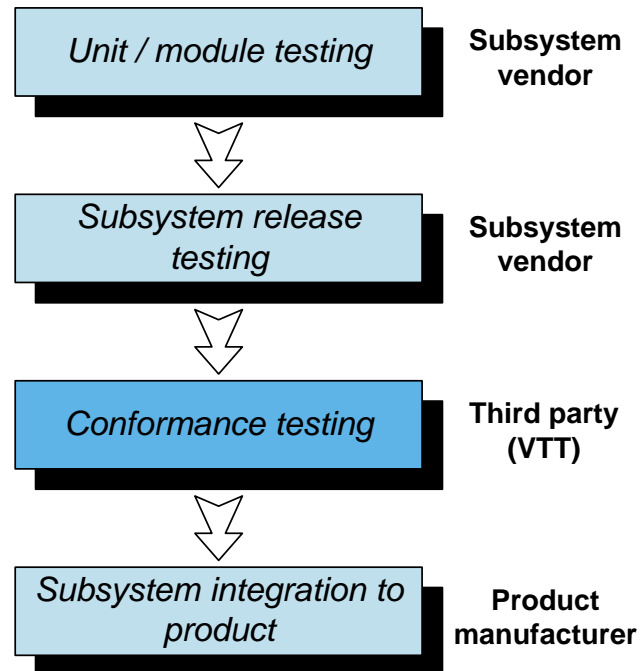
- NoTA enables modularity in system compositions by offering a common low-level interfacing for NoTA subsystems
 - A NoTA subsystem includes the implementation of the DIP protocol together with a certain set of Service and Application Nodes therefore defining the logical architecture of NoTA → Every application that utilizes NoTA interconnect is a NoTA subsystem
- NoTA facilitates flexibility in using different communication domains (e.g. Bluetooth, USB, TCP/IP) between devices, since the NoTA interconnect makes service and application development independent of the underlying physical transport layers
- Besides the benefits, NoTA also presents challenges:
 - There will be many independent NoTA subsystem vendors
 - NoTA is a platform independent interconnect and therefore the NoTA DIP stack will be implemented and optimized separately for many different platforms
 - NoTA subsystems should be interoperable
 - ***How to ensure interoperability between NoTA subsystems?***

Conformance testing service

- To address the challenges in NoTA interoperability VTT has:
 - Specified a testing process and guidelines for testing NoTA subsystems
 - Identified and categorized the possible testing targets of NoTA subsystems
 - Whole NoTA subsystem, application & service nodes, DIP stack layers
 - Researched testing approaches and testing requirements for the testing targets
 - Developed a reusable and customizable tool chain for testing NoTA subsystems

- VTT offers conformance testing service to assure that NoTA subsystems conform to the NoTA specification and architecture, and are interoperable with other NoTA subsystems

Vendor independent conformance testing service for NoTA subsystems

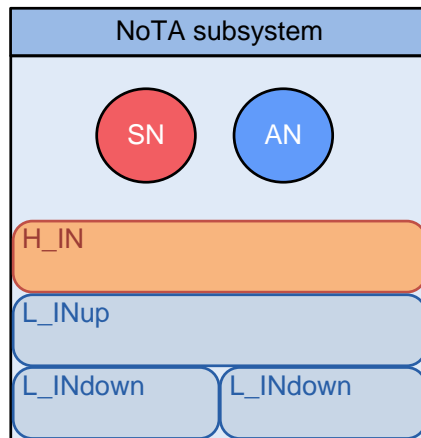


- Vendor independent testing enhances confidence between NoTA subsystem vendors and their customers
- Added value for subsystem vendor:
 - Proof that the NoTA subsystem conforms to the NoTA specification
 - Proof that the NoTA subsystem meets its functional requirements
- Added value for subsystem buyer:
 - Confidence that the NoTA subsystem is interoperable with other NoTA subsystems
 - *Faster time-to-market* due shortened integration & testing

High-level conformance testing process

- The testing process between the client and VTT
- Process inputs (delivered by the client):
 - NoTA subsystem requirements and specifications
 - NoTA subsystem implementation
- Process outputs (delivered by VTT):
 - NoTA subsystem test summary report including all executed test cases, their results, and tracing to requirements
 - Overall report of the NoTA subsystems conformity and interoperability
- Testing activities can be performed in VTT based on product specifications, or at the customer premises by participating to the customers product development lifecycle

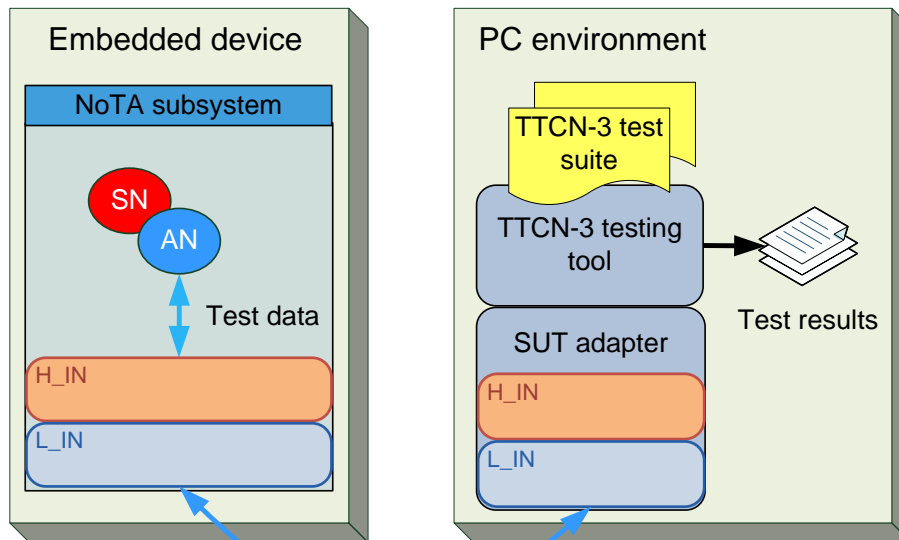
The NoTA testing targets



- VTT has identified the NoTA testing targets so that the system under testing (SUT) can be:
 1. NoTA DIP stack (H_IN, L_INup, L_INdown)
 - Whole stack
 - Stack layers separately
 2. NoTA nodes (AN/SN)
 - AN and SN nodes separately
 - Many nodes at the same time
 3. Whole NoTA subsystem (DIP stack + nodes)
- VTT has researched testing approaches for all identified NoTA testing targets

A testing approach for NoTA nodes (1/2)

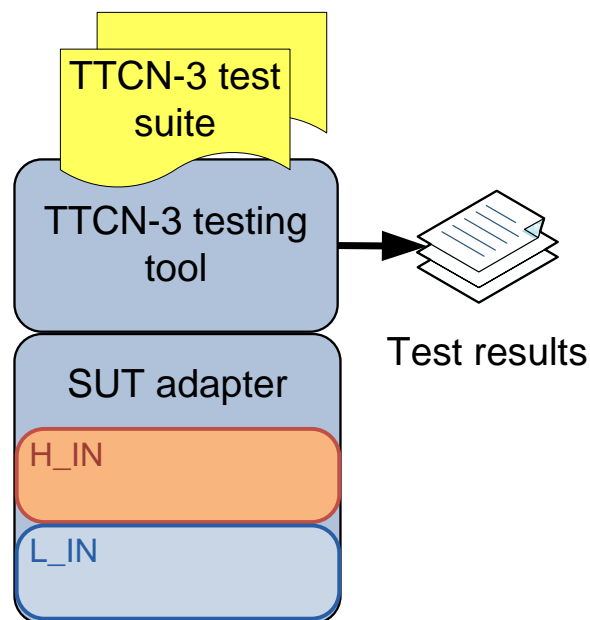
Illustration of NoTA node testing setup



Test data over Bluetooth / TCP/IP / USB

- Highly customizable tool chain: the tool chain can be easily modified for different NoTA testing targets and for NoTA implementations in different platforms
- Efficient test automation and reporting
- The test suites can be written manually, or be designed with model-based testing technologies
- The approach makes it possible to simulate the environment of the target NoTA node before the environment is really implemented → testing of NoTA nodes in very early phase during the development process

A testing approach for NoTA nodes (2/2)



- TTCN-3 based modular testing solution
 - TTCN-3, Testing and Test Control Notation version 3, is an internationally standardized test scripting language used mainly in conformance testing
- The modularity means that the test cases, SUT adaptation, test data coding, logging, and test control are separate entities providing flexibility in developing TTCN-3 test systems for different testing applications
 - E.g. the SUT adapter can be set to emulate the role of a NoTA service node (or many nodes) when testing a NoTA application node

Keypoints

- VTT is a neutral, traditional certification organisation, which has strong research background → neutral testing with high quality standards
- VTT has strong expertise on testing processes and test system development
- VTT offers vendor-independent testing service for NoTA subsystems
 - Ensuring interoperability with other NoTA subsystems accross the NoTA ecosystem
 - Vendor-independent testing reduces risks and enhances confidence between NoTA subsystem vendors and their customers
 - Understanding and serving customers from all market segments (HW, SW, services, ...)



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technology**