Converged Messaging Technology

E2E Validation and Certification

COMET CERTIFICATION White Paper

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ABSTRACT

The purpose of this document is to describe the strategy which has been followed in the COMET Project in order to develop an end-to-end Validation process, and the Certification scheme SQS has defined for any commercial deployment of the solution.

The document describes the design and implementation of the Product/System Validation performed. This validation has been oriented to demonstrate requirements (functional, non-functional) fulfillment, ensure a continuous integration of the testing process with the development process, implement traceability, and mitigate risks identified in the system/product concept.

The development of a Certification scheme for commercial applications/products based on COMET is also described. Defining a Certification model optimizes the implementation time and assures the interoperability of the product deployed.

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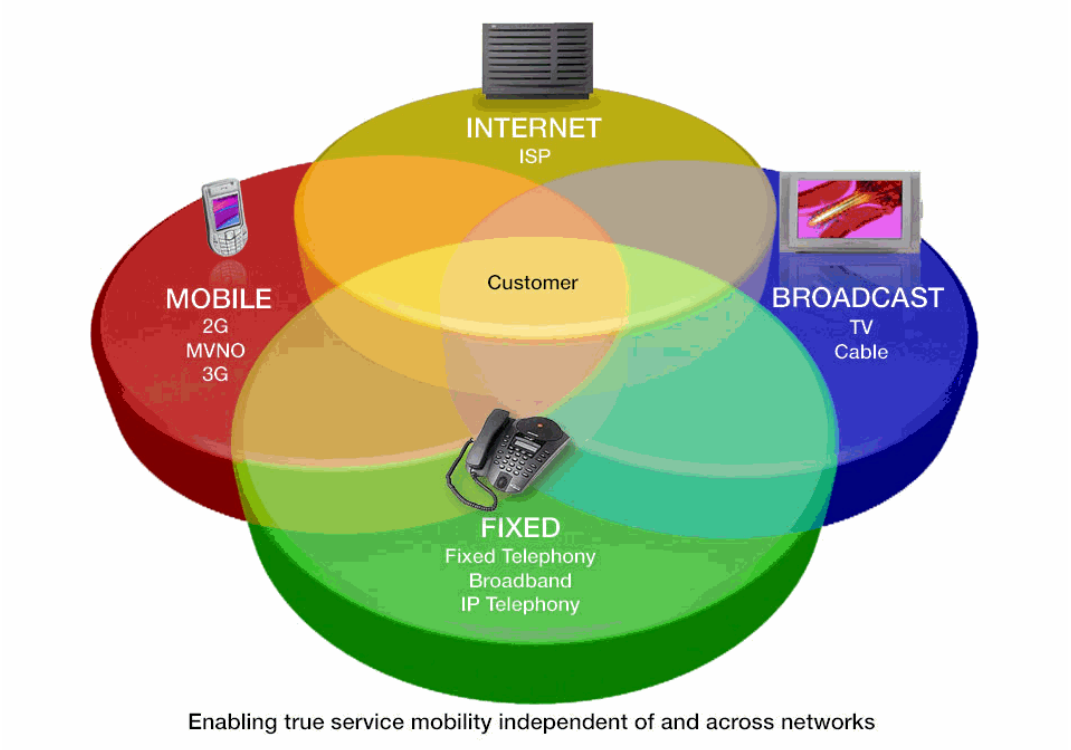
INTRODUCTION

The overall goal of the COMET project is to realise the potential of a converged messaging service beyond 3G by creating the global enabling technology for easy-to-activate and easy-to-use converged messaging services, allowing users to navigate and control all their messages Anytime, Anyplace, regardless of the access network and the type of device they are using.

This picture illustrates the fact; any type of device (mobile, fixed, a device connected to the internet….) using any network will converge in the new service.



Enabling true service mobility independent of and across networks

By achieving its overall goal, the COMET project will contribute directly to the achievement of the priorities of critical importance as set out by the Commission with respect to the future of the Information Society. These priority areas include: Content and services; elclusion and citizenship; Interoperability; and Trust and dependability.

To assure a correct roll-out of the COMET solution and the interoperability of it within any operator, SQS has defined a certification scheme to be followed in any deployment.

END-TO-END VALIDATION PRINCIPLES

VALIDATION PRINCIPLES

The validation has been performed to demonstrate that the platform fulfils the requirements correctly. The detailed procedure used for performing primary validation tests is defined within the following chapters.

The overall COMET Validation strategy is based on the step-wise testing of the COMET reference system. The aim was to ensure that each COMET reference system release meets the agreed quality criteria and that each step in the testing was based on the results of the previous step, thus avoiding unnecessary duplication of work.

The strategy promoted the sharing and/or re-use of test tooling (test frameworks, test software, test scripts) that had been created as part of the R&D Work Packages that deliver the COMET components.

VERIFICATION OVERVIEW

COMET distinguishes the following test phases (in chronological order):

- Unit testing. These tests are an integral part of the R&D work in the various work packages and verify the internal working of the software or of the installation and configuration scripting. Unit tests are based on the 'white-box' principle i.e. they take the architecture and design of the system into account. Unit tests should aim towards full coverage of the software code.
- Sub-system testing. These tests ensure the compliancy of the system with the User Stories at a requirement level. Both functional and technical requirements should be tested. Each requirement (User Story) must be covered with one or more sub-system tests. Sub-system tests are run as part of the R&D work. Sub-system tests are 'black-box' tests. They aim for full coverage of the User Stories
- Integration testing. These tests are run to ensure that the various components of the COMET reference implementation can be glued together as an integrated solution. The solution can be installed and configured successfully and operate in a lab environment on target server and client platforms.

The validation team analyzed the verification reports (verification plan, verification test cases, and verification result report) of each software product (client, server) integrated in the final COMET solution.

The validation team also analyzed the integration test plan and the corresponding integration test report.

At reception of a platform release, a basic set of test cases has been executed. This set constitutes the minimum number of test cases needed to consider that the product submitted has got the minimum quality to be validated. If test cases are not passed the platform release is sent back to the integration team.

RISK ANALYSIS

Validation starts with the risks analysis. This analysis is based on the defined User Stories. All User Stories have been completely analyzed, to find gaps and achieve a better understanding of what COMET should do and what shouldn't. When new User Stories have been identified, they were located and defined during the analysis.

The involvement of all partners in the revision is necessary, so a technical Committee Team has analyzed the Risk Analysis.

The risk analysis was the first approach on the definition of the possible errors and new palliative actions. The objective was to be capable of demonstrating, at any time, the quality of the COMET Solution, either to the EC or any relevant Organism.

TEST CASES

Validation tests were ran to ensure the correct interoperability of the COMET reference software with the life networks (including 2G, 2.5G, 3G, IMS, Internet) and COMET-enabled devices (mobile platforms, fixed platforms) as well as legacy devices (including SMS and MMS-enabled mobile terminals). The test cases were divided into different topics:

- General
- SIP, IMS …
- Related to different Technologies
- ……..

Specific test cases were created using the Risk Analysis described above.

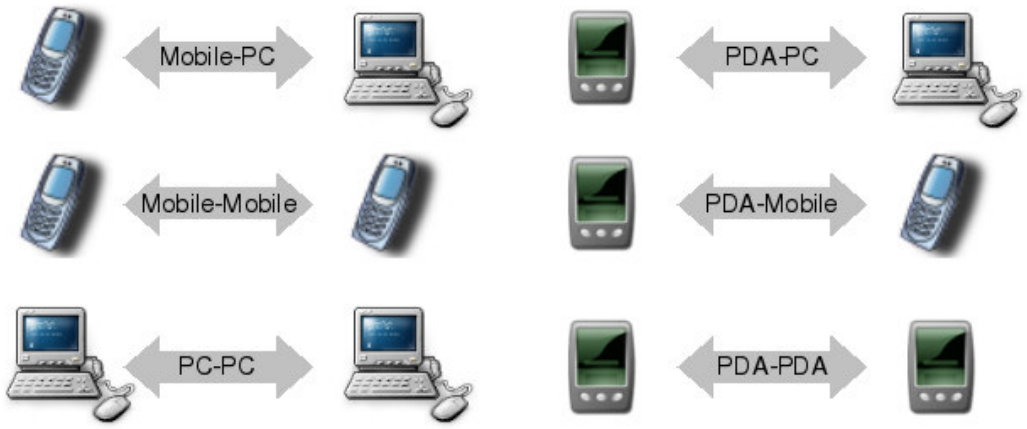
The complexity of the product to be validated and the huge functionality and complex interoperability that Test Cases must cover, made it impossible to start with the definition of the Test Cases from scratch. A brief introduction to the structure followed and a brief description of the concepts used is essential to facilitate a better understanding.

Test structure used is based on a tree hierarchy, containing the following items: Test Class, Test Sub Class, Test Case and Test Data. This structure is based on a functional-focussed strategy where the Test Classes represent either high-level independent functionality or wide-featured dependent functionality. Test Sub-Classes symbolize limited-featured dependent functionality. Test Cases address to individual functionality and Test Data are the concretion of Test Cases for different data.

This division can be, sometime, very subtle and depends on the experience and understanding of the testing team. Anyway, the organization can be modified if the implementation of new features clearly requires these changes.

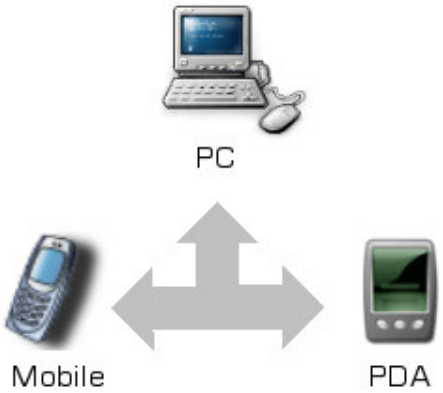
All specified test cases were executed with different clients just to ensure that COMET platform is working as it is expected. For testing purposes End to End validation has been performed communicating all kind of devices which each others.

	Client A	Client B
Test environment 1	Mobile	PC
Test environment 2	Mobile	Mobile
Test environment 3	PC	PC
Test environment 4	PDA	PC
Test environment 5	PDA	Mobile
Test environment 6	PDA	PDA



Communications between multiple different clients (Groups)

	Client A	Client B	Client C
Test environment 7	PDA	PC	Mobile



For E2E validation, all specified test cases were executed with different Operative System just to ensure that COMET platform is working as it is expected. COMET provides access to the messaging service via multiple and heterogeneous networks and using multiple and heterogeneous client devices in a consistent, easy-to-use and easy-to-access way.

Operative System
Symbian Series60 (edition II)
Symbian Series60 (edition III)
Windows XP

TOOLS

The need of a study in depth of all the relevant tools was identified for the implementation of the processed. Tools were defined for:

1. **Test cases Specification.**

   SQS TestWorkKFlow is a tool designed to help throughout the software validation process and has been used in COMET testing to specify the test cases and assure the traceability.
2. **Error Tracking and User Stories Management.**

   Mantis tool has been used to perform the error tracking and the management of the user stories. Mantis is a web-based tool for error-tracking.
3. **Automated testing.**

   Validation has been performed in an automated way, using a solution for automated test creation, execution and management. The Automation of validation tests provides easy and quick testing for the final certification of COMET on a board operator.

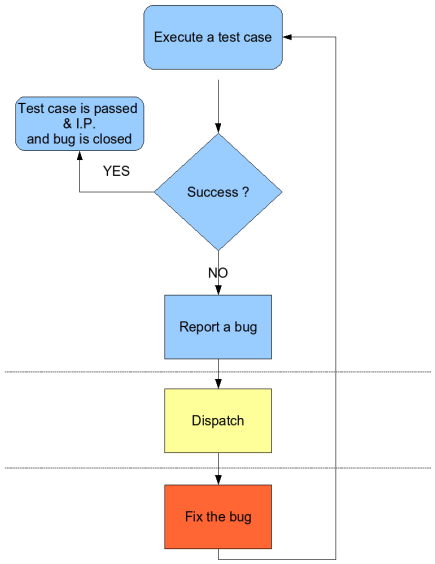
ERROR TRACKING

The Error Tracking can be summarized as follows:

- All errors have been stored in the Mantis database, and all of them are linked to a user story.
- All partners of the consortium have access to this database, and they have to check continuously the errors found in order to solve them.
- Each partner has to take those errors related to its developed component, in case of doubt, the integration team analyzes where the error was found and which partner it is the responsible for solving it.
- Once and error is corrected, the status of it changes.
- The validation team has been responsible of checking the status of all the errors, and executing all the test related to errors that were corrected in order to validate if they have been solved
- In case the error was not successfully corrected, the issue was submitted again and the process started again.

All COMET found bugs have been registered in Mantis system. Mantis is an open source popular web-based system that allows bug-tracking. This tool should be accessible by all COMET partners via Internet.

Every time the QA team (SQS) executed a test case and it failed, they must have reported an error to INTEGRATION TEAM for them to resend to the correspond team. As soon as the bug was fixed QA team should have been informed and the flow began again till the test case was successfully executed. All of this process is represented in the flow diagram:



CERTIFICATION

CERTIFICATION PRINCIPLES

The aim of the validation principles described, is the development of a Certification scheme for commercial applications/products based on COMET.

The results of validating COMET are sound basis for future certification schemes that will allow assessing the compatibility/interoperability of commercial products and solutions to the technology developed. This will allow the industry to identify and manage potential compliancy and interoperability issues in the IMS domain from day one.

CERTIFICATION OVERVIEW

Certification will follow these steps:

- **Operator's new user stories**

  If the COMET solution or a product based on it is commercially deployed by an operator, new user stories might be defined in order to assure the interoperability of the product in the operator's network or in response to new requirements defined.
  The validation/certification team will analyze, in this case, if the test cases defined in the end to end test cases definition document cover or not the new requirements.

- **Test cases definition to validate the new user stories**

  If new user stories have been defined, an analysis is done to ensure that the test cases cover these user stories. If the user stories are not covered, new test cases have to be defined. These new tests are added to the end to end test cases definition document, and executed by the validation and certification team.

- **Definition of most significant test cases to be executed**

  In order to provide a fast and profitable validation, the most significant test cases will be defined and executed for the operator. A core TestPlan will be defined with the test cases that are mandatory to be performed on any operator. The test cases must cover the COMET user stories and the new user stories defined by the operator.

- **Automation of test cases**

  The test cases will be automated for the certification phase. The automation will be performed using a tool that provides the validation team the possibility of defining and executing scripts and analyzing results in an easy way. The scripts needed to cover the tests will be developed and executed by SQS in an automated way. The Automation of validation tests will provide easy and quick testing for the final certification of COMET on a board operator.

VALIDATION ON CUSTOMER'S SITE AND ROLLOUT

For SQS the results of COMET End To End Validation are the ground on the deployment of a Test Lab specialized on IMS and New Generation Networks Testing Validating and Certifying.

During the COMET project, the SQS team has acquired knowledge and experience on testing and validating this type of systems, and sat infrastructure and expertise basis to perform End To End Validation and Certification issues for any commercialization process of IMS products, based or not on COMET. SQS team is able to certify interoperability of the product on any operator's site and perform a fast and profitable roll-out, assuring good quality of the product deployed.