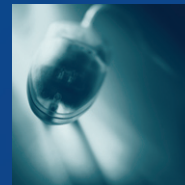


SITQ-a

TETRA

TETRA Handset Approval Automation

SITQ's proposal has the aim to automate the majority of the handset tests (> 80%) and the majority of test cases (> 80%). There may be limits in case of very specific handsets (e.g. capacitive touch screen displays) and very specific tests (e.g. testing dynamic changing T9 algorithm).



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Customer Requirements Analysis

Following our discussions several customers have the aim to increase the number of devices tested and / or the test depth of devices.

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Typically operators are executing several hundreds of highly important test cases per handset; some hundreds different handsets per year and each handset need to be tested between 3 .. 4 times before it's formally qualified.

On the other hand manufactures are executing around thousand test cases per handset; some tenth different handsets per year and each handset need to be tested between several tenth times before it's formally qualified.

This is today done by employees and freelancers manually executing an internal confidential test case list. SITQ ensures that the test script development needed for the automation can be done by customer engineers with limited support of SITQ engineers. Therefore it's not mandatory to deliver this confidential document to SITQ.

SITQ Automation Proposal

SITQ handset test automation proposal is based on SITQ tools for test execution, distribution, control and documentation. On top of this SITQ offers electromechanical robots combined with cameras in order to test handsets without any change at the handsets (no additional wires soldered, no additional software inside the handset ...)

The handsets will be initially recognized at one Handset Test Station. The process is computer aided. The camera will take a picture of the handset, store it with an identifier (typically the handset name) and ask the engineer to identify keys and the LCD. This process will typically need < 5 minutes.

Next step is the scripting of the test cases for a specific phone. Test scenarios are implemented in a simple test language (JAVA style). The process is computer aided. There are two different use cases.

Use case #1 the handset is comparable but not equal to already implemented handsets (e.g. a specific manufacturer series of devices); in this case the engineer can use the already existing test scripts, check and change them. This process will typically need <= 50% of the time of one manual test.

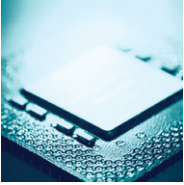
Use case #2 the handset is different to already implemented handsets; in this case the engineer must teach the robot totally new. This process will typically need ~ the time of one manual test.

Handset teaching can be done at normal working hours (normal shift); in the night and weekend shifts handset testing will be executed.

The handset testing with the overall manual effort of 40 hours will typically need 8 .. 12 hours.

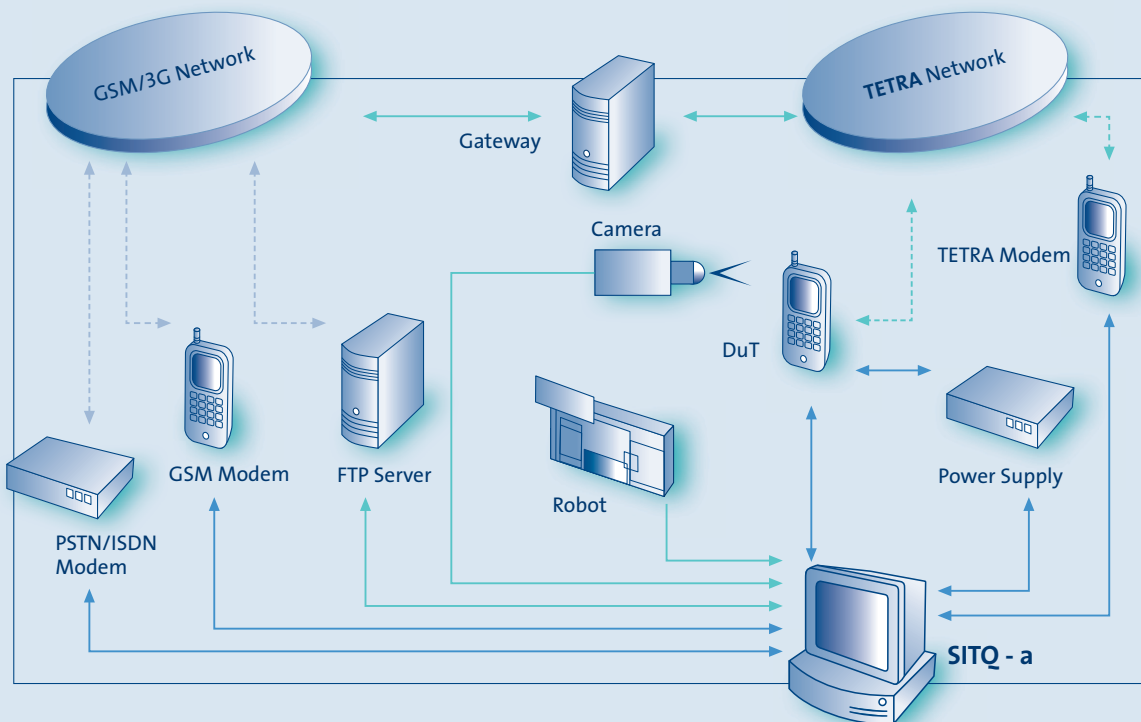
All information gathered at one Handset Test Station will be distributed (super user controlled) to all Handset test Stations available; this means handsets need to be taught only once. Sites which are not teaching do not need engineer's on-site but only clerks who can manually mount / change handsets from time to time.

Test orders and test results can be controlled centrally. The test lead engineer can start test execution centrally, will be informed about the progress and will get test results from all Handset Test Stations connected. He can generate reports of different styles (management reports .. engineering reports).



SITQ Automation proposal The automation proposal will be explained bottom-up.

Handset Test Station



The SITQ-a Handset Test Station is one of several equal / similar test execution work places. The Device under Test (DuT) will be fully controlled by a robot and a camera. Test cases will be translated into DuT key board pressings and text / picture recognition of the DuT LCD. The DuT data port (e.g. serial, IRDA, USB, BlueTooth) will be used for data payloads.

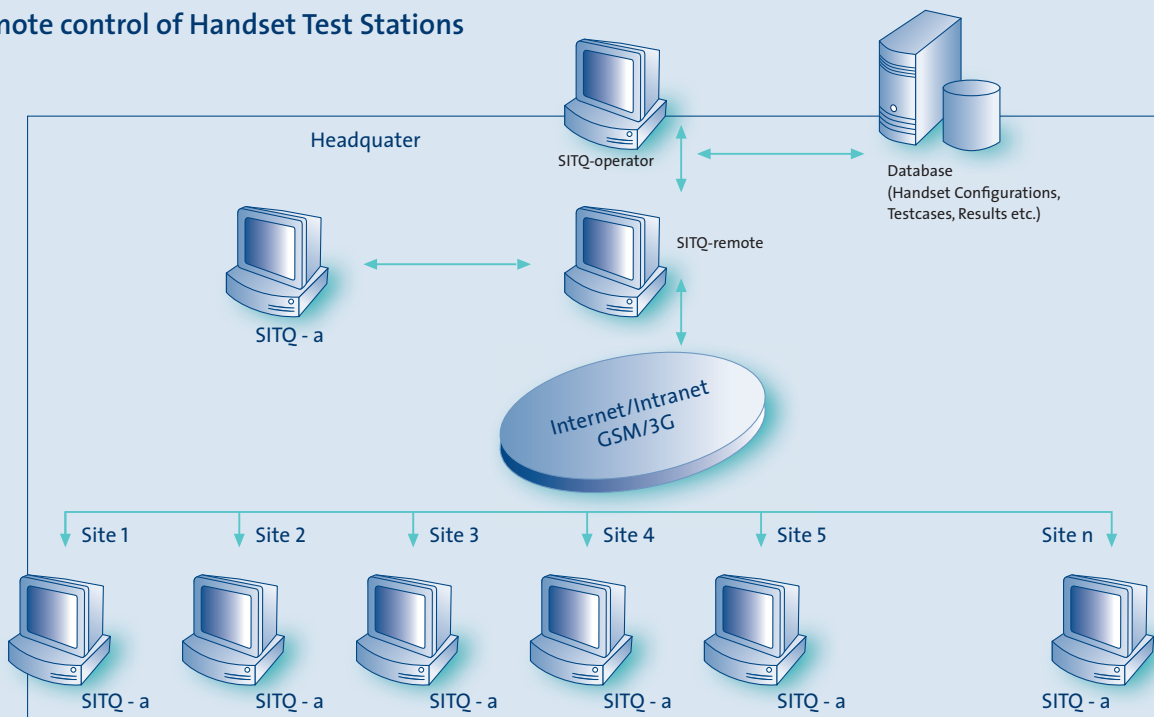
The PSTN/ISDN modem, the TETRA modem and the GSM modem are designed for test cases which may need a second device (e.g. MTC). The FTP server is designed for test cases which measures the data performance in controlled environment (e.g. throughput). The power supply is designed for test cases which measures the current (e.g. idle current) or which need to be performed with different voltages.

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TETRA Handset Approval Automation

Remote control of Handset Test Stations



SITQ-remote unit controls via any network (internet, intranet, GSM .. 3G network) several SITQ-a installations distributed either in the same lab or in several labs in different countries.

SITQ-remote units distribute test scripts and test suites as well as new SITQ-a software builds. SITQ-remote collects test results from the distributed SITQ-a Handset Test Stations.

Operating of Remote controlled Handset Test Stations

SITQ operator allows configuring test orders, downloading software builds, downloading test suites, starting test suites, to get progress reports (via e-mail, SMS) and to get the results in different presentations (details for engineers, traffic light for managers).

The database stores all handset configurations, test scripts & test results.