Registry System Testing

Master Test Plan

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1. Introduction

This section gives an introduction to the Registry System Testing (RST).

1.1 Background

ICANN (Internet Corporation for Assigned Names and Numbers) perform technical tests of gTLDs (generic Top-Level Domains).

1.2 Purpose

The purpose of the Registry System Testing (RST) is to verify that the TLD meets the technical standards and the requirements of the Registry Agreement between ICANN and the Registry Operator of the TLD.

1.3 Goals

Each of the requirements will be broken down into a set of test procedures. The process of doing this will be done by following the standard IEEE 829-2008 with some adoptations.

1.4 Scope

Only the requirements given (and referred to) in the agreements between the RST Service Provider and ICANN will be used as a foundation for the test cases. The set of testing documents will focus on the actual test cases and procedures rather than the testing system.

This document, the RST Master Test Plan, defines the procedure of an RST test and what Test Areas that are available. Indirectly, through the Test Area documents, the Test Cases are defined.

This document does not define what tests to actually execute when an RST test is performed. It is defined in the RST Type Test Plan for each RST Type.

1.5 Test Areas and Test Cases

RST is divided into several Test Areas, e.g. DNS and Whois. Each Test Area defines a number of Test Cases. A Test Area is not a test to be performed, is a collection of its Test Cases.

1.6 RST Type

Each RST Type has its own Test Plan that defines the actual tests to be performed for that RST Type.

1.7   References
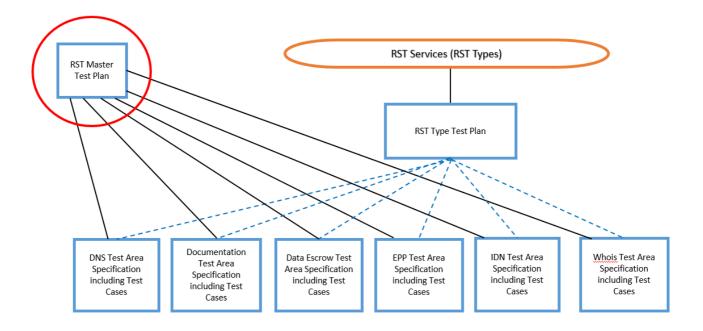
1.7.1   External

- IEEE 829-2008
- ICANN gTLD Applicant Guidebook, Version 2012-06-04
- TLD Registry Agreement (RA) per TLD
- IETF RFCs

1.7.2   Internal

- Statement of Work between ICANN and RST Service Provider
- Registry System Testing, DNS Test Area Specification
- Registry System Testing, Whois Test Area Specification
- Registry System Testing, EPP Test Area Specification
- Registry System Testing, IDN Test Area Specification
- Registry System Testing, Data Escrow Test Area Specification
- Registry System Testing, Documentation Test Area Specification
- RST Type Test Plans

1.7.3   RST Test Type

1.7.4   Document Hierarchy

This document is the Master Test Plan for RST (circled in red in the above graphic). Full details of the Test Areas and its Test Cases are found in the Test Area Specifications.

1.8 System overview and key features

RST includes both reviewing of submitted documentation and tests of system interfaces of Internet. This includes:
- Whois
- EPP
- DNS/DNSSEC
- Data Escrow
- DNSSEC Practice Statement (DPS)
- IDN Tables

1.9 Test overview

The test organization, test schedule, integrity level scheme, test resources, responsibilities, tools, techniques, and methods are necessary to perform the testing.

1.9.1 Organization

The tests are executed in the Test System (TS) by the Test Leaders and the Test Officers. Input parameters are collected by the external facing Registry System Testing system (https://rst.iis.se/) and the results are reported back to the internal OTRS ticketing system for further analysis.

1.9.2 Master test schedule

The RST Testing scheduling is handled by ICANN. The scheduling is delivered as a feed from the ICANN database to the OTRS system.

Re-execution of individual tests may be scheduled by the test system.

1.9.3 Integrity level schema

An integrity level schema is used for illustrating relative importance of a software component. The effect of a failing component can range from negligible to catastrophic. A component with a high integrity level needs to be tested more thoroughly than a component with a low level. There is, however, no guidance in the requirements that indicate the relative importance of different areas. Each area is thus considered equally important. However, one of the main objectives is to ensure the stability of DNS.

1.9.4 Resources summary

There are two types of resources working with the tests:
- Test Leader – Initiate and coordinate the tests for a single TLD.
- Test Officer – The ones performing the tests in each test area.

1.9.5 Responsibilities

The Registry Operator selects a time slot for when the RST test should be performed on their systems and documentation. ICANN then delivers the test schedule to the RST Service Provider. Tickets are created and assigned to a Test Leader in the OTRS based on the test schedule. The Test Leader will review the task and assign Test Officers for the different test areas. The Test Officers are the ones performing the actual tests.

1.9.6 Tools, techniques, methods, and metrics

The automated and scripted tests are performed in the Test System. The Test System consists of a Test Master and Test Nodes. All of the tests are initiated from the Test Master and can be run on the different Test Nodes. There is at least one Test Node in each ICANN region using both IPv4 and IPv6: Africa, Asia/Australia/Pacific, Europe, Latin America/Caribbean islands, and North America.

Each test area is automated as much as possible and uses different support tools and scripts. Below is a list of tools used for each test area:

- **DNS** – DNSCheck integrated in DNS Test Script
- **Whois** – netcat integrated in Whois Test Script
- **EPP** – PHP registrar script integrated in EPP Test Script
- **Data Escrow** – GnuPG integrated in Data Escrow Test Script
- **IDN** – IDN table analyzer

2.   Details of the Master Test Plan

The utilization of the IEEE 829-2008 is described in this chapter. There is also a mapping between the test areas and the requirements.

2.1   Test processes

The goal of these documents is to describe the test cases and how the new gTLDs are tested. This is just a part of a larger project where the only goal is to do testing. Processes for Management, Acquisition, Supply, Development, Operation, and Maintenance are not part of this subproject to define.

2.2   Definition of test levels (Test Areas)

There can be different types of tests, e.g. unit, system, and acceptance tests. This test environment will only focus on acceptance testing, thus only one test level. Multiple areas have however been identified within the system requirements:
- DNS
- Whois
- EPP
- IDN
- Data Escrow
- Documentation

These areas are defined as horizontal levels within the acceptance test level.

2.3   Test documentation requirements

The following documents can be created according to the standard:
- Level Test Plan (LTP)
- Level Test Design (LTD)
- Level Test Case (LTC)
- Level Test Procedure (LTPr)

The LTD, LTC and LTPr has been incorporated in the LTP, and is here called Test Area Specification.

2.3.1   Level Test Plan

The systems will undergo acceptance testing against the requirements each time a change is introduced. Each area is documented in a separate test plan (Test Area Specification). The purpose is to map the requirements into test cases and also to describe the approach for testing this level (Area).

In the title of the document, the name of the Area is included.

2.3.2   Level Test Case

The purpose of the LTC is to define the information needed as it pertains to inputs to and outputs from the software or software-based system being tested. LTC is included in the Test Area Specification.

2.4   Test administration requirements

These activities are needed to administer the tests during execution.

2.4.1 Anomaly Resolution

The tests are executed with the input given by the registry of the TLD to be tested. The input data is validated against the corresponding XML schema and assertions made in the application. However, it can be the case that a test will not run successfully because:

- Wrong input was given by the registry
- Wrong information was gathered
- The test is not written correctly
- There are issues with the communication between the test environment and the registry's services

The Test Officer must investigate why the test was not run successfully. In most cases this can be resolved after a clarifying question to the registry.

2.4.2 Reporting Processes

Each test area is reported separately back to the Review System where the overall assessment is performed.

2.5 Test reporting requirements

The following documents can be created according to the standard:

- Level Test Log (LTL)
- Anomaly Report (AR)
- Level Interim Test Status Report (LITSR)
- Level Test Report (LTR)
- Master Test Report (MTR)

The LITSR has been excluded from this test environment, since there will always be an LTR generated by the system.

2.5.1 Level Test Log

Each automated test will generate a log based on the output from the test script. The format does not follow the IEEE standard, but is intended to be machine readable.

The review of the self-certification and other documents will however comply with the standard.

2.5.2 Anomaly Report

An Anomaly Report is created if the result from the test is not conclusive due to internal or external anomalies. It gives suggestions on how the issue can be resolved, but it needs approval either from ICANN.

2.5.3 Level Test Report

The results from the test areas are reported back to the Review System. It contains a summary of the different tests.

2.5.4 Master Test Report

The Master Test Report is created once all of the test areas have been finalized. It will give the recommendation to ICANN whether the TLD has passed or failed the tests.

2.6 System requirements

The initial requirements are found in the Statement of Work. Some of the requirements are also referring to requirements in the ICANN gTLD Applicant Guide Book and the IANA Technical Requirements. Furthermore, there are additional requirements based on policy documents set by ICANN.

2.6.1 gTLD Applicant Guide Book

Module 5 in the gTLD Applicant Guide Book (AGB) describes the final steps for the gTLD before it can be delegated. There is a mixture of test areas, as defined in section 2.2, e.g. DNS, document, and performance testing.

2.6.2 IANA Technical Requirements

IANA clearly defines the requirements on authoritative name servers and the DNSSEC trust anchors.

3.   General

This section contains the glossary and document change procedures for all of the test plans and test cases.

3.1   Glossary

Word / Acronym	Explanation
AGB	Applicant Guidebook
AR	Anomaly Report
DNS	Domain Name System
DNSSEC	DNS Security Extensions
EPP	Extensible Provisioning Protocol
IDN	Internationalized Domain Name
LTC	Level Test Case
LTL	Level Test Log
LTP	Level Test Plan
LTR	Level Test Report
MTP	Master Test Plan
MTR	Master Test Report
Registry	Organization or company responsible for the operation of the TLD or designated functions necessary for the TLD
SOW	Statement of Work
Test Master (TM)	System used by the RST Provider to coordinate the Test Nodes.
Test Nodes (TN)	System used by the RST Provider to perform tests in different regions.
Test Officer	Testing services personnel responsible for executing one or several RST tests.
Test System (TS)	System used by the RST Provider to perform tests on the Registry Operator's systems. The test System consists of Test Nodes and the Test Master.

3.2 Document change procedures

The overall change procedures are defined by the project and the change management. However, there are some steps to take into consideration when changing the test documents.

3.2.1 Identifying

A change to the documents may be initiated because of several reasons, e.g.

- New internal or external requirements
- Problems with the test cases
- Texts that needs to be clarified

3.2.2 Implementing

The documents are handled by the internal document management software.

It is important that the outcome of the test cases stays the same unless the change was based on new or updated requirements by ICANN.

3.2.3 Recording Changes

An overall description must be stated in the document control chapter, including a new revision number. A more detailed description of the changes is sent together with the document for approval.

3.2.4 Approving

The updated documents can be sent to ICANN for approval after the changes have been reviewed internally.