



## CUHK ALE Middleware - Test Plan

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### Revision History

Date	Ver./Rev.	Description	Author
31 Aug 2007	1.0	First Release	Daiming Qu



### 1 Introduction

This document describes the test plan of CUHK RFID Middleware.

#### 1.1 Scope

The types of testing that will be addressed by this plan are functional test and performance test.

#### 1.2 Reference

The test plan is designed based on the EPCglobal Applicatoin Level Event Specification.

### 2 Test Strategy

By nature of ALE middleware architecture, the functionality of ALE is to provide a set of APIs via Web services. Therefore the functional tests are designed based on the available set of web service APIs, and a testing software – ECSpec Explorer, is developed for testing purpose.

ECSpec Explorer is an application that can view all defined ECSpec subscribers via user-friendly interface. Besides, it also supports all existing ALE APIs.

The differences between testing via ECSpec Explorer and internal unit test cases include the following:

1. ECSpec Explorer can simulate the exact application side action;
2. All underlying APIs are called via SOAP in ECSpec Explorer; and
3. Normal unit tests are run within the same sandbox, which makes ECSpec Explorer a better candidate for functional tests.

In an isolated environment, testers may not able to utilize a real tag reader to simulate tag arrival. It is assumed that testers will have basic knowledge on using tag emulator to trigger a tag arrival / departure in this case.

In performance tests, a set of capacity profiling tools should be used, as listed in the followings:

1. System Internals' Process Explorer
  - Monitor real-time resource consumption within 1 hour
2. Health Monitor from <http://healthmonitor.zucchetti.com> [GPL]
  - Monitor CPU and memory consumption, sampling at every 1 minute
3. Apache JMeter
  - Load testing with multiple SOAP messages
4. MySQL Administrator
  - Monitor MySQL performance

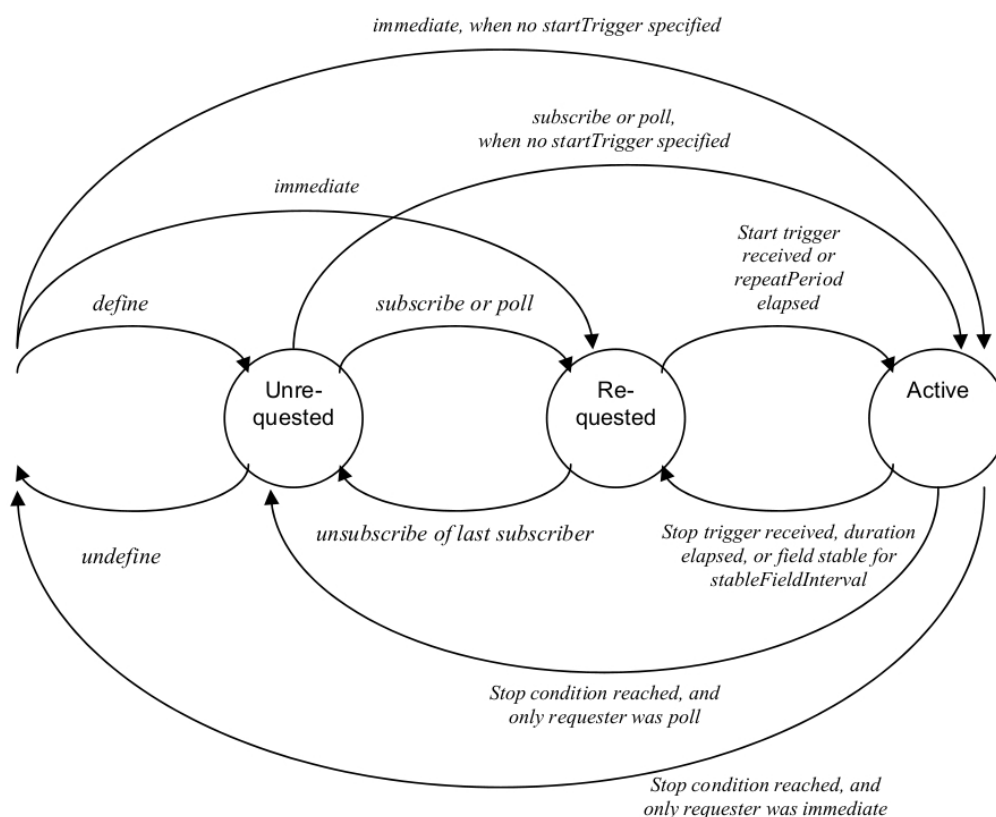
It is assumed that the testers will have basic knowledge on the above common profiling tools when running the performance tests.



## 2.1 System Testing

### 2.1.1 Functional Tests

All functional test cases are designed base on the following state diagram, which is extracted from EPCGlobal ALE Specification:



Although the above is a visualization of internal states, each state transition should be triggered by external actions, such as start/stop trigger, tag arrival, Ecspec duration reached and Ecspec definition, etc. As a result, functional tests are designed in view of the above diagram. For instance, the following procedures constitute a complete flow of the functional test cases:

1. Tester starts ECSpec Explorer
2. Tester defines a Ecspec based on a sample Ecspec XML
3. Tester subscribes a Ecspec
4. Tester triggers a tag read (via emulator or real reader)
5. Tester waits until Ecspec duration ends
6. Tester unsubscribes the Ecspec
7. Tester undefines the Ecspec



### 2.1.2 Performance Profiling

In order to ensure that the system is working within the capacity of the environment, performance profiling is needed. In general, performance testing measures static and dynamic resource consumption such as CPU consumption, memory, virtual swap, and the relation with dynamic settings, which include number of request, variety of content processing, etc.

Two java programs are developed in order to test the performance:

1. Tag Loader – An application that sends random tags to the Reader Adaptor in a predefined rate, e.g. 100 tag/s
2. SOAPALEServiceClientLoadTestCase – An application that creates a predefined number of ECSpec(s)

### 3 Tools

The following tools are required for this project:

Test Types	Tools
Functional testing	CUHK ECSpec Explorer
Performance testing	<ol style="list-style-type: none"><li>1. System Internals' Process Explorer</li><li>2. Health Monitor</li><li>3. Apache JMeter</li><li>4. MySQL Administrator</li></ol>