|  |  |  |
| --- | --- | --- |
|  |  |  |
| E-12446-01-01\_RS\_01 |  | Rel Date |
| Description: E:\New Mysore 2013 Oct\TS Transformation\lnt ts_logo.jpg | | |
| **LTTS\_Motorola\_Co-Existence Testing** | | |
| Requirements Specification | | |
|  | | |
|  | | |
|  |  |  |
|  | Ver – 1.0 |  |
|  |  |  |
|  |  | EMB\_RM\_01F/8.2/17-Apr-18 |
|  |  |  |

DOCUMENT HISTORY

| **Ver. Rel. No** | **Release Date** | **Mod.By**  **Mod. Dt** | **Rev. By**  **Relevant Stakeholders**  **Rev. Dt.** | **Auth By**  **Auth Dt.** | **Remarks/ Revision details** |
| --- | --- | --- | --- | --- | --- |
| 1.0 | 03-Apr-2020 | Bhargav Kumar | Raghavendra | Raghavendra |  |
| 03-Apr-2020 | 05-Apr-2020 | 05-Apr-2020 |
|  |  |  |  |  |  |
|  |  |  |

**Table of contents**

[1.0 Introduction 4](#_Toc37752582)

[1.1 Purpose of this project 4](#_Toc37752583)

[1.2 Key success Factors 4](#_Toc37752584)

[1.3 Stakeholders Reference 4](#_Toc37752585)

[1.4 References 4](#_Toc37752586)

[2.0 Project Descriptions 4](#_Toc37752587)

[2.1 Product / Project Overview 4](#_Toc37752588)

[2.2 Block Diagram 4](#_Toc37752589)

[2.3 Scope of the Project 5](#_Toc37752590)

[2.4 Not in the scope of the Project 6](#_Toc37752591)

[2.5 Product Functions / General Descriptions 6](#_Toc37752592)

[2.6 Annual quantity/ prototype quantity 6](#_Toc37752593)

[2.7 Expected product life 6](#_Toc37752594)

[2.8 Similar System Information 6](#_Toc37752595)

[2.9 System Environment 7](#_Toc37752596)

[2.10 Tools / Software /components agreed to be supplied by the customer 7](#_Toc37752597)

[2.11 Design and Implementation Constraints 7](#_Toc37752598)

[• Constraints from Test System Perspective (TBD) 7](#_Toc37752599)

[• Constraints from Android Perspective (TBD) 7](#_Toc37752600)

[• Constraints from Modem Framework Perspective (TBD) 7](#_Toc37752601)

[2.12 Assumptions and Dependencies 7](#_Toc37752602)

[2.13 Customer Requirements on Retention period & “Hazard Analysis” 7](#_Toc37752603)

[3.0 Application Environment 8](#_Toc37752604)

[3.1 Business Context 8](#_Toc37752605)

[3.1.1 Environment 8](#_Toc37752606)

[3.1.2 Functions 8](#_Toc37752607)

[3.1.3 Problems / Risks to be watched for 8](#_Toc37752608)

[3.2 Operational Concepts & Scenarios: 8](#_Toc37752609)

[Android test application to work as a client. Testing is driven from server (test system). All the commands sent from Test Application should be honoured. 8](#_Toc37752610)

[3.3 User Profiles 8](#_Toc37752611)

[3.4 Cost 8](#_Toc37752612)

[4.0 Details of requirements gathering process 8](#_Toc37752613)

[4.1 Strategy / Process adopted for Requirements Gathering and Elicitation 8](#_Toc37752614)

[5.0 Requirements Specifications 9](#_Toc37752615)

[5.1 System Requirements 9](#_Toc37752616)

[5.2 Software Requirements 9](#_Toc37752617)

[Launching Android test application in the background (without UI). It should launch with device power ON. 9](#_Toc37752618)

[NA 9](#_Toc37752619)

[Test application should launch with or without configuration file 9](#_Toc37752620)

[SWR\_01 10](#_Toc37752621)

[Uninstall and reinstall the application. Application should also run in daemon process in the next power cycle 10](#_Toc37752622)

[SWR\_01 10](#_Toc37752623)

[After launching Test App should establish and listen to two Internet Protocol (IP) sockets. 10](#_Toc37752624)

[SWR\_02 10](#_Toc37752625)

[Verify application can communicate through Wi-Fi AP 11](#_Toc37752626)

[SWR\_04 11](#_Toc37752627)

[Verify application can communicate through USB 11](#_Toc37752628)

[SWR\_04 12](#_Toc37752629)

[Once the Test App is launched it should able to receive all types of commands with various parameters(JSON format) 12](#_Toc37752630)

[SWR\_03 12](#_Toc37752631)

[Once the Test App is launched it should able to reply to all types of commands with various parameters(JSON format) 12](#_Toc37752632)

[SWR\_07 13](#_Toc37752633)

[SWR\_08 13](#_Toc37752634)

[NA 14](#_Toc37752635)

[NA 14](#_Toc37752636)

[NA 15](#_Toc37752637)

[NA 15](#_Toc37752638)

[NA 16](#_Toc37752639)

[NA 16](#_Toc37752640)

[5.3 Hardware Requirements 16](#_Toc37752641)

[5.4 Engineering Requirements 16](#_Toc37752642)

[5.5 Non-Functional Requirements 16](#_Toc37752643)

[5.6 Operational Requirements (OPR) 17](#_Toc37752644)

[5.7 Product Standards Requirements (PSDR) 17](#_Toc37752645)

[5.8 Safety Requirements (SFR) 17](#_Toc37752646)

[5.9 Statutory/Regulatory Requirements (SR) 17](#_Toc37752647)

[5.10 Mechanical/EMI EMC Requirements (EMI/EMC) 17](#_Toc37752648)

[5.11 Security Requirements (SCR) 17](#_Toc37752649)

[5.12 Reliability Requirements- (RLR) 17](#_Toc37752650)

[5.13 Availability Requirements – (AVR) 17](#_Toc37752651)

[5.14 Maintainability Requirements – (MTR) 17](#_Toc37752652)

[5.15 Manufacturing Requirements (MFR) 17](#_Toc37752653)

[5.16 Installation /Servicing Requirements (ISR) 17](#_Toc37752654)

[5.17 Product Obsolescence (PRO) 17](#_Toc37752655)

[5.18 Usability Requirements (UR) 17](#_Toc37752656)

[5.19 User training Requirements (UTR) 18](#_Toc37752657)

[5.20 Sterilization/Cleanliness related Requirements (SCRR) 18](#_Toc37752658)

[6.0 Implicit Requirements 18](#_Toc37752659)

[7.0 Non-Technical Requirements 18](#_Toc37752660)

[7.1 Deliverables and Acceptance Criteria 18](#_Toc37752661)

[8.0 Special Requirement 19](#_Toc37752662)

[9.0 Test Strategy 19](#_Toc37752663)

[10.0 Glossary 19](#_Toc37752664)

# Introduction

## Purpose of this project

To provide detailed requirements for Co-existence testing application used in Converged Devices.

## Key success Factors

* Should be able to test all the scenarios defined by the test system

## Stakeholders Reference

* Pasula Bhargav Kumar(PL): [pasula.bhargav@ltts.com](mailto:pasula.bhargav@ltts.com)
* Raghavendra CS(PM): [raghavendra.cs@ltts.com](mailto:raghavendra.cs@ltts.com)

## References

1. Test Design Document (customer document)

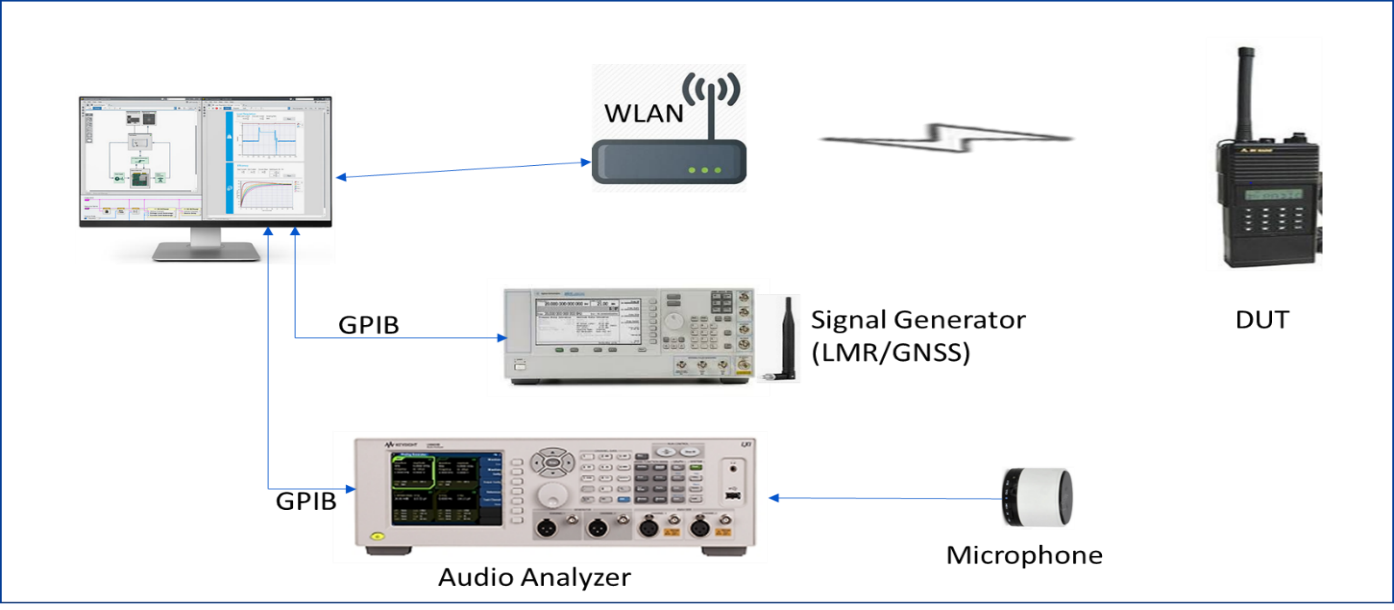
2. Interface Control Document (customer document)

# Project Descriptions

## Product / Project Overview

* To develop Software interface for coexistence testing application for converged Motorola radio devices (LMR + LTE + BT + WLAN + GNSS + NFC). This would be an android O application running in background (without UI). This application to accept test commands and scripts, execute the test and send back the results through WiFi AP interface to test system

## Block Diagram



## Scope of the Project

* Android test application should run as a background (no UI) application on Android O. Architecture of the application should be designed in such a way that the Android OS upgrades should have no or minimum impact on the application. Application will be pre-built with the system image as it needs the access to QMI/Telephony APIs that are not available as part of SDK.
* Application should be able to communicate with test system via Wi-Fi AP using below approaches
* Application should be able to communicate with test system via Wi-Fi AP using below approaches
  + DUT and test system will have fixed IP Address.
  + Test system will open the communication on DUT IP Address directly.
  + Test system can send defined commands to DUT over Wi-Fi AP.
* Application should put Qualcomm modems into FTM (Factory Test Mode) or Normal Mode using QMI/Diag APIs exposed by the Qualcomm from the modem side and the API from the Telephony Manager
* Application should put non-Qualcomm modems (LMR, NFC) into FTM (Factory Test Mode) or Normal Mode using MOTOROLA provided APIs
* Application should communicate with Qualcomm modems (LTE, WLAN, BT, GNSS) using Qualcomm specific APIs (QMI/Diag interface) LTTS needs to determine the method to control these modems.
* Application should use the APIs to communicate with modems. MOTOROLA shall expose any such APIs to test application (through AP)
* Application should receive various information from modem/device as mentioned below
  + Receive benchmark RSSI/SNR/Temperature measurement after configuring Victim
  + Receive RSSI/SNR/Temperature after starting the test (with aggressors)
  + Buffer the RSSI/SNR/Temperature readings and send it back to test system
* Application should allow suitable downtime or cool down time allowing device temperature to come down

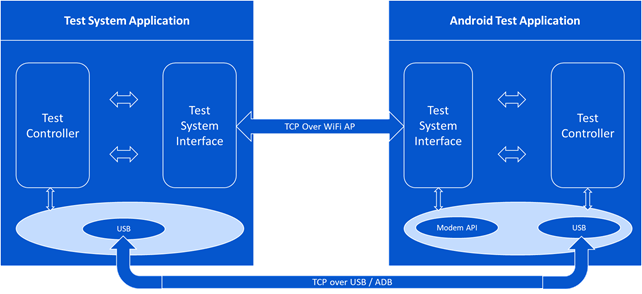
to benchmark level.

* Application should put modems in either continuous Rx or continuous Tx mode.
* Should configure modems for Victim/Aggressor as mentioned below
  + Aggressors: LMR, LTE, WLAN, BT, NFC
  + Victim: LMR, LTE, WLAN, BT, GNSS (any one at a time)
* At any point of time only one victim (except NFC) and rest all modems will be aggressors (except GNSS)
* Modems should be configured with various modem parameters (Band, Bandwidth, Frequency, Channel Spacing, Protocol/Modulation type, Transmit Power Level, Audio settings)

## Not in the scope of the Project

* Test system
* Testing the device
* Modem APIs, interface with modem subsystem
* Application running on the Test System, LabView or TLR
* Analysis of results received from the subsystem.

## Product Functions / General Descriptions



* Test application to communicate with test system over WiFi/USB using TCP sockets
* Test system is a client and should respond to test system commands to send/receive any data**.**
* Application shall listen to 2 IP sockets,one on WiFi AP and another one on USB (later is for backup).

## Annual quantity/ prototype quantity

* Its one-time delivery no maintenance required
* Application to be generic so that customer can maintain themselves

## Expected product life

* Application to be generic so that customer can maintain themselves

## Similar System Information

* No such system is available in LTTS

## System Environment

* Motorola proprietary test system
* Signal generator and local test system will be decided post 14th April
* Andriod O
* L&T provided laptops and desktops with standard configuration

## Tools / Software /components agreed to be supplied by the customer

* LMR Radios
* Motorola Code base Access for SDM660
* Qualcomm Create point access for technical documentation (QMI, DIAG, FTM Commands) specific to the chipset
* MOTOROLA to provide the QMI APIs with the signature required for LMR and Qualcomm RF interface for testing.
* Communication protocol Interface between DUT (Victim) and Aggressor

## Design and Implementation Constraints

### Constraints from Test System Perspective (TBD)

### Constraints from Android Perspective (TBD)

### Constraints from Modem Framework Perspective (TBD)

## Assumptions and Dependencies

.

* Test system application will be developed by Motorola by following the communication command guidelines defined by both parties.
* MOTOROLA shall provide 3 radios (modified RF with power adaptors) for development/testing.
* Test system and DUT will communicate via Wi-Fi Access Point (AP) or with USB with fixed IP address
* Test system application (server) will provide by client
* Actual testing will perform by client

## Customer Requirements on Retention period & “Hazard Analysis”

**NA**

# Application Environment

## Business Context

### Environment

#### Not in the scope of LTTS

#### Signal generators are used only for LMR and GNSS

#### LMR: SINAD will be used to compute test verdict

#### GNSS: involves CW and should measure SNR

#### LTE/WLAN/BT/NFC doesn’t require signal generators

### Functions

#### Android test application to work as a client. Testing is driven from server (test system)

### Problems / Risks to be watched for

#### Customer to clear some requirements on GNSS testing, LMR & NFC testing APIs

## Operational Concepts & Scenarios:

### Android test application to work as a client. Testing is driven from server (test system). All the commands sent from Test Application should be honoured.

## User Profiles

Role : Client

Functional Area : Client application

Needs/Expectations from the system : All the commands sent from Test Application should be honoured.

## Cost

Application to be completed and delivered on 15th June 2020

# Details of requirements gathering process

## Strategy / Process adopted for Requirements Gathering and Elicitation

* Interface control document and Test design document provided by customer from those documents created required architectures and functionalities of application.

# Requirements Specifications

All the requirements are segregated into Technical & Non-Technical requirements. The technical requirements are captured in section 6.0 and the Non-technical requirements are captured in sec 8.0.

The Requirements Specifications have been divided into five categories

1. System Requirements
2. Software Requirements
3. Hardware Requirements
4. Engineering Requirements and
5. Non-Functional Requirements

## System Requirements

NA

## Software Requirements

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_01 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | Launching Android test application in the background. |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | NA |
| **Expected Results with acceptability limits, Wherever applicable** | Application should launch in the background. It should launch automatically when device powers ON or when device reboots or when the application crashes |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_02 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | Application launch with or without configuration file |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | SWR\_01 |
| **Expected Results with acceptability limits, Wherever applicable** | 1. Application should launch successfully with valid configuration file 2. With invalid configuration: Application should launch, dump the error into logfile |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_03 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | Uninstall and reinstall the application |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | SWR\_01 |
| **Expected Results with acceptability limits, Wherever applicable** | Un installing the application should remove all the context and data  After power cycle app should launch and execute normally |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_04 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | Application to listen to two Internet Protocol (IP) sockets (over USB and WiFi) |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | SWR\_02 |
| **Expected Results with acceptability limits, Wherever applicable** | Test app should establish TCP/Ip sockets with test system via below interfaces  Through Wi-Fi AP and Through USB connected to DUT.  Note: valid configuration file should be present |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_05 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | Application to communicate through Wi-Fi AP |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | SWR\_04 |
| **Expected Results with acceptability limits, Wherever applicable** | On sending any commands through Wi-Fi AP application should reply with proper ACK/error message  1.Application should establish communication through Wi-Fi  2.Disable USB communication  3.Send any command and check for ACK |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_06 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | Application to communicate through USB |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | SWR\_04 |
| **Expected Results with acceptability limits, Wherever applicable** | On sending any commands through USB DUT to send ACK  1.Application should establish communication through USB  2.Disable Wi-FI communication  3.Send any command and check for ACK |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_07 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | Application to receive all types of commands with various parameters (as per JSON format) |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | SWR\_03 |
| **Expected Results with acceptability limits, Wherever applicable** | Test App shall be capable of receiving all commands and all parameters in JSON format, below are the commands list.  CONFIG\_AGGRESSOR  CLEAR\_CONFIG  CONFIG\_VICTIM  EXECUTE\_TEST  STOP\_TEST  GET\_RSSI  GET\_RESULTS |
| **Method of Verification** | Manual verification required for each command |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_08 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | Application to reply to all commands with various parameters (JSON format) |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | SWR\_07 |
| **Expected Results with acceptability limits, Wherever applicable** | Test App shall be capable of reply to all commands and with various parameters (after validating with JSON file) below are the replies  ACK\_CLEAR\_CONFIG  ACK\_CONFIG\_VICTIM  ACK\_EXECUTE\_TEST  ACK\_STOP\_TEST  TEST\_COMPLETE |
| **Method of Verification** | Manual verification required for each command with proper parameters |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_09 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | App shall be capable of sending ACK with error code back to the test system |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | SWR\_08 |
| **Expected Results with acceptability limits, Wherever applicable** | Once Test App able to receive the commands it need to verify that the parameters are in range by comparison to the ranges in the configuration file and then send the ACK command with error back to the test system |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_10 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | Application to send ACK with proper error messages back to the test system for each command received |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | NA |
| **Expected Results with acceptability limits, Wherever applicable** | Once Test App able to receive the commands it need to, verify that the parameters are in range by comparison to the ranges in the configuration file, **if out of range** and then send the ACK command back to the test system |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_11 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | Once Test App able to configure the modem it has to receive EXECUTE\_TEST command to begin test sequence, Test App shall respond to this command with the ACK |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | NA |
| **Expected Results with acceptability limits, Wherever applicable** | Test App able to start the test sequence once it receives Execute\_Test command |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_12 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | After the test App has been completed, the DUT Test App will return to idle mode, listening for commands asking for the test results and configuration commands for the next test. |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | NA |
| **Expected Results with acceptability limits, Wherever applicable** | App shall be moved to idle on post execution of the test case. |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_13 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | After the test App has been launched and able to configure all modems app has to receive CLEAR\_AGGRESSORS and has to clear the entire aggressor modem list |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | NA |
| **Expected Results with acceptability limits, Wherever applicable** | DUT Test App shall reply with the ACK message back to the Test Setup |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_14 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | After the Test App has been launched and able to Enable all aggressors in the aggressor list and wait for the STOP\_TEST command |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | NA |
| **Expected Results with acceptability limits, Wherever applicable** | DUT Test App should, disable all aggressors/victim and move to the idle state |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

|  |  |
| --- | --- |
| **Requirement Id.** | SWR\_15 |
| **Reference** | 1. ICD Document: [https://docs.google.com/document/d/1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1eCujX-sfJ4aa4Fu2OglcNjT2v-8lHAlFqr723rJMP9A%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=%2FH20KtinZNSSB8oqBdQ9DxqnJCGavD0wMOMKzdXq2SA%3D&reserved=0) 2. TDD Document- [https://docs.google.com/document/d/1\_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR\_SI/edit?usp=sharing](https://ind01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdocs.google.com%2Fdocument%2Fd%2F1_-Enilej398UrpOXnqGn2BDzbkzurt3K-iwhkRvR_SI%2Fedit%3Fusp%3Dsharing&data=02%7C01%7Cpasula.bhargav%40ltts.com%7Cce8d8725779e4376100c08d7da6e3cc7%7C311b33788e8a4b5ea33fe80a3d8ba60a%7C0%7C0%7C637218039328970641&sdata=LWO6Ay9N2M2q3vQ8N3BF6S5VDNCpU8MxM3hf7GjcIgs%3D&reserved=0) |
| **Description** | Once Test App able to configure the modem it has to receive EXECUTE\_TEST command to begin test sequence, then Test App send the test result from the DUT Test App after receiving, Get Test Results message |
| **Criticality** | Critical |
| **Technical issues** | NA |
| **Risks** | NA |
| **Dependencies with other requirements** | NA |
| **Expected Results with acceptability limits, Wherever applicable** | DUT Test App should, send ACK TEST\_COMPLETE message with all parameters. |
| **Method of Verification** | Manual verification |
| **Method of Validation** | NA |

## Hardware Requirements

NA

## Engineering Requirements

NA

## Non-Functional Requirements

NA

## Operational Requirements (OPR)

NA

## Product Standards Requirements (PSDR)

NA

## Safety Requirements (SFR)

NA

## Statutory/Regulatory Requirements (SR)

NA

## Mechanical/EMI EMC Requirements (EMI/EMC)

NA.

## Security Requirements (SCR)

NA

## Reliability Requirements- (RLR)

NA

## Availability Requirements – (AVR)

NA

## Maintainability Requirements – (MTR)

NA

## Manufacturing Requirements (MFR)

NA

## Installation /Servicing Requirements (ISR)

NA

## Product Obsolescence (PRO)

NA

## Usability Requirements (UR)

NA

## User training Requirements (UTR)

NA

## Sterilization/Cleanliness related Requirements (SCRR)

NA

# Implicit Requirements

NA

# Non-Technical Requirements

## Deliverables and Acceptance Criteria

* Communication protocol Interface between DUT (Victim) and Test System.
* Sample test application communicating with test system with basic commands.
* Accepentence testing my making all aggressors and no victims

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Deliverables agreed**  **(Both Intermediate & Final**) | **Date of Delivery, Only if committed to the customer** | **Deliverable format** | Acceptance Criteria | | Remarks |
| **Task** | **Responsibility** |
| Sample test application communicating with test system with basic commands | 22-Apr-2020 | Word Format/Excel |  |  |  |
| Initial delivery + acceptance + bug fixing for final delivery | 3-Jun-2020 | Word Format/Excel |  |  |  |
| Final delivery of Test application to Motorola including source code, unit test, acceptance test. | 10-Jun-2020 | Word Format/Excel |  |  |  |

**Other aspects agreed upon:**

1. Periodic Reviews with the client: Weekly, every Monday, Thursday

Visits to customers place: NA

# Special Requirement

NA

# Test Strategy

##### Application to communicate with SDM660 Qualcomm chipset and to be developed in Android O.

##### Application code should follow coding standards and all APIs should be modularized

##### Application should accommodate any further changes done from the modem perspective. The code should be generic enough so that it can be easily ported.

##### Application should accommodate any new modems or APIs

# Glossary

NA