#### **Problem 1: Environment for Ethernet communication**

**Challenge overview:**

Identify the method to create the environment for Ethernet communication drop without disturbing physical Ethernet network cable/router

Cell Radio communication primarily used as backup communication for Burglary Alarm industry and Ethernet as Primary communication path.

For the tester, It is difficult to create the scenario to drop only internet without removing Ethernet cable/restrict the data transmission in Firewall level

Also there is possibility of 4G LTE network drop, when it is happen, Cell radio should be capable to switch to 3G or 2G as fall back mechanism, as a tester need to create the method to simulate the 4G network drop and recover back

Also there is possibility of over congestion in specific cell radio tower, then cell radio module should be capable to connect with next available tower to ensure to avoid communication drop, As a tester need to simulate the scenario for over congestion and auto switching to Cell radio module.

**Objective:**

The primary objective is to develop an algorithm which will inject the noise/drop the data packet completely and provide Auto switch over from Ethernet to cell radio and when communication restored switch back to Ethernet.

Also Algorithm capable to handle multiple frequency channels supported by European and North American region

Simulate the 4G network drop, So, the tester can test fall back mechanism of the cell radio from 4G to 3 G and wise versa

Also the same with Roaming between cell radio network towers

Overall this help the tester to simulate/identify the defects and Gaps before release to customer

We can connect Cell Radio module with Maxpro Intrusion controller and we can send the commands via controller if required,

Also required changes/improvements can be done in Cell Radio Firmware to achieve the simulation

Cell radio data/Log can be accessed from controller connecting Winscp

**Expected Output**

·      *Option-1: Switch controller communication from Ethernet to Cell radio and Revert back to Ethernet when data communication in Ethernet restored scenario should work stable within acceptable switching time interval.*

*Option-2: Validate 4G to 3G fall back, Tester can identify the unusual delay for fall back or failure in fallback, along with cell radio tower roaming failure scenarios*

#### **Problem 2: Measurement of open space communication range for Wireless RF sensors**

**Challenge overview:**

Measuring open space communication range for Wireless RF sensors with simulated environment

and monitor sensors roaming scenario between RF transceivers, whenever there is signal low/drop between RF sensor and Transceiver

**Objective:**

The primary objective is to develop predictive and prescriptive models that can simulate the environment in closed lab environment to measure Open space Wireless sensors communication range

When there are multiple transceiver connected to the controller, If the sensor signal strength is reach to low/drop, corresponding sensors auto switch over to other available transceivers in the vicinity to continue the operations.

To achieve above, need to develop the model to induce the Low signal strength for RF sensor/transceiver

We can connect transceiver Via UART cable with computer to access the Transceiver module and can send the commands if required,

Also required changes/improvements can be done in Transceiver Firmware to achieve the simulation

1.    Max open space communication range

2.    Min open space communication range

3.    Parameters affecting Range

4.    Inject noise/reduce power to simulate Low signal strength or signal drop

5.    Monitor sensors communication with transceiver to check the availability of sensors

6.    Monitor sensors roaming/routing when there is signal level reaches to desired low level

**Expected Output**

***Part-1:*** *Based on the above data, user can test their product in the simulated environment to predict the Open space Wireless RF sensors communication range*

***Part-2:*** *Based on injection of noise or reduce power, user can verify the Auto routing of sensors between transceivers*

#### **Problem 3 : Test Creation from Text Conversation**

**Challenge overview:**

Test Cases creation takes time and requires complete understanding of the system to cover all scenarios. Also because of the dependency on expertise of the test designer, there are chances to miss some sub-system when creating the test cases.

**Objective:**

The Primary objective is to develop a solution, which can go through the transcript file, which is basically a speech to text converted file. The technical points, requirements discussed over the calls and in the meetings are recorded and transcript files are made available, the solution should be capable of parsing the file and convert it to test cases.

**Expected Output:**

The expected output is the solution prototype, which can take the transcript file as input and provide output as the test cases, either in excel or in a document format. The sample file will be made available for the reference and for developing a POC.

#### **Problem 4 : Test Framework on Java to execute parallel test scenarios**

**Objective:**

OES is an order execution system which manages the order handling within the warehouse when it receives orders from host/customers, executes and sends the fulfilled order back to customers. It has multiple modules which are deployed as individual microservices. They have CRUD API’s exposed to perform various operations.

To test the entire system, business flows (test scenarios) have been identified and automated using java + cucumber framework (any other java based framework can used). These automated test cases run sequentially. To reduce the testing time, parallel execution of these automated test cases is required.

**Data Provided:**

To enable the order processing, system creates and manages the inventory. When orders are received from the customer, system creates the order and make allocation of the inventory for the requested item and quantity. If the system can fulfill the order, system creates tasks in assigned status and moves the order to Planned status.

Eventually system starts the order processing, based on the order start time and completes all the tasks associated to the order and moves the order to Completed status.

Microservices/modules involved in the system are:

·       INVENTORY

·       ORDER

·       TASK

Please refer the rest CRUD APIs (pdf attached : OES\_Sample\_Data.pdf), which are used by the system to execute the order.

Business Flows:

1.    Create Item, Inventory, Order. Create Task and complete them to complete the order.

2.    Create Item, Inventory, Order. Create Task and suspend them if the inventory not available

3.    Create Item, Inventory, Order. Create Task and cancel them if the order is cancelled

**Expected Output**

Design a java based testing framework to automate the business flows and run them in parallel.

#### **Problem 5 : Digitize Handwritten Text**

**Challenge overview:**

There is a need to Digitize the Paper based handwritten Batch Records for next level of analysis. A reliable Handwriting recognition application which can translate the data from handwritten paper based batch records into a certain Digital Format.

**Objective:** The primary objective is to develop an application with ability to scan or read the handwritten records and digitize the records in the form of spreadsheet. The application should be able to digitize the below but not limited items.

1.    Diagrams

2.    Text

**Expected Output**

Sample Paper based batch records will be provided to engineers. Need a Solution Prototype that can digitize the hand written record in a defined Format.

The format needs to be in spreadsheet.

Inputs/Output Format: Attached is the handwritten format. This needs to be ported into xls.

#### **Problem 6 : Verify video Smoothness**

**Objective:**

During video acquisition, due to sensor malfunction, poor network bandwidth, acquired videos suffers from blurry artifacts, different noise effects. A surveillance camera developer needs to test the product by manually verifying these videos void from any unwanted artifacts. However, these videos are captured for long duration (Days of recordings) and manually reviewing recorded video for so long duration is too time-consuming and cost ineffective approach.

The objective of this problem is to find distorted frame timestamp (starting from the video first frame) and distortion type, provide suitable metric results. Further, participants are encouraged to analyze perceptual quality of the video and the most impacted patch region over the video duration.

**Expected Output**

A software module to identify video perceptual defects and record time-stamp