1. Test Approach

Process of testing:
Test team will work on an agile (Scrum) process. Each sprint of Scrum is 14 days long.

Bug/Defect Management:
We will use Jira to manage our Bug/Defects.

Test Management tools:
As a test management tool, we will use TestRail.

Testing levels and Types:
We will follow the test pyramid where test levels are

- Unit Test
- Integration Test
- System Test
- End to end test

Under System test, we will follow

- Functional Test
    - Regression Test
- Non-Functional Test
    - Performance Test
    - Load Test
    - Security Test
    - Recovery Test

What to test at what point:

Unit Test:
Unit test should be done by the developer during the development, and it should be applicable for each unit of a module. Here modules are:

- Service manager
- Auth server
- Proxy
- Protocol mapper
- Container manager
- Base protocol mapper
- Admin UI
- Broker.

The code coverage should be well. This unit test will give us confidence about our code quality.

Integration Test:
We need integration test for the following point:

- Service manager -> Auth Server
- Service manager -> Protocol Mapper
- Service manager -> Proxy
- Service manager -> Container Manager
- Machine/PLC -> Protocol Mapper -> Broker

In the above point integration test needed because

- Important functionalities lie there.
- Check whether they can work with another.

Integration test will be performed during development phase by the testers.

Regression Test:
Regression Test will be performed to check whether development of one feature or adding a new code breaks existing code or not. It is mainly done before any release. Regression test will be applicable for so far implemented features.

Performance Test:
Performance test shall be done to check the behaviour of the system under a specific data volume. We can perform the test by

- creating many services by different commissioning files.
- create such services where data from machine to Protocol Mapper is standard.

We can make sure whether our system is working fine when there are moderate number of services running simultaneously and realistic volume of data coming from machines.

Load Test:
Load test will be performed to check how many requests it can handle at a time and be aware of the highest benchmark. The ideal time to perform load test is when the system is developed and stable and before going to production. The test should be done on following point:

- Machine/PLC -> Protocol Mapper -> Broker

By load test we can make sure how properly load balancing is done by Protocol Mapper encapsulated in agent. Load test is very important here because from the machine, it is expected to have many data and they should be handled carefully.

Recovery Test:
Recovery test should be done to check whether our system can recover data in case of any failure. It should be done when our application is stable. Recovery test is mainly crucial around databases.

End to End Test:
Perform end to end test with user who will use:

- Different protocols
- Multiple protocols simultaneously.

End to end test will confirm the entire workflow working fine of not.

2. Testing Tools

We will test the following types of tests with given tools:

Test Type	Tool	Manual/Automation
Unit Test	Junit or TestNG	Automation
Integration Test	Postman, Custom	Manual, Automation
Regression Test	Custom	Manual, Automation
Performance Test	Gatling	Automation
Load Test	Gatling	Automation
Recovery Test	-	Manual
End to End Test	Custom	Manual, Automation