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Software Requirements Specification

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:

Functional Testing Procedures

PT Len Industri

Business and Technology Development Division

SILVue CG1000

PT Len Industri

Business and Technology Development Division

SILVue CG1000

Agreement

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# Purpose

The purpose of this document is to describe the sequence procedure of testing the SILVue CG1000’s developed database redundancy. It including the testing steps to be performed to achieve the database redundancy as per design and requirement.

# Document References

**Table 2.1 List of References**

| **S/N** | **Document Number** | **Document Title** |
| --- | --- | --- |
| 1 | IEC 61508 | Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems |
| 2 | BS EN 50126 | Railway Applications -The Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS) |
| 3 | BS EN 50128 | Railway applications. Communications, signalling and processing systems. Software for railway control and protection systems |
| 4 | BS EN 50129 | Railway applications. Communication, signalling and processing systems. Safety related electronic systems for signalling |

# Prerequisites

Prior to the test of database redundancy, the following pre-requisites must be achieved:

* Proper local Ethernet network installed.
* Installed mariadb version 10.1.38 in SILVue CG1000 module.
* SILVue CG1000 schema already setup in mariadb.
* Replication feature of mariadb is already configured.

# Environmental Requirements

Prior to the commencement of database redundancy test, the following environmental requirements must be provided.

* All equipment shall be protected against effects of heat and damage.
* Good temperature and humidity prior to SILVue CG1000 module specification.
* Dry environment to prevent short circuit.

# Agenda and Schedule of Test

Time duration estimate refer to table below

**Table 5.1 Test Agenda and Schedule**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Item** | **Schedule** | **Location** |
| 1 | SILVue CG1000 functional test |  | PT. Len Industri |

# Personnel and Equipment

<This chapter explain the software requirements specification structured>

# Test Cases

The following section details all the tests to be performed as part of database redundancy testing. The Test Cases are grouped into the following areas:

1. Module Configuration Test

These test ensure the module can be configured via user interface.

1. Communication Driver Configuration Test

These test ensure each communication driver of CG1000 (including Modbus TCP Client, Modbus RTU Master, IEC 61850 Client, and OPC UA Server) can be configured and variable can be imported via user interface.

1. Monitoring System Test

These test ensure CG1000 status can be monitored via user interface and SNMP.

1. Redundancy Test

These test ensure the module’s redundancy working properly.

1. Auto Start Up Test

These test ensure the CG1000 modules are auto started and auto connected to the master/slave device when configured properly.

# Overall Test Result

<This chapter explain the all interfaces with any other system>

**APPENDIX 1**

**CHECKLIST FORM**

| **Step** | **Description** | | | **Acceptance Criteria** | | **Result (Pass/Fail)** |
| --- | --- | --- | --- | --- | --- | --- |
| **Module Configuration Test** | | | | | | |
| 1. | Change module network configuration (IP Address, Subnet, Gateway) | | | CG1000 module user interface can be accessed with new network configuration | | Pass |
| 2. | Change hardware name | | | New hardware name is displayed in general setting page | | Pass |
| 3. | Change master clock IP | | | CG1000 module can connect to new master clock IP | | - |
| **Communication Driver Configuration: Modbus TCP Client** | | | | | | |
| 1. | Change Modbus TCP Client configuration | | Modbus TCP Client driver can connect to Modbus TCP Server simulator | | | Partialy Pass |
| 2. | Import variable from csv file | | New imported Modbus TCP variables can be viewed via user interface | | | Pass |
| Modbus variable request can be viewed from Modbus TCP Server simulator | | |
|  | Add new variable from user interface | | New Modbus TCP variable can be viewed via user interface | | | Partialy Pass |
| Modbus variable request can be viewed from Modbus TCP Server simulator | | |
| 4. | Delete variables from user interface | | Deleted variables are no longer on user interface | | | Pass |
| Deleted variables aren’t requested to Modbus TCP Server simulator | | |
| **Communication Driver Configuration: Modbus RTU Master** | | | | | | |
| 1. | Change Modbus RTU Master configuration | | Modbus RTU Master driver can connect to Modbus RTU Server simulator | | |  |
| 2. | Import variable from csv file | | New imported Modbus RTU variables can be viewed via user interface | | |  |
| Modbus RTU variable request can be viewed from Modbus RTU Server simulator | | |
| 3. | Add new variable from user interface | | New Modbus RTU variable can be viewed via user interface | | |  |
| Modbus variable request can be viewed from Modbus RTU Server simulator | | |
| 4. | Delete variables from user interface | | Deleted variables are no longer on user interface | | |  |
| Deleted variables aren’t requested to Modbus RTU Server simulator | | |
| **Communication Driver Configuration: IEC 61850 Client** | | | | | | |
| 1. | Change IEC 61850 Client configuration | | IEC 61850 Client simulator can connect to CG1000 module | | | Partialy Pass |
| 2. | Import variable from csv file | | New imported IEC 61850 Client variables can be viewed via user interface | | | Partialy pass |
| New imported IEC 61850 variables can be browsed with OPC UA client simulator | | |
| 4. | Delete variables from user interface | | Deleted variables are no longer on user interface | | | Pass |
| Deleted variables aren’t requested to IEC 61850 simulator | | |
| **Communication Driver Configuration: OPC UA Server** | | | | | | |
| 1. | Change OPC UA Server configuration | | OPC UA Client simulator can connect to CG1000 module | | | Pass |
| 2. | Import variable from csv file | | New imported OPC UA variables can be viewed via user interface | | | Partialy Pass |
| New imported OPC UA variables can be browsed with OPC UA client simulator | | |
| 3. | Add new variable from user interface | | New OPC UA variable can be viewed via user interface | | | Fail |
| New OPC UA variable can be browsed with OPC UA client simulator | | |
| 4. | Delete variables from user interface | | Deleted variables are no longer on user interface | | | Partialy Pass |
| Deleted variables can’t be browsed with OPC UA client simulator | | |
| **Monitoring System** | | | | | | |
| 1. | CG1000 monitoring status from Web Service when system running. | Monitoring Hardware Status changed when system power not applied | | | N/A | |
| Monitoring Redundancy Status changed when backup module down/disconnect | | |  | |
| Monitoring Master Status changed when system off | | | Pass | |
| Monitoring Slot 1 Status changed when running/stop, enable/disable | | | Pass | |
| Monitoring Slot 2 Status changed when running/stop, enable/disable | | | Pass | |
| Monitoring Slot 3 Status changed when running/stop, enable/disable | | | Pass | |
| Monitoring Slot 4 Status changed when running/stop, enable/disable | | | Fail | |
| Monitoring event logs when system running | | | Fail | |
| 2. | CG1000 monitoring status from SNMP | Monitoring Slot 1 status from SNMP changed | | |  | |
| Monitoring Slot 2 status from SNMP changed | | |  | |
| Monitoring Slot 3 status from SNMP changed | | |  | |
| Monitoring Slot 4 status from SNMP changed | | |  | |
| 3. | CG1000 Monitoring from OLED | IP Address changed when hardware IP changed | | |  | |
| Firmware Status changed to RUNNING/STOP when system running/stop | | |  | |
| Redundancy status changed when redundancy mode on/off | | |  | |
| **Redundancy Test** | | | | | | |
| 1. | Change redundancy configuration several times (IP Address, Subnet, Gateway, Virtual IP, Redundancy Type, Router ID) | | | CG1000 redundancy configuration changed | | Fail |
| Redundancy status is ready wiith new configuration | |
| 2. | Dominant redundancy: switchover from main module to backup module | | | Data exchange are still running normally after switchover | | Partialy Pass |
| Communication drivers status are connected | |
| 3. | Dominant redundancy: re-activate main module | | | Redundancy status is ready | | Pass |
| Same configuration of driver and general setting between main and backup module | |
| The old main module becomes current main module | |
| 4. | Non-Dominant redundancy: switchover from main module to backup module | | | Data exchange are still running normally after switchover | | Partially Pass |
| Communication drivers status are connected | |
| 5. | Non-Dominant redundancy: re-activate new module as backup | | | Redundancy status is ready | | Pass |
| Same configuration of driver and general setting between main and backup module | |
| The old main module becomes current main module | |
| **Auto Startup Test** | | | | | | |
| 1. | CG1000 auto start when turning on and configured properly | | | Last configuration is displayed on general setting and protocols setting | |  |
| Redundancy status is ready when both modules are started and configured properly | |
| The communication driver status is connected to master and slave device | |