**Medtronic MITG**

**Research & Development**

**System Verification Plan**

**Gateway Device Management Platform v4.0**

**RE00062810 Rev A**

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# Introduction

The purpose of this document is to detail the system verification strategy and plan of the Gateway Device Management Platform (GDMP) v4.0, to be released during the Maintenance Phase of the GDMP software lifecycle.

The project team will update and revise this plan as needed throughout the v4.0 project.

# References

1. System Requirements Specification: Gateway Remote Service Platform; Rev S; R0030891
2. Software Development Plan for Gateway V4.0; RE00062807
3. Server Install and Configure Guide Gateway; R0043209
4. System Trace Matrix Gateway v4.0RE00062808
5. System Test Procedure Gateway v4.0 RE00068285
6. Off the Shelf Software Validation Plan Gateway; R0046348
7. Performance Test Plan Gateway v 4.0, RE00080576

Note: Unless specified with a version number, all documents will be referenced by their latest approved version in Agile.

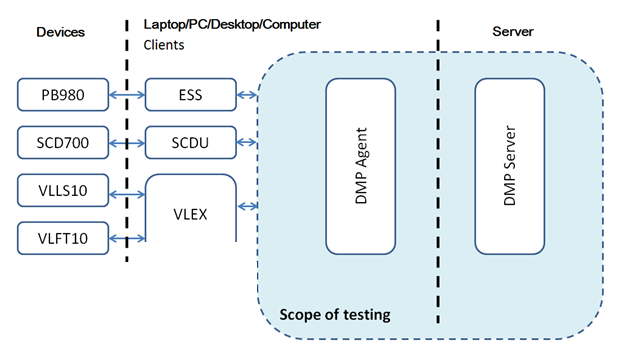
# Scope

This GDMP v4.0 release is a refactored release of current GDMP system, which ensures the compatibility with already integrated Client Applications and devices (VLLS10, VLFT10, SCD700, PB980, Emprint, and Signia)

The testing scope is limited to the GDMP and all requirements in v4.0 as described in [1].

The client’s software ESS, SCDU, VLEX and Emprint Client are out of scope and will be handled by respective group in charge of their development, namely:

* Respiratory and Monitoring Solutions for ESS, PB980
* Vascular Therapies team for SCDU, SCD700
* Surgical Innovations team for VLEX, VLLS10, VLFT10, and Signia
* Early Technologies for Emprint Client, Emprint Planning Software



**Signia**

Vlex Client

Emprint

Emprint Client

Figure 1 Testing Scope of v4.0

The GDMP v4.0 also fixes legacy defects leftover by v3.3 and decided to be fixed at this release. These defects are listed in section 9.

The testing scope of defect fixing is to verify that:

* All the defects are fixed.
* No side effect will be introduced by the defect fixing

# Definitions and Acronyms

**GDMP**: Gateway Device Management Portal

**SVP**: System Verification Plan

**FT**: Functional Testing

**IQ**: Installation Qualification

**SCDU**: SCD700 Software Updater

**ESS**: Enhanced Service Software

**VLEX**: ValleyLab Exchange Software

# Test Strategy

GDMP v4.0 is a new refactored system, and approximately more than 70% source code was changed by new development for release v4.0. Therefore all requirements will be tested during system test phase to ensure all functionality works after refactor.

In general, each requirement will be tested with one client application unless system behavior driven by the requirement varies according to the device types. In those cases, the requirement will be tested on each client.

The testing categories include IQ, FT and End To End Test and defects verification. Automation scripts will be introduced to execute FT.

The relationship between system requirements and scripted test procedures is identified in traceability matrix [7].

## Test environment

First the system is tested on QA environment where IQ, FT, End-End Testing and regression testing will be executed. Then the system is installed on Production environment and an IQ and Post Deployment Checkout is executed by the Medtronic test team.

## Defect management

All the issues found during testing execution are logged into JIRA defect management system. The details of defect tracking process, test reporting and the acceptance criteria are in SW Development Plan (SDP) [2].

## Verification approach and methodologies

Verification consists of the following levels of testing. The approach and methodology of all levels’ testing will be performed as following:

### Unit Testing

The Unit Test Procedures in this project are a set of executable scripts that are used to verify the correct functionality of the software units or modules. Unit testing is done by development team throughout the Development Phase. The Unit Tests are run daily by Jenkins as part of the Continuous Integration Process.

### System Testing (IQ, FT, Defect verification)

System dry run testing will be performed informally during the development phase and test procedures will be finalized. System testing will use the final versions of these test procedures that are submitted and approved in document control system (Agile).

* + Installation Qualification (IQ): Installation testing verifies proper upgrade of software on the servers located in the external hosting site. IQ also verifies proper installation of Agent software on the laptop. The IQ does not verify proper installation of the Client Application. For Server side, the IQ verifies the Installation Guide [4] is correct. The Installation Qualification (IQ) establishes confidence and documented evidence that QA environment and ancillary systems are compliant with appropriate codes and approved design intentions.
  + Functional Test (FT): FT verifies the correct implementation of system requirements [1]. FT is to test system functionality working fine for each module. The procedure is documented in System Test Procedures[5].
  + Defect verification:
    - All the legacy defects are fixed, and no side effect is introduced.

### End to end testing

End to end testing verifies production system works from medical device to server. The testing will be based on real scenarios with different roles. This testing is to ensure end users can use GDMP product in real use cases. The end to end testing also demonstrates the end user needs listed in the client specific User Requirement Document (URD) has been satisfied. The End to End Testing uses real devices and real clients (not simulators).

### Security Testing

Security testing is performed by a third party partner and aims to uncover any security issues in the server and agent through threat modeling and penetration testing. The impact and risks associated with the found issues will be evaluated and guidance will be provided in the prioritization and remediation steps.

### Performance Testing

Performance test is performed to evaluate GDMP Key Performance Indicators (KPIs), including Agent message traffic KPIs, load testing KPIs and RESTful API calls KPIs, as detailed in [7]. The performance test will make use of Apache JMeter as test tool to send HTTP requests, including both normal request for static files and RESTful API to GDMP 4.0 instance, to simulate multiple users making use of GDMP 4.0 system simultaneously. Apache JMeter will record related performance indicators like Average Response Time as test result.

### Regression testing

In case the GDMP release candidate is failed during system verification testing (IQ, FT, defect verification and End-end testing), a new GDMP release candidate will be released and tested again during regression testing. The regression testing will cover all corrected defects with executing a selected subset of existing test procedures or new identified test procedures.

## Data Migration Process and Test Methodologies

As the production server cannot be accessed directly, to ensure the quality for the migration, the migration tool will be run locally and only the SQL,LDIF and other files generated will be submitted. That means we need to create the environment to run the migration tool first.

Software list to setup in the environment:

1. JRE v1.8, encryption package is a built-in package of the server application, JRE v1.8 is required to run the java code
2. JCE for Java 1.8, required for the file encryption
3. Python 2.6, the python version the migration tool running on
4. MySQLdb library, a python package to access MySQL DB
5. MySQL community server v5.17 and v5.7 or later, v5.17 is for GDMP v3.1.6, and v5.7 or later is for the new GDMP v4.0, the schema for GDMP v3.1.6 cannot be compatible to the MySQL 5.7 and later

Prepare the pre-setup software:

1. JRE v1.8, download the JRE package from <http://www.oracle.com/technetwork/java/javase/downloads/index.html> and install it
2. JCE, download the jce\_policy-8.zip file from <http://www.oracle.com/technetwork/java/javase/downloads/jce8-download-2133166.html>, and then unzip it and copy the files to the your java installed path /jre/security/
3. Python 2.6
4. MySQLdb library, use “yum install MySQL-python.x86\_64” to install
5. MySQL,

a.Setup

* + - Latest version is 5.7 now, on the Redhat OS, yum can be used to get this version of MySQL community server DB.
    - If you want run different versions of MySQL on the same server, another MySQL version such as 5.1.7 must be tar file and need unzip and configuration by yourself, for example migrate the old my.cnf file from the QA server

b. Prepare data for MySQL 5.17

* + - Create schema ‘covidiendb’
    - Create account ‘covidiendbuser’@’%’, then grant this user all the privileges on the new ‘covidiendb’ schema
    - Import the dump SQL, “mysql –uroot –ppassword covidiendb < dump SQL path

c. Prepare data for MySQL 5.7

* + - Import the structure of gdmp4.0 structure

1. File,

Unzip all the encrypted files to specified directory

Run migration tool

Three parts composes of the migration tool, including LDAP data migration, MySQL database migration, and file migration

1. LDAP data migration,
   * + Specify the account, host and port for v3.1.6 schema
     + Run the LDAP data migration tool
       - *command: ldap\_migrate.py*
     + 4 files will be generated, result.ldif,user.sql,user\_group.sql,user\_group\_relation.sql
2. MySQL database migration
   * + Import the user.sql, user\_group.sql, user\_group\_relation.sql first
     + Specify the account, host and port both for v3.1.6 schema and v4.0 schema in the migration tool script
     + Run the database migration tool
       - *command:database\_migrate.py*
     + Valid data will be import to the new GMDP4.0 schema and invalid data will be reported in log
     + Verify the invalid data to try to rectify, then import the rectified data into the database manually, and report the data not rectifiable
     + Dump a SQL file from the new schema
3. File migration
   * + Specify the top directory of the encrypted files and the account, host, port for the v4.0 schema in the migration tool script
     + Run the file migration tool
       - *command*: file\_migrate.py
     + decrypted files and re-encrypted files will be output with same directory structure as the encrypted files
     + the new data of the file, such as file size, file name, file’s hash will be updated in the v4.0 schema
     + if there is any unexpected things happen, such as decrypted failure or encrypted failure, the information will be output to log

Data verification principle

1. Data count comparison.

Compare the number of the major data in old and new database, including software, hardware, name configuration, customer, user, device, device component and so on. Make sure no main data lost.

1. Functionality verification.
   * + View major data from WebUI. Compare the data displayed in old system and new system . Make sure the same data displayed in both systems should be the same. And the association relationship is not lost or incorrect.
     + End to End test cases should be executed with migrated data.

Data Migration Validation Test Cases

Data Migration validation will be executed in ET format. Detailed test cases can be referred to Appendix A-Data Migration Test Cases.

1. **Test Targets**

Verifications will be performed on test targets and raise defects for found issues.

|  |  |
| --- | --- |
| **Configuration Item** | **Versions** |
| **Gateway Device Management Platform** | 4.0 |
| Web Server | 4.0.4 |
| Application Server | 4.0.4 |
| Agent | 4.0.4 |

1. **Test Configurations**

All Gateway v4.0 testing shall run on QA servers that are hosted by Terremark.

* 1. **Hardware Configurations**

All Gateway v4.0 server deliverables shall run on servers that are hosted by Terremark. Server information will be captured during testing execution.

Server information such as IP Address, CPU, Memory and HDD, etc. will be captured during patch release testing.

Testing computers information such as Module, CPU, Memory and HDD will be captured during patch release testing

All the medical devices information such as Module, Serial Number and Device Software version will be captured during patch release testing.

* 1. **Software Configurations**
* **Server Software Configuration**

Server Software Configurations will be captured in the patch release test report.

* **Agent Software Configuration**

OS: Windows 7 64bit/ Windows 8 64 bit/Windows 10 64bit

Browser: Internet Explorer 11 /Firefox 10/Google Chrome v33/ Safari OSX v 6.1 or later

* **Client Software Configurations**

Windows 7 64bit

SCDU configuration file v5

* **Device Software**

All the medical devices software information will be captured during this patch testing.

* 1. **Client Application**

Patch release testing will be conducted using the following tools:

* Emprint Client version: \_\_\_\_\_\_\_\_\_\_\_\_

# Test Plan and Test Procedures to Be Executed

Note: All test cases in E2E test procedures will be executed.

|  |  |  |
| --- | --- | --- |
| Test Procedure | Document Number | Executing Environment  (Server in Terremark) |
| System Installation Qualification (IQ) Plan & Procedure | RE00062907 | QA |
| System Verification Test Procedure v4.0 | RE00068285 | QA |
| System End to End Test Plan & Procedure - Emprint | RE00042537 | QA |

# Defects list

Below list defects fixed in GDMP4.0. In the tickets, Security related tickets need Security team to verify. It’s not in InsigmaUS QA testing scope. Since the tickets were found in old GDMP system, and 4.0 refactored systems would resolved the issues. No specific ET will be introduced to verify the tickets. QA team will reproduce the issues scenario in 4.0. If issues cannot be reproduced, we assume the verification is PASS.

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Status | **Requirement/Issue** | Type |
| GATEWAY-1898 | Reopened | WASA Medium Severity Finding: Application Errors | Security |
| GATEWAY-1899 | Investigation | WASA Medium Severity Finding: CSRF (Cross Site Request Forgery) | Security |
| GATEWAY-1900 | Reopened | Reopened for v3.0 - WASA Medium Severity Finding: Cross-Frame Scripting | Security |
| GATEWAY-1913 | Investigation | Open in v3.0: v2.0 WASA Low Severity Finding: Server Information Leaked in HTTP Response Headers | Security |
| GATEWAY-2205 | Investigation | Issues from WASA Testing and Others | Security |
| GATEWAY-2985 | In Progress | v3.0 WASA High Severity Finding: Cross-Site Scripting (Reflected) | Security |
| GATEWAY-2986 | Investigation | v3.0 WASA High Severity Finding: Vulnerable Version of JQuery | Security |
| GATEWAY-2989 | Entered | v3.0 WASA Medium Severity Finding: Session Token in URL | Security |
| GATEWAY-2990 | Entered | v3.0 WASA Low Severity Finding | Security |
| GATEWAY-2991 | Entered | v3.0 WASA Medium Severity Finding: Lack of Input Validation | Security |
| GATEWAY-3373 | Entered | v3.0 WASA Medium Severity Finding: SSLv3 POODLE Vulnerability | Security |
| GATEWAY-3406 | Entered | Security: CoT Admin role should only be functional from within the MDT network. | Security |
| GATEWAY-3407 | Entered | Security: DOM-Based Cross-Site Scripting | Security |
| GATEWAY-3416 | Entered | Security: HttpOnly Cookie Attribute Not Set | Security |
| GATEWAY-3417 | Entered | Security: HTTP Strict Transport Security Not Enabled | Security |
| GATEWAY-3418 | Entered | Security: Secure Cookie Attribute Not Set | Security |
| GATEWAY-3408 | In Progress | Security: Hardcoded Admin Credentials | Security |
| GATEWAY-3409 | Entered | Security: Stream encrypt the software packages as they land on the server | Security |
| GATEWAY-3413 | Investigation | Security: Symmetric Key Password on Client | Security |
| GATEWAY-3442 | In Progress | Generate New Keys for File and XML Encryption | Security |
| GATEWAY-3497 | Deployed | Add Ablation Roles per Emprint requirments | GDMP |
| GATEWAY-4262 | Entered | App server file repo is accessible via URL | GDMP |
| GATEWAY-2704 | approved | Defer SOUP version upgrades from DMP 3.0 to 3.1/4.0 scope | Environment |
| GATEWAY-3144 | In Code Review | GATEWAY-2704 Upgrade Agent to use Java 8 | Environment |
| GATEWAY-3145 | In Code Review | GATEWAY-2704 Upgrade Server to use Java 8 / Tomcat 8 | Environment |
| GATEWAY-3204 | In Progress | GATEWAY-2704 Soup Upgrades / New Tools in 4.0 | Environment |
| GATEWAY-3020 | Deployed | [3.0 formal testing]System configuration with "In Production" status shouldn't contain software configuration in 'Limited Release' status | GDMP |
| GATEWAY-3160 | Deployed | [3.0 Regression] Approved self-registered non-covidien user with customer as ‘Unknown’ cannot be edited. | GDMP |
| GATEWAY-3458 | Entered | Errors present in Tomcat Catalina.out file on prod appserver | GDMP |
| GATEWAY-3459 | Entered | More Errors Present in catalina.out file on prod appserver | GDMP |
| GATEWAY-3346 | approved | [3.0 Regression]Device Current Configuration Report Column S/W Name & Version is not correct | GDMP |
| GATEWAY-3347 | approved | [3.0 Regression]Device Current Configuration Report download as XLS,column S/W name & version is empty | GDMP |
| GATEWAY-3441 | Entered | Upgrade Redhat O/S release and patch up on PROD and QAPROD | Environment |
| GATEWAY-3337 | approved | getsysconfig should only send down "in production" and "limited release" named sys configs to agent | GDMP |
| GATEWAY-3336 | approved | [3.1] Password Reset Email Format is not accurate when click "Forgot Password" from Vlex client | GDMP |
| GATEWAY-2501 | In Code Review | Modify ETL process to accept devices with incomplete location information | ETL |
| GATEWAY-3450 | approved | Time zones on reports need to all be EST | GDMP |
| GATEWAY-3157 | Resolved | GATEWAY-3134 Fix the failures in Importing the data source from IS team after account renumbering | ETL |
| GATEWAY-3434 | approved | [3.1.1 QA]In WebUI, Devices-LogViewer, service date cannot be deleted if it is selected previously | GDMP |
| GATEWAY-3449 | approved | Exported Service Records Report has incomplete timestamps | GDMP |
| GATEWAY-3055 | Resolved | Self-Reg shows approved but not Userid was created | GDMP |
| GATEWAY-3268 | Resolved | should only show SW config column for invalid-SW warning config | GDMP |
| GATEWAY-3315 | approved | [3.0 Regression Test] Audit Trail Report for 'Valleylab ForceTriad' displayed in detail report lists. | GDMP |
| GATEWAY-3486 | approved | [3.1.3]No Paging in Pending Registration List page | GDMP |
| GATEWAY-3483 | approved | User's training records are not saved and are different on the pending page | GDMP |
| GATEWAY-3518 | Entered | User Password Expiration Notification Email | GDMP |
| GATEWAY-3468 | Entered | Device Hardware Configuration is not updated on DMP | GDMP |
| GATEWAY-3526 | Entered | RfData Log files should not have a date appended to the logfile name | GDMP |
| GATEWAY-3531 | Entered | RfData log files should be tagged by device serial number on the server | GDMP |
| Gateway-4193 | approved | Customer name not shown in audit trail report acivity information | GDMP |
| GATEWAY-3321 | Entered | Force Agent into Disconnected mode if network performance is poor or flapping | GDMP |
| GATEWAY-4020 | Investigation | Approving manager list is not populating | GDMP |
| GATEWAY-4230 | approved | [3.2\_DryRun]Associated Software Configuration is missing in "Edit a Named System Configuration" page | GDMP |
| GATEWAY-3451 | approved | Response to CreateDevice takes almost 3 minutes | GDMP |
| GATEWAY-4319 | Entered | software version report with none country signia device cannot be searched out | GDMP |
| GWTEWAY-4325 | approved | Uploaded device log names are renamed in DMP | GDMP |
| GWTEWAY-4326 | approved | [3.2.4\_UAT]Software upgrade report missing LS10 upgrade record | GDMP |

# Test Results

At the end of IQ, System Verification Test (Defect verification, End-to-End, and FT) and Regression Test, a unique test report will be created; these deliverables will contain the following information:

* Test procedure executed along with results
* Problems found (if any)
* Test configuration in use
* A final result “PASS”/“FAIL”

Once all test stages have been executed, a system verification summary report will be written to summarize all test results per testing stage and articulate a final conclusion on whether or not the GDMP system v4.0 can be released for production use based on the criteria defined in SW Development Plan (SDP) [3].

In order to provide evidence of system verification completeness, all test reports will be approved in the Agile system.

# Appendix A – Data Migration Test Cases

