# **GBCS Validation Tool (GVT)**

# **User Guide**



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http://www.slscorp.com



# About this Guide

## Introduction

This guide helps users to know about the basics of the GBCS Validation Tool.

Table below shows the revision history of this user guide.

Version	Date	Description					
1.4	January 2019	Updated Figure 3-9, 3-14, 3-16, 3-18, 3-24, 3-25, and 3-32 in Chp. 3 Added License Activation and ITCH Device section in Chp. 3					
1.3	August 2018	Updated Connection and Test Case Execution through Command Line sections in Chp. 3					
1.2	June 2018	Added Zigbee Packet Sniffer support					
1.1	May 2018	Added Watcher section and update Fig 3.3 and 3.12 in Chp. 3					
1.0	March 2018	First Publication					

# How To Find Information

- The Adobe Acrobat Find feature allows you to search the contents of a PDF file. Use Ctrl + F to open the Find dialog box. Use Shift + Ctrl + N to open to the Go To Page dialog box.
- Bookmarks serve as an additional table of contents.
- Thumbnail icons, which provide miniature preview of each page, provide a link to the pages.
- Numerous links shown in Navy Blue color allow you to jump to related information.

# How to Contact SLS

For the most up-to-date information about SLS products, go to the SLS worldwide website at http://www.slscorp.com. For additional information about SLS products, consult the source shown below.

Information Type	E-mail
Product literature services, SLS literature services, Non-technical customer services, Technical support.	support@slscorp.com

The user guide uses the typographic conventions as shown below:

## Typographic Conventions

Visual Cue Meaning Bold Type with Initial Capital All headings and Sub headings Titles in a document are displayed in letters bold type with initial capital letters; Example: Introduction, GVT Usecases. Bold Type with Italic Letters All Definitions, Figure and Table Headings are displayed in Italics. Examples: Figure 1-1. An Architecture Italic type Variable names are enclosed in angle brackets (< >) and shown in italic type. Example: GVT.exe <Com Port> <Baud Rate> <TestCase Path> 1., 2. Numbered /Alphabetic steps are used in a list of items, when the sequence of items is important, such as steps listed in procedure. a). . Different Bullets (Round/Square) are used in a list of items when the sequence of items is not important. The hand points to special information that requires special attention R The caution sign indicates required information that needs special consideration and understanding and should be read prior to starting or continuing with the procedure or process. CAUTION

Visual Cue	Meaning
••••	The feet direct you to more information on a particular topic.
	The note point indicates the information that should be read prior to starting or continuing the procedure or processes.

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# 1. Introduction

## Overview

GBCS Validation Tool (GVT) is an application, which is designed to validate Great Britain Companion Specification (GBCS) for any Smart Meter Devices.

GVT can be applicable for all the smart meter devices like GSME, ESME, HCALCS or PPMID. Device manufacturers can send and receive GBCS messages to identify any potential differences with their device specifications compared to GBCS.

GVT also emulates Remote Parties such as Energy Suppliers along with ACB. It validates CHF as well as Metering Devices conformance with standard protocols.

#### Figure 1-1. High Level Architecture



# High Level Architecture

GVT has following major components:

#### GVT Tool GUI

GVT Tool has simple design and interactive GUI. It is useful to set-up configuration of devices and its test-cases. It can generate a set of GBCS messages with customized input values and can save those sets for reuse. It also allows to configure Remote Party and Device Under Test (DUT) credentials. At the end of the test, it will display the results of all test-cases executed.

#### **GBCS** Library

GBCS library is a high-performance component that supports parameter based payload generation for GBCS messages. Along with that, it supports parsing of GBCS compliant responses received from participating devices.

It includes security credentials of Remote Parties and participating devices. It is useful for them to sign the payloads and to verify encrypted/secured responses received from devices. It supports both: Critical and Non-critical messages as per the GBCS requirement.

#### **Communication Interface Module**

GVT supports different interfaces, which are Serial, TCP and UDP communication. These are useful to communicate with different devices like, CHF and Smart meters.

#### **Test Report Generation**

A comprehensive Test Report is generated upon completion of Test execution. It covers all the necessary information for testing evidence. Along with that, it includes all the logs (messages/commands exchanged between DUT) in mannered format with PASS/FAIL information.



Reports will be generated in well-structured HTML format, which can also be shared as Test evidence.

# 2. GVT Use Cases



GVT is useful with various combinations of Smart Metering devices. It has capability to serve various groups of Smart Metering Implementation Programme for verification of their respective device's GBCS implementation.

GVT is applicable for following groups of users:

- Energy Suppliers: They can test end to end scenarios and use TCH or ITCH.
- Device Manufacturers: They can use serial/TCP/UDP connection scenario to send GBCS messages to their devices and to validate its responses.
- DCC:
  - To test virtually in SIT/UIT and to gather evidence, they can use TCH or ITCH.
  - To generate test scenarios in the DCC Device Test Events (DCC interop testing events)
  - For "production proving", where real Production Communications Hubs are required to be tested in a limited scenario to show that the Communications Hubs which come off the Production Line are good quality and working as expected.
- Industry Test Schemes

Here are some of the combinations which will serve various parties involved in SMIP testing:

# a) GVT communicating with CHF through LAN/WAN or Serial Communication

- This combination can help Energy Suppliers to perform end to end test scenarios without the need of DSP. Whereas, they can use TCH or ITCH.
- Under this option, GVT can be used to send commands to CHF and CHF which is joined with Metering devices on HAN will forward those messages to respective end devices.
- End devices generate appropriate responses & alerts and it will send back to CHF which are then received back by GVT. GVT will validate them against expected responses as per GBCS specifications and it will produce comprehensive Test Report. See Figure 2-1. & Figure 2-2.







Figure 2-2. GVT Communicating with CHF through Serial Communication

- b) GVT Communicating with Metering Devices through Serial Communication
  - Metering Device manufacturers can use this option to validate their implementation of GBCS during their development phase, without need of setting up complete test environment with CHF and ACB. See Figure 2-3.

Figure 2-3. GVT Communicating with Metering Devices through Serial Communication







# System Requirements

User must have the following minimum system requirements to successfully run GVT:

- **Operating System:** Windows 7 or above
- **RAM:** 2 GB or higher recommended
- **.NET Framework:** .NET Framework Version 4.5

To use the GVT tool, user needs to activate the license. On startup the application, Registration window appear as shown in Figure 3-1. There are two methods to activate the license.

- Online
- Offline

#### Figure 3-1. Registration



#### **Online License Activation**

The online license activation allows user to activate the license online using internet connectivity. To activate online, click on **Online Request**.

It displays an "Online Registration Request" window as shown in Figure 3-2.

# License Activation

Figure 3-2. Online Request



Fill out the requested details and click on Request to submit.

The status bar displays the SLS license server connection status. The green color indicates online and red color indicates offline. After submitting the details, an acknowledgement e-mail sent on the registered e-mail ID. See Figure 3-3.

Figure 3-3. Acknowledgement E-Mail



On successful registration, an activation e-mail with license file sent to the registered e-mail ID. See Figure 3-4.

#### Figure 3-4. Activation E-Mail

License Activated	
'our license has been activated successfu	lly.
Please use attached License file to activat	e GBCS Validation Tool off-line for Registration Key F7B0-D845-19AA-E4BD-BAD3-9147-B01B-5459
f you have any query you can contact us	on gvt@slscorp.com.
his is an automatically generated e-main	, please do not reply to this e-mail.

The license is activated online, now open the application to get started.

#### **Offline License Activation**

For offline license activation, drop an e-mail at gvt@slscorp.com with registration key, name, company name, e-mail ID and contact number. On successful receipt of the e-mail, an acknowledgement and activation e-mail sent to the mentioned e-mail ID. Save the license file provided with activation e-mail.

Click on **Browse a license file**. It will open file browser as shown in Figure 3-6.

Figure 3-5. Offline Activation - Browse a License File



Select the license file and click **Open** to close the window. On successful activation, it displays the information as per the license file. See Figure 3-6.

Figure 3-6. Launch the Application

Registration key	<b>y</b> :	F7B0-D	845-19	AA-E4BD	-BAD3-914	17-B01E	8-5459	
Current status	1	SUBSC	RIBED					
Valid from (UTC	;):	2019-0	1-29 08	:17:25				
Valid to (UTC)	1	2019-0	2-28 08	:17:25				
Remaining days	3 :	30						

Click on Launch to get started with the application.

Login To login into an application, user needs to provide his/her System User-name & Password (Windows Credentials).

#### Figure 3-7. Login



# Workspace Selection

After successful login, user needs to select a workspace path to store all test cases and generated results. See Figure 3-8.

#### Figure 3-8. Workspace Launcher



### Workspace

The GVT Tool window is shown in Figure 3-9. The main window gives an understanding about GVT Test environment which is used to setup Test Configurations and to perform different test-cases.



#### Figure 3-9. GVT Tool Window

Table 3-1.	GVT Tool Bar D	Details			
Button	Shortcuts	Description	Button	Shortcuts	Description
× ÷	F1	To connect devices		-	To view reports
Œ	Ctrl + N	To create new test case	5	-	To view logs
-	Ctrl + E	To edit test case	Î	Delete	To delete test case
•	Ctrl + S	To save test case		Ctrl + Shift + E	To export test case
•	F5	To run test case		Ctrl + Shift + I	To import test case
•	-	To stop any test case from execution	٩	Ctrl + P	For Configuration
Ø	-	To capture alerts continuously		Ctrl + Shift + P	Response/Alert Parser
<u>±</u>	-	Upload to repository	\$	-	Settings
ŧ	-	Test case repository	-	-	View user's details
	-	Test results repository	(કાડ	-	About SLS & Registration
2	Ctrl + Shift + C	For new console			
Use-case T	ool Bar				

Table 3-1 provides the quick information about all the available tools.

Table 3-1.	GVT Tool Bar D	Details			
Button	Shortcuts	Description	Button	Shortcuts	Description
+	-	Add new run	Ж	-	To collapse
Î	Delete	Delete run	Ō	-	Add delay
↑	F9	Up	♦	-	Add CLI
$\checkmark$	F10	Down	2	Ctrl+F5	Generate command
	Ctrl + Shift + D	Disable security (Middle Pane)	G	-	Clear parameters
Ð	Alt + Shift + D	Duplicate run/test case		-	Negative test (Right Pane)

# Setting up the GVT

Before generating any test case, user needs to configure GVT for particular test along with the details like Devices, Remote Parties, Preamble configuration and Supplementary Remote Parties information.

For configuration, click on  $\checkmark$  button available at Tool bar as shown in Figure 3-9.

Detailed descriptions are as follows.

- Device Configuration
- Remote Party Configuration
- Preamble Configuration
- Supplementary Remote Party Configuration

Table 3-2.	Configuration	Tool Bar Details			
Button	Shortcuts	Description	Button	Shortcuts	Description
+	Ctrl + N	Add Device configuration	•	Ctrl + S	To save
5	-	To export configuration		-	To import configuration
Î	Delete	To remove configuration	i	Ctrl + i	Additional information
	Ctrl + D	Set default configuration	-	-	-

#### **Device Configuration**

User can Add, Delete, Import or Export device configuration. Along with that, user needs to provide device GUID, Type and Device Certificates. In which, device certificates will be useful for security of Critical/Non Critical commands. See Figure 3-10. Also, refer Table 3-2 for detailed tool information.

Figure 3-10.Configuration

V Configuration	×
Device Remote Party Preamble S	RP
Configuration	Settings
	Device Name ESME Device Name
GPF	Device Id 70F8E71000100211 Device Id
GSME	Type ESME Device Type ~
PPMID	Remote Party PIT Device Remote Party
HCALCS	DigitalSignature Certificate E:\Local\Desktop\csr_70F8E71000100211_DS.der
	E:\Local\Desktop\csr_70F8E71000100211_KA.der
	Device DS/KA Certificate
	Save Close

### **Remote Party Configuration**

User can Add, Delete, Import or Export different sets of Organizations. Along with that, user needs to configure Organization certificates, Keys and Counter values for each Remote Party to perform test with different environments like PIT, SIT, OCA, etc. See Figure 3-11. Also, refer Table 3-2.

Click on the Public Certificate GUID, to view more information about certificates.

Click on the

button, to view Private Key.

Figure 3-11.Remote Party Configuration

Device	Remote Party	Preamble	Browse to load SRP RemotePartySet	Remote Party Certificate	Rer Pi	note Party rivateKev	1	Remote Party Counter	^
(	Configuratio	n		Se	etting	5			
+			Name ZAZ1					_	4
ZAZ1			Role	Public Certificate		Private Key		Counter	
чт			Root DS	0000000000000000		Ο	1	1	T
			Recovery DS	90B3D51F30000001		Ο		1	1
			Supplier DS	90B3D51F30010000		O	<b>T</b>	1	Î
лт	List of Rom	ote	Supplier KA	90B3D51F30010000		0	<b>E</b> t		
	Party Se	t	SupplierP KA	90B3D51F30010000		Ο	<b>E</b> t	4294967296	
			NetworkOperator DS	90B3D51F30020000		Ο	<b>T</b>	1	Î
			NetworkOperator KA	90B3D51F30020000		0			Î
			AccessControlBroker DS	90B3D51F30000002		Ο		1	Î
			AccessControlBroker KA	90B3D51F30000002		Ο			i.
			TransitionalCoS DS	90B3D51F30000004		Ο		1	Î
			WanProvider DS	90B3D51F30000007		•		1	
				Click on GUID To View Certificate	Click	on eye to view PrivateKey		Save	Close

R

Instruction to load Remote Party Set:

- Keep all the Remote Party DS/KA Certificates and Private Keys in the 'Remote Party Set' folder.
- Avoid/remove "**Supplier Prepayment KA**" Certificate and Private Key from the folder.

- Do not keep multiple copies of Remote Party DS/KA Certificates and Private Keys in the folder.
- Now, click on the browse folder button to load Remote Party Set into configuration.

### **Preamble Configuration**

User can Add, Delete, Import or Export device Preamble Configuration. Along with that, user can configure device specific Command, Response or Alert Prefix/Postfix for different devices. It will automatically append for send command to a particular device, and in the same way user will receive the Response/Alert payload. See Figure 3-12. Refer Table 3-2.

To set Preamble Configuration as Default, click on the **one** button.



Response Timeout will execute next command, if selected device won't response in mentioned time-duration. Also, if user do not set Response Timeout, GVT will wait for the response infinite time duration. In that case, user can stop execution, manually.

Figure 3-12. Preamble Configuration

evice Remote Part	y Preamble	SRP		
Configur	ation		Settings	
+	ort Delete	Test Configuration Name SLS Emulator	Name	
ICH SMTLITE	Default	Response Timeout (In seconds 240	® Response Timeout	
PF SMTLITE	Configuration	Note : Please insert all	the characters including a whitespace, while confi Command Postfix String	iguring below prefix and postfix.
ICH HAN SMTLITE		{cmdZP,300,FF,	}	
ICH DSPSTUB		Response Prefix {TuData,0,	Response Postfix }	Length of prefix response byte
LS Emulator		Alert Prefix {TuData,0,	Alert Postfix }	Length of prefix Alert byte
		·		
			Command / Response / Alert Prefix - Post	tfix
				Save Close

### **Supplementary Remote Party Configuration**

User can Add, Delete, Import, Export and set device SRP Configuration, which is useful for SRP supported Use-cases. See Figure 3-13. Also, refer Table 3-2.

Figure 3-13. Supplementary Remote Party Configuration

V Configuration			×
Device Remote Party Prea	mble SRP		
Configuration		Settings	
🛨 🔁 📮 📮 🖡	2	RP Name CAZ1 Supplier SRP Name	
Add Save Export Import Delete ZAZ1 Supplier	ç	ARP Id 0083D51F30010000 SRP Id	
PIT Supplier	5	SRP Counter SRP Counter	
		SRP Key Agreement Certificate       SRP Key Agreement Key   SRP KA Certificate/Key	
		Save Close	2

# Test Case Generation

To generate a new test case, click on the button available at GVT Tool Bar as shown in Figure 3-9. Also, refer Table 3-1 for detailed tool information.

It will bring you the window as shown in Figure 3-14.

- In Create New Test case, user needs to provide Title and Description (if any) of particular Test case.
- After that, user needs to select a particular Device (from configured devices).
- Based on selected device, user can select the use-case/s to perform the test. Also, user can select multiple devices from configured devices.
- Click on the <sup>b</sup> button, to import use-cases.
- User can add DELAY and manufacturer specific CLI along with Use-cases.
- User can edit or delete selected devices with available options shown in Figure 3-14. Also, user can delete particular use-case.
- User can also change the use-cases sequences by clicking on Up/ Down button available at Tool bar. See Figure 3-14.

#### Figure 3-14.Create Test Case

🖁 Create Testcase		×
Create New Testcase		
Title SR 1.2.1 - ECS01b ESME TestCase Title	e	
Description SR 1.2.1 - ECS01b Set Price On ESME TestCase Disc	cription	Import
0022A3000009A48D - ESME - A48D Selection	Usecase List Search GBCS Usecas Delay CLI	<b>E</b>
/ 🗊 🏗	↑ ↓ 📋 🗊 💆 Hex 💽 ← Command Format	T Add All
do22A300009A497 - ESME - ESME_Emulator Edit Device	SR 1.2.1 - ECS01b - Set price on ESME SR 4.11.1 - ECS24 - Read ESME Tariff Data	
	Save Close	

- By clicking on the Save button, a new test case will be created and will display on the Left Panel as shown in Figure 3-15.
- Selection of particular test case will display associated Use Cases in the middle panel. See Figure 3-15. Also, refer Table 3-1.

#### Figure 3-15. Test-Case Window

Searc	h List of Test Cases	[ + <b>i</b> ↑ ↓ ) <b>⊑</b> ¥ Ŏ
-	SR 1.2.1 - ECS01b ESME	SR 1.2.1 - ECS01b - Set price on ESME
	TestResults_20180312113250	→ Run 1
	TestResults_20180101184107	SR 4.11.1 - ECS24 - Read ESME Tariff Data
>	SR 2.1 - ECS08_ESME	SR 1.2.1 - ECS01b - Set price on ESME
>	SR 2.1 - GCS05_GSME_GPF	SR 1.2.1 - ECS01b - Set price on ESME
>	SR 3.1 - ECS10_ESME	SR 4 11 1 - ECS24 - Read ESME Tariff Data
>	SR 3.1 - GCS07_GSME	
>	SR 3.3 - CS11 GSME_GPF	
>	SR 3.3 - ECS15a and ECS15c ESME	List of Use Cases
>	SR 3.4 - ECS16_ESME	List of use cases
>	SR 3.4 - GCS44_GSME	
>	SR 6.11 - ECS70_ESME	
>	SR 6.15.1 - CS02b_ESME	
>	SR 6.15.1 - CS02b_GSME	
>	SR 6.21 - CS02b GSME	
>	SR 6.23 - CS02b_ESME	
>	SR 6.23 - CS02b_GSME	
>	SR 6.24.2 - CS02e ESME	
>	SR 6.24.2 - CS02e_GPF_GSME	
>	SR 6.6 - GCS23_GSME	
>	SR 6.8 - ECS30_ESME	
	SR 6.8 - GCS25_GSME_GPF	
>	SR 8.1.1 - GCS28_GSME	
>	SR 8.11 - CCS01_CHF	
>	SR 8.11 - CCS02_CHF	
>	SR 8.7.1 - CS03A1_ESME	
>	SR 8.7.1 - CS03C_GSME	

- Upon selecting particular use-case, configurable fields (if any) will display at the right panel. User can edit the use-case as per the test requirements. See Figure 3-16.
- To validate Response with expected values, user can set Expected Values for different fields. See Figure 3-16.
- Click on the 🎽 button, to generate command payload, manually.

#### Figure 3-16.Use-case/Input Parameter Window

Target : 00	022A3000009A48D - ESME - A48D 🔹
RemoteParty : Su	upplier 👻
Command format : Hex	Input Parameters for Selected Usecase
Parameters :	7
Activation Date Time :	immediate
Special Day Entries :	+ I Index : 1 Date : 2017-11-01 Identifier : 1
Prepayment Credit Max Meter Bala	ance : 100000
Prepayment Credit Maximum Crec Non Disablement Calendar :	dit Threshold : 100000  +  Index : 1  Script Ref : 32  Switch Time : 00:00:00
	Exec Weekdays : 1111111
	Exec Specdays : 1
	Begin Date : 2017-11-01
	End Date : 2017-12-01
	Index : 2

## Connection

To connect CHF/Meter, user needs to select a particular interface. In which, user can choose any of the available communication medium, i.e. TCP, UDP or Serial. See Figure 3-17.

If device have different serial connection to receive response then user can also connect that serial connection by check in "Has Different Receiver Port" checkbox.

At the same time user can also connect zigbee sniffer dongle. User can also view Recent Connections and can directly connect to any of them by double clicking on it.

GVT has been tested to support zigbee sniffer dongle with NXP JN51xx R. Module. For dongle related queries, please contact gvt@slscorp.com.

For TCP & UDP connection, user needs to provide IP address and Port. 

- Whereas for Serial connection, user needs to provide COM Port and Baud Rate.
- For zigbee connection, user needs to provide COM Port and Channel.

#### Figure 3-17. Connection

1-27



# **Test Case** Execution

Upon successful connection, a workspace window will display as shown in Figure 3-18.

To execute a test case, click on the button available at tool bar. It will sequentially execute all the associated use-cases.

For individual use-case, payload will be generated as per GBCS using the values, provided by user. Also, Payload will have MAC & Signature security.

This payload will be sent to the connected Device via selected interface.

Device will receive this payload and generate an appropriate Response/Alert to send it back.

GVT will parse received 'Response/Alert Payload' into relevant information and it will validate Response/Alert with GBCS specifications. Along with that, it will also validate an Expected Values, if provided by user.

At the time of executing a test case, GVT will start capturing zigbee packets using connected zigbee dongle until test case ends & saves captured zigbee packets in test results folder using "pcap" file format. This pcap file can be opened and viewed in any available Zigbee Packet analyzer tool which supports .pcap format.

Test-case Output Log will display ongoing commands and response/alert as shown in Figure 3-18.

After execution, Reports and Logs will be saved in test-case results and result of individual test-cases will be displayed on the left panel. Also, associated use-cases containing Run status will be displayed on middle panel. If run status is passed then it will be marked with green color else red. See Figure 3-18.



V COM9 - GBCS VALIDATION TOOL		×
중 🖪 / 🗟 ト 🗉 🗎	🗄 🔳 🖻 🗳	💘 🛨 生 脂 🗔 🚸 🏟 🚢 (Sis
Search -	+ 1 个 🗸 🐽 🖏 🤴 🔯 💥 C 🗇	
SR 1 1 1 GCS01a GSME     SR 1 1 1 GCS01a GSME_new	SR 1.2.1 - ECS01b - Set price on ESME Target : 0100010203040506 - ESME - ESME Meter	•1
> SR 1 1 1 ECS01a ESME	RemoteParty : Supplier	-
> SR 1 2 1 GCS01b GSME	SR 4.11.1 - ECS24 - Read ESME Tariff Data     Parameters :	
SR 1.2.1 - ECS01b ESME	→ Run 1 Activate Next Date Time : immediate	
TestResults_20180314110040	SR 1.2.1 - ECS01b - Set price on ESME     Tariff Block Price MatrixTOU Price Scale : -5	
TestResults_20180314110026	→ Run 1 Tariff Block Price MatrixTOU : +	
TestResults_20180314105827	SR 1.2.1 - ECS01b - Set price on ESME  Index : 01	
TestResults_20180314105805	→ Run 1 Charge Per Unit : 3000	
TestResults_20180312113250	SR 4.11.1 - ECS24 - Read ESME Tariff Data Index : A1	
TestResults_20180101184107	→ Run 1 Charge Per Unit: 3000	
> SR 2.1 - ECS08_ESME TestCase Res	ults Status based on Results Index : A2	
SR 2.1 - GCS05_GSME_GPF	TestCase Output Log	
SR 3.1 - ECS10_ESME	Index : B1	
SR 3.1 - GCS07 GSME	Logs 🔽 Console 🗮 Watcher Logs	
> SR 3.3 - CS11 GSME_GPF	>> 2018-03-14 11:01:29   Response Received   SR 1.2.1 ECS016	Set price on ESME   Run 1   Fail
SR 3.3 - ECS15a and ECS15c ESMI	>> 2018-03-14 11:01:30   ProcessGBCS DD0000000000081F811000	00000DF090100000000000000000B0B3D51F3001000008
SR 3.4 - ECS16_ESME	>> 2018-03-14 11:01:30   Command Sent   Serial   SR 4.11.1 E	CS24 Read ESME Tariff Data   Run 1
SR 3.4 - GCS44_GSME	> 2018-03-14 11:01:38   DD0000000000008204171100000000DF090	20000000000000000000000000000000000000
> SR 6.11 - ECS70_ESME		4

Select previously executed Test-case and click on the button, to view its Report.

- Select previously executed Test-case and click on the button, to view its Logs.
- User can also run previously executed test-cases without any changes in a parameters.

### Log & Console

User can view ongoing test case commands and response/alert at log section as shown in Figure 3-19.

#### Figure 3-19.Log Section

😑 Logs	<u>&gt;</u> 0	Console	Output Window
» 2018-0	3-12 1	1:32:50	Starting
» 2018-	3-12 1	1:32:50	Configuring
» 2018-0	3-12 1	1:32:53	{cmdZP,300,FF,DD000000000000000000000000000000
» 2018-	3-12 1	1:32:53	Command Sent   TCP   SR 1.2.1 ECS01b Set price on ESME   Run 1
» 2018-	3-12 1	1:32:57	DF090200000000000000040870F8E71000100211080000DB000000A0120C07E2021A010D2C2500800000200A215DA200000400000400000000000200020002000200
» 2018-0	3-12 1	1:32:57	Response Received   SR 1.2.1 ECS01b Set price on ESME   Run 1   Pass
» 2018-0	3-12 1	1:32:58	{cmdZP, 300, FF, DD000000000000000000000000000000
* 1010 ·	0 10 1	1.00.00	Command Come   TED   ED & 11 1 EFEOA David EFEE Tanléf Davin   Dun 1

Also, user can view connected device logs at console section as shown in Figure 3-20.



Using command bar, user can send device specific commands to connected device and can view ongoing logs in a Console section.

Figure 3-20.Console Section

E Logs D. Console	
0x0 0x0 0x0 0x0 0x0 0x4 0x13	介
[2018/02/26 13:44:55][ RPMSECURITY_Service.c][ 427]: secRole = 103	
[2018/02/26 13:44:55][ RPMSECURITY Service.c][2353]: [rpmsecurity GetSharedSecret] ::1	
[2018/02/26 13:44:55][ RPMSECURITY Service.c][1860]: [rpmsecurity GetTrustAnchorInfo] :: ESME.	
[2018/02/26 13:44:55][ RPMSECURITY Service.c][1909]: rpmsecurity SharedSecretFromCellID :: 3	
[2018/02/26 13:44:55][ RPMSECURITY Service.c][2363]: [rpmsecurity_GetSharedSecret] ::2	
[2018/02/26 13:44:55][ RPMSECURITY_Service.c][2397]: [rpmsecurity_GetSharedSecret] ::8	
[2018/02/26 13:44:55][ RPMSECURITY_Service.c][ 453]: After rpmsecurity_GetSharedSecret,result = 0	
[2018/02/26 13:44:55][ RPMSECURITY_Service.c][ 458]: After rpmsecurity_CreateOtherinfo	
[2018/02/26 13:44:55][ RPMSECURITY_Service.c][ 460]: After rpmsecurity_DeriveKey	
[2018/02/26 13:44:55][ RPMSECURITY_Service.c][ 472]: After gcm_init. result = 0	
[2018/02/26 13:44:55][ RPMSECURITY_Service.c][ 478]: After gcm_free.	
[2018/02/26 13:44:55][ RPMSECURITY_Service.c][ 482]: dataWith0x11.	
[2018/02/26 13:44:55][ RPMSECURITY_Service.c][ 487]: Beore result.	
<pre>[2018/02/26 13:44:55][ MESSAGE_Service.c][ 648]: [MESSAGE_ConstructMessage]: result = 0</pre>	
[2018/02/26 13:44:55][ HostApp_Communication.c][7609]: after construct length = 881, result = 0	
[2018/02/26 13:44:55][ HostApp_Communication.c][7610]: [0m[0m Sending Response [0m	
<pre>[2018/02/26 13:44:55][ HostApp_communication.c][9311]: Length = 1762</pre>	
Sending response to App : DD000000000000000000000000000000000	100010
[2018/02/26 13:44:55][ HostApp_Communication.c][9321]: Data len to send on message queue : 1773	
[2018/02/26 13:44:55][ HostApp_Communication.c][7650]: Complete parsing	
43035D208C662,2}{TuData,0,DD0000000000000000000000000000000	100010
06FFFFFF010106FFFFFF010106FFFFFF0300020302020F000FFB02031200000906000000000000000000000000000000	302020
09010710000002020901081000000202090109100000020209010410000002020901081000000202090100100000020209010110000002020901010000002020901011000000202090111100000000	995959
0901171000000202090118100000020209011910000002020901141000000202090118100000202090110100000020209011810000020209011910000002020901201000000202090121100000	995959
Command Command	

### Test Case Execution through Command Line

To execute Testcase from the command line following CLI commands should be followed.

Following CLI commands need to be followed during CLI execution.

Open Command Prompt from path where GVT.exe exists.

- For Serial Connection
  - GVT.exe -p <password> Serial <Com Port> <Baud Rate> [-rc <Com Port> <Baud Rate>] -tc <TestCase Path> [-ds] [-zb <Com Port> <Channel>]
  - GVT.exe -p "xyz" Serial COM1 9600 -rc COM9 9600 -tc "D:\GVT\GVT.xml"
- For TCP Connection
  - GVT.exe -p <password> TCP <IP Address> <Port> -tc <TestCase Path> [-ds] [-zb <Com Port> <Channel>]
  - GVT.exe -p "xyz" TCP 127.0.0.1 5555 -tc "D:\GVT\GVT.xml"
- For UDP Connection
  - GVT.exe -p <password> UDP <IP Address> <Port> -tc <TestCase Path> [-ds] [-zb <Com Port> <Channel>]
  - GVT.exe -p "xyz" UDP 127.0.0.1 4059 -tc "D:\GVT\GVT.xml"

[]: Optional field - do not use bracket

[-ds]: Disable Security

[-zb <Com Port> <Channel>]: Use for zigbee sniffer





**ITCH Device** 

GVT tool has the ability to generate GBCS commands in Hex/Base64/.bin format directly, which can be sent to the ITCH device directly from GVT as per the configuration shown in Figure 3-22.



Figure 3-22.ITCH Device Workspace

GVT receives response from ITCH and automatically convert it into Hex and parse it as per the GBCS template and generate comprehensive test report.

In-built CLI commands are also available as shown in Figure 3-23.

Figure 3-23.CLI Command Support

👿 Create Testcase	×
Create New Testcase	
Title CLI Commands	
Description CLI Commands	
ITCH-WNC	Search GBCS Usecase
/ 🗊 🕸	1 V 📋 🗊 🖸 Hex 🗾
ITCH-WNC	plugin events-server add     plugin messaging-server time     plugin messaging-server confirm     plugin messaging-server importance     plugin messaging-server transmission     plugin messaging-server message
	plugin messaging-server plugin calendar-common set-seasons-info plugin calendar-common set-week-prof-info plugin calendar-common set-day-prof-info plugin calendar-common add-cal-info
	Save Close

# **Test Report** Upon execution of all the test-cases, a comprehensive Test Report will be generated as shown in Figure 3-24.

It has all the details about passed/failed use-cases and it will also provide detailed logs containing Parsed Response received from the Device.

Green/Red row color indicates passed/failed use-case information.

#### Figure 3-24. Test Report

		restResults_2019	0121195440	
V GBCS Va	lidation Tool			
Test Statistics				
Test case Title	Default_ESME	Start Time	2019-01-21 19:54:52 +05:30	
SVT Version	1.3.1.0	End Time	2019-01-21 20:38:46 +05:30	
xecuted By	SLSCORP\Viral.Thakkar.384	Elapsed	00.00:43:53	
Overall Status	Fail	Total	250	
Security	Enabled	Pass/Fail	240/10	
est Execution	n Log			All Pass Fail
	n Log			All Pass Fail
Cest Execution Default_ESME [1] SR 6.11 ECS70 Set Clo	n Log ck on ESME [ ESME ]			All Pass Fail
Cest Execution           Default_ESME           [1] SR 6.11 ECS70 Set Clo           [2] SR 3.3 ECS15a Clear E	n Log ck on ESME [ ESME ] /SME Event Log [ ESME ]			All Pass Fail [Critical] [Non Critical]
Cest Execution Default_ESME [1] SR 6.11 ECS70 Set Clo [2] SR 3.3 ECS15a Clear E [3] SR 3.4 ECS16 Write Su	n Log ck on ESME [ ESME ] :SME Event Log [ ESME ] pplier Contact Details on ESME [ ESME ]			All Pass Fail [Critical] [Non Critical] [Non Critical]
Cest Execution           Default_ESME           [1] SR 6.11 ECS70 Set Clo           [2] SR 3.3 ECS15a Clear E           [3] SR 3.4 ECS16 Write Su           [4] SR 9.1 ECS50 Send Cli	n Log ck on ESME [ ESME ] :SME Event Log [ ESME ] pplier Contact Details on ESME [ ESME ] N to ESME [ ESME ]			All Pass Fail [Critical] [Non Critical] [Non Critical] [Non Critical] [Non Critical]
Cest Execution Default_ESME [1] SR 6. 11 ECS70 Set Clo [2] SR 3.3 ECS15a Clear E [3] SR 3.4 ECS16 Write Su [4] SR 9.1 ECS50 Send Cli [5] SR 6.20.1 ECS39a Set	n Log ck on ESME [ ESME ] (SME Event Log [ ESME ] pplier Contact Details on ESME [ ESME ] N to ESME [ ESME ] MPAN Value on the ESME [ ESME ]			All Pass Fail Critical [Non Critical] [Non Critical] [Non Critical] [Non Critical] [Non Critical] [Non Critical]
Cest Execution Default_ESME [1] SR 6.11 ECS70 Set Clo [2] SR 3.3 ECS15a Clear E [3] SR 3.4 ECS16 Write Su [4] SR 9.1 ECS50 Send Cli [5] SR 6 2.0 1 ECS39a Set [6] SR 6 2.7 ECS40 Read 1	n Log ck on ESME [ ESME ] (SME Event Log [ ESME ] pplier Contact Details on ESME [ ESME ] N to ESME [ ESME ] MPAN Value on the ESME [ ESME ] MPAN Value on the ESME [ ESME ]			All Pass Fail Critical [Non Critical [Non Critical] [Non Critical] [Non Critical] [Non Critical] [Non Critical] [Non Critical]
Cest Execution           Default_ESME           [1] SR 6.11 ECS70 Set Clo           [2] SR 3.3 ECS15a Clear E           [3] SR 3.4 ECS16 Write Su           [4] SR 9.1 ECS50 Send Cli           [5] SR 6.20.1 ECS39 aset           [6] SR 6.2.7 ECS40 Read 1           [7] SR 3.5 ECS14 Disable I	ck on ESME [ ESME ] (SME Event Log [ ESME ] pplier Contact Details on ESME [ ESME ] N to ESME [ ESME ] MPAN Value on the ESME [ ESME ] MPAN Value on the ESME [ ESME ] Phyacy PIN Protection on ESME [ ESME ]			All Pass Fail
Cest Execution           Default_ESME           [1] SR 6.11 ECS70 Set Clo           [2] SR 3.3 ECS15a Clear E           [3] SR 3.4 ECS16 Write Su           [4] SR 9.1 ECS50 Send Cli           [5] SR 6.2.1 ECS30 Send Cli           [6] SR 6.2.7 ECS40 Read 1           [7] SR 3.5 ECS14 Disable I           [8] SR 1.1 2 ECS52 Read E	ck on ESME [ ESME ] (SME Event Log [ ESME ] pplier Contact Details on ESME [ ESME ] IN to ESME [ ESME ] MPAN Value on the ESME [ ESME ] MPAN Value on the ESME [ ESME ] Phyacy PIN Protection on ESME [ ESME ] SME/Comms Hub Firmware Version [ ESME ]			All Pass Fail Critical Con Critical

To view particular use-case in detail, click on the individual use-case. It will display the detailed information as shown in Figure 3-25.

It includes Command Payload, Received Response Payload and Response Parsed fields.

Figure 3-25.Detailed View of Individual Use-cases

		1011100113_20130121133440					
[8] SR 11.2 ECS52 R	ead ESME/Comms Hub Firm	vare Version [ ESME ]	[ Non Critica				
Run 1   Pass			00:00:03.38				
Input							
Command Execution Start	2019-01-21 19:55:33.237 +05:30						
Command Execution End	2019-01-21 19:55:36.624 +05:30						
Command	DD 00 00 00 00 00 00 47 11 00 16 A7 DC 4B 32 06 58 9A 75 3B	00 00 0D DF 09 01 00 00 00 00 00 00 00 8B 08 90 B3 D5 1F 30 01 00 00 08 70 F8 E7 10 00 10 0 AF 99	2 4F 00 02 00 59 13 D9 20 00 00 8B 00 01 01 00 01 00 00 00 02 01 FF 02 01 00 0				
Response	DD 00 00 00 00 00 00 45 11 00 FA 21 D8 E1 DA 96 B3 8D F6 6/	00 00 0D DF 09 02 00 00 00 00 00 00 00 8B 08 70 F8 E7 10 00 10 02 4F 08 90 B3 D5 1F 30 01 0 A0	0 00 00 02 00 59 11 DA 20 00 00 8B 00 00 01 09 04 0A 01 01 02 01 01 00 00 94				
Parsing	MAC Header	DD 00 00 00 00 00 45 11 00 00 00 00					
	Grouping Header	DF 09 02 00 00 00 00 00 00 00 8B 08 70 F8 E7 10 00 10 02 4F 08 90 B3 D5 1F 30 01 0	0 00 00 02 00 59 11				
	CRA	2					
	Originator Counter	00 00 00 00 00 00 08B					
	Business Originator ID	inator ID 70 F8 E7 10 00 10 02 4F					
	Business Target ID	90 B3 D5 1F 30 01 00 00					
	Date	NA					
	Message Code	0059					
	Supplementary Info	NA					
	Length	17					
	Payload	DA 20 00 00 8B 00 00 01 09 04 0A 01 01 02 01 01 00					
	Parsed Parameters	Tag	0xDA				
		Configuration	0×20				
		Invoke ID	0×00008B				
		Datetime	0×00				
		Access Request Specification	0×00				
		Number Of Entries	0x01				
		Data Type	0×09				
		Length	0×04				
		Firmware Version Value	0x0A010102				
		Number Of Entries	0x01				
		Access Response Get	0x01				
		Firmware Version Result	0x00				
		Success	True				
	MAC	94 EA 21 D8 E1 DA 96 B3 8D E6 6A A0					

## **Console Window**

To capture Logs from any device which is under test, click on the button. It will display a window as shown in Figure 3-26.

To connect a device, user needs to provide TCP/Serial interface information.

Figure 3-26. Connect Device with Console

CHF/M	eter (Local : Serial) 🛛 CHF/M	eter (Local : TCP)
COM Port	▼ Baud Rate	

To save Logs into text file, user needs to select the check-box option before connecting a device. It can be useful for future purpose.

After successful connection, user can view device Logs as shown in Figure 3-27. Using command bar, user can execute device specific commands with connected device.

If Console Window is connected during the Test Case Execution, then this logs will also save in Test Case Results.



#### Figure 3-27.Console Window

## **Parser Window**

To generate Parsed information of any Response/Alert, click on the the button. It will display a parser window as shown in Figure 3-28.

Now, enter the Response/Alert Payload (Hex format) information and click on the Parse button.

GVT will parse & decode the Payload as per GBCS format and it will display an in-detailed parsed information as shown in Figure 3-28.



Parser will not parse encrypted responses.

Figure 3-28. Parser to Response/Alert Parser

<b>v</b>	Parser		
Parser			<
Please enter Response / Alert here :	Response / Alert		
DD 00 00 00 00 00 00 00 45 11 00 00 00 00 A0 13 00 02 00 59 11 DA 20 00 00 5	NO DF 09 02 00 00 00 00 00 00 00 FE 08 70 FE E7 10 00 10 02 74 08 00 8 00 00 01 09 04 0A 01 00 04 01 01 00 00 95 FE 63 1E E0 D9 A8 7A 36 BC	00 DB 00 B9 8B	) 6
Parse Parsed Response / Alert :	Parsed response		
MAC Header : DD 00 00 00 00 00 00 00 00 Grouping Header : DF 09 02 00 00 00 11 CRA : 2 Originator Counter : 00 00 00 00 00 00 Business Originator DI : 70 87 57 10 Business Target ID : 00 00 DB 00 00 00 DAte : NA Message Code : 0059 Supplementary Info : NA Payload : DA 20 00 00 F8 00 00 10 99 Payload : DA 20 00 00 F8 00 00 10 99 Payload : DA 20 00 00 F8 00 00 10 99	11 00 00 00 00 10 00 00 00 FS 05 70 FS E7 10 00 10 02 74 05 00 00 DS 00 00 00 A0 13 0 00 FS 0 A0 13 24 0 A0 13 40	00 02 00	) 5
Tag : DA Configuration : 20 InvokeID : 0000F8 Datetime : 00 Access Request Specification : 00 Number Of Entries : 01 Data Type : 09 Length : 04 Firmware Version Volue : 0A010004			
Number Of Entries : 01 Access Response Get : 01 Firmware Version Result : 00 Success : True MAC : 95 FB 63 1E E0 D9 A8 7A 36 B0 E	9 88		

## Repository

Using Repository, user can upload, download and view Configured Test-cases & Test Results to a particular location. It can be useful to multiple users for different test scenarios and can help them to reduce their test-time.

#### **Upload to Repository**

To upload any test-case or test result to Repository, click on the 📫 button.

It will display a window as shown in Figure 3-29. User needs to enter a valid Repository Path and Upload Name.

To select mentioned path as default, user can select check-box option.

Figure 3-29. Upload to Repository



#### **Test Case Repository**

To download any test-case from Repository, click on the button. It will display a Test Case Repository window as shown in Figure 3-30.

Browse/Paste Repository path and click on the Load button. It will fetch all the available test-cases as shown in Figure 3-30.

User can search particular Test-case by entering test-case details at Search option.

Double Click on the test-case to download it from repository.

Figure 3-30.Test Case Repository

Testcase Repository Path \\192.168.0.1\Intercom\GVTShared\Results		Testcase Repository path			Load
Use this as the default and do not ask again arch Testcase	Testcase				
Testcase Name	Created By	Date Created	Modified By	Date Modified	
R 1 1 1 GCS01a GSME_20180208181945	User1	2018-02-08 06:02:22	User1	2018-02-08 06:19:45	6
R 1 1 1 ECS01a ESME_20180208182010	User1	2018-02-08 06:02:35	User1	2018-02-08 06:20:10	0
R 2.1 - ECS08_ESME_20180208181936	User2	2018-02-08 06:04:58	User2	2018-02-08 06:19:36	1
R 3.1 - GCS07_GSME_20180208182818	User2	2018-02-08 06:06:26	User2	2018-02-08 06:28:18	0
R 3.3 - CS11 GSME_GPF_20180208181902	User1	2018-02-08 06:04:41	User1	2018-02-08 06:19:02	0
R 6.11 - ECS70_ESME_20180208181829	User2	2018-02-08 06:04:16	User2	2018-02-08 06:18:29	6
R 6.15.1 - CS02b_ESME_20180208181821	User1	2018-02-08 06:06:39	User1	2018-02-08 06:18:21	6
R 8.11 - CCS01_CHF_20180208181807	User2	2018-02-08 06:02:57	User2	2018-02-08 06:18:06	0
R 8.7.2 - CS03B_GSME_GPF_20180208182026	User2	2018-02-08 06:03:21	User2	2018-02-08 06:20:26	0

#### **Test Results Repository**

To view any test results from Repository, click on the display a Test Result Repository window as shown in Figure 3-31.

Browse/Paste Repository path and click on the Load button. It will fetch all the available test results as shown in Figure 3-31.

User can search particular Test Result by entering test-case details at Search option.

Click on the

button, to view Test Report.

Click on the **b**utton, to view Test Logs.

Green/Red row color indicates passed/failed test-cases.

Figure 3-31.Test Results Repository

R

Test Results Repository Path  (\192.168.0.1\Intercom\GVTShared\Results)		Test Results Repository path			Load
Use this as the default and do not ask again					
arch Testcase Search Testca	ase				
estcase Name	Created By	Date Created	Modified By	Last Date Modified	
R 1 1 1 GCS01a GSME_20180208181945	User1	2018-02-08 06:02:22	User1	2018-02-08 06:19:45	
R 1 1 1 ECS01a ESME_20180208182010	User1	2018-02-08 06:02:35	User1	2018-02-08 06:20:10	
R 2.1 - ECS08_ESME_20180208181936	User2	2018-02-08 06:04:58	User2	2018-02-08 06:19:36	
8 3.1 - GCS07_GSME_20180208182818	User2	2018-02-08 06:06:26	User2	2018-02-08 06:28:18	
8 3.3 - CS11 GSME_GPF_20180208181902	User1	2018-02-08 06:04:41	User1	2018-02-08 06:19:02	
R 6.11 - ECS70_ESME_20180208181829	User2	2018-02-08 06:04:16	User2	2018-02-08 06:18:29	
R 6.15.1 - CS02b_ESME_20180208181821	User1	2018-02-08 06:06:39	User1	2018-02-08 06:18:21	
8.11 - CCS01_CHF_20180208181807	User2	2018-02-08 06:02:57	User2	2018-02-08 06:18:06	
8.7.2 - CS03B_GSME_GPF_20180208182026	User2	2018-02-08 06:03:21	User2	2018-02-08 06:20:26	
					-7

## Watcher

To start watcher, click on button. It will capture alert continuously on connected interface. Watcher Output Log will display captured alert as shown in Figure 3-32.



To stop watcher, click on same button again. After stop watcher, Reports and Logs will be saved in WatcherReports. Individual WatcherReports will be displayed on the left panel as shown in Figure 3-32.



Watcher will be pause while regression is running and resume after regression finishes.

# 4. Advantages of GVT



- 1. User friendly and intuitive UI which makes it easy for novice testers to understand and operate the tool without spending more learning time.
- 2. Option to configure multiple sets of Remote Party Certificates and use any of them while generating a Test Case.
- **3.** It supports to test multiple Device types like ESME, GSME, PPMID and HCALCS.
- 4. Options to test multiple combination of devices like CHF + Meter, Only CHF, Only Meter, etc.
- **5.** Multi-connection interfaces are supported for different versions of CHs and Meters.
- **6.** Ready-made Scenarios can be provided where combination of Set/Get commands are bunched together.
- 7. Scheduling of Regression Test can be added.
- **8.** GVT can be install and configure with any Windows supported machines.
- **9.** Backward compatible to perform test with previous GBCS specific versions.
- **10.** This tool can also be used by Meter manufacturers during their development phase to validate their GBCS implementation without having HAN communication ready.
- **11.** We can execute Regression tests on ESME and GSME simultaneously if they are connected to same CH. Two different CHs are not required.
- **12.** Using "Disable Security" feature, user can test GBCS implementation on SME devices without validating their security (MACS/Signatures).
- **13.** Using "Negative Test" feature, user can test negative scenarios, where intentionally we send incorrect command and expect specific Alert in response.
- **14.** An easy to understand Report makes it easy to identify the issue in case of Test Case fails.

- **15.** User inputs for the variable parameters are validated, which reduces the chances of manual error.
- **16.** Logs from any device under test can be captured and saved in text files which can be used for future purpose.



# 5. Glossary

Acronym	Description
ACB	Access Control Broker
CHF	Communications Hub Function
GBCS	Great Britain Companion Specification
ESME	Electricity Smart Metering Equipment
GSME	Gas Smart Metering Equipment
SMIP	Smart Metering Implementation Programme
ТСН	Test Communications Hub
ITCH	Instrumented Test Communications Hub