

HAMPEL SOFTWARE ENGINEERING

hse-gennet

HAMPEL SOFTWARE ENGINEERING

Version 1.0.0 (2024-08-16)

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This document was created fully automated from the actual LabVIEW Source Code of this project using the [Release Automation Tools](#) of [Hampel Software Engineering](#).

The Release Automation Tools (RAT) help automate the validating, testing, documenting, building, packaging and publishing of your projects. Built-in support for Git lets you trigger our tools from your repository, via GitLab CI/CD or Azure DevOps amongst others.

For a more detailed overview of what these tools do, see <https://rat.hampel-soft.com/>, where you can find information on the available tools, how we automate them using GitLab CI, when the next scheduled webinars are on, and how you can run those tools on your own servers using a commercial license for RAT.

CHAPTER 1. STATE MACHINES



No state machines found.

HSE offers a robust, parsable, free open-source State Machine Template! You can find out more about it at <https://dokuwiki.hampel-soft.com/code/dqmh/hse-module-templates/state-machine>.

CHAPTER 2. CALLING DEPENDENCY DIAGRAMS

2.1. OVERVIEW

No elements found.

2.2. CALLERS

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2.3. LISTENERS

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APPENDIX A: DQMH

DQMH modules documentation

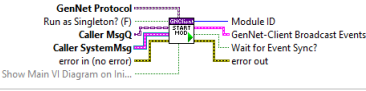
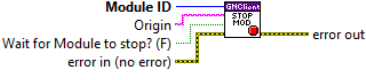
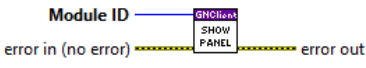

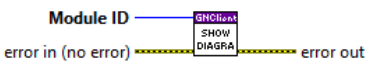
A.1. GENNET-CLIENT.LVLIB


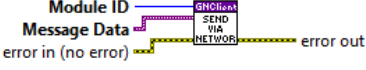



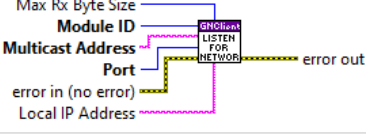





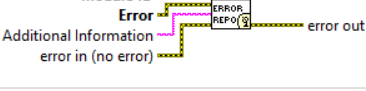



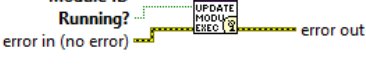
Type: Cloneable



Responsibility: No description found (add content in DQMH module lvlib description)

A.1.1. EVENT LIST

Table 1. Events

Name	Type	Connector pane	Description	S.	R.	I.
Start Module		 <p>GenNet Protocol Run as Singleton? (F) Caller MsgQ Caller SystemMsg error in (no error) Show Main VI Diagram on Init...</p>	Launches the Module Main.vi.			
Stop Module		 <p>Module ID Origin Wait for Module to stop? (F) error in (no error)</p>	<p>Send the Stop request to the Module's Main.vi. If Wait for Module to stop? is TRUE, then this VI will not complete execution until the Module Main VI has stopped running.</p> <p>Note: If the cloneable module is running as singleton, then the 'Wait for Module to stop?' input is ignored... this VI will always wait until a cloneable Main VI running as singleton has stopped running.</p> <p>Note: This VI was modified by the Validate DQMH Module tool to upgrade it to the DQMH 5.1 approach to poll the execution state of a cloneable module running as singleton to know when the module has gone idle.</p> <p>Note: This VI was modified by the Validate DQMH Module tool to upgrade it to the DQMH 5.0 approach to destroying cloneable module event references.</p> <p>Note: This VI was modified by the Validate DQMH Module tool to remove the Status Updated.vi subVI call.</p>			
Show Panel	→	 <p>Module ID error in (no error)</p>	Send the Show Panel request to the Module's Main.vi.			
Hide Panel	→	 <p>Module ID error in (no error)</p>	Send the Hide Panel request to the Module's Main.vi.			
Show Diagram	→	 <p>Module ID error in (no error)</p>	This VI tells the Module to show its block diagram to facilitate troubleshooting (add probes, breakpoints, highlight execution, etc).			

Name	Type	Connector pane	Description	S.	R.	I.
Send via Network		 <p>Module ID Message Data error in (no error)</p>	Forwards the message of a DQMH module via Network			
Connect		 <p>Module ID error in (no error) wait for reply (T)</p>	Open the TCP/IP connection to the listening module			
Listen for Network Broadcasts		 <p>Max Rx Byte Size Module ID Multicast Address Port error in (no error) Local IP Address</p>	Opens a port to listen for broadcasts sent by other modules via UDP			
Module Did Init		 <p>Module ID Origin Initialized? error in (no error)</p>	Send the Module Did Init event to any VI registered to listen to this module's broadcast events.			
Status Updated		 <p>Module ID Status error in (no error)</p>	Send the Status Updated event to any VI registered to listen to events from the owning module.			
Error Reported		 <p>Module ID Error Additional Information error in (no error)</p>	Send the Error Reported event to any VI registered to listen to events from the owning module.			
Module Did Stop		 <p>Module ID Origin error in (no error)</p>	Send the Module Did Stop event to any VI registered to listen to this module's broadcast events.			
Update Module Execution Status		 <p>Module ID Running? error in (no error)</p>	Fire the Get Module Execution Status request.			

Type:  → Request |  → Request and Wait for Reply |  → Broadcast

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

A.1.2. MODULE RELATIONSHIP

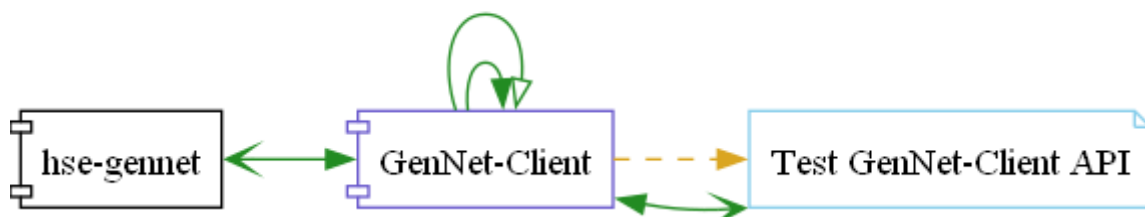


Table 2. Requests callers

Request Name	Callers
Connect	Test GenNet-Client API.vi hse-gennet.lvlib:GenNet Init Client.vi

Request Name	Callers
Hide Panel	GenNet-Client.lvlib:Main.vi Test GenNet-Client API.vi
Listen for Network Broadcasts	Test GenNet-Client API.vi
Send via Network	Test GenNet-Client API.vi
Show Diagram	Test GenNet-Client API.vi
Show Panel	Test GenNet-Client API.vi

Table 3. Broadcasts Listeners

Broadcast Name	Listeners
Error Reported	Test GenNet-Client API.vi
Module Did Init	Test GenNet-Client API.vi
Module Did Stop	Test GenNet-Client API.vi
Status Updated	Test GenNet-Client API.vi
Update Module Execution Status	Test GenNet-Client API.vi

Table 4. Used requests

Module	Requests
GenNet-Client.lvlib	Hide Panel.vi Stop Module.vi

Table 5. Registered broadcast

Module	Broadcasts
☒—☒	☒—☒

A.1.3. MODULE START/STOP CALLS

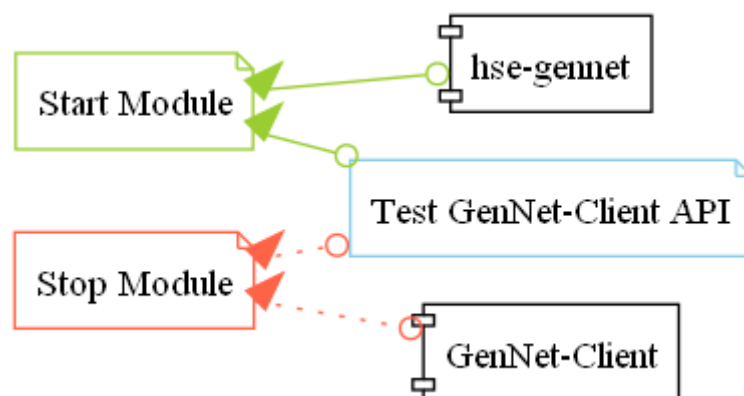


Table 6. Start and Stop module callers

Function	Callers
Start Module	Test GenNet-Client API.vi hse-gennet.lvlib:GenNet Init Client.vi
Stop Module	GenNet-Client.lvlib:Handle Exit.vi Test GenNet-Client API.vi

A.1.4. MODULE CUSTOM ERRORS



Custom errors are added to the module via vi named `*--error.vi`.

Module GenNet-Client.lvlib use the following custom errors:

Table 7. Custom errors

Name	Code	Description
Module Running as Singleton	403680	The "%s" module is currently running as singleton, but the Start Module VI was called with 'Run as Singleton' specified as FALSE.
Module Not Stopped	403682	%s Module did not finish clean up on exit.
Module Not Synced	403683	%s Module was unable to synchronize events.
Module Not Running	403684	Not a single instance of "%s" Module running.
Module Running as Cloneable	403685	The "%s" module is currently running as cloneable, but the Start Module VI was called with 'Run as Singleton' specified as TRUE.
Request Timed Out	403686	The reply for the request "%s" of the "%s" Module timed out.
Request and Wait for Reply Timeout	403686	%s
Master Reference Not Closed	403687	The "%s" module cannot be run as singleton because the Master Reference is still open from a prior run as cloneable. If you plan on running this module as both singleton and cloneable, consider changing your Main VI to wire a value of TRUE to the 'Close Master Reference' input of Init Module.vi.

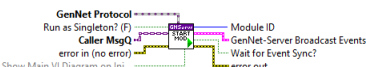
A.2. GENNET-SERVER.LVLIB

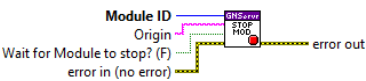
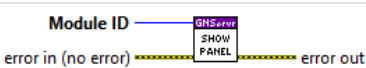
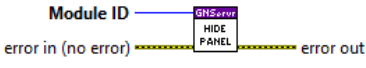
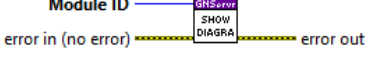
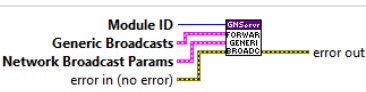
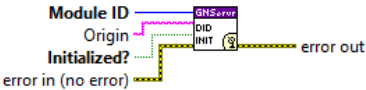
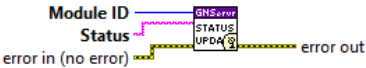
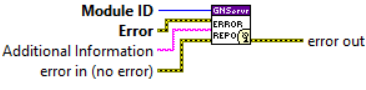
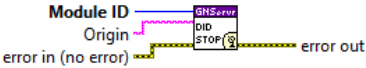
Type: Cloneable


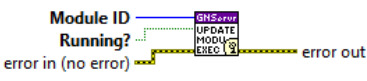


Responsibility: No description found (add content in DQMH module lvlib description)

A.2.1. EVENT LIST

Table 8. Events



Name	Type	Connector pane	Description	S.	R.	I.
Start Module			Launches the Module Main.vi.			

Name	Type	Connector pane	Description	S.	R.	I.
Stop Module			<p>Send the Stop request to the Module's Main.vi. If Wait for Module to stop? is TRUE, then this VI will not complete execution until the Module Main VI has stopped running.</p> <p>Note: If the cloneable module is running as singleton, then the 'Wait for Module to stop?' input is ignored... this VI will always wait until a cloneable Main VI running as singleton has stopped running.</p> <p>Note: This VI was modified by the Validate DQMH Module tool to upgrade it to the DQMH 5.1 approach to poll the execution state of a cloneable module running as singleton to know when the module has gone idle.</p> <p>Note: This VI was modified by the Validate DQMH Module tool to upgrade it to the DQMH 5.0 approach to destroying cloneable module event references.</p> <p>Note: This VI was modified by the Validate DQMH Module tool to remove the Status Updated.vi subVI call.</p>			
Show Panel	→		Send the Show Panel request to the Module's Main.vi.			
Hide Panel	→		Send the Hide Panel request to the Module's Main.vi.			
Show Diagram	→		This VI tells the Module to show its block diagram to facilitate troubleshooting (add probes, breakpoints, highlight execution, etc).			
Forward Generic Broadcasts to Network	→		Enables forwarding of the callers Generic Broadcast Events to the network via UDP as set in the Network Broadcast Params .			
Module Did Init	→		Send the Module Did Init event to any VI registered to listen to this module's broadcast events.			
Status Updated	→		Send the Status Updated event to any VI registered to listen to events from the owning module.			
Error Reported	→		Send the Error Reported event to any VI registered to listen to events from the owning module.			
Module Did Stop	→		Send the Module Did Stop event to any VI registered to listen to this module's broadcast events.			

Name	Type	Connector pane	Description	S.	R.	I.
Update Module Execution Status			Fire the Get Module Execution Status request.			
GenNet Message Received			Broadcasts a received message as variant datatype. The actual datatype (and decoding) of the variant depends on the GenNet Protocol being used.			

Type:  → Request |  → Request and Wait for Reply |  → Broadcast

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

A.2.2. MODULE RELATIONSHIP



Table 9. Requests callers

Request Name	Callers
Forward Generic Broadcasts to Network	Test GenNet-Server API.vi
Hide Panel	Test GenNet-Server API.vi
Show Diagram	Test GenNet-Server API.vi
Show Panel	Test GenNet-Server API.vi

Table 10. Broadcasts Listeners

Broadcast Name	Listeners
Error Reported	Test GenNet-Server API.vi
GenNet Message Received	Test GenNet-Server API.vi
Module Did Init	Test GenNet-Server API.vi
Module Did Stop	Test GenNet-Server API.vi
Status Updated	Test GenNet-Server API.vi
Update Module Execution Status	Test GenNet-Server API.vi

Table 11. Used requests

Module	Requests
GenNet-Server.lvlib	Stop Module.vi (3)

Table 12. Registered broadcast

Module	Broadcasts
☒—☒	☒—☒

A.2.3. MODULE START/STOP CALLS



Table 13. Start and Stop module callers

Function	Callers
Start Module	Test GenNet-Server API.vi
Stop Module	GenNet-Server.lvlib:Main.vi GenNet-Server.lvlib:Handle Exit.vi Test GenNet-Server API.vi

A.2.4. MODULE CUSTOM ERRORS



Custom errors are added to the module via vi named `*--error.vi`.

Module GenNet-Server.lvlib use the following custom errors:

Table 14. Custom errors

Name	Code	Description
Module Running as Singleton	403680	The "%s" module is currently running as singleton, but the Start Module VI was called with 'Run as Singleton' specified as FALSE.
Module Not Stopped	403682	%s Module did not finish clean up on exit.
Module Not Synced	403683	%s Module was unable to synchronize events.
Module Not Running	403684	Not a single instance of "%s" Module running.
Module Running as Cloneable	403685	The "%s" module is currently running as cloneable, but the Start Module VI was called with 'Run as Singleton' specified as TRUE.
Request and Wait for Reply Timeout	403686	%s
Master Reference Not Closed	403687	The "%s" module cannot be run as singleton because the Master Reference is still open from a prior run as cloneable. If you plan on running this module as both singleton and cloneable, consider changing your Main VI to wire a value of TRUE to the 'Close Master Reference' input of Init Module.vi.

APPENDIX B: LIBRARIES

Misc. reuse libraries

B.1. HSE-GENNET.LVLIB

Responsibility: The DQMH-GenNet library contains all support files necessary to use the HSE Generic Networking Singleton Module provided by HAMEL SOFTWARE ENGINEERING.




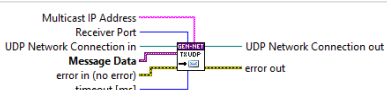











The Delacor Queued Message Handler (DQMH) reference design is provided by Delacor, an NI Alliance Partner. The DQMH is available for download from the LabVIEW Tools Network. You can find more information on the Delacor Queued Message Handler (DQMH) at <http://delacor.com/products/dqmh/>.







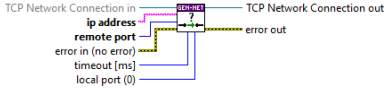


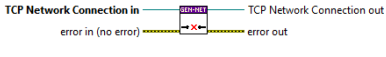




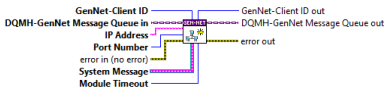

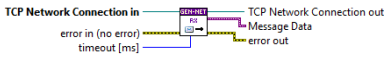


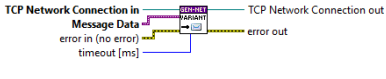




Version: 1.0.0.0

Table 15. Nested libraries

Name	Type
GN Protocol Connection.lvclass	LVClass
GN Protocol Server.lvclass	LVClass
GN Protocol Connection - Variant.lvclass	LVClass
GN Protocol Server - Variant.lvclass	LVClass
DQMH-GenNet Message Queue.lvclass	LVClass

Table 16. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
GenNet Close UDP Connection		Closes a TCP/IP connection.			
GenNet Send UDP Message		Sends a message via TCP/IP to a GenNet-Server module. The message is flattened to a string, and the length of the string is prepended before sending it over the network.			
GenNet Receive UDP Message		Receives a message sent by a GenNet-Client module. The first 4 bytes of the message contain the length of the actual data sent. The received message is converted to a variant.			
GenNet Get Broadcast Name From Variant		No description found (add content in vi description)			
GenNet Add Broadcast Name To Variant		No description found (add content in vi description)			

Name	Connector pane	Description	S.	R.	I.
DQMH-GenNet Add Notifier To Variant		HSE: If a notifier reference is given, stores it as an attribute inside the Message Data variant. The notification data type is variant.			
DQMH-GenNet Get Notifier From Variant		HSE: Gets the Wait Notifier Refnum (datatype variant) from the Message Data variant			
GenNet Check Connection		Checks for a valid TCP/IP connection. Reestablishes the connection if no valid connection found. Creates a new connection if none was given.			
GenNet Close Connection		Closes a TCP/IP connection.			
GenNet Format System Message for MsgQ		Formats the contents of a System Message			
GenNet Init Client		Initializes a GenNet Client if ClientID == -1 and automatically connects to it. See usage example inside for how to use this VI.			
GenNet Receive Variant Message		Receives a message sent by a GenNet-Client module. The first 4 bytes of the message contain the length of the actual data sent. The received message is converted to a variant.			
GenNet Send Message		Sends a message via TCP/IP to a GenNet-Server module. The message is flattened to a string, and the length of the string is prepended before sending it over the network.			
GenNet Version-Safe Unflatten Variant		Unflattens a variant from a string. Automatically prepends the correct header if the variant was flattened in another LabVIEW version.			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

APPENDIX C: CLASSES

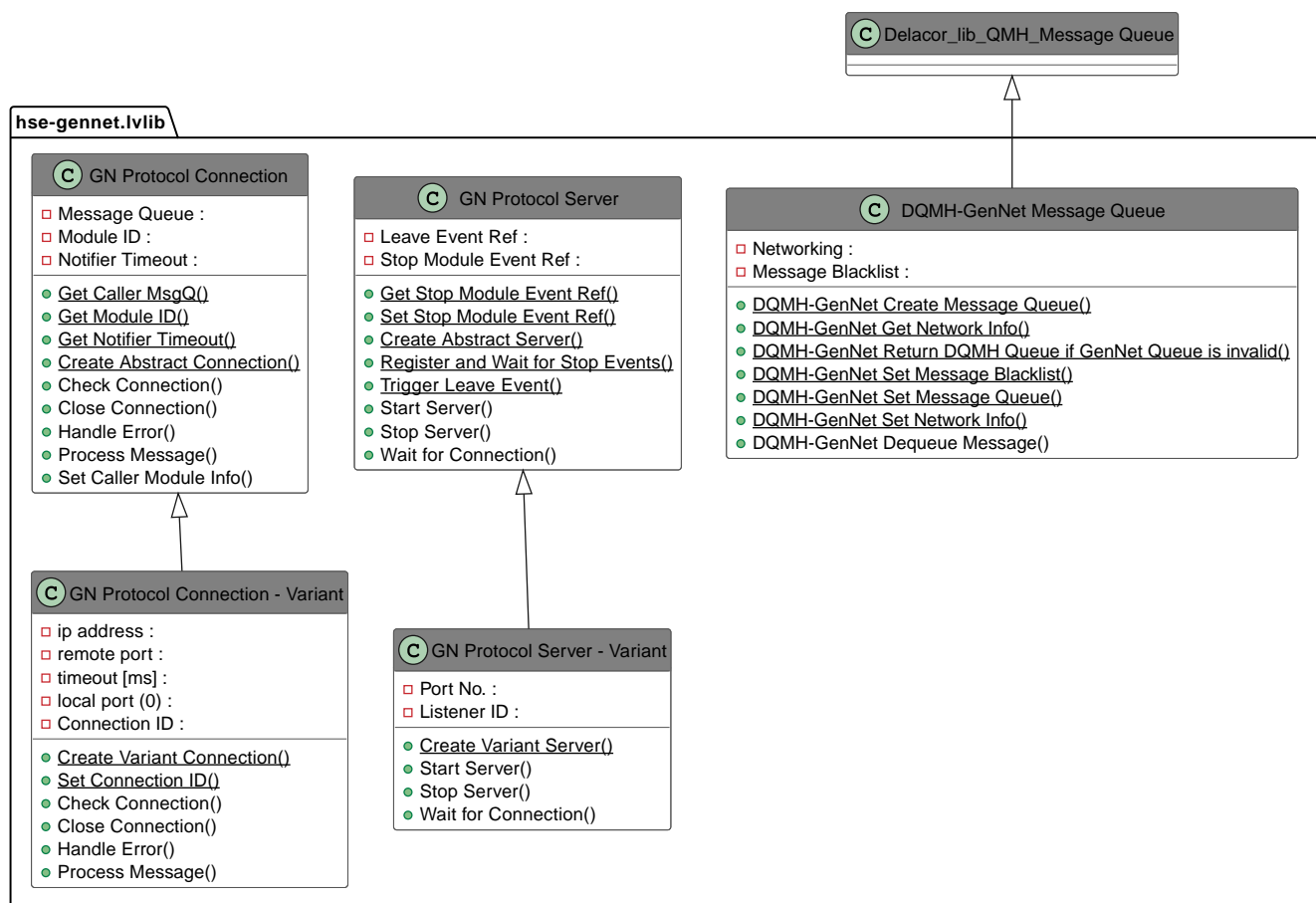
LabVIEW Classes

C.1. CLASSES OVERVIEW

This project contains 5 classes and 0 interface.

Table 17. Classes list

Classes	Interfaces
GN Protocol Connection.lvclass	
GN Protocol Server.lvclass	
GN Protocol Connection - Variant.lvclass	
GN Protocol Server - Variant.lvclass	
DQMH-GenNet Message Queue.lvclass	



C.2. GN PROTOCOL CONNECTION.LVCLASS

Responsibility: No description found (add content in lvclass description)

Version: 1.0.0.0

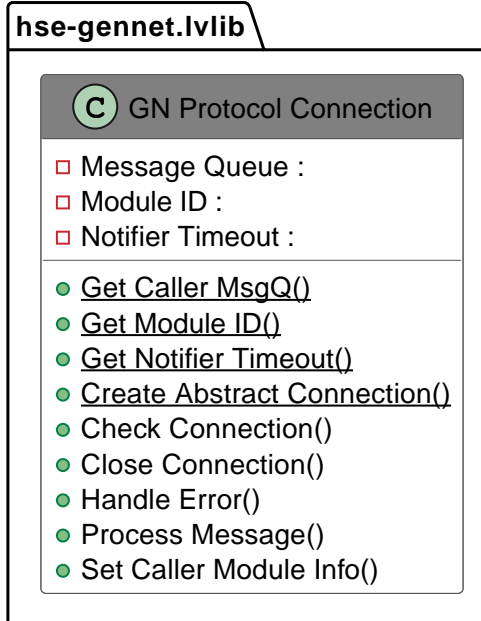













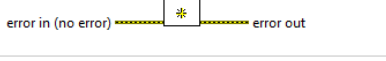
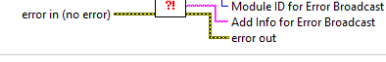

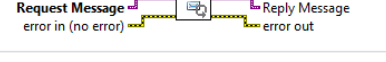



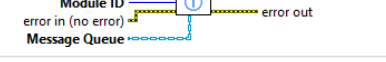

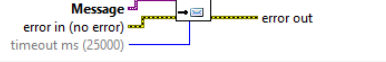



Table 18. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Get Caller MsgQ		No description found (add content in vi description)			
Get Module ID		No description found (add content in vi description)			
Get Notifier Timeout		No description found (add content in vi description)			
Check Connection		No description found (add content in vi description)			
Close Connection		No description found (add content in vi description)			
Create Abstract Connection		No description found (add content in vi description)			
Handle Error		No description found (add content in vi description)			
Process Message		No description found (add content in vi description)			
Read Message		No description found (add content in vi description)			
Set Caller Module Info		No description found (add content in vi description)			
Write Message		No description found (add content in vi description)			

Scope:  → Protected |  → CommunityReentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

C.3. GN PROTOCOL SERVER.LVCLASS

Responsibility: No description found (add content in lvclass description)

Version: 1.0.0.2

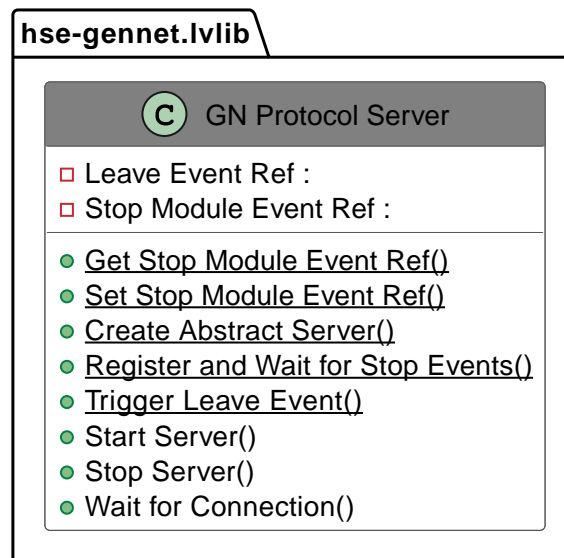
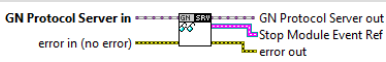


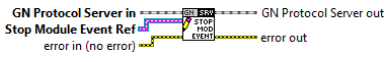





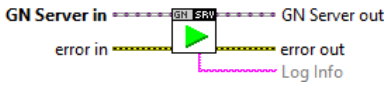


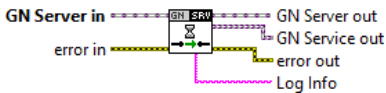



Table 19. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Get Stop Module Event Ref		No description found (add content in vi description)			
Set Stop Module Event Ref		No description found (add content in vi description)			
Create Abstract Server		No description found (add content in vi description)			
Register and Wait for Stop Events		No description found (add content in vi description)			
Start Server		No description found (add content in vi description)			
Stop Server		No description found (add content in vi description)			
Trigger Leave Event		No description found (add content in vi description)			
Wait for Connection		No description found (add content in vi description)			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

C.4. GN PROTOCOL CONNECTION - VARIANT.LVCLASS

Responsibility: No description found (add content in lvclass description)

Version: 1.0.0.1

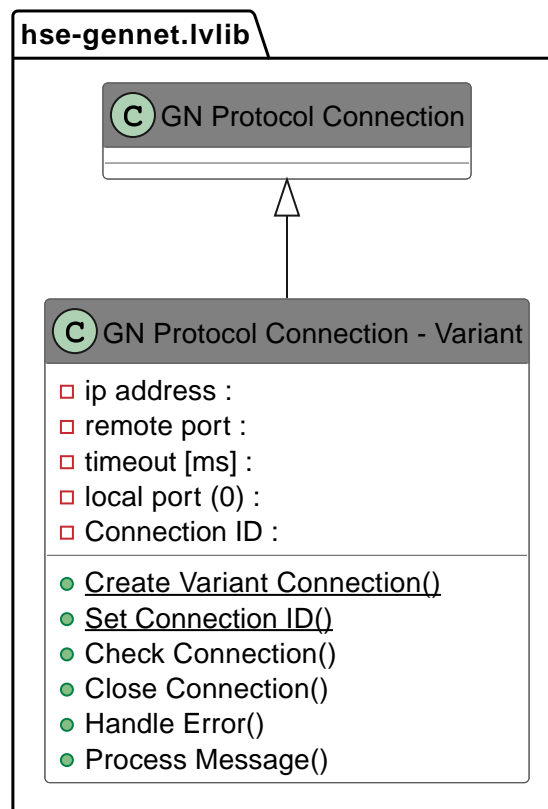




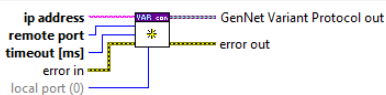

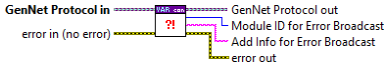







Table 20. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Check Connection		No description found (add content in vi description)			
Close Connection		No description found (add content in vi description)			
Create Variant Connection		No description found (add content in vi description)			
Handle Error		No description found (add content in vi description)			
Process Message		No description found (add content in vi description)			
Read Message		No description found (add content in vi description)			

Name	Connector pane	Description	S.	R.	I.
Set Connection ID		No description found (add content in vi description)			
Write Message		No description found (add content in vi description)			

Scope: → Protected | → Community

Reentrancy: → Preallocated reentrancy | → Shared reentrancy

Inlining: → Inlined

C.5. GN PROTOCOL SERVER - VARIANT.LVCLASS

Responsibility: No description found (add content in lvclass description)

Version: 1.0.0.0

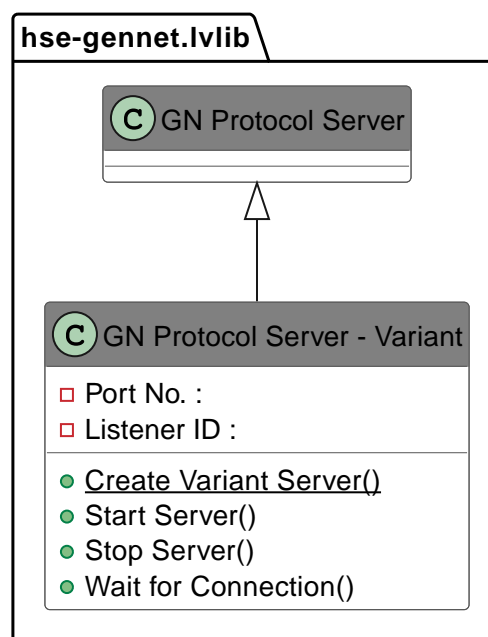


Table 21. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
Create Variant Server		No description found (add content in vi description)			
Start Server		No description found (add content in vi description)			
Stop Server		No description found (add content in vi description)			
Wait for Connection		No description found (add content in vi description)			

Scope: → Protected | → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

C.6. DQMH-GENNET MESSAGE QUEUE.LVCLASS

Responsibility: The DQMH-GenNet Message Queue class adds properties for network connection configuration and methods for forwarding messages to another module to the DQMH message queue.

Version: 1.0.0.0

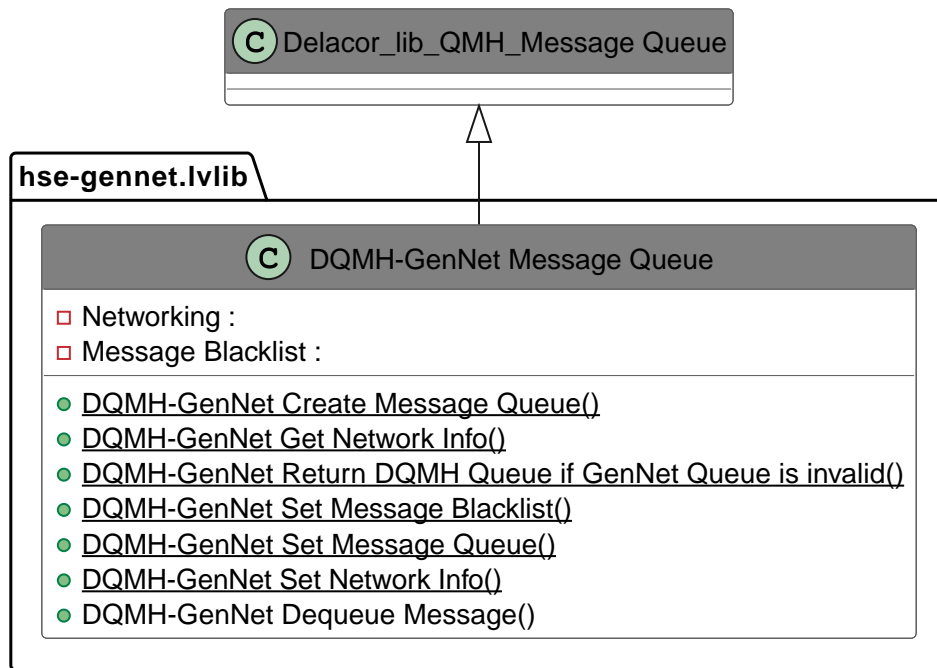

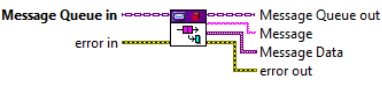

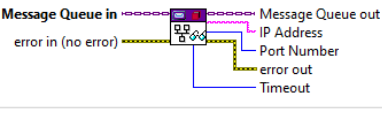
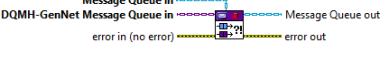



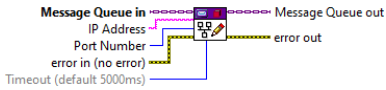






Table 22. Functions (non private scope only)

Name	Connector pane	Description	S.	R.	I.
DQMH-GenNet Create Message Queue		This is the modified "Create Message Queue" VI for DQMH Generic Networking			
DQMH-GenNet Dequeue Message		This VI pulls messages off the DQMH Generic Networking Message Queue.			
DQMH-GenNet Get Network Info		Gets the network information from the Message Queue			
DQMH-GenNet Return DQMH Queue if GenNet Queue is invalid		No description found (add content in vi description)			

Name	Connector pane	Description	S.	R.	I.
DQMH-GenNet Set Message Blacklist		sets the message message blacklist to the GenNet Message Queue. In default, Add is set to true and the current Blacklist will be extended. If it is set to false, the current Blacklist will be replaced.			
DQMH-GenNet Set Message Queue		Gets the message queue from the original DQMH object in Message Queue in and writes it to the DQMH-GenNet Message Queue			
DQMH-GenNet Set Network Info		Sets or clears the network info in the Message Queue private data			

Scope:  → Protected |  → Community

Reentrancy:  → Preallocated reentrancy |  → Shared reentrancy

Inlining:  → Inlined

APPENDIX D: CUSTOM ERRORS

List of Custom Error VIs

D.1. CUSTOM ERRORS



Custom errors are added via vi named `*--error.vi`.

Table 23. Custom errors

Name	Code	Description	Owned by
Module Running as Singleton	403680	The "%s" module is currently running as singleton, but the Start Module VI was called with 'Run as Singleton' specified as FALSE.	GenNet-Client.lvlib GenNet-Server.lvlib
Module Not Stopped	403682	%s Module did not finish clean up on exit.	GenNet-Client.lvlib GenNet-Server.lvlib
Module Not Synced	403683	%s Module was unable to synchronize events.	GenNet-Client.lvlib GenNet-Server.lvlib
Module Not Running	403684	Not a single instance of "%s" Module running.	GenNet-Client.lvlib GenNet-Server.lvlib
Module Running as Cloneable	403685	The "%s" module is currently running as cloneable, but the Start Module VI was called with 'Run as Singleton' specified as TRUE.	GenNet-Client.lvlib GenNet-Server.lvlib
Request Timed Out	403686	The reply for the request "%s" of the "%s" Module timed out.	GenNet-Client.lvlib
Request and Wait for Reply Timeout	403686	%s	GenNet-Client.lvlib GenNet-Server.lvlib
Master Reference Not Closed	403687	The "%s" module cannot be run as singleton because the Master Reference is still open from a prior run as cloneable. If you plan on running this module as both singleton and cloneable, consider changing your Main VI to wire a value of TRUE to the 'Close Master Reference' input of Init Module.vi.	GenNet-Client.lvlib GenNet-Server.lvlib

GLOSSARY

The rat-documentr tool facilitates the following LabVIEW-related tools and libraries:

- Antidoc by Wovalab
- AsciiDoc Toolkit by Wovalab
- Graph Builder by C. Gambini
- Classy by T. Boylston
- DQMH® by Delacor

Furthermore, it relies on the following tools and libraries:

- Ruby
- AsciiDoctor
- Java
- GraphViz