Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – LiftGate Softswitch Interface Client

Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.2

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FORD CONFIDENTIAL

Revision History

Date	Ver	Notes	
October 29, 2018	**1.0**	**Initial Release**	
February 8, 2019	**1.1**		
	LGSS-IIR-REQ-323817/B-LGSSInterfaceClient_Rx	MBORREL4: Removed REQ-332999 & REQ-333000, Added REQ-201601	
	LGSS-REQ-328538/B-Powermode Conditions	MBORREL4: Added Delayed Acc, Acc, and Start	
	STR-572684/B-Requirements	MBORREL4: Removed REQ-332486	
	LGSS-REQ-332246/B-LiftGate Release - User Input Enable/Disable	MBORREL4: Changed to a precondition table for clarity. Added some new preconditions	
	LGSS-UC-REQ-323953/B-User selects Manual LiftGate Softswitch on LGSSInterfaceClient (switch enabled)	MBORREL4; Updated postcondition as LGSSServer1 opens manual liftgates	
	LGSS-UC-REQ-323963/B-User selects Open Power LiftGate Softswitch on LGSSInterfaceClient (switch enabled)	MBORREL4: Updated postconditions (no switch updates)	
	LGSS-UC-REQ-323974/B-User selects Close Power LiftGate Softswitch on LGSSInterfaceClient (switch enabled)	MBORREL4: Updated postconditions (no switch updates)	
	LGSS-UC-REQ-323975/B-User selects Power LiftGate Softswitch on LGSSInterfaceClient while LiftGate in motion (switch enabled)	MBORREL4: Updated postconditions (no switch updates)	
	LGSS-ACT-REQ-333020/B-User Selects Power LiftGate Softswitch On LGSSInterfaceClient	MBORREL4: Updated to remove HMI button text update	
	LGSS-SD-REQ-333007/B-User Selects Manual LiftGate Softswitch On LGSSInterfaceClient	MBORREL4; Updated postcondition as LGSSServer1 opens manual liftgates	
	LGSS-SD-REQ-333021/B-User Selects Power LiftGate Softswitch On LGSSInterfaceClient	MBORREL4: Updated to remove HMI button text update	
June 21, 2019	**1.2**		
	LGSS-IIR-REQ-323817/C-LGSSInterfaceClient_Rx	MBORREL4: Added REQ-333000	
	STR-572684/C-Requirements	MBORREL4: Added REQ-354975	
	LGSS-REQ-354975/A-LiftGate Ajar Status	MBORREL4: New req.	
	LGSS-UC-REQ-323953/C-User selects Manual LiftGate Softswitch on LGSSInterfaceClient (switch enabled)	MBORREL4: Updated to include liftgate ajar status	
	LGSS-UC-REQ-323963/C-User selects Open Power LiftGate Softswitch on LGSSInterfaceClient (switch enabled)	MBORREL4: Updated to include liftgate ajar status	
	LGSS-UC-REQ-323974/C-User selects Close Power	MBORREL4: Updated to include liftgate ajar status	

	LiftGate Softswitch on LGSSInterfaceClient (switch enabled)	
	LGSS-UC-REQ-323975/C-User selects Power LiftGate Softswitch on LGSSInterfaceClient while LiftGate in motion (switch enabled)	MBORREL4: Updated to include liftgate ajar status

Table of Contents

1 Architectural Design

1.1 LGSS-CLD-REQ-323809/A-LiftGate Softswitch Interface Client

The LiftGate Softswitch Interface Client (LGSSInterfaceClient) is responsible for the tasks listed below:

- Providing a user interface for the LiftGate Softswitch feature
- Managing feature restricted status
- Transmitting user input to LGSSServer1
- Displaying active feature state on user interface

Please review the implementation guide/block diagram to locate the LGSSInterfaceClient class.

1.2 LGSS-CLD-REQ-323810/A-LiftGate Softswitch Server1

The LiftGate Softswitch Server1 (LGSSServer1) is responsible for the tasks listed below:

- Receiving user request from LGSSInterfaceClient
- Transmitting request to LGSSServer2

Please review the implementation guide/block diagram to locate the LGSSServer1 class.

1.3 LGSS-CLD-REQ-323811/A-LiftGate Softswitch Server2

The LiftGate Softswitch Server2 (LGSSServer2) is responsible for the tasks listed below:

- Receiving release request from LGSSServer1
- Releasing the LiftGate

Please review the implementation guide/block diagram to locate the LGSSServer2 class.

1.4 Physical Mapping of Classes

The table below shows an example of how the logical classes that make up the LiftGate Softswitch feature can be mapped into physical modules. This mapping is an example only and does not necessarily carryover to other carlines or vehicle architectures.

Logical Class	Physical Module (ECU)
LGSSInterfaceClient	SYNC
LGSSServer1	BCM
LGSSServer2	RGTM

1.5 LGSSInterfaceClient Interface

1.5.1 LGSS-IIR-REQ-323816/A-LGSSInterfaceClient_Tx

1.5.1.1 MD-REQ-328278/A-LiftgateReleaseCounter_Rq

Message Type: Request

This signal is used to request a release of the LiftGate. This signal increments by 1 everytime it is sent to request a release.

Name	Literals	Value	Description
Type	-	-	Unit: SED Resolution: 1 Offset: 0
	Initial Value	0x0	Reserved for transmitter reset
	Code Value	0x1 To 0x6	

	Not Used	0x7	

1.5.2 LGSS-IIR-REQ-323817/C-LGSSInterfaceClient_Rx

1.5.2.1 MD-REQ-027149/A-IgnitionStatus_St (TcSE ROIN-225464-1)

Message Type: Status

Signal used to indicate ignition state.

Name	Literals	Value	Description
Type	-	-	Indicates ignition state
	Unknown	0x0	
	Off	0x1	
	Accessory	0x2	
	Run	0x4	
	Start	0x8	
	Invalid	0xF	

1.5.2.2 MD-REQ-014025/A-VehicleSpeed_St (TcSE ROIN-223023-1)

Message Type: Status

Status used to indicate vehicle speed.

Name	Literals	Value	Description
Type	-	-	Indicates vehicle speed. Unit: kph Resolution:0.01 Offset:0
	kph	0x0 to 0xFFFF	

1.5.2.3 MD-REQ-333022/A-LockInhibit_St

Message Type: Status

This signal is used to indicate the lock inhibit status.

Name	Literals	Value	Description
Type	-	-	Current Lock Inhibit status
	No Inhibit	0x0	
	Inhibit	0x1	

1.5.2.4 MD-REQ-014023/A-GearLvrPos_D_Actl (TcSE ROIN-266648-1)

Message Type: Status

Vehicle status signal for the Gear Lever Position on an automatic transmission vehicle.

Name	Literals	Value	Description
Type	-	-	-
	Park	0x0	
	Reverse	0x1	

	Neutral	0x2	
	Drive	0x3	
	Sport_DriveSport	0x4	
	Low	0x5	
	First	0x6	
	Second	0x7	
	Third	0x8	
	Fourth	0x9	
	Fifth	0xA	
	Sixth	0xB	
	Undefined_Treat_as_Fault	0xC	
	Undefined_Treat_as_Fault1	0xD	
	Unknown_Position	0xE	
	Fault	0xF	

1.5.2.5 MD-REQ-086348/A-CarMode_St

Message Type: Status

Name	Literals	Value	Description
Type	-	-	Defines what car mode state is active.
	Normal	0x0	
	Factory	0x1	
	NotUsed	0x2	
	Transportation	0x3	

1.5.2.6 MD-REQ-201601/A-Delay_Accy

Message Type: Status

This signal is used indicate whether Delayed Accessory is active or not.

Name	**Literals**	**Value**	**Description**
Type	-	-	Status of delayed accessory
	Off	0x00	
	On	0x01	

1.5.2.7 MD-REQ-333000/A-LiftgateAjar_St

Message Type: Status

The signal is used to inform the LGSSInterfaceClient of the current Liftgate ajar status.

Name	**Literals**	**Value**	**Description**
Status	-	-	Indicates the current liftgate ajar status
	Closed	0x0	
	Open	0x1	

2 General Requirements

2.1 LGSS-REQ-328538/B-Powermode Conditions

The LGSSInterfaceClient shall only allow the functionality of this feature when:

- IgnitionStatus_St = Run, Start, or Acc and the touch screen display is On, OR
- IgnitionStatus_St = Off and Delay_Accy = On and the touch screen display is On

2.2 LGSS-REQ-328539/A-Feature Configuration

The LGSSInterfaceClient shall have a configurable parameter to determine whether the vehicle supports LiftGate Softswitch.

- If the parameter indicates the vehicle supports LiftGate Softswitch, then all the functionality and signals defined in this SPSS shall be supported.
- If the parameter indicates the vehicle does not support LiftGate Softswitch, then none of the functionality defined in this SPSS shall be supported.

Note: This feature (and configuration) is to be used for all back end enclosure types (power liftgate, manual liftgate, decklid, etc) requiring the release softswitch. The LGSSServer1 shall manage the different back end enclosures and send the appropriate request signal to the LGSSServer2.

2.3 LGSS-REQ-328540/A-Speed Restriction Configuration

The LGSSInterfaceClient shall have a configurable parameter to set the vehicle speed threshold by which the LiftGate Softswitch menu shall be made available/unavailable.

3 Functional Definition

3.1 LGSS-FUN-REQ-323940/A-Manual/Power LiftGate Softswitch

3.1.1 Requirements

3.1.1.1 LGSS-REQ-332237/A-LiftGate Release - Interface Client Request

When the LiftGate Release is selected by the user via HMI, the LGSSInterfaceClient shall increment the event counter LiftgateReleaseCounter_Rq by a value of 1.

When LiftgateReleaseCounter_Rq reaches a count value of 6, the next increment shall reset the counter to a value of 1. The count value of 0 is reserved, and shall not be used in the increment operation of this counter.

3.1.1.2 Event Counter Requirements

3.1.1.2.1 LGSS-REQ-332238/A-Initial Value

When the LGSSInterfaceClient resets, it shall initialize and publish LiftgateReleaseCounter_Rq = 0.

Immediately following a reset, the LGSSInterfaceClient shall monitor for events that will cause LiftgateReleaseCounter_Rq to increment.

The LGSSInterfaceClient shall continue to publish 0 until an event causes LiftgateReleaseCounter_Rq to increment.

3.1.1.2.2 LGSS-REQ-332239/A-Valid Events

For a count event to be deemed valid, the LGSSInterfaceClient must first detect a “non-button press” before an actual “press.” Only then shall the LGSSInterfaceClient increment LiftgateReleaseCounter_Rq.

When powering back On from a reset, the LGSSInterfaceClient shall not increment LiftgateReleaseCounter_Rq if the first value it reads for the corresponding button is a “pressed” value. This is to avoid any possible “stuck button” error conditions.

Ex. If the interface is a manual switch that is pressed/not pressed, the module shall ensure that the switch is first not pressed, and then when it sees a pressed event, it shall increment the counter.

3.1.1.2.3 LGSS-REQ-332241/A-Voltage Range

The LGSSInterfaceClient shall not increment LiftgateReleaseCounter_Rq when voltage is out of range, even if an incrementing event occurs (refer to Ford Next Generation Infotainment Engineering Spec_VerX_SYNC4 for voltage requirements).

3.1.1.2.4 LGSS-REQ-332242/A-Bus Wakeup

The LGSSInterfaceClient shall wake CAN whenever LiftgateReleaseCounter_Rq has changed.

3.1.1.2.5 LGSS-REQ-332243/A-Bus Sleep Voting

The LGSSInterfaceClient is allowed to vote for CAN Sleep 5 seconds after the last change in LiftgateReleaseCounter_Rq, independent of the FNOS wakeup strategy.

3.1.1.2.6 LGSS-REQ-332244/A-Value Retention

The LGSSInterfaceClient shall retain the last transmitted value of LiftgateReleaseCounter_Rq through sleep/wake cycle.

3.1.1.3 LGSS-REQ-332245/A-LiftGate Release - User Input

The LGSSInterfaceClient shall provide a user interface (button/graphic) to allow selection of the LiftGate Softswitch release button.

3.1.1.4 LGSS-REQ-332246/B-LiftGate Release - User Input Enable/Disable

The LGSSInterfaceClient shall enable/disable (show/hide, grey-out, etc.) the LiftGate Softswitch user interface (button/graphic) based on the following:

LockInhibit_St	CarMode_St	VehicleSpeed_St	IgnitionStatus_St	Delay_Accy	Transmission Type config.	GearLvrPos_D_Actl	LiftGate Softswitch User Interface
Inhibit	D/C	D/C	D/C	D/C	D/C	D/C	Disabled
No_Inhibit	Normal	Less than threshold in REQ-328540	OFF	ON	D/C	D/C	Enabled
No_Inhibit	Normal	Less than threshold in REQ-328540	ACC	D/C	D/C	D/C	Enabled
No_Inhibit	Normal	Less than threshold in REQ-328540	RUN or START	D/C	Automatic	Park	Enabled
No_Inhibit	Factory	D/C	D/C	D/C	D/C	D/C	Enabled
No_Inhibit	Transport	D/C	D/C	D/C	D/C	D/C	Disabled

*D/C – Don't Care

Note: Transmission Type config. = Manual will be considered at a later time. As of this SPSS release, the LGSSInterfaceClient shall not support this feature on a Manual Transmission vehicle.

3.1.1.5 LGSS-REQ-354975/A-LiftGate Ajar Status

The LGSSInterfaceClient shall display a graphic indicating the ajar (open/close) status of the LiftGate. The graphic shall be shown as such:

- When LiftgateAjar_St = "(0x0) Closed" the LiftGate shall be shown as Closed
- When LiftgateAjar_St = "(0x1) Open" the LiftGate shall be shown as Opened
    - If LiftgateAjar_St is not available on the bus or cannot be read, the LiftGate shall be shown as Closed

3.1.2 Use Cases

3.1.2.1 LGSS-UC-REQ-323953/C-User selects Manual LiftGate Softswitch on LGSSInterfaceClient (switch enabled)

Actors	Vehicle Occupant
Pre-conditions	Powermode Conditions are met LGSSInterfaceClient is ON LiftGate Softswitch is Enabled Manual LiftGate is Closed
Scenario Description	The user selects the LiftGate softswitch on the LGSSInterfaceClient
Post-conditions	The LGSSServer1 releases the Manual LiftGate LGSSInterfaceClient displays the LiftGate as Opened
List of Exception Use Cases	
Interfaces	LGSSInterfaceClient CAN, G-HMI

3.1.2.2 LGSS-UC-REQ-323963/C-User selects Open Power LiftGate Softswitch on LGSSInterfaceClient (switch enabled)

Actors	Vehicle Occupant
Pre-conditions	Powermode Conditions are met LGSSInterfaceClient is ON LiftGate Softswitch is Enabled Power LiftGate is Closed
Scenario Description	The user selects the LiftGate softswitch on the LGSSInterfaceClient
Post-conditions	The LGSSServer2 begins to open the Power LiftGate LGSSInterfaceClient displays the LiftGate as Opened
List of Exception Use Cases	
Interfaces	LGSSInterfaceClient CAN, G-HMI

3.1.2.3 LGSS-UC-REQ-323974/C-User selects Close Power LiftGate Softswitch on LGSSInterfaceClient (switch enabled)

Actors	Vehicle Occupant
Pre-conditions	Powermode Conditions are met LGSSInterfaceClient is ON LiftGate Softswitch is Enabled Power LiftGate is Open
Scenario Description	The user selects the LiftGate softswitch on the LGSSInterfaceClient
Post-conditions	The LGSSServer2 begins to close the Power LiftGate LGSSInterfaceClient displays the LiftGate as Opened until it fully closes. When closed, the LGSSInterfaceClient displays the LiftGate as Closed.
List of Exception Use Cases	
Interfaces	LGSSInterfaceClient CAN, G-HMI

3.1.2.4 LGSS-UC-REQ-323975/C-User selects Power LiftGate Softswitch on LGSSInterfaceClient while LiftGate in motion (switch enabled)

Actors	Vehicle Occupant
Pre-conditions	Powermode Conditions are met LGSSInterfaceClient is ON LiftGate Softswitch is Enabled Power LiftGate is in motion (opening/closing)
Scenario Description	The user selects the LiftGate softswitch on the LGSSInterfaceClient
Post-conditions	The LGSSServer2 stops/pauses Power LiftGate operation/motion LGSSInterfaceClient displays the LiftGate as Opened

List of Exception Use Cases	
Interfaces	LGSSInterfaceClient CAN, G-HMI

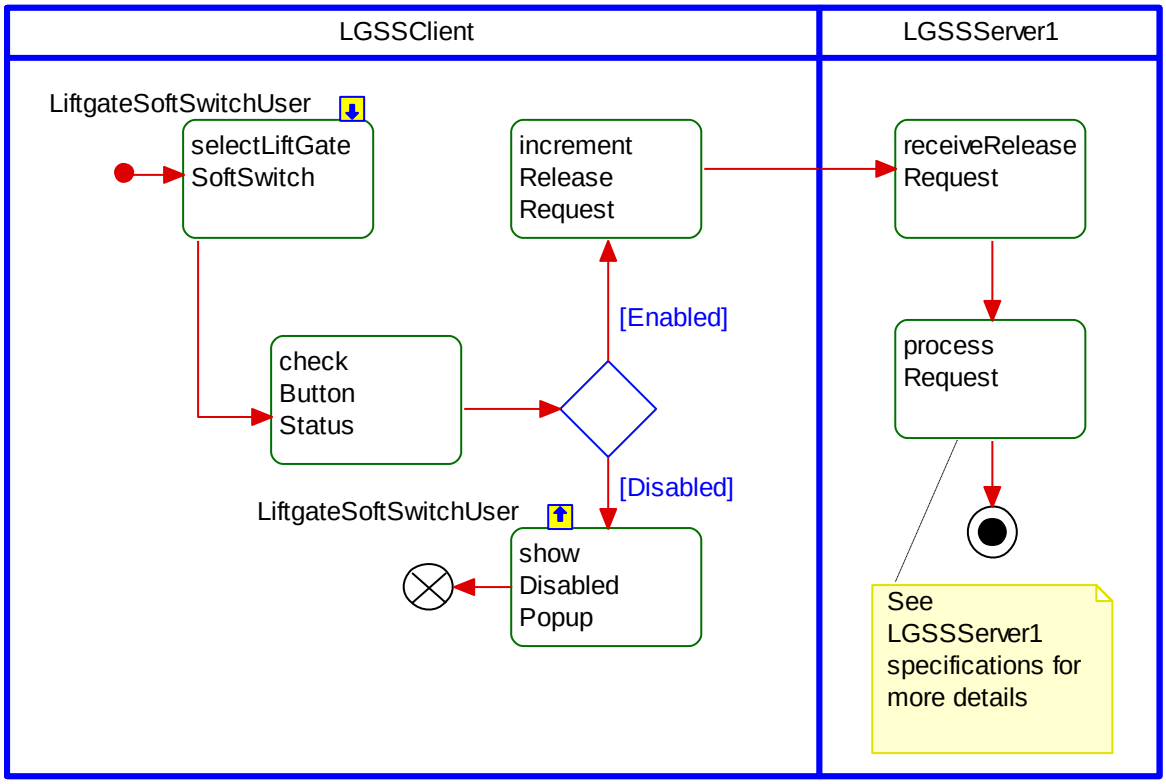
3.1.2.5 LGSS-UC-REQ-323954/A-User selects Manual/Power LiftGate Softswitch on LGSSInterfaceClient (switch disabled)

Actors	Vehicle Occupant
Pre-conditions	Powermode Conditions are met LGSSInterfaceClient is ON LiftGate Softswitch is Disabled
Scenario Description	The user selects the LiftGate softswitch on the LGSSInterfaceClient
Post-conditions	The LGSSInterfaceClient indicates that the operation cannot be performed at this time
List of Exception Use Cases	
Interfaces	LGSSInterfaceClient CAN, G-HMI

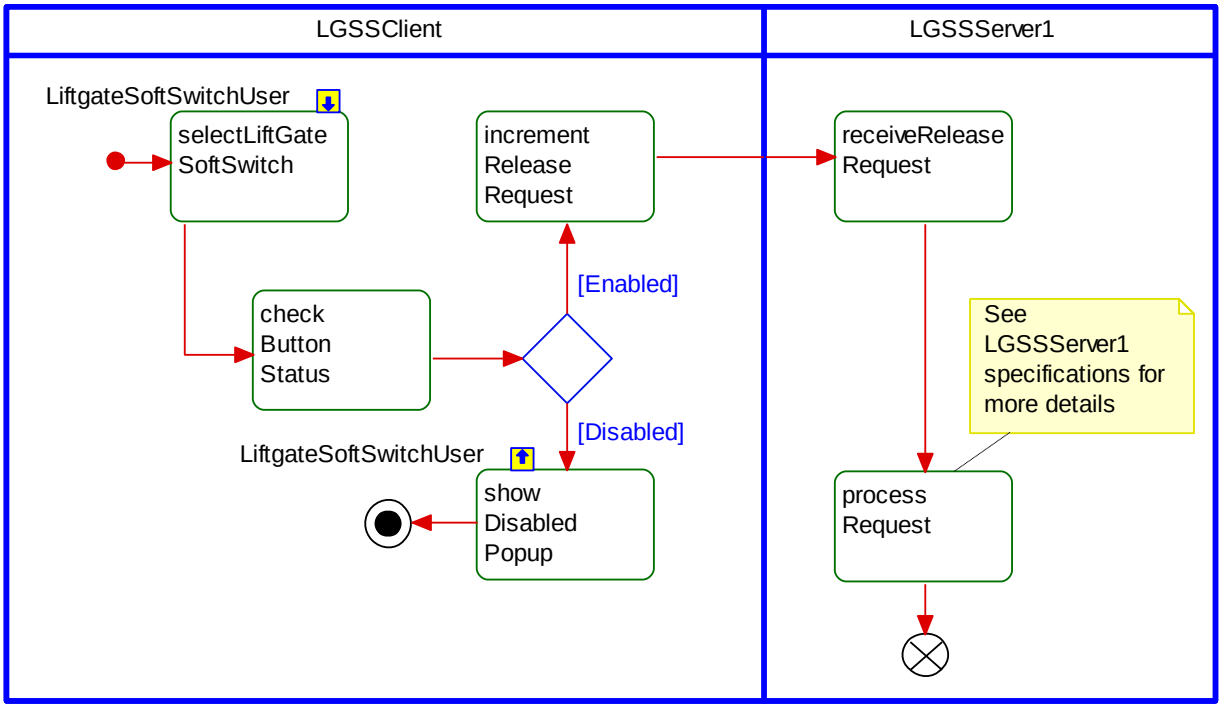
3.1.3 White Box View

3.1.3.1 Activity Diagrams

3.1.3.1.1 LGSS-ACT-REQ-333006/A-User Selects Manual LiftGate Softswitch On LGSSInterfaceClient Activity Diagram



3.1.3.1.2 LGSS-ACT-REQ-333020/B-User Selects Power LiftGate Softswitch On LGSSInterfaceClient Activity Diagram



3.1.3.2 Sequence Diagrams

3.1.3.2.1 LGSS-SD-REQ-333007/B-User Selects Manual LiftGate Softswitch On LGSSInterfaceClient

Constraints

Pre-Condition

Powermode Conditions are met
LGSSInterfaceClient is ON
LiftGate Softswitch is Enabled
Manual LiftGate is Closed

Scenarios

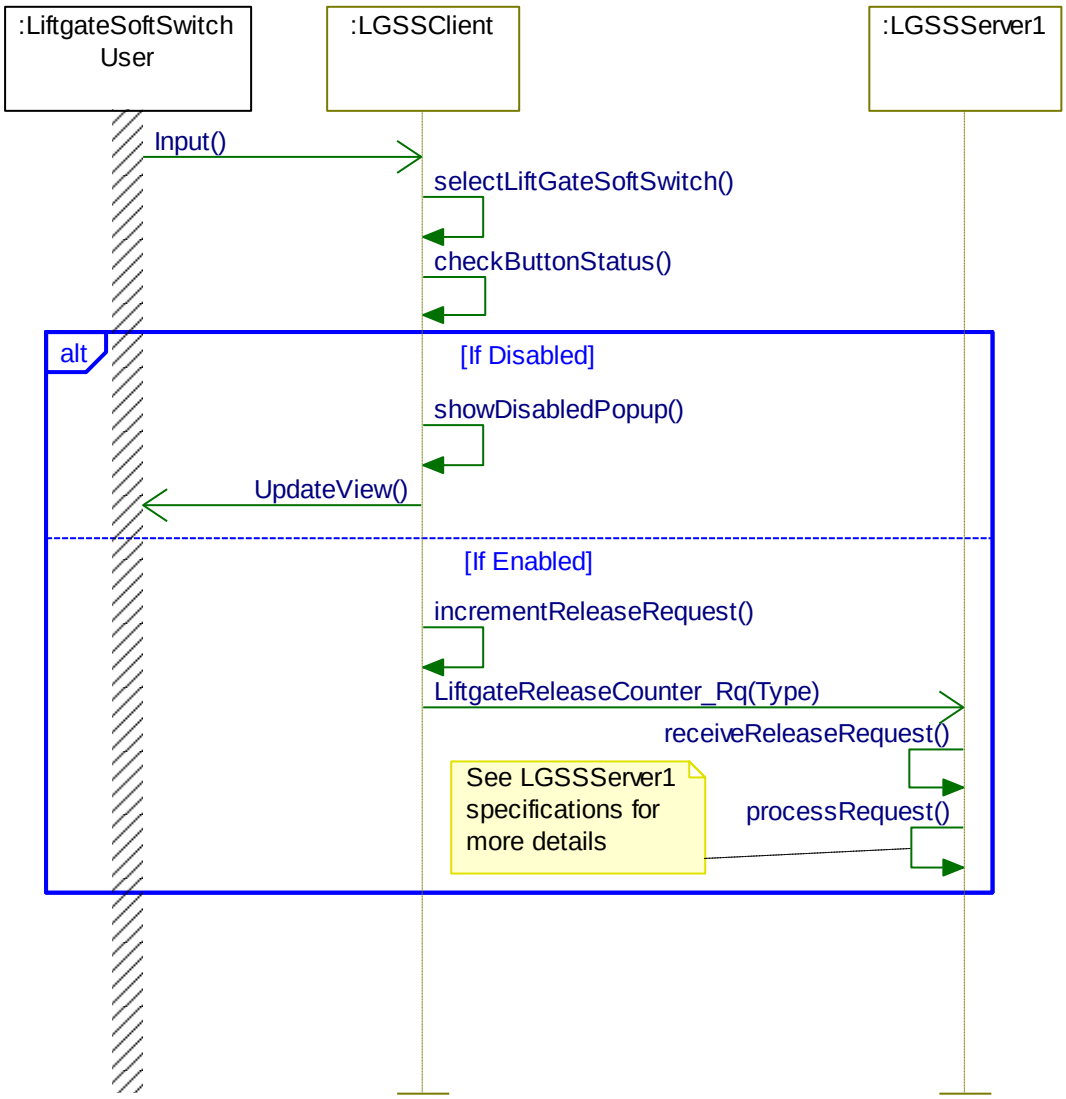
Normal Usage

The user selects the LiftGate softswitch on the LGSSInterfaceClient

Post-Condition

The LGSSServer1 releases the Manual LiftGate

Sequence Diagram



3.1.3.2.2 LGSS-SD-REQ-333021/B-User Selects Power LiftGate Softswitch On LGSSInterfaceClient

Constraints

Pre-Condition

Powermode Conditions are met
LGSSInterfaceClient is ON
LiftGate Softswitch is Enabled
Power LiftGate is Closed

Scenarios

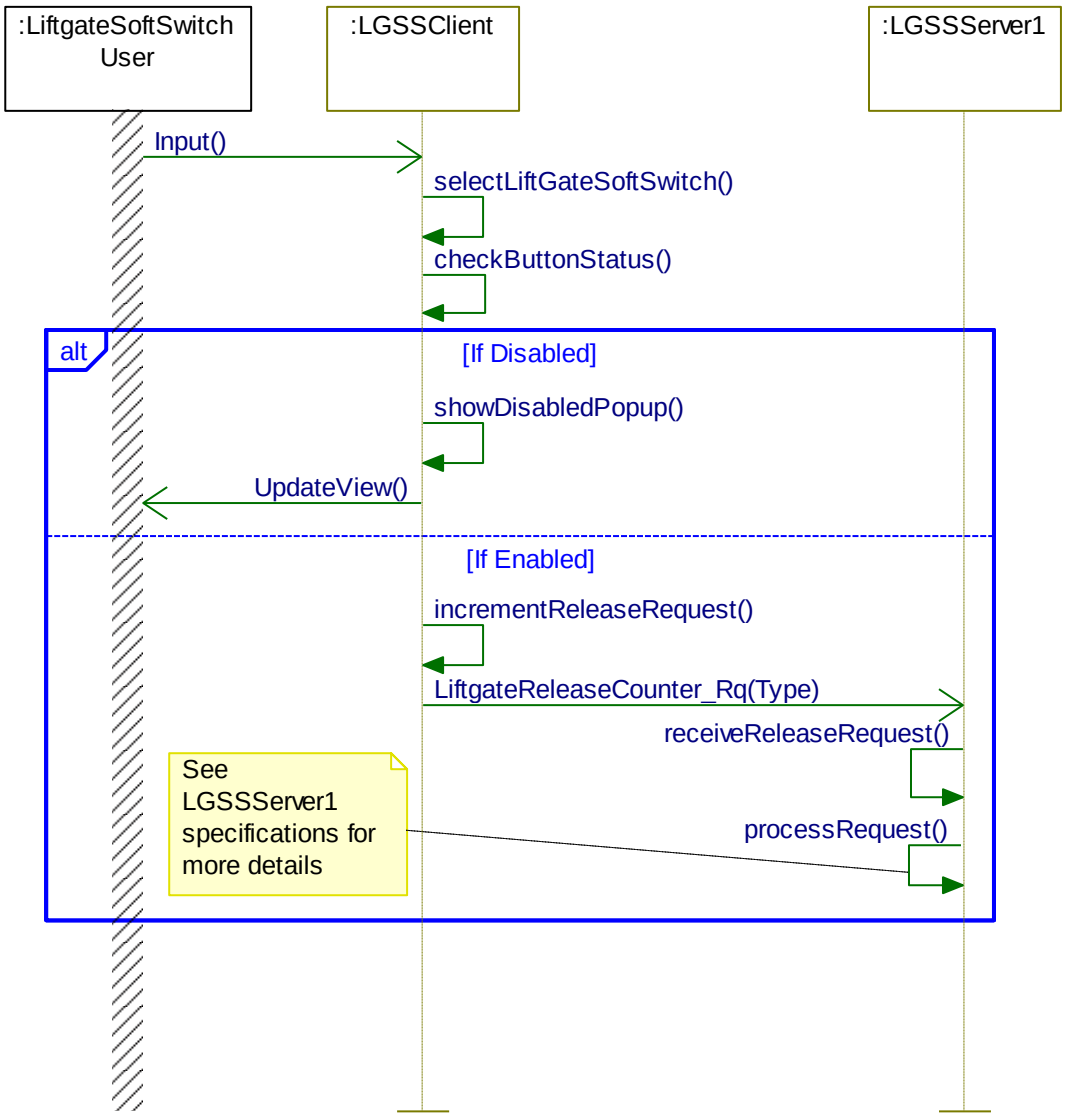
Normal Usage

The user selects the LiftGate softswitch on the LGSSInterfaceClient

Post-Condition

The LGSSServer2 begins to open the Power LiftGate

Sequence Diagram



4 Appendix: Reference Documents

Reference #	Document Title
1	Infotainment Diagnostics Specification APIM Gen 4
2	Ford Next Generation Infotainment Engineering Spec_VerX_SYNC4
3	
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