

**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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**Version Date: June 21, 2019**

**FORD CONFIDENTIALF**

**Revision History**

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| **Date** | **Ver** | **Notes** | |
| **October 29, 2018** | **1.0** | **Initial Release** |  |
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| **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 LiftGate Softswitch on LGSSInterfaceClient (switch enabled) | | MBORREL4: Updated to include liftgate ajar status |
|  | 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 |

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# Architectural Design

## 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.

## 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.

## 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.

## 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 |

## LGSSInterfaceClient Interface

### LGSS-IIR-REQ-323816/A-LGSSInterfaceClient\_Tx

#### 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 |  |

### LGSS-IIR-REQ-323817/C-LGSSInterfaceClient\_Rx

#### 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 |  |

#### 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 |  |

#### 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 |  |

#### 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 |  |

#### 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 |  |

#### 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 |  |

#### 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 |  |

# General Requirements

## 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

## 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.

## 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.

# Functional Definition

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

### Requirements

#### 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.

#### Event Counter Requirements

##### 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.

##### 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.

##### 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).

##### LGSS-REQ-332242/A-Bus Wakeup

The LGSSInterfaceClient shall wake CAN whenever LiftgateReleaseCounter\_Rq has changed.

##### 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.

##### LGSS-REQ-332244/A-Value Retention

The LGSSInterfaceClient shall retain the last transmitted value of LiftgateReleaseCounter\_Rq through sleep/wake cycle.

#### 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.

#### 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.

#### 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

### Use Cases

#### 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 |

#### 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 |

#### 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 |

#### 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 |

#### 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 |

### White Box View

#### Activity Diagrams

##### LGSS-ACT-REQ-333006/A-User Selects Manual LiftGate Softswitch On LGSSInterfaceClient

Activity Diagram



##### LGSS-ACT-REQ-333020/B-User Selects Power LiftGate Softswitch On LGSSInterfaceClient

Activity Diagram



#### Sequence Diagrams

##### 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



##### 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



# Appendix: Reference Documents

|  |  |
| --- | --- |
| Reference # | Document Title |
| 1 | Infotainment Diagnostics Specification APIM Gen 4 |
| 2 | Ford Next Generation Infotainment Engineering Spec\_VerX\_SYNC4 |
| 3 |  |
| 4 |  |
| 5 |  |
| 6 |  |
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