



Research & Vehicle Technology
“Infotainment Systems Product Development”

Feature – Zone Lighting

**ECG Infotainment Subsystem Part Specific
Specification (SPSS)**

Version 1.5

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FORD CONFIDENTIAL



Revision History

Date	Version	Notes	
February 15, 2018	1.0	Initial Release	
July 31, 2018	1.1		
	LGT360-REQ-295575/B-Car Gateway	tmertiri: better explaining the car gateway	
	LGT360-FUR-REQ-284001/B-360 Lighting Logical Signal Mapping	tmertiri: Update table with new signals and changed name of a signal.	
	LGT360-FUR-REQ-294559/B-Individual Light States	tmertiri: added signals names to the table.	
	LGT360-REQ-284000/B-Rolling Counter	tmertiri: Added text to try to better explain rolling counter purpose and behaviour.	
	LGT360-IIR-REQ-290587/B-360 Lighting Client_Tx	tmertiri: updated requirements in the structure	
	LGT360-MD-REQ-323952/A-ExitEntryRmtSt	tmertiri: added new signal	
	LGT360-IIR-REQ-290588/B-360 Lighting Client_Rx	tmertiri: added additional signals	
	LGT360-MD-REQ-273988/C-FeatureSt	tmertiri: updated signal parameters	
	LGT360-MD-REQ-323932/A-LLamp1	tmertiri: added new signal	
	LGT360-MD-REQ-323933/A-LLamp2	tmertiri: added new signal	
	LGT360-MD-REQ-323934/A-LLamp3	tmertiri: added new signal	
	LGT360-MD-REQ-323935/A-LLamp4	tmertiri: added new signal	
	LGT360-MD-REQ-323936/A-LLamp5	tmertiri: added new signal	
	LGT360-MD-REQ-323937/A-LLamp6	tmertiri: added new signal	
	LGT360-MD-REQ-323938/A-LLamp7	tmertiri: added new signal	
	LGT360-MD-REQ-323941/A-LLamp8	tmertiri: added new signal	
	LGT360-MD-REQ-323943/A-LLamp9	tmertiri: added new signal	
	LGT360-MD-REQ-323944/A-LLamp10	tmertiri: added new signal	
	LGT360-MD-REQ-323976/A-ExitEntrySt	tmertiri: new requirement	
	502012/B-General Requirements	tmertiri: added new requirements	
	572679/A-Power State Overview	tmertiri: added text to better describe the power state	
	REQ-323924/A-Power State Input	tmertiri: new requirement	
	REQ-323925/A-Power State Decision	tmertiri: new requirement	
	REQ-323926/A-Modules Reset	tmertiri: new requirement	
	REQ-323927/A-Requests Forwarding	tmertiri: new requirement	
	REQ-323928/A-Requests processing	tmertiri: new requirement	
	REQ-324030/A-Cargo Lamps	tmertiri: new requirement	
	LGT360-REQ-323931/A-Cargo Lamp Status	tmertiri: new req	
	LGT360-SD-REQ-295588/B-All lights status update SD	tmertiri: update diagram	
October 5, 2018	1.2		
	LGT360-502011/B-Architectural Design	new cld added	
	LGT360-CLD-REQ-295573/B-Zone Lighting Client	tmertiri: Update wording and req title.	
	LGT360-CLD-REQ-295574/B-Zone Lighting Off Board Client	tmertiri: Update wording and req title	
	LGT360-CLD-REQ-331026/A-Zone Lighting Client 2	tmertiri: new requirement	
	LGT360-CLD-REQ-295575/C-Off Board Client Gateway	tmertiri: update requirement	
	LGT360-CLD-REQ-331025/A-Zone Lighting Server	tmertiri: new definition for server	
	LGT360-592745/A-Logical signal mapping	tmertiri: new information	
	LGT360-592746/A-Individual Lights Signal Map	tmertiri: new information	
	LGT360-592744/A-FTCP logical signals	tmertiri: new information	
	LGT360-MD-REQ-323952/B-ExitEntryRmtSt	tmertiri: update definition	
	LGT360-IIR-REQ-290588/C-360 Lighting Client_Rx	tmertiri: updated signals	
	LGT360-MD-REQ-323976/B-ExitEntrySt	tmertiri: updated signal definition	



LGT360-REQ-331021/A-FeatureSt	tmertiri: new req number. updated content
LGT360-REQ-331022/A-FeatureTimer	tmertiri: new req number. updated content
LGT360-502012/C-General Requirements	tmertiri: remove req 295566
LGT360-REQ-290589/B-Status Update	tmertiri: revise requirement
LGT360-REQ-296430/B-Communication of Off BoardClient Gateway	tmertiri: new details
LGT360-REQ-331265/A-Missing Light Signals	tmertiri: new details
LGT360-572679/B-Power State Overview	tmertiri: Update content
LGT360-REQ-323924/B-Power State Input	tmertiri: update content
LGT360-REQ-323925/B-Power State Decision	tmertiri:Update requirement
LGT360-REQ-323926/B-Modules Reset	tmertiri: update req wording
LGT360-REQ-323927/B-Requests Forwarding	tmertiri: update req wording
LGT360-REQ-323928/B-Requests processing	tmertiri: update req wording
LGT360-REQ-324030/B-Cargo Lamps	tmertiri: update wording
LGT360-REQ-331132/A-CCS Settings	tmertiri:new requirement
LGT360-482339/B-Use Cases	tmertiri: add new usecase
LGT360-UC-REQ-284008/B-Light On with Vehicle On state Request	tmertiri: update conditions
LGT360-UC-REQ-284009/B-Light Off with Vehicle On state Request	tmertiri: update conditions
LGT360-UC-REQ-284010/B-Light On with Vehicle Off Request	tmertiri: update conditions
LGT360-UC-REQ-284011/B-Light Off with Vehicle Off Request	tmertiri: update conditions
LGT360-UC-REQ-284012/B-Timer activation	tmertiri: update conditions
LGT360-UC-REQ-284014/B-Lighting activation with insufficient battery charge	tmertiri: update conditions
LGT360-UC-REQ-284015/B-Battery draining while Lights On	tmertiri: update usecase
LGT360-UC-REQ-284016/B-Multiple Zones Activation while Vehicle is Off	tmertiri: update conditions
LGT360-UC-REQ-284017/B-Multiple Zones Activation while Vehicle is Off, Timer Reset	tmertiri: update conditions
LGT360-UC-REQ-331129/A-All Zones Status change request	tmertiri: new usecase
LGT360-ACT-REQ-284005/B-Lighting 360 Operation AD	tmertiri: Update AD. Remove Control My Car references
LGT360-ACT-REQ-295587/B-All lights status update AD	tmertiri: Update AD. Remove Control My Car references
LGT360-482342/B-Sequence Diagram	tmertiri: New SD added
LGT360-SD-REQ-284006/B-Lighting360 Operation SD	tmertiri: General Revision of the diagram
LGT360-SD-REQ-295588/C-All lights status update SD	tmertiri: General revision of the diagram

October 19, 2018	1.3	
	LGT360-MD-REQ-323952/B-ExitEntryRmtSt+	tmertiri: update definition
	LGT360-MD-REQ-323952/C-ExitEntryRmtSt	tmertiri: update wording
	LGT360-IIR-REQ-290588/C-360 Lighting Client_Rx	tmertiri: updated signals
	LGT360-MD-REQ-323976/B-ExitEntrySt	tmertiri: updated signal definition
	LGT360-REQ-290589/C-Status Update	tmertiri: update content
	LGT360-REQ-296430/B-Communication of Off BoardClient Gateway	tmertiri: new details
	LGT360-REQ-331265/A-Missing Light Signals	tmertiri: new details
	LGT360-572679/B-Power State Overview	tmertiri: Update content
	LGT360-REQ-323924/B-Power State Input	tmertiri: update content
	LGT360-REQ-323926/C-Modules Reset	tmertiri: fixed signal name typo
	LGT360-REQ-323927/B-Requests Forwarding	tmertiri: update req wording
	LGT360-REQ-323928/B-Requests processing	tmertiri: update req wording
	LGT360-REQ-331132/B-CCS Settings	tmertiri: updated CCS table



LGT360-UC-REQ-284008/B-Light On with Vehicle On state Request	tmertiri: update conditions
LGT360-UC-REQ-284009/B-Light Off with Vehicle On state Request	tmertiri: update conditions
LGT360-UC-REQ-284010/B-Light On with Vehicle Off Request	tmertiri: update conditions
LGT360-UC-REQ-284011/B-Light Off with Vehicle Off Request	tmertiri: update conditions
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LGT360-UC-REQ-284016/B-Multiple Zones Activation while Vehicle is Off	tmertiri: update conditions
LGT360-UC-REQ-284017/B-Multiple Zones Activation while Vehicle is Off, Timer Reset	tmertiri: update conditions
LGT360-SD-REQ-284006/C-Lighting360 Operation SD	tmertiri: update SD
502014/B-Appendix	tmertiri: added new reference

September 4, 2019

1.4

LGT360-FRD-REQ-295521/B-Zone Lighting ECG SPSS	tmertiri: title change
STR-502011/C-Architectural Design	tmertiri: changes in structure
STR-473881/B-Overview	tmertiri: content reword
LGT360-681757/A-Logical Class Description Mapping	tmertiri: new content
LGT360-592744/B-FTCP logical signals	tmertiri: updated table
LGT360-REQ-284000/C-Rolling Counter	tmertiri: reword content
LGT360-IIR-REQ-290587/C-Zone Lighting Client_Tx	tmertiri: title update
LGT360-IIR-REQ-290588/D-Zone Lighting Client_Rx	tmertiri: title update
STR-502012/D-General Requirements	tmertiri: changes in the structure
LGT360-REQ-273968/B-Light Zones	tmertiri: added references
LGT360-REQ-323926/D-Modules Reset	tmertiri: added signal reset parameter content
LGT360-REQ-361977/A-Configuration Values for Zone Number Determination	tmertiri: new req
LGT360-REQ-361980/A-Timeout Configuration	tmertiri: new req
LGT360-REQ-361981/A-Correlation ID	tmertiri: new req
LGT360-REQ-361982/A-Alerts Configurations	tmertiri: new req
STR-502013/B-Functional Definition	tmertiri: multiple content changes
LGT360-FUN-REQ-284004/B-Zone Lighting	tmertiri: wording change
STR-482339/C-Use Cases	tmertiri: wording change
LGT360-UC-REQ-284008/C-Light On with Vehicle On state Request	tmertiri: wording change
LGT360-UC-REQ-284009/C-Light Off with Vehicle On state Request	tmertiri: wording change
LGT360-UC-REQ-284010/C-Light On with Vehicle Off Request	tmertiri: wording change
LGT360-UC-REQ-284011/C-Light Off with Vehicle Off Request	tmertiri: wording change
LGT360-UC-REQ-284012/C-Timer activation	tmertiri: wording change
LGT360-UC-REQ-284013/B-Vehicle becomes non stationary	tmertiri: wording change
LGT360-UC-REQ-284014/C-Lighting activation with insufficient battery charge	tmertiri: wording change
LGT360-UC-REQ-284015/C-Battery draining while Lights On	tmertiri: wording change
LGT360-UC-REQ-284016/C-Multiple Zones Turn On While Vehicle is Off	tmertiri: wording change
LGT360-UC-REQ-284017/C-Multiple Zones Turn On while Vehicle is Off, Timer Reset	tmertiri: wording change
LGT360-UC-REQ-295586/B-All Lights Status request	tmertiri: wording change
LGT360-UC-REQ-331129/B-All Zones Status change request	tmertiri: wording change
LGT360-UC-REQ-362222/A-ConfigurableTimeout	tmertiri: wording change



STR-482340/B-White Box Views	tmertiri: structure change
STR-482341/B-Activity Diagram	tmertiri: structure change
LGT360-ACT-REQ-284005/C-Zone Lighting Operation AD	tmertiri:update table
STR-482342/C-Sequence Diagram	tmertiri: structure content changes
LGT360-SD-REQ-284006/D-Zone Lighting Operation SD	tmertiri: title change
LGT360-FUN-REQ-361956/A-Power State	tmertiri: new structure
STR-572679/C-Power State Overview	tmertiri: new content
LGT360-REQ-323925/C-Power State Decision	tmertiri:change word from command to alert
STR-681764/A-Use Cases	tmertiri: new content
LGT360-UC-REQ-361959/A-Power State Change Request	tmertiri: new content
681780/A-White Box Views	tmertiri: new content
STR-681765/A-Activity Diagram	tmertiri: new content
LGT360-ACT-REQ-361958/A-Power State Decision	tmertiri: new content
STR-681766/A-Sequence Diagram	tmertiri: new content
LGT360-SD-REQ-284003/B-Power State Decision	tmertiri: new content
STR-502014/C-Appendix	tmertiri: update content

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	LGT360-592745/B-Logical signal mapping	tmertiri: no content change
	LGT360-592746/B-Individual Lights Signal Map	tmertiri: adding cargo lights signal
	LGT360-592744/C-FTCP logical signals	tmertiri: modify the ftcp table content. added FTCP signals
	LGT360-IIR-REQ-290588/E-Zone Lighting Client_Rx	tmertiri: added cargo lights in the structure
	REQ-364356/A-LLamp11	tmertiri: new signal
	STR-502012/E-General Requirements	tmertiri: remove req and add new ones
	LGT360-SD-REQ-295588/D-All lights status update SD	tmertiri: new diagram



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1 Architectural Design

1.1 Overview

Zone Lighting is a feature that allows the user to control the vehicle's exterior lights through an app in their mobile device. The exterior vehicle lights are divided into multiple zones and the user can switch the state of the lights to On/Off independently.

1.2 Logical Class Description Mapping

Throughout this documentation, logical names are used for devices interfacing with each other. The table below matches the logical names used (Class Description (CLD)) to the vehicles modules.

Zone Lighting Client	ECG
Zone Lighting Off Board Client	Mobile App/Cloud
Off Board Client Gateway	TCU
Zone Lighting Server	BCM
Zone Lighting Client 2	APIM
OnBoard User	User interfacing through APIM
OffBoard User	User interfacing through Mobile App

This SPSS does not include any requirements related to Gateway ECG. Applicable requirements refer to ECG Binary Application.

1.3 LGT360-CLD-REQ-295573/B-Zone Lighting Client

Zone Lighting Client (also referred to as Client)is the device that provides users requests to the server. It also has connection to Off Board Client Gateway, so it can forward this data to the user.

1.4 LGT360-CLD-REQ-295574/B-Zone Lighting Off Board Client

Zone Lighting Off Board Client (also referred to as Off Board Client) is the device which the user can interface with in order to make feature requests. This client is not linked physically to the vehicle. The client connection to the Zone lighting client is done through Off Board Client Gateway.

1.5 LGT360-CLD-REQ-331026/A-Zone Lighting Client 2

Zone Lighting Client 2 (also referred as Client2) is located in the vehicle. It requests power state change to the Client.

1.6 LGT360-CLD-REQ-295575/C-Off Board Client Gateway

Off Board Client Gateway (also referred to gateway) enables communication between Client and zone lighting off board client.

1.7 LGT360-CLD-REQ-331025/A-Zone Lighting Server

Server: Server controls the zones states. It takes users requests on whether to turn the light zones On or Off and provides the current state of the light zones and individual lights to the user.

1.8 Logical signal mapping

The CAN signals mentioned throughout this document shall refer to the CAN signal's logical name. The logical names shall be mapped to their actual CAN signal names. Please use the table below to perform the mapping. The InfoCAN database file is the master file for the actual CAN signal names. Note: There may be cases where the actual CAN signal name is used in this documentation.

Logical Name	CAN Signal Name
LeftSt	ExtLghtLeft_D_Stat
RightSt	ExtLghtRight_D_Stat
FrontSt	ExtLghtFront_D_Stat



RearSt	ExtLghtRear_D_Stat
FeatureSt	ExtLght_D_Falt
FeatureTimer	ExtLghtAlrt_B_Rq
LeftLight	ExtLghtLeft_D_RqOta
RightLight	ExtLghtRight_D_RqOta
FrontLight	ExtLghtFront_D_RqOta
RearLight	ExtLghtRear_D_RqOta
ExitEntryRmtSt	ExtLghtDsply_B_StatArb
ExitEntrySt	ExtLghtDsply_D_Stat

Table: Logical name/CAN signal mapping

1.9 Individual Lights Signal Map

This table consists of individual light signals sent by the server to the client. The client shall provide the individual light status to Off Board Client.

Logical Names used in SPSS	Can Signal Names	Other names used elsewhere
LLamp1	FogLghtFrontOn_B_Stat	Fog Lamps
LLamp2	HeadLghtHiOn_B_Stat	High Beam
LLamp3	Parklamp_Status	Park Lamps
LLamp4	TrukBedLght_B_Stat	Bed Lamps
LLamp5	RvrseLghtOn_B_Stat	Reverse Lamps
LLamp6	LicPlateLght_B_Stat	License Plate Lamps
LLamp7	TrlrHitchLamp_D_Stat	Trailer Assist Lamps
LLamp8	PudLamp_D_Rq	Puddle Lamps
LLamp9	SpotLghtLeft_D_Stat	Spot Lamps Left
LLamp10	SpotLghtRight_D_Stat	Spot Lamps Right
LLamp11	CargoLght_D_Stat	Cargo Lights

1.10 FTCP logical signals

FTCP Signal	Logical FTCP Name	Logical Can Signal Name	Description
	Zone Lighting Feature On/Off		
ActivateZoneLightingCommand InactivateZoneLightingCommand	ExitEntry	ExitEntryRmtSt	This signal publishes the latest value of Feature ON/OFF state from in-vehicle and remote app HMI
	Zone Feature light status signals		
TurnOnZoneCommandResponse TurnOffZoneCommandResponse	Front_Status	FrontSt	Zone Lighting feature response for Front zone
	Rear_Status	RearSt	Zone Lighting feature response for Rear zone



	Left_Status	LeftSt	Zone Lighting feature response for Left zone
	Right_Status	RighSt	Zone Lighting feature response for Right zone
ZoneLightingActivateAlert	ExitEntry_Veh	ExitEntrySt	This signal publishes the latest value of Feature ON/OFF state from in-vehicle and remote app
	Zone Feature light request signals		
TurnOnZoneCommand TurnOffZoneCommand	Front_App	FrontLight	Left Zone change request
	Rear_App	RearLight	Right Zone change request
	Left_App	LeftLight	Front Zone change request
	Right_App	RightLight	Rear Zone change request
	AllZones_App		When all the zones are being communicated.
Individual Lights Signals			
ZoneAndLightSwitchStatusSyncAlert	IndividualLights_States	LLamp1	Fog Lamps
		LLamp2	High Beam
		LLamp3	Park Lamps
		LLamp4	Bed Lamps
		LLamp5	Reverse Lamps
		LLamp6	License Plate Lamps
		LLamp7	Trailer Assist Lamps
		LLamp8	Puddle Lamps
		LLamp9	Spot Lamps Left
		LLamp10	Spot Lamps Right
		LLamp11	Cargo Lights
	Warning Timer		
ZoneLightingShutdownWarningAlert	Timer_Alert	FeatureTimer	Zone Lighting feature TIMER_ALERT to notify the user about internal feature timer expiration
	Fault Signal		
ZoneLightingFaultStatusENUM	ActivationFailure	FeatureSt	Zone Lighting feature status when a fault is triggered. The faults include low battery, start engine and not stationary

Check the latest approved protofile file for accurate naming.

1.11 LGT360-REQ-284000/C-Rolling Counter

Rolling Counter is the technique of encoding the data sent by the client to the server for feature changes request. If the user wants to turn any of the light zones On and value of the zonelight request signal is 2, next time the user wants the zone to be Off, the signal would have a value of 3. Next time they want the feature On the signal would have a value of 4 and so on. A button press may not necessarily require a +1 increment to the rolling counter.

1.12 LGT360-IIR-REQ-290587/C-Zone Lighting Client_Tx

1.12.1 LGT360-MD-REQ-274293/B-LeftLight

LeftLight: This signal is sent from the client to the server to request left light zone status changes.



Name	Literals	Value	Description
LeftLight			
		0x0	Reset
		0x1	Light zone Off
		0x2	Light zone On
		0x3	Light zone Off
		0x4	Light zone On
		0x5	Light zone Off
		0x6	Light zone On
		0x7	Not Used

1.12.2 LGT360-MD-REQ-274294/B-RightLight

RightLight: This signal is sent from the client to the server to request right light zone status changes.

Name	Literals	Value	Description
RightLight			
		0x0	Reset
		0x1	Light zone Off
		0x2	Light zone On
		0x3	Light zone Off
		0x4	Light zone On
		0x5	Light zone Off
		0x6	Light zone On
		0x7	Not Used

**1.12.3 LGT360-MD-REQ-274295/B-FrontLight**

FrontLight: This signal is sent from the client to the server to request front light zone status changes.

Name	Literals	Value	Description
FrontLight			
		0x0	Reset
		0x1	Light zone Off
		0x2	Light zone On
		0x3	Light zone Off
		0x4	Light zone On
		0x5	Light zone Off
		0x6	Light zone On
		0x7	No Used

1.12.4 LGT360-MD-REQ-274296/B-RearLight

RearLight: This signal is sent from the client to the server to request rear light zone status changes.

Name	Literals	Value	Description
RearLight			
		0x0	Reset
		0x1	Light zone Off
		0x2	Light zone On
		0x3	Light zone Off
		0x4	Light zone On
		0x5	Light zone Off
		0x6	Light zone On
		0x7	Not Used

**1.12.5 LGT360-MD-REQ-323952/C-ExitEntryRmtSt**

ExitEntryRmtSt: This signal is sent from client to client2 and the server to indicate whether the zone lighting is active or not.

Name	Literals	Value	Description
ExitEntryRmtSt			
		0x0	Off
		0x1	On

1.13 LGT360-IIR-REQ-290588/E-Zone Lighting Client_Rx**1.13.1 LGT360-MD-REQ-273984/B-FrontSt**

FrontSt: This signal is sent from the server to the client to indicate front light zone status.

Name	Literals	Value	Description
FrontSt			
	NULL	0x0	Do nothing. Stay in current state.
		0x1	Light zone is Off
		0x2	Light zone is On
		0x3	Unused.

1.13.2 LGT360-MD-REQ-273985/B-RearSt

RearSt: This signal is sent from the server to the client to indicate rear light zone status.

Name	Literals	Value	Description
RearSt			
	NULL	0x0	Do nothing. Stay in current state.
		0x1	Light zone is Off
		0x2	Light zone is On
		0x3	Unused.

1.13.3 LGT360-MD-REQ-273986/B-LeftSt

LeftSt: This signal is sent from the server to the client to indicate left light zone status.

Name	Literals	Value	Description
LeftSt			



	NULL	0x0	Do nothing. Stay in current state.
		0x1	Light zone is Off
		0x2	Light zone is On
		0x3	Unused.

1.13.4 LGT360-MD-REQ-273987/B-RightSt

RightSt: This signal is sent from the server to the client to indicate right light zone status.

Name	Literals	Value	Description
RightSt			
	NULL	0x0	Do nothing. Stay in current state.
		0x1	Light zone is Off
		0x2	Light zone is On
		0x3	Unused.

1.13.5 LGT360-MD-REQ-323932/A-LLamp1

Name	Value	Description
LLamp1		
	0x0	Off
	0x1	On

1.13.6 LGT360-MD-REQ-323933/A-LLamp2

Name	Value	Description
LLamp2		
	0x0	Off
	0x1	On

1.13.7 LGT360-MD-REQ-323934/A-LLamp3

Name	Value	Description
LLamp3		



	0x0	Off
	0x1	On
	0x2	Unknown. Treat as Off
	0x3	Invalid. Treat as Off

1.13.8 LGT360-MD-REQ-323935/A-LLamp4

Name	Value	Description
LLamp4		
	0x0	Off
	0x1	On

1.13.9 LGT360-MD-REQ-323936/A-LLamp5

Name	Value	Description
LLamp5		
	0x0	Off
	0x1	On

1.13.10 LGT360-MD-REQ-323937/A-LLamp6

Name	Value	Description
LLamp6		
	0x0	Off
	0x1	On

1.13.11 LGT360-MD-REQ-323938/A-LLamp7

Name	Value	Description
LLamp7		
	0x0	Off
	0x1	On

1.13.12 LGT360-MD-REQ-323941/A-LLamp8

Name	Value	Description
LLamp8		
	0x0	Off
	0x1	On
	0x2	Ramp Up. Treat as On
	0x3	Ramp Down. Treat as Off

**1.13.13 LGT360-MD-REQ-323943/A-LLamp9**

Name	Value	Description
LLamp9		
	0x0	Off
	0x1	On

1.13.14 LGT360-MD-REQ-323944/A-LLamp10

Name	Value	Description
LLamp10		
	0x0	Off
	0x1	On

1.13.15 LGT360-MD-REQ-323976/B-ExitEntrySt

ExitEntrySt: This signal is sent from client2 to Client to request status change to power state of the feature.

Name	Literals	Value	Description
ExitEntrySt			
		0x0	Reset
		0x1	Light zone Off
		0x2	Light zone On
		0x3	Light zone Off
		0x4	Light zone On
		0x5	Light zone Off
		0x6	Light zone On
		0x7	Not Used

1.13.16 REQ-364356/A-LLamp11

LLamp11: This signal is sent from the server to the client to provide the client with cargo light status. Consult with the CAN database for all the correct values.

Name	Literals	Value	Description
LLamp11			
		0x0	Null
		0x1	Manual
		0x2	Automatic
		0x3	NotUsed

1.13.17 LGT360-REQ-331021/A-FeatureSt

FeatureSt: This signal is sent from the server to Zone Lighting Client to provide some vehicle information. The client shall forward the details of this message content to Zone Lighting Off Board Client Consult with the CAN database for all the correct values.

Name	Literals	Value	Description
FeatureSt			
	NULL	0x0	Null
		0x1	Restart Engine
		0x2	Not Stationary
		0x3	Error

1.13.18 LGT360-REQ-331022/A-FeatureTimer

FeatureTimer: This signal is sent from the server to Zone lighting client so the client may send an alert.

Name	Literals	Value	Description
FeatureTimer			
		0x0	Do not send alert
		0x1	Send Alerts



2 General Requirements

2.1 LGT360-REQ-273968/B-Light Zones

Vehicle exterior lights are divided among different zones.

Zone 1 – Front lights

Zone 2 – Rear lights

Zone 3 – Left side lights

Zone 4 – Right side lights

Each zone has its own CAN Signal for controlling the zone lights. Please consult architectural design section of this SPSS for details.

For further details about particular lights and zones availability refer to R_F_360 Lighting_00002 and R_F_360 Lighting_00617 in AFS-360 Lighting ver 2.6.

2.2 LGT360-REQ-290589/C-Status Update

The client shall update the off board client when there are new status updates from the various sources or if there are any requests for status update from off board client.

2.3 LGT360-REQ-296430/B-Communication of Off BoardClient Gateway

Refer to Protfile for communication between Client and Off Board Client Gateway. Functional description is shown in Activity and Sequence diagrams but actual data format and other details can be found in Protofile.

2.4 LGT360-REQ-331265/A-Missing Light Signals

If any light or zone signals go missing, client shall consider and process last known state of those signals.

2.5 LGT360-REQ-323926/D-Modules Reset

In case of client reset due to vehicle power cycle or a system crash (not to be confused with user intentional master reset) , the client should hold and send the previous ExitEntryRmtSt signal value to the bus.

Upon startup from such resets, the Client shall send these signals LeftLight, RightLight, FrontLight and RearLight with parameter value 0x0 (Reset) .

If signal ExitEntrySt, comes with a value of 0x0 (Reset) the client should hold the previous value, On or Off (whatever previous value was), until a new value other than Reset gets provided by ExitEntrySt signal.

2.6 LGT360-REQ-323927/B-Requests Forwarding

The client should forward every new request from client2 and off board client gateway (off board clients) to the server.

2.7 LGT360-REQ-323928/B-Requests processing

The client should be able to differentiate any retry requests due to networking functionality coming from off board clients and should not forward these requests to the server. Any retry request due to user behavior, such as pressing zone requests multiple times should be forwarded and processed. The rolling counter that represents off board client zone requests should be incremented accordingly when the requests coming are genuinely originating from the user.

2.8 LGT360-REQ-361977/A-Configuration Values for Zone Number Determination

The Client shall have a means of determining how many zones to support, 2 or 4 zones, by checking configuration DID values. For exact values, refer to diagnostics spec.



2.9 LGT360-REQ-361980/A-Timeout Configuration

The configurable timeout value determines how long the client will wait for a response from the server. When a user's request is sent to the server, the client should receive a response within ConfigurableTimeout seconds from the server. If the server does not respond within ConfigurableTimeout seconds, the client shall send a timeout error response to the off-board client. ConfigurableTimeout values are noted in diagnostics spec.

2.10 LGT360-REQ-361981/A-Correlation ID

Correlated alerts are alerts generated in response to a command and non-correlated alerts are those generated due to a vehicle event. Every correlated alert shall have a correlation ID, which references the original command or request associated with the alert. All Zone Lighting alerts shall be non-correlated and therefore will not have an associated correlation ID.

2.11 LGT360-REQ-361982/A-Alerts Configurations

Below table contains a list of configurable alerts. For byte locations and further details refer to diagnostics spec.

	Config Type	Apply Type	Description
ZoneLightingActivateAlert	5	Immediate	Alert sent from the vehicle to notify the user on the mobile app that Zone Lighting has been activated on Client 2 HMI
ZoneLightingInactivateAlert	5	Immediate	Alert sent from the vehicle to notify the user on the mobile app that Zone Lighting has been inactivated on Client 2 HMI
ZoneAndLightSwitchStatusSyncAlert	5	Immediate	Alert sent from the vehicle to notify the user that a fault has occurred
ZoneLightingShutdownWarningAlert	5	Immediate	Alert sent from the vehicle to notify user that two minutes are remaining before the exterior lights shut off
ClearZoneLightingShutdownWarningAlert	5	Immediate	Alert sent from the vehicle when the user intervenes while the timer is active and when the timer expires. Used to clear the zone lighting shutdown-warning alert.



3 Functional Definition

3.1 LGT360-FUN-REQ-284004/B-Zone Lighting

3.1.1 Use Cases

3.1.1.1 LGT360-UC-REQ-284008/C-Light On with Vehicle On state Request

Actors	OffBoard User
Pre-conditions	Vehicle ON; Vehicle is stationary; User has Remote App installed and authenticated; User's Remote App hosting device has cellular network; Zone Lighting zone(s) are OFF
Scenario Description	User selects zone(s) on Remote App
Post-conditions	Lights Off in selected zone(s) will turn On. The time it takes from user input to zone light changes, should be no longer than 25 sec. Lights ON in selected zone(s) shall remain ON
List of Exception Use Cases	Feature not active
Interfaces	Remote App

3.1.1.2 LGT360-UC-REQ-284009/C-Light Off with Vehicle On state Request

Actors	OffBoard User
Pre-conditions	Engine is ON; Vehicle is stationary; User has Remote App installed/authenticated; User's Remote App hosting device has cellular network; Zone Lighting zone(s) ON
Scenario Description	User turns off the zone(s) on Remote App.
Post-conditions	Lights ON by Zone Lighting feature in selected zone(s) will turn OFF; Lights not actuated by Zone Lighting shall continue to display previous behavior;
List of Exception Use Cases	Feature not active
Interfaces	Remote App

3.1.1.3 LGT360-UC-REQ-284010/C-Light On with Vehicle Off Request

Actors	OffBoard User
Pre-conditions	Vehicle OFF; Vehicle is stationary; User has Remote App installed and authenticated; User's Remote App hosting device has cellular network; Zone Lighting zone(s) OFF
Scenario Description	User selects zone(s) on Remote App



Post-conditions	Lights OFF in selected zone(s) will turn ON with a latency of 25 secs and remain ON until time out; Lights ON in selected zone(s) shall remain ON
List of Exception Use Cases	Not enough battery to support feature Feature not active
Interfaces	Remote App

3.1.1.4 LGT360-UC-REQ-284011/C-Light Off with Vehicle Off Request

Actors	OffBoard User
Pre-conditions	Vehicle OFF; Vehicle is stationary; User has Remote App installed/authenticated; User's Remote App hosting device has cellular network; Zone Lighting zone(s) ON
Scenario Description	User de-selects zone(s) on Remote App
Post-conditions	Lights ON by Zone Lighting feature in selected zone(s) will turn OFF; Lights not actuated by Zone Lighting shall continue to display previous behavior;
List of Exception Use Cases	Feature not active
Interfaces	Remote App

3.1.1.5 LGT360-UC-REQ-284012/C-Timer activation

Actors	OffBoard User
Pre-conditions	Vehicle is OFF; Zone Lighting zone(s) ON
Scenario Description	Feature Timer about to expire
Post-conditions	A warning will be popped-up on user interfaces Remote App when the timer has 2 minutes remaining to expire after feature is ON
List of Exception Use Cases	Not enough battery to support the feature Feature not active
Interfaces	Remote App

3.1.1.6 LGT360-UC-REQ-284013/B-Vehicle becomes non stationary

Actors	OnBoard User
Pre-conditions	Vehicle is stationary; Zone Lighting zone(s) ON
Scenario Description	Vehicle is in Park User moves the gearshift to any other position
Post-conditions	Lights turned ON by zone lighting returns to OFF state. Zone lighting does not change the status of the lights turned ON by switch or other means. User gets notification on Remote App and Zone Lighting Client 2 user interface Timeout timer gets reset



List of Exception Use Cases	Feature is not active
Interfaces	Remote App, Zone Lighting Client 2

For vehicle stationary status condition refer to R_F_360 Lighting_00021 in AFS-360 Lighting ver 2.6 .

3.1.1.7 LGT360-UC-REQ-284014/C-Lighting activation with insufficient battery charge

Actors	OffBoard User
Pre-conditions	Vehicle is OFF; Zone Lighting zone(s) OFF Insufficient battery power.
Scenario Description	User attempts to turn on Zone Lighting zones.
Post-conditions	Lights in illumination zone(s) retain previous state. No zone light changes happen because of user request. User gets feedback on Remote App.
List of Exception Use Cases	Feature not active.
Interfaces	Remote App

3.1.1.8 LGT360-UC-REQ-284015/C-Battery draining while Lights On

Actors	OffBoard User
Pre-conditions	Vehicle is OFF. Zone Lighting zone(s) are ON.
Scenario Description	Battery thresholds almost reached. Interior lights signal timer is about to expire. Server sends timer notification to the Client.
Post-conditions	Client forwards the timer notification to the Off board client. Lights in the selected zone(s) turn OFF. User gets feedback on Remote App.
List of Exception Use Cases	Feature not active
Interfaces	Remote App

3.1.1.9 LGT360-UC-REQ-284016/C-Multiple Zones Turn On While Vehicle is Off

Actors	OffBoard User
Pre-conditions	Vehicle is Off; Zone Lighting zone(s) OFF Headlamps and fog lamps OFF; Doors closed
Scenario Description	User activates the front zone activation button first, then rear zone, left and right zones (not necessarily in the same order).
Post-conditions	Lights from the selected zones turn ON and remain ON. A timer starts when the user activates the first zone activation button. At the end of first zone activation time out, all zone lights turn off. User get notified in remote app for zone states.
List of Exception Use Cases	Drained Battery. Feature is not active.



Interfaces	Remote App
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3.1.1.10 LGT360-UC-REQ-284017/C-Multiple Zones Turn On while Vehicle is Off, Timer Reset

Actors	OffBoard User
Pre-conditions	Vehicle is Off; Zone Lighting zone(s) OFF
Scenario Description	User activates the front zone activation button first, then rear zone, left and right zones (not necessarily in the same order); Lights from the selected zones turn ON and remain ON. A timer starts when the user activates the first zone activation button; User turn off all zones in Zone lighting before the timer ends.
Post-conditions	Lights turn OFF at all zones and the timer gets reset for next zone turn on request.
List of Exception Use Cases	Battery drained. Feature is not activated.
Interfaces	Remote App

3.1.1.11 LGT360-UC-REQ-295586/B-All Lights Status request

Actors	OnBoard User
Pre-conditions	Off board client has connection to client.
Scenario Description	User changes manually individual light status (one or many).
Post-conditions	Client shall update the off board client with the lights status upon detection in individual light state changes.
List of Exception Use Cases	Feature no active.
Interfaces	Remote App.

3.1.1.12 LGT360-UC-REQ-331129/B-All Zones Status change request

Actors	OffBoard User
Pre-conditions	Vehicle is stationary Zone Lighting feature is enabled.
Scenario Description	User requests All Zones ON (or Off) through user interface in remote app.
Post-conditions	Client shall send all individual zone status signals to the server requesting zones status change. If a zone is already same state as all zones request, the client shall send a new compatible request (update the rolling counter to match the user's request)
List of Exception Use Cases	
Interfaces	Remote App

3.1.1.13 LGT360-UC-REQ-362222/A-ConfigurableTimeout

Actors	ZoneLightingClient, ZoneLightingServer, OffBoardClientGateway
Pre-conditions	ZoneLightingClient sends request to ZoneLightingServer

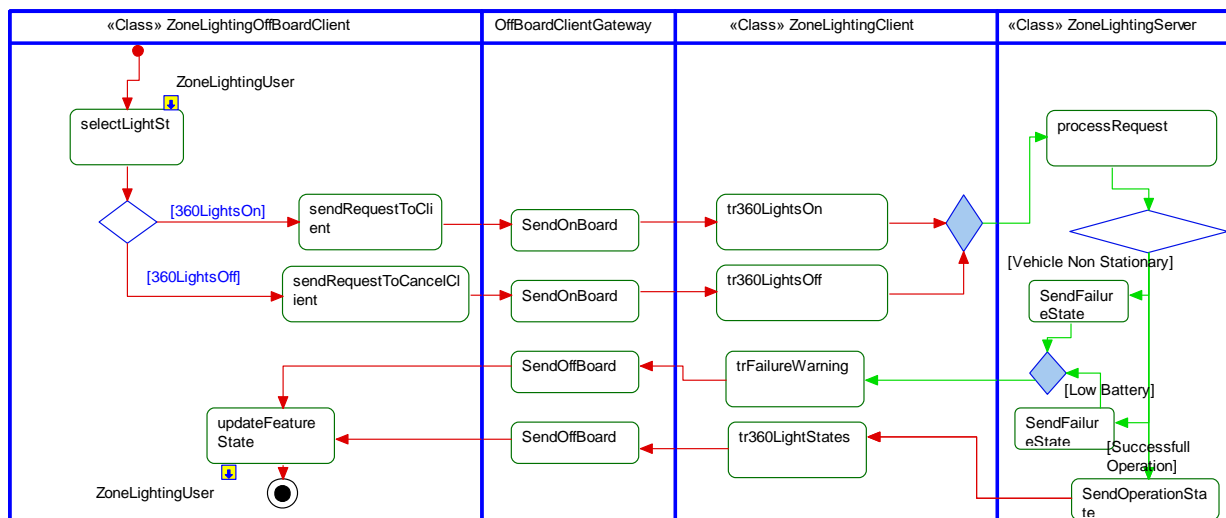


Scenario Description	ZoneLightingClient waits for a response from the ZoneLightingServer
Post-conditions	ZoneLightingClient receives feedback from the ZoneLightingServer within ConfigurableTimeout seconds.
List of Exception Use Cases	ZoneLightingClient does not receive feedback from the ZoneLightingServer within ConfigurableTimeout seconds and sends a timeout response to the OffBoardClientGateway
Interfaces	Vehicle System Interface

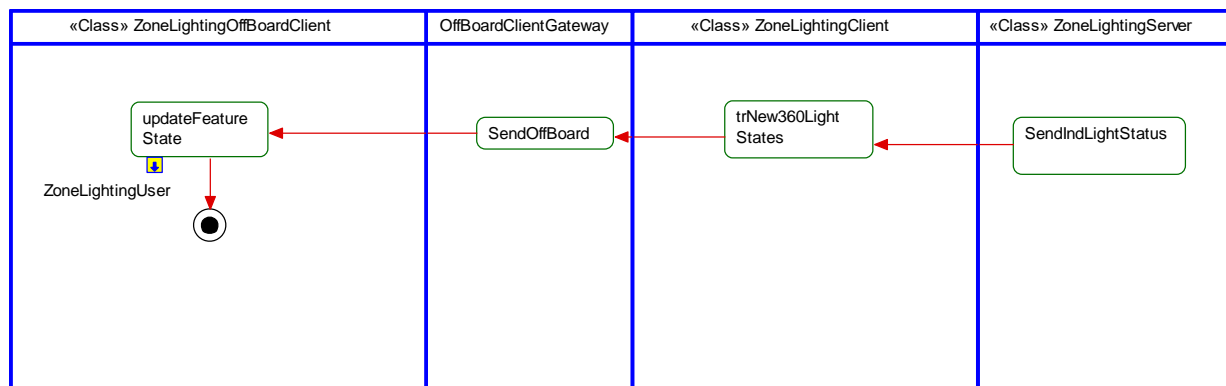
3.1.2 White Box Views

3.1.2.1 Activity Diagram

3.1.2.1.1 LGT360-ACT-REQ-284005/C-Zone Lighting Operation AD



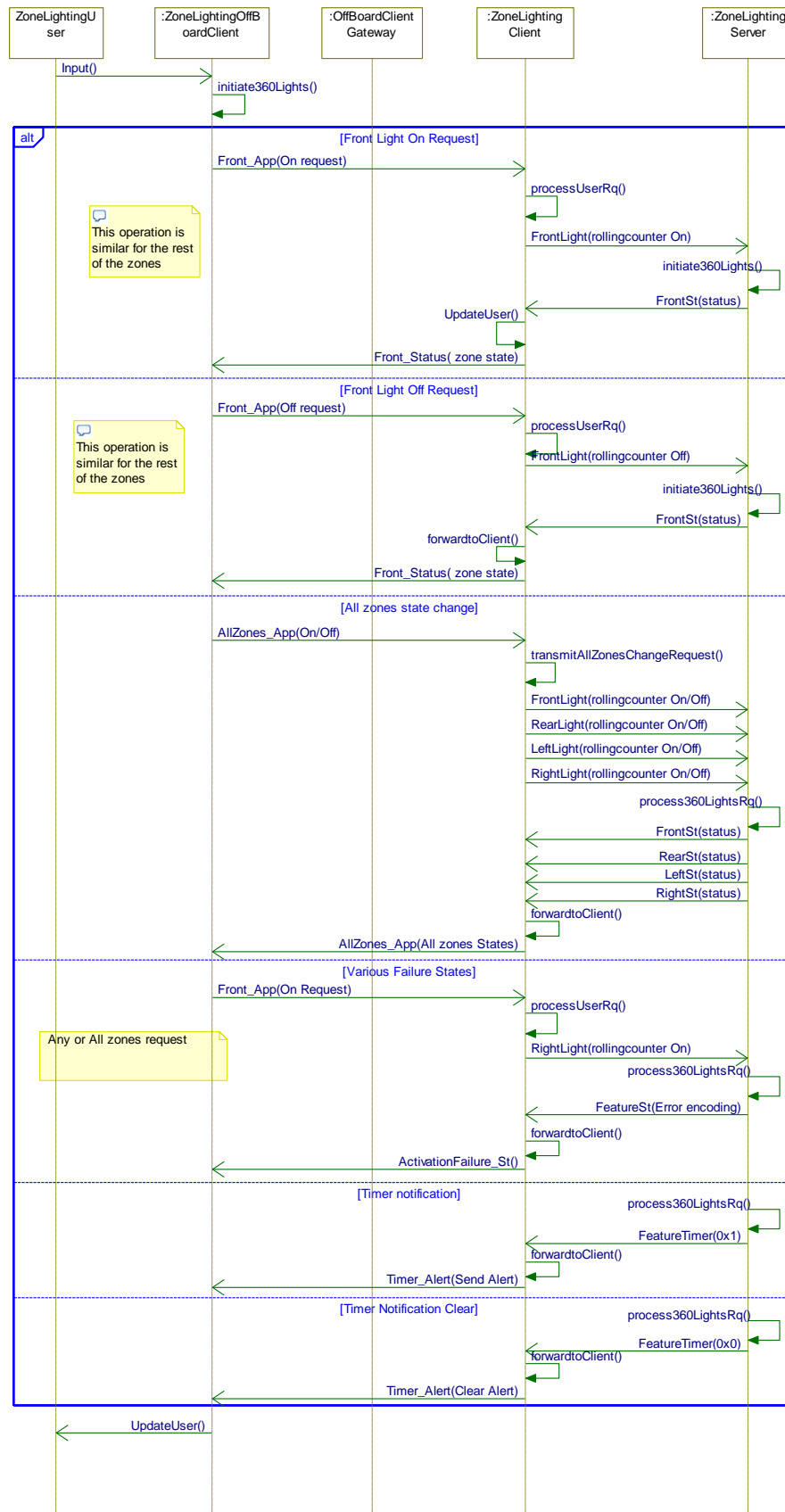
3.1.2.1.2 LGT360-ACT-REQ-295587/B-All lights status update AD





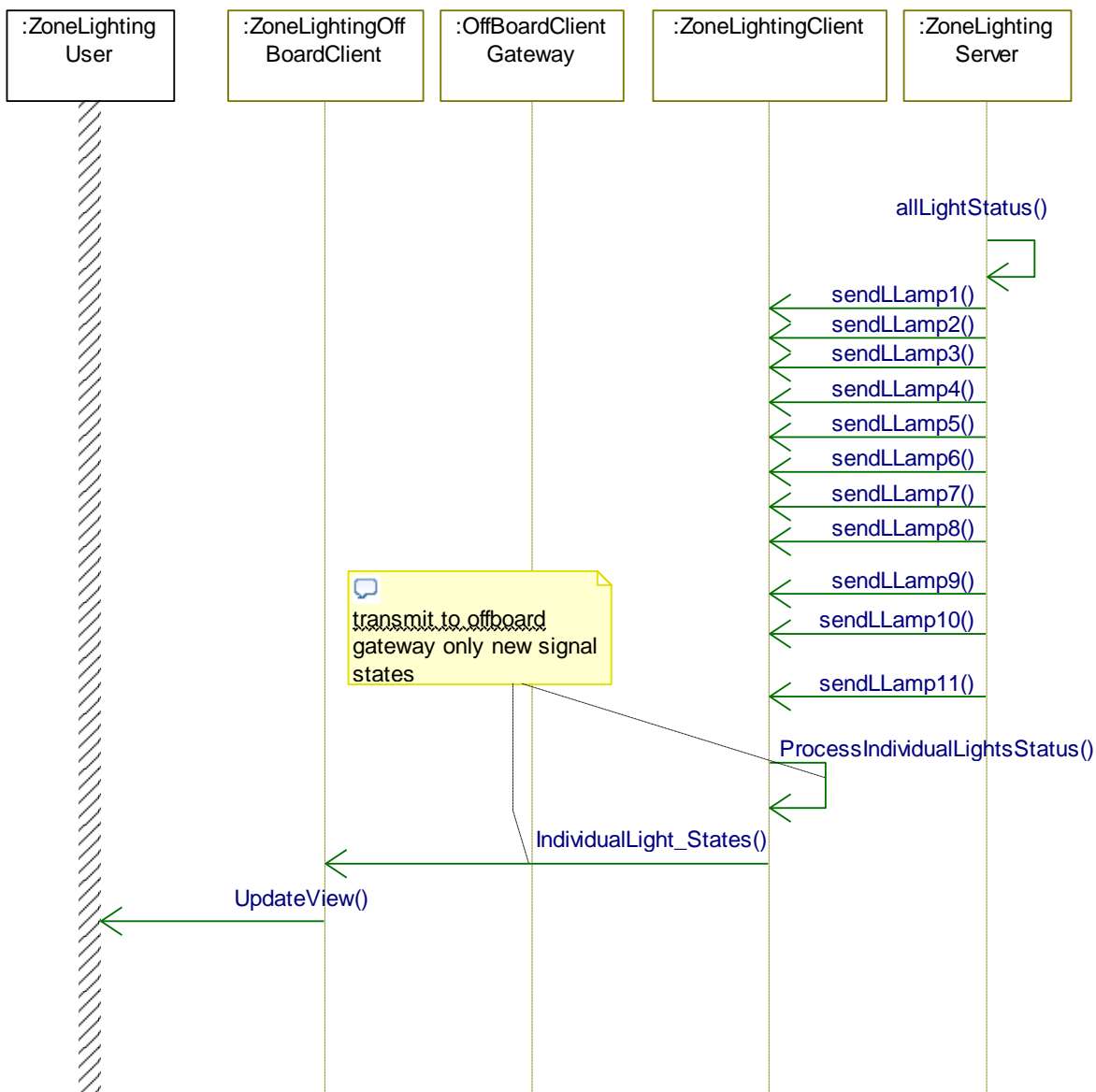
3.1.2.2 Sequence Diagram

3.1.2.2.1 LGT360-SD-REQ-284006/D-Zone Lighting Operation SD





3.1.2.2.2 LGT360-SD-REQ-295588/D-All lights status update SD



3.2 LGT360-FUN-REQ-361956/A-Power State

3.2.1 Power State Overview

This feature gives the user the ability to turn the feature off. When the feature gets turned off, the user won't be able to requests zone light status changes, nor would the user be able to see any light indicators, in addition to that, the light zones will turn off from the server. The Client in this SPSS, serves as the master about these particular requests. The requests can come from multiple sources but the Client here decides which request to forward to the server for further processing.

3.2.2 LGT360-REQ-323924/B-Power State Input

Client shall use `ExitEntrySt` signal coming from client2 and the respective command coming from off board client to decide on current power state of the feature.

3.2.3 LGT360-REQ-323925/C-Power State Decision

Client shall send `ExitEntryRmtSt` signal to server and client2. Client shall send respective alerts to off board client gateway to indicate the current status of Zone lighting.



Below table describes how client should decide if two power states requests come Client 2 and Off Board client.
Action 1 event happens at an earlier time than Action 2.

Action 1	Action 2	Final state
ExitEntrySt = Off (0x1,0x3,0x5)	ExitEntry = On	ExitEntryRmtSt = On (0x1)
ExitEntrySt = Off (0x1,0x3,0x5)	ExitEntry = Off	ExitEntryRmtSt = Off (0x0)
ExitEntrySt = On (0x2,0x4,0x6)	ExitEntry = On	ExitEntryRmtSt = On (0x1)
ExitEntrySt = On (0x2,0x4,0x6)	ExitEntry = Off	ExitEntryRmtSt = Off (0x0)
ExitEntry = On	ExitEntrySt = Off (0x1,0x3,0x5)	ExitEntryRmtSt = Off (0x0)
ExitEntry = On	ExitEntrySt = On (0x2,0x4,0x6)	ExitEntryRmtSt = On (0x1)
ExitEntry = Off	ExitEntrySt = Off (0x1,0x3,0x5)	ExitEntryRmtSt = Off (0x0)
ExitEntry = Off	ExitEntrySt = On (0x2,0x4,0x6)	ExitEntryRmtSt = On (0x1)

3.2.4 Use Cases

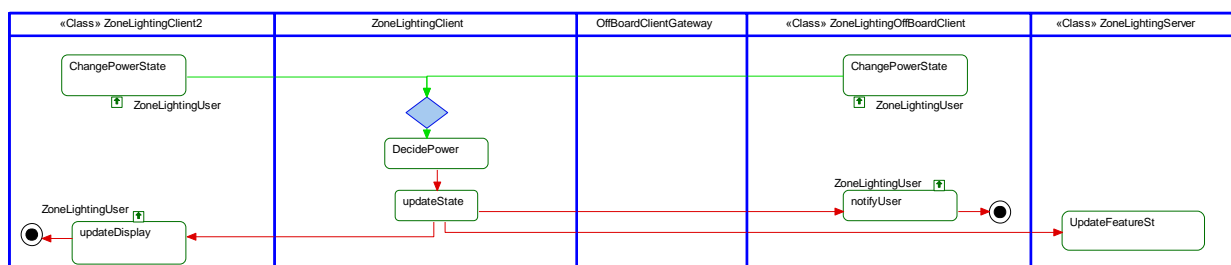
3.2.4.1 LGT360-UC-REQ-361959/A-Power State Change Request

Actors	Off Board User
Pre-conditions	There are no other power state changes requests ongoing.
Scenario Description	A single request coming from OffBoard user. OffBoard user sends request to change the power state of the feature.
Post-conditions	Zone Lighting Client decides the power state of the feature (per req# 323925). Zone lighting client sends appropriate information to Zone Lighting Server, Zone Lighting Client 2 and Zone Lighting Off Board Client.
List of Exception Use Cases	
Interfaces	Remote App

3.2.5 White Box Views

3.2.5.1 Activity Diagram

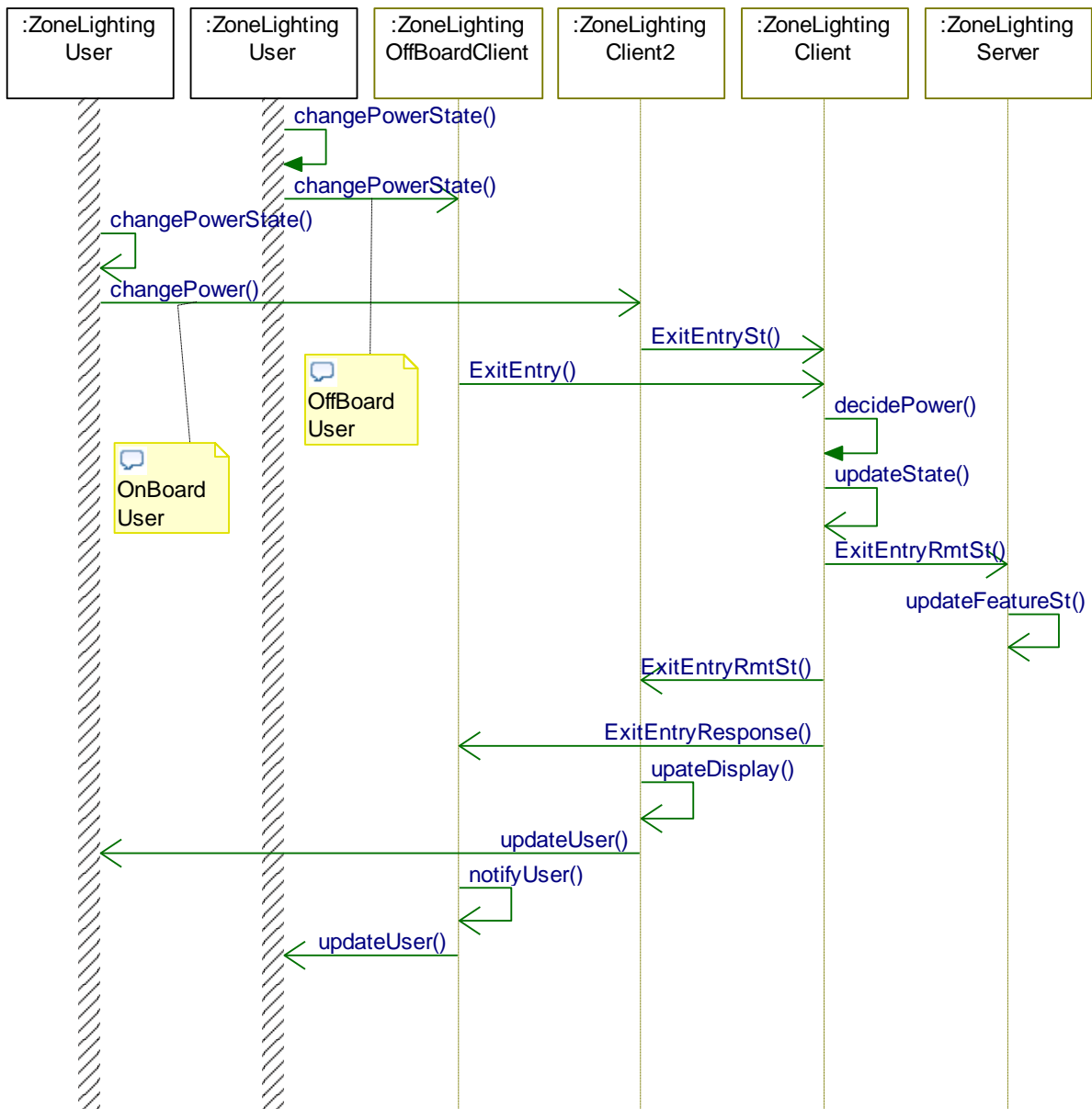
3.2.5.1.1 LGT360-ACT-REQ-361958/A-Power State Decision





3.2.5.2 Sequence Diagram

3.2.5.2.1 LGT360-SD-REQ-284003/B-Power State Decision





4 Appendix

1	Part 2 DSMU5T-14G650-XXX (The Diagnostics Spec)
2	FTCP Proto Files
3	Control My Car SPSS
4	Zone Lighting feature PRD and PSD documents for additional cloud specific details.
5	AFS-360 Lighting ver 2.6 (Feature Spec)