



Research & Vehicle Technology
“Infotainment Systems Product Development”

Feature –PDLC Digital Shade

APIM Phoenix Domain Controller
Infotainment Subsystem Part Specific
Specification (SPSS)

Version 1.0

UNCONTROLLED COPY IF PRINTED

Version Date: October 5, 2021

FORD CONFIDENTIAL



Revision History

Date	Version	Notes	
October 5, 2021	1.0	Initial Release	



Table of Contents

REVISION HISTORY	2
1 OVERVIEW	4
1.1 Feature Operation	4
1.2 Feature Assumptions	4
1.3 Terminology and Abbreviations	4
2 ARCHITECTURAL DESIGN.....	5
2.1 CLD-REQ-419659/A-FrontShadeClient	5
2.2 CLD-REQ-425950/A-RearShadeClient.....	5
2.3 CLD-REQ-448057/A-OffBoardClient.....	5
2.4 CLD-REQ-419660/A-ShadeServer	5
2.5 Physical Mapping of Classes	5
2.6 Logical Signal Mapping	5
2.7 IIR-REQ-419661/A-FrontShadeClient _Rx	6
2.7.1 MD-REQ-419662/A-Shade_St	6
2.7.2 MD-REQ-273750/A-Ignition_Status	7
2.8 IIR-REQ-419663/A-FrontShadeClient _Tx.....	7
2.8.1 MD-REQ-419664/A-FrontShade_Rq.....	7
3 GENERAL REQUIREMENTS	9
3.1 DSD-REQ-447950/A-Preconditions for Digital Shade	9
3.2 DSD-REQ-394820/A-Define Seat Location	9
4 FUNCTIONAL DEFINITION	10
4.1 FUN-REQ-419665/A-Request Shade Change.....	10
4.1.1 Requirements	10
4.1.2 Use Cases	14
4.1.3 White Box View	16
5 APPENDIX: REFERENCE DOCUMENTS.....	20

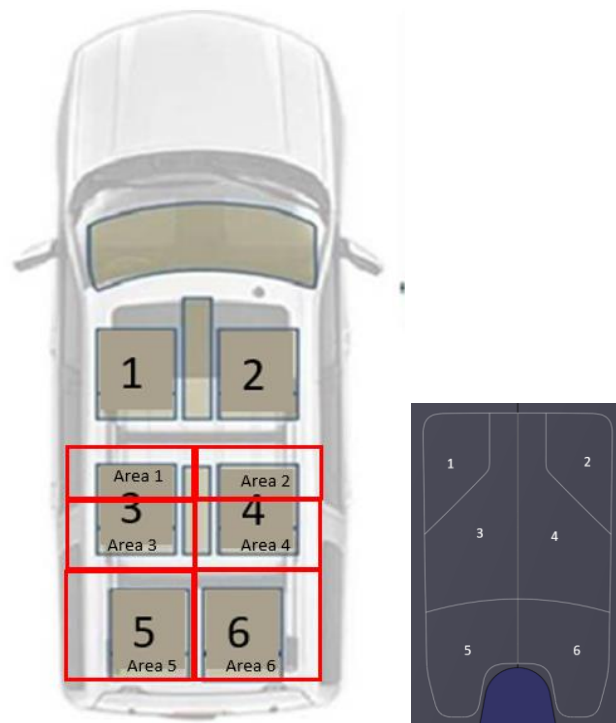


1 Overview

The Digital Shade feature will allow the vehicle user to control the shade of the vehicle's roof glass. The user will be able to control the four areas above the four rear seats independently. They shall have the option to have the glass Shaded, Clear, Auto or Pattern (Pattern Only Seat 3 and Seat 4). Auto allows the system to change shade or clear automatically.

1.1 Feature Operation

The Digital Shade feature allows the glass to be clear or shaded depending on the user's input from multiple client sources. The glass is divided into different six area. The Diagrams below is only to depict the glass area as it relates to seat location. The area shape may be different than the diagram. For Seat 3(Area 1 and Area 3) and Seat 4 (Area 2 and Area 4) are design such that if one area is Clear and the other is Shade, it will create a Pattern over the seat. This shall allow the glass above seat 3 and 4 to be Clear, Shaded or Pattern. Seats 5 and 6 can only be Shade or Clear. Also, there shall be an Auto mode that shall automatically control the entire glass making the glass clear or shaded.



1.2 Feature Assumptions

1.3 Terminology and Abbreviations

The following table lists terminologies that are used in this document along with a brief description.

Term	Description
BID	Brought in Device
URC	Ultimate Remote Control
PDC	Phoenix Domain Controller
PDLC	Polymer Dispersed Liquid Crystal



2 Architectural Design

2.1 CLD-REQ-419659/A-FrontShadeClient

The FrontShadeClient is responsible for receiving the input from the user, sending request to the ShadeServer and updating the user's HMI.

2.2 CLD-REQ-425950/A-RearShadeClient

The RearShadeClient is responsible for receiving the input from the user, sending request to the ShadeServer and updating HMI.

2.3 CLD-REQ-448057/A-OffBoardClient

The OffBoardClient is responsible for receiving the input from the user, sending request to the FrontShadeClient and receiving feedback from the FrontShadeClient.

2.4 CLD-REQ-419660/A-ShadeServer

The ShadeServer is responsible for receiving request to update the shade and communicate the shade status.

2.5 Physical Mapping of Classes

The table below shows an example of how the logical classes that make up the Digital Shade feature may be mapped into physical modules. This mapping example is specific to the Digital Shade architecture and does not necessarily carryover to other carlines or vehicle architectures.

Logical Class	Physical Module (ECU)
FrontShadeClient	PDC (SYNC)
RearShadeClient	RACM
OffBoardClient	URC App on BID
ShadeServer	HCM

2.6 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
ShadeMode_St	DgtlShadeMde_D_Stat
ShadeArea1_St	DgtlShadeAr1_D_Stat
ShadeArea2_St	DgtlShadeAr2_D_Stat
ShadeArea3_St	DgtlShadeAr3_D_Stat
ShadeArea4_St	DgtlShadeAr4_D_Stat
ShadeArea5_St	DgtlShadeAr5_D_Stat
ShadeArea6_St	DgtlShadeAr6_D_Stat
ShadeMode_Rq	DgtlShadeMdeFront_D_Rq
ShadeArea1_Rq	DgtlShadeAr1Front_D_Rq
ShadeArea2_Rq	DgtlShadeAr2Front_D_Rq
ShadeArea3_Rq	DgtlShadeAr3Front_D_Rq
ShadeArea4_Rq	DgtlShadeAr4Front_D_Rq



ShadeArea5_Rq	DgtlShadeAr5Front_D_Rq
ShadeArea6_Rq	DgtlShadeAr6Front_D_Rq

Table: Logical name/CAN signal mapping

2.7 IIR-REQ-419661/A-FrontShadeClient _Rx

2.7.1 MD-REQ-419662/A-Shade_St

Message Type: Status

This signal is used to report the Status of the Shade.

Name	Literals	Value	Description
ShadeMode_St	-	-	A Status to inform the ShadeClients of the state of Digital Shade
	Null	0x00	
	AllOnClear	0x01	All Glass Clear Status
	AllOffShade	0x02	All Glass Shade Status
	Pattern	0x03	All Glass Patten Status
	Auto	0x04	Glass in Auto Mode Status
	ManualMode	0x05	Individual Seat Status
	Reserved	0x06	
ShadeArea1_St	-	-	A request to update Area1
	Null	0x00	Null
	On Clear	0x01	Area1 Clear Status
	Off Shade	0x02	Area1 Shade Status
	AutoClear	0X03	Area1 in Auto Mode and Status Clear
	AutoShade	0X04	Area1 in Auto Mode and Status Shade
	Reserved	0x05	
ShadeArea2_St	-	-	A request to update Area2
	Null	0x00	Null
	On Clear	0x01	Area2 Clear Status
	Off Shade	0x02	Area2 Shade Status
	AutoClear	0X03	Area2 in Auto Mode and Status Clear
	AutoShade	0X04	Area2 in Auto Mode and Status Shade
	Reserved	0x05	
ShadeArea3_St	-	-	A request to
	Null	0x00	Null
	On Clear	0x01	Area3 Clear Status
	Off Shade	0x02	Area3 Shade Status
	AutoClear	0X03	Area3 in Auto Mode and Status Clear
	AutoShade	0X04	Area3 in Auto Mode and Status Shade
	Reserved	0x05	
ShadeArea4_St	-	-	A request to
	Null	0x00	Null
	On Clear	0x01	Area4 Clear Status
	Off Shade	0x02	Area4 Shade Status
	AutoClear	0X03	Area4 in Auto Mode and Status Clear
	AutoShade	0X04	Area4 in Auto Mode and Status Shade



	Reserved	0x05	
ShadeArea5_St	-	-	A request to
	Null	0x00	Null
	On Clear	0x01	Area5 Clear Status
	Off Shade	0x02	Area5 Shade Status
	AutoClear	0X03	Area5 in Auto Mode and Status Clear
	AutoShade	0X04	Area5 in Auto Mode and Status Shade
	Reserved	0x05	
ShadeArea6_St	-	-	A request to
	Null	0x00	Null
	On Clear	0x01	Area6 Clear Status
	Off Shade	0x02	Area6 Shade Status
	AutoClear	0X03	Area6 in Auto Mode and Status Clear
	AutoShade	0X04	Area6 in Auto Mode and Status Shade
	Reserved	0x05	

2.7.2 MD-REQ-273750/A-Ignition_Status

Message Type: Status

Signal sent to the infotainment system indicating the ignition status of the vehicle

Logical Signal Name	Literals	Value	Description
Ignition_Status	Unknown	0x0	
	OFF	0x1	
	Accessory	0x2	
	Run	0x4	
	Start	0x8	
	Invalid	0xF	

2.8 IIR-REQ-419663/A-FrontShadeClient_Tx

2.8.1 MD-REQ-419664/A-FrontShade_Rq

Message Type: Request

This signal is used to Request a change to the Glass.

Name	Literals	Value	Description
ShadeMode_Rq	-	-	A request to place the ShadeServer in a specific Mode
	Null	0x00	
	AllOnClear	0x01	All Glass Clear Request
	AllOffShade	0x02	All Glass Shade Request
	PatternAll	0x03	All Glass Pattern Request
	AutoAll	0x04	All Glass in Auto Mode Request
	ManualMode	0x05	Mode to change individual glass by Area Request
	Reserved	0x06	
ShadeArea1_Rq	-	-	A request to change Area1 Independently
	Null	0x00	Null
	OnClear	0x01	Area1 Clear Request



	OffShade	0x02	Area1 Shade Request
	Auto	0x03	Area1 Auto Request
	Reserved	0x04	
ShadeArea2_Rq	-	-	A request to change Area2 Independently
	Null	0x00	Null
	OnClear	0x01	Area2 Clear Request
	OffShade	0x02	Area2 Shade Request
	Auto	0x03	Area2 Auto Request
	Reserved	0x04	
ShadeArea3_Rq	-	-	A request to change Area3 Independently
	Null	0x00	Null
	OnClear	0x01	Area3 Clear Request
	OffShade	0x02	Area3 Shade Request
	Auto	0x03	Area3 Auto Request
	Reserved	0x04	
ShadeArea4_Rq	-	-	A request to change Area4 Independently
	Null	0x00	Null
	OnClear	0x01	Area4 Clear Request
	OffShade	0x02	Area4 Shade Request
	Auto	0x03	Area4 Auto Request
	Reserved	0x04	
ShadeArea5_Rq	-	-	A request to change Area5 Independently
	Null	0x00	Null
	OnClear	0x01	Area5 Clear Request
	OffShade	0x02	Area5 Shade Request
	Auto	0x03	Area5 Auto Request
	Reserved	0x04	
ShadeArea6_Rq	-	-	A request to change Area6 Independently
	Null	0x00	Null
	OnClear	0x01	Area6 Clear Request
	OffShade	0x02	Area6 Shade Request
	Auto	0x03	Area6 Auto Request
	Reserved	0x04	



3 General Requirements

3.1 DSD-REQ-447950/A-Preconditions for Digital Shade

Digital Shade shall be Active when the vehicle engine is Active, which is determined by Ignition_Status = 0x4 (Run) or 0x8 (Start) or 0x2 (Acc)

3.2 DSD-REQ-394820/A-Define Seat Location

When referring to a seat location in this SPSS, the following definition will be true.

Seat3 is covered by ShadeArea1 and ShadeArea3

Seat4 is covered by ShadeArea2 and ShadeArea4

Seat5 is covered by ShadeArea5

Seat6 is covered by ShadeArea6



4 Functional Definition

4.1 FUN-REQ-419665/A-Request Shade Change

4.1.1 Requirements

4.1.1.1 DSD-REQ-419666/A-FrontShade_Rq sent in One Message

FrontShade_Rq message will be sent with all signals at the same time.

100 msec after event message FrontShade=Rq shall send a message with ALL values as 'Null'.

4.1.1.2 DSD-REQ-420863/A-Sending Change Shade Request

The FrontShadeClient shall send the ShadeServer to request a change to the glass Shade.

When FrontShadeMode_Rq is in any state other than ManualMode (0x05), ShadeArea1_Rq, ShadeArea2_Rq, ShadeArea3_Rq, ShadeArea4_Rq, ShadeArea5_Rq, ShadeArea6_Rq would be set to NULL.

4.1.1.3 DSD-REQ-416738/A-Sending Full Glass Requests

The FrontShadeClient shall send requests to update the entire glass.

To request the entire glass to **Clear** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="AllOnClear",
ShadeArea1="Null", ShadeArea2="Null", ShadeArea3="Null", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Null"

To request the entire glass to **Shade** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="AllOffShade",
ShadeArea1="Null", ShadeArea2="Null", ShadeArea3="Null", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Null"

To request the entire glass to **Pattern** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="PatternAll",
ShadeArea1="Null", ShadeArea2="Null", ShadeArea3="Null", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Null"

To request the entire glass to **Auto** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="AutoAll",
ShadeArea1="Null", ShadeArea2="Null", ShadeArea3="Null", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Null"

4.1.1.4 DSD-REQ-424762/A-Sending Individual Seat3 Requests

The FrontShadeClient shall send requests to update the glass over individual Seat3

To request the Seat3 glass to **Clear** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Clear", ShadeArea2="Null", ShadeArea3="Clear", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Null"



To request the Seat3 glass to **Shade** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Shade", ShadeArea2="Null", ShadeArea3="Shade", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Null"

To request the Seat3 glass to **Patten** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Shade", ShadeArea2="Null", ShadeArea3="Clear", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Null"

To request the Seat3 glass to **Auto** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Auto", ShadeArea2="Null", ShadeArea3="Auto", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Null"

4.1.1.5 DSD-REQ-424765/A-Sending Individual Seat4 Requests

The FrontShadeClient shall send requests to update the glass over individual Seat4

To request the Seat4 glass to **Clear** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Null", ShadeArea2="Clear", ShadeArea3="Null", ShadeArea4="Clear", ShadeArea5="Null",
ShadeArea6="Null"

To request the Seat4 glass to **Shade** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Null", ShadeArea2="Shade", ShadeArea3="Null", ShadeArea4="Shade", ShadeArea5="Null",
ShadeArea6="Null"

To request the Seat4 glass to **Patten** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Null", ShadeArea2="Shade", ShadeArea3="Null", ShadeArea4="Clear", ShadeArea5="Null",
ShadeArea6="Null"

To request the Seat4 glass to **Auto** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Null", ShadeArea2="Auto", ShadeArea3="Null", ShadeArea4="Auto", ShadeArea5="Null",
ShadeArea6="Null"

4.1.1.6 DSD-REQ-424766/A-Sending Individual Seat5 Requests

The FrontShadeClient shall send requests to update the glass over individual Seat5

To request the Seat5 glass to **Clear** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Null", ShadeArea2="Null", ShadeArea3="Null", ShadeArea4="Null", ShadeArea5="Clear",
ShadeArea6="Null"

To request the Seat5 glass to **Shade** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Null", ShadeArea2="Null", ShadeArea3="Null", ShadeArea4="Null", ShadeArea5="Shade",
ShadeArea6="Null"



To request the Seat5 glass to **Auto** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Null", ShadeArea2="Null", ShadeArea3="Null", ShadeArea4="Null", ShadeArea5="Auto",
ShadeArea6="Null"

4.1.1.7 DSD-REQ-424767/A-Sending Individual Seat6 Requests

The FrontShadeClient shall send requests to update the glass over individual Seat6

To request the Seat6 glass to **Clear** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Null", ShadeArea2="Null", ShadeArea3="Null", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Clear"

To request the Seat6 glass to **Shade** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Null", ShadeArea2="Null", ShadeArea3="Null", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Shade"

To request the Seat6 glass to **Auto** the FrontShadeClient shall send the FrontShade_Rq as follows

ShadeMode_Rq="ManualMode",
ShadeArea1="Null", ShadeArea2="Null", ShadeArea3="Null", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Auto"

4.1.1.8 DSD-REQ-416736/A-Update Full Glass Indicators HMI

The FrontShadeClient shall update HMI Indicators when it receives Shade_St.

Clear Indicator- The FrontShadeClient shall have HMI to indicate the entire Digital Shade is all Clear.

If ShadeMode_St = "AllOnClear" HMI for All Clear shall be active.

Shade Indicator- The FrontShadeClient shall have HMI to indicate the entire Digital Shade is all Shade.

If ShadeMode_St = "AllOffShade" HMI for All Shade shall be active.

Pattern Indicator- The FrontShadeClient shall have HMI to indicate the entire Digital Shade is in Full Pattern.

If ShadeMode_St = "PatternAll" HMI for Full Pattern shall be active.

Auto Indicator- The FrontShadeClient shall have HMI to indicate the entire Digital Shade in Full Auto.

If ShadeMode_St = "AutoAll" HMI for Full Auto shall be active.

4.1.1.9 DSD-REQ-420864/A-Update Seat Status HMI

The FrontShadeClient shall have HMI to show the STATUS of the glass by seat location. This HMI shall be updated when it receives Shade_St.

For Seat 3:

(ShadeArea1_St="Clear" OR ShadeArea1_St="AutoClear") AND (ShadeArea3_St="Clear" OR
ShadeArea3_St="AutoClear") the STATUS HMI for Seat3 shall update to "Clear".

(ShadeArea1_St="Shade" OR ShadeArea1_St="AutoShade") AND (ShadeArea3_St="Shade" OR



ShadeArea3_St="AutoShade") the STATUS HMI for Seat3 shall update to "Shade".

ShadeArea1_St ="Shade" AND ShadeArea3_St="Clear", the STATUS HMI for Seat3 shall update to "Pattern".

ShadeArea1_St ="Clear" AND ShadeArea3_St="Shade", should never be received and consider INVALID

For Seat 4:

(ShadeArea2_St ="Clear" OR ShadeArea2_St ="AutoClear") AND (ShadeArea4_St="Clear" OR ShadeArea4_St="AutoClear") the STATUS HMI for Seat4 shall update to "Clear".

(ShadeArea2_St ="Shade" OR ShadeArea2_St ="AutoShade") AND (ShadeArea4_St="Shade" OR ShadeArea4_St="AutoShade") the STATUS HMI for Seat4 shall update to "Shade".

ShadeArea2_St ="Shade" AND ShadeArea4_St="Clear", STATUS HMI for Seat4 shall update to "Pattern".

ShadeArea2_St ="Clear" AND ShadeArea4_St="Shade", should never be received and consider INVALID

For Seat 5:

ShadeArea5_St ="Clear", STATUS HMI for Seat5 shall update to "Clear".

ShadeArea5_St ="Shade", STATUS HMI for Seat5 shall update to "Shade".

For Seat 6:

ShadeArea6_St ="Clear", STATUS HMI for Seat6 shall update to "Clear".

ShadeArea6_St ="Shade", STATUS HMI for Seat6 shall update to "Shade".

4.1.1.10 DSD-REQ-416737/A-Update Seat Mode Status HMI

The FrontShadeClient shall have HMI to show the MODE of the glass by seat location. This HMI shall be updated when it receives the Shade_St.

For Seat 3:

(ShadeArea1_St ="Clear" AND ShadeArea3_St="Clear") the MODE HMI for Seat3 shall update to "Clear".

(ShadeArea1_St ="AutoClear" AND ShadeArea3_St="AutoClear") the MODE HMI for Seat3 shall update to "Auto".

(ShadeArea1_St ="Shade" AND ShadeArea3_St="Shade") the MODE HMI for Seat3 shall update to "Shade".

(ShadeArea1_St ="AutoShade" AND ShadeArea3_St="AutoShade") the MODE HMI for Seat3 shall update to "Auto".

(ShadeArea1_St ="Shade" AND ShadeArea3_St="Clear") the MODE HMI for Seat3 shall update to "Pattern".

(ShadeArea1_St ="Clear" AND ShadeArea3_St="Shade") Should be consider an error.

For Seat 4:

(ShadeArea2_St ="Clear" AND ShadeArea4_St="Clear") the MODE HMI for Seat4 shall update to "Clear".

(ShadeArea2_St ="AutoClear" AND ShadeArea4_St="AutoClear") the MODE HMI for Seat4 shall update to "Auto".

(ShadeArea2_St ="Shade" AND ShadeArea4_St="Shade") the MODE HMI for Seat4 shall update to "Shade".

(ShadeArea2_St ="AutoShade" AND ShadeArea4_St="AutoShade") the MODE HMI for Seat4 shall update to "Auto".

(ShadeArea2_St ="Shade" AND ShadeArea4_St="Clear") the MODE HMI for Seat4 shall update to "Pattern".



(ShadeArea2_St="Clear" AND ShadeArea4_St="Shade") Should be considered an Error.

For Seat 5:

ShadeArea5_St="Clear" the MODE HMI for Seat5 shall update to "Clear".
ShadeArea5_St="AutoClear" the MODE HMI for Seat5 shall update to "Auto".
ShadeArea5_St="Shade" the MODE HMI for Seat5 shall update to "Shade".
ShadeArea5_St="AutoShade" the MODE HMI for Seat5 shall update to "Auto".

For Seat 6:

ShadeArea6_St="Clear" the MODE HMI for Seat6 shall update to "Clear".
ShadeArea6_St="AutoClear" the MODE HMI for Seat6 shall update to "Auto".
ShadeArea6_St="Shade" the MODE HMI for Seat6 shall update to "Shade".
ShadeArea6_St="AutoShade" the MODE HMI for Seat6 shall update to "Auto".

4.1.1.11 DSD-REQ-382101/A-Rejuvenate Active

When Rejuvenate becomes Active

- If ShadeMode_St = "Auto" FrontShadeClient shall remember this state.
- FrontShadeClient shall send
 - ShadeMode_Rq="AllOffShade",
ShadeArea1="Null", ShadeArea2="Null", ShadeArea3="Null", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Null"

When Rejuvenate changes from Active to Inactive

- If FrontShadeClient has a remembered ShadeMode_St = "Auto", FrontShadeClient shall send
 - ShadeMode_Rq="AutoAll",
ShadeArea1="Null", ShadeArea2="Null", ShadeArea3="Null", ShadeArea4="Null", ShadeArea5="Null",
ShadeArea6="Null"
- If there is no remembered state no message is sent
- Once message is sent the remembered state shall be cleared.

4.1.2 Use Cases

4.1.2.1 **DSD-UC-REQ-419667/A-Change to glass to Auto**

Actors	Shade_User
Pre-conditions	All preconditions for Digital Shade are met Glass is all Shade
Scenario Description	User selects HMI to select Auto
Post-conditions	Glass is set to Auto.
List of Exception Use Cases	
Interfaces	HMI

4.1.2.2 **DSD-UC-REQ-421089/A-Change Seat3 to Shade**

Actors	Shade_User
Pre-conditions	All preconditions for Digital Shade are met



	Glass is all Clear
Scenario Description	User selects HMI change to Shade over Seat 3 (Area1 and Area3)
Post-conditions	Glass is changed to Shaded over Seat 3
List of Exception Use Cases	
Interfaces	HMI

4.1.2.3 DSD-UC-REQ-421777/A-Change Seat 4 Pattern

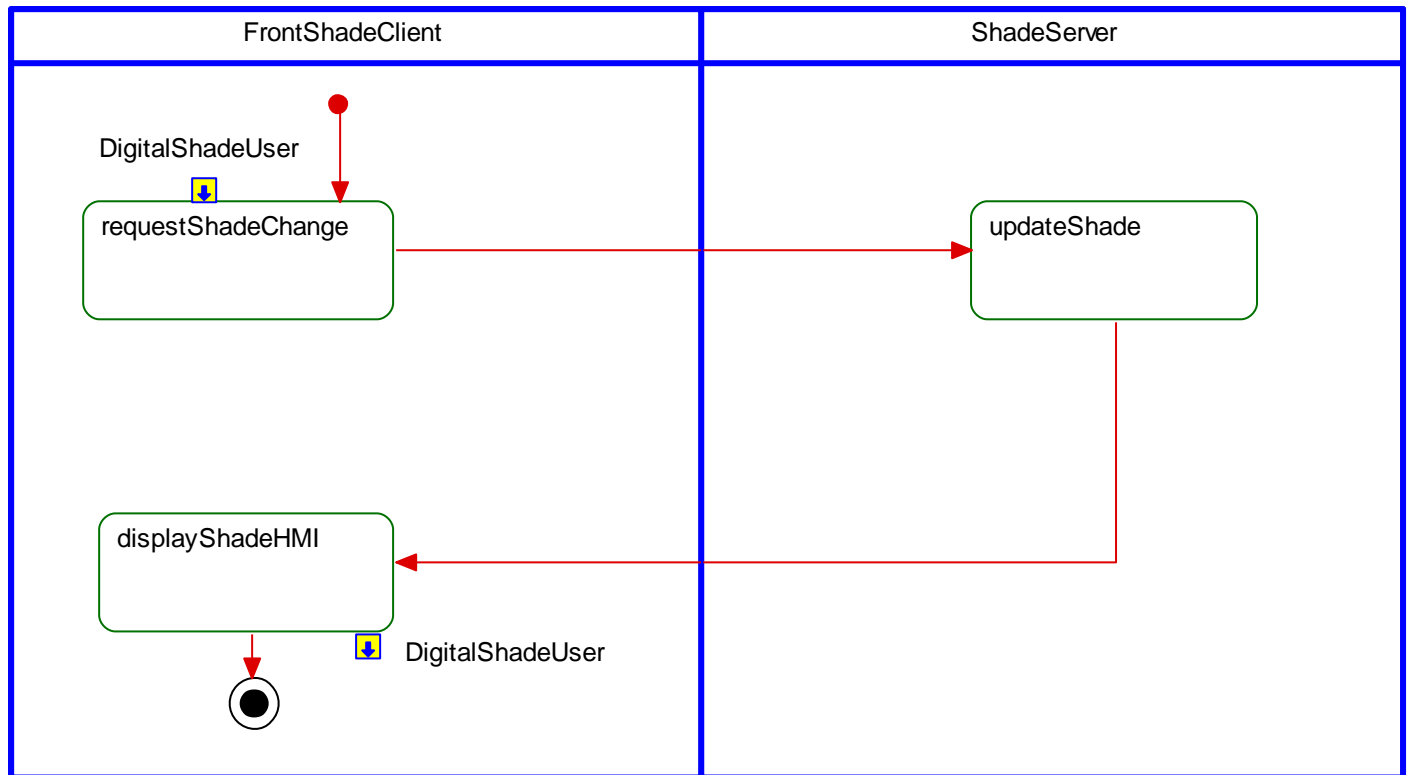
Actors	Shade_User
Pre-conditions	All preconditions for Digital Shade are met Seat 3 is Shaded Seat 4, 5 and 6 are Clear
Scenario Description	User selects HMI change Seat 4 to Pattern
Post-conditions	Glass is changed to Pattern over Seat 4 Seat 3 remains shaded Seat 5 and 6 remains Clear
List of Exception Use Cases	
Interfaces	HMI



4.1.3 White Box View

4.1.3.1 Activity Diagrams

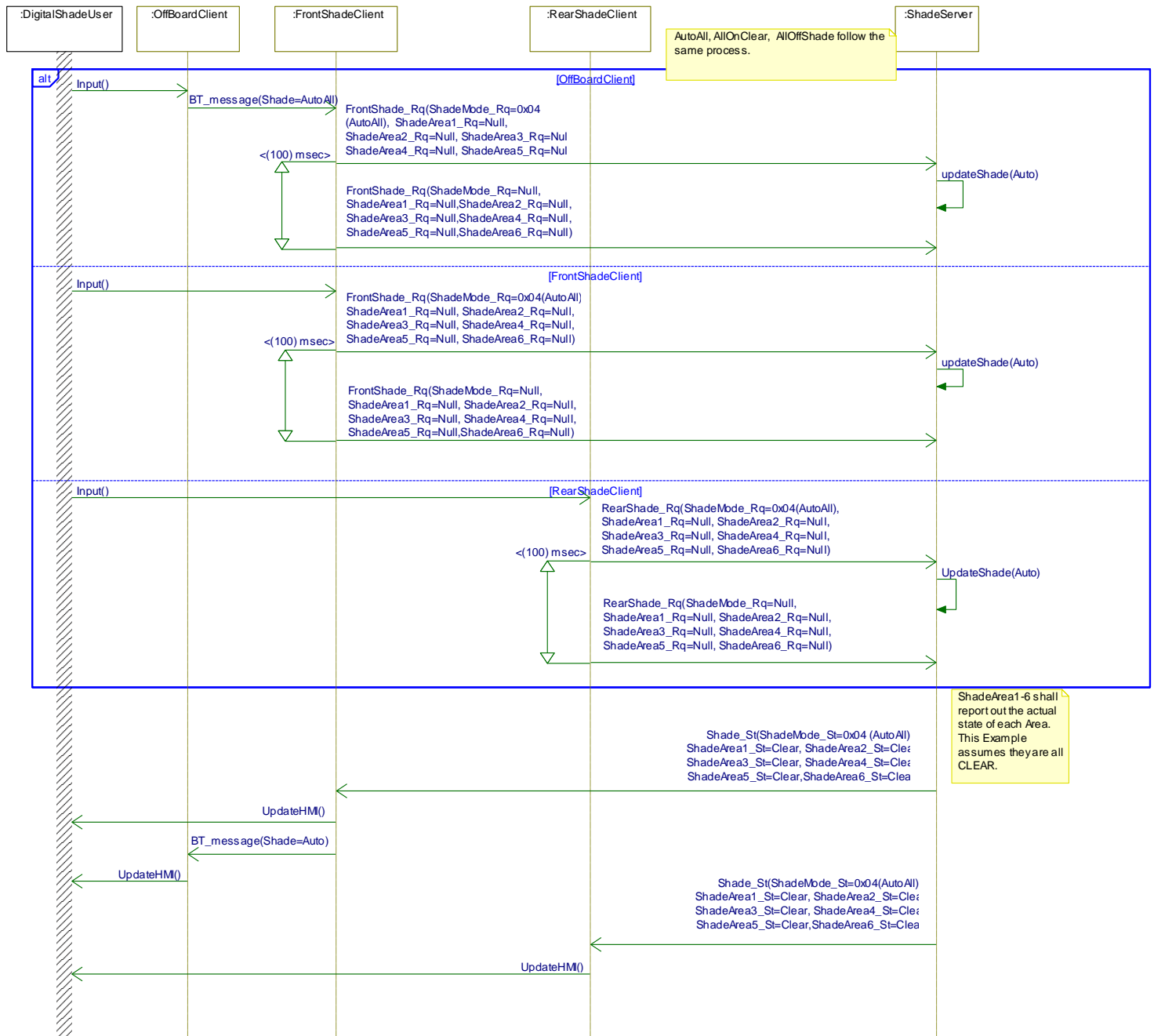
4.1.3.1.1 DSD-ACT-REQ-419668/A-Request Shade Change





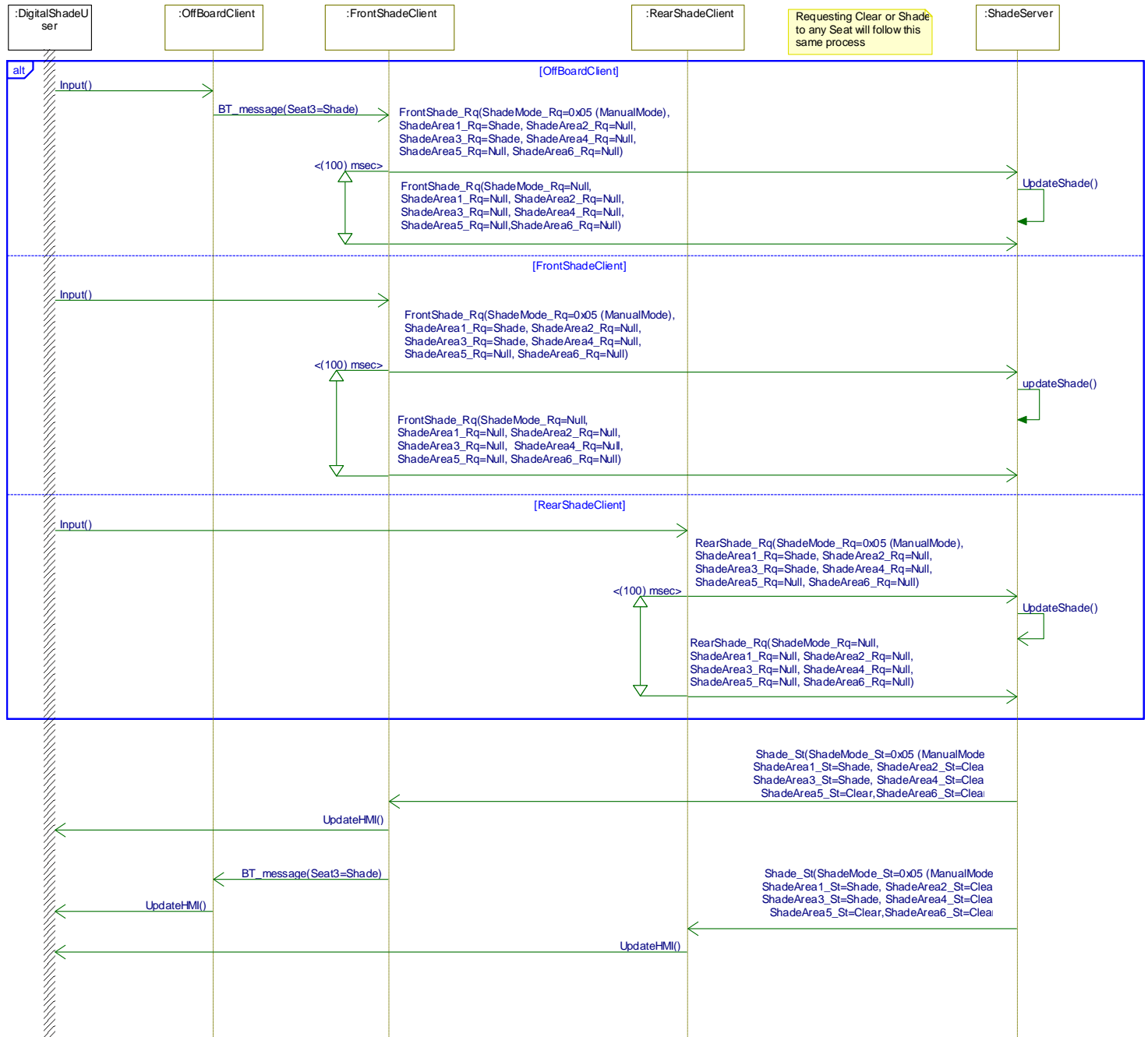
4.1.3.2 Sequence Diagrams

4.1.3.2.1 DSD-SD-REQ-419669/A-Enable Auto Entire Glass



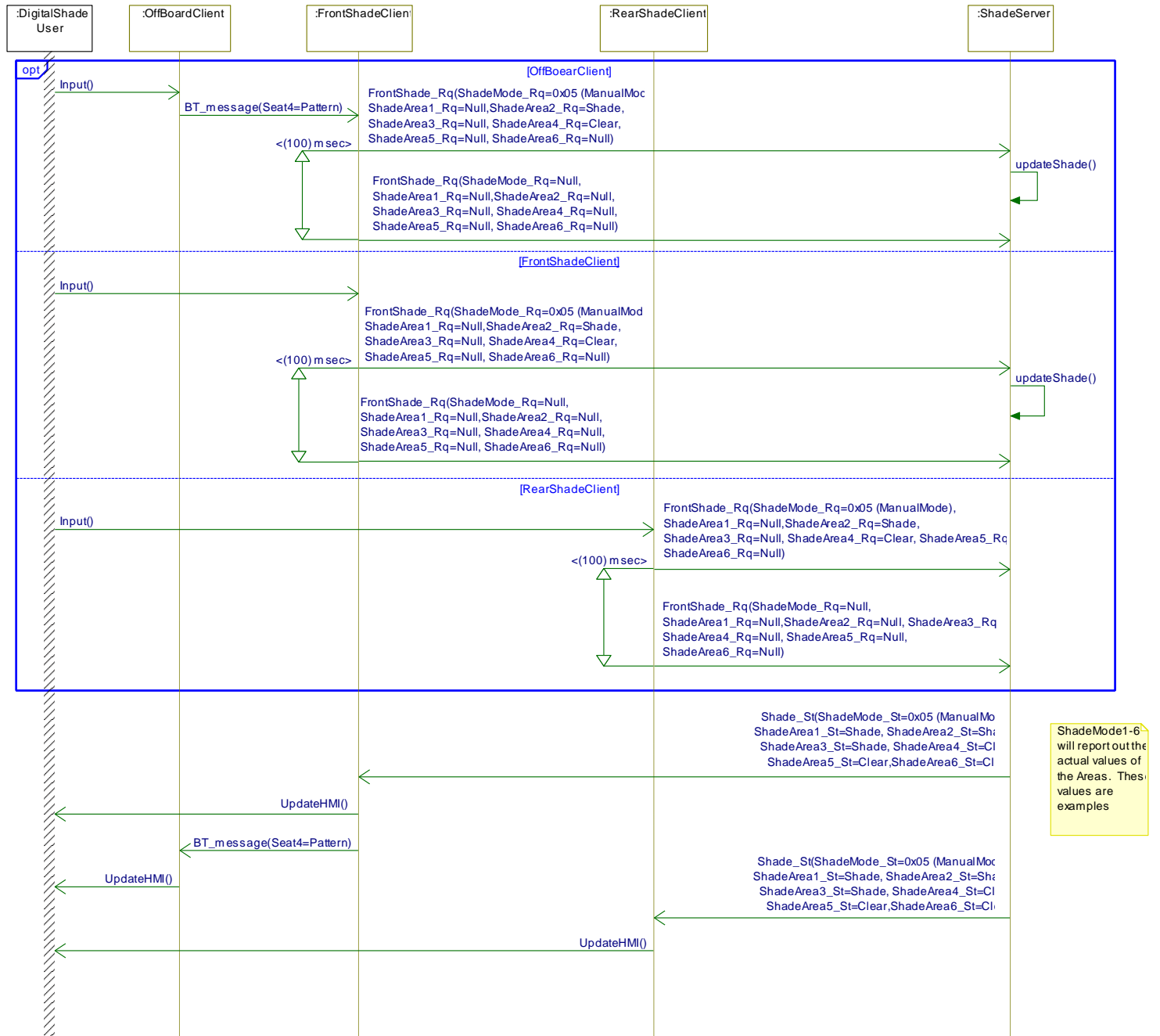


4.1.3.2.2 DSD-SD-REQ-421090/A-Change Area Independently Seat3 Shade





4.1.3.2.3 DSD-SD-REQ-421778/A-Change Area Independently Seat4 Pattern





5 Appendix: Reference Documents

Reference #	Document Title
1	RACM Digital Shade SPSS
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	