Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – Idle Management

Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.1
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FORD CONFIDENTIAL

Revision History

Date	Version	Notes	
April 29, 2021	1.0	**Initial Release**	
July 9, 2021	1.1		
		890248/B-Logical Signal Mapping	tmertiri: update mapping table
		MD-REQ-414883/B-LimccRq	tmertiri:update signal definition
		IMCC-IIR-REQ-414693/B-Eco Idle Client_Rx	tmertiri: added new signal
		MD-REQ-427928/A-LidleMnu	tmertiri: added new signal
		IMCC-REQ-414902/B-Determine Active Feature	tmertiri: requirement update
		IMCC-FUN-REQ-414859/B-Driver Selectable Idle	tmertiri: structure update
		IMCC-SD-REQ-414910/B-Driver Selectable Idle	tmertiri:update diagram, to make Limccrq a toggle
		IMCC-FUN-REQ-427941/A-Driver Selectable Idle Menu	tmertiri: new function
		931185/A-Objective	tmertiri: new content
		931186/A-Requirements	tmertiri: new content
		IMCC-REQ-427948/A-Menu Display	tmertiri: new requirements
		IMCC-FUN-REQ-414882/B-Pro Eco Idle	tmertiri: structure update
		STR-890300/B-Requirements	tmertiri: structure and req update
		IMCC-REQ-414891/B-User changes IMCC State	tmertiri: update the requirement
		IMCC-REQ-414893/B-Closing Popup	tmertiri: update requirement
		IMCC-REQ-414895/B-IMCC Status Display	tmertiri: update requirement
		IMCC-SD-REQ-414912/B-IMCC	tmertiri: update diagram.

Table of Contents

1 Architectural Design

1.1 Overview

This feature is used to control vehicle idle time. This is done in two distinct ways. One way through Driver Selectable Idle function, where the user has full control of how long to keep the engine idling, and the other way through IMCC, where the server makes the necessary decisions to keep the engine idling or not.

The feature integrates these two functions very smoothly. IMCC is the default way to control the idle time. When user "disables" IMCC, the client gives control to the user by making Driver Selectable Idle function main operation. User can disable Driver Selectable Idle by enabling IMCC once again.

Naming convention:
These two features/functions are referred with various names in different literature or documentation.
IMCC= Idle Management with Cabin Comfort = Pro Eco Idle
Driver Selectable Idle = Idle Timer

1.2 IMCC-CLD-REQ-414690/A-Eco Idle Client

Client provides a way for the user to interface with the feature. It allows the user to enter their input choice and displays feature output content.

1.3 IMCC-CLD-REQ-414691/A-Eco Idle Server

Server control the feature status. It receives user's request and decides on what to do with the feature.

1.4 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
Lign	Ignition_Status
LidleType	EngIdlShutDown_D2_Type
LidleSt	EngIdlShutDownT_D_Stat
LidleRq	EngIdlShutDownT_D_Rq
LidleMnu	EngIdlShutDownT_D_DsplyMnu
LimccRq	StopStrtImccSel_B_Rq
LimccFalt	StopStrtImccSel_B_Falt
LimccTxtSt	StopStrtImccTxt_D_Stat
LimccTxt	StopStrtImccTxt_D_Rq
LimccSt	StopStrtImccActv_D_St

Table: Logical name/CAN signal mapping

1.5 IMCC-IIR-REQ-414692/A-Eco Idle Cient_Tx

1.5.1 MD-REQ-414696/A-LidleRq

LidleRq: This signal is sent form the client to the server to indicate user requested idle timer. It is used to request for how long the engine should stay idle.

Signal Parameters	Description
0x0	NULL. Default Signal state
0x1 - 0xF0	Idle Time 1-240 min. Sent by client to inform server that the user has selected a new idle time. Available value could be restricted to what is shown in client hmi.
0xF1	Not Used
0xF2	Indefinite Idle. Sent by client to inform server that the user had vehicle to idle indefinitely
0xF3 – 0xFF	Not Used.

1.5.2 MD-REQ-414883/B-LimccRq

LimccRq: This signal is sent from the client to the server to indicate the user request to change the status of the feature.

Signal Parameter	Description
0x0	User is not pressing the soft button.
0x1	User is pressing the soft button.

*Due to client being unable to deliver all requirements, changes were done to the feature. To make the feature work, the LimccRq had to change the operation from On/Off to Press/Not Press. This change in behavior is documented in SPSS but canDB still has the On/Off state operation. For this change only, SPSS has higher authority than canDB. No other changes have been intended, implied or implemented. If a user of this spec notices any discrepancy with candb for any other signal, please bring that to feature owner or owner of SPSS for further discussion.

1.5.3 MD-REQ-414884/A-LimccFalt

LimccFault: This signal is sent from the client to the server to indicate that the clients is having issues with IMCC feature.

Signal Parameter	Description
0x0	No: Feature is operating fine in client side.
0x1	Yes: Client is having errors with the feature.

1.5.4 MD-REQ-414885/A-LimccTxtSt

LimccTxtSt: This signal is sent from the client to the server to provide popup feedback.

Signal Parameters	Parameter Description
0x0	Not Active: There is no popup showing on client HMI screen.
0x1	ActiveOnDsply: Popup is being shown on client HMI screen.
0x2	ClosedNo: User rejected the popup
0x3	CosedYes: User accepted popup action
0x4	ClosedTimeout: System Timed Out. Popup removed because it stayed in client HMI screen for the allowable time.
0x5-0x7	Not used at the moment. Client should not generate such values.

1.6 IMCC-IIR-REQ-414693/B-Eco Idle Client_Rx

1.6.1 MD-REQ-414694/A-Lign

Lign: This signal is sent by server to tell the client the ignition status of the vehicle.

Signal parameters	Parameter meanings
0x0	Unknown
0x1	Off
0x2	Accessory
0x4	Run
0x8	Start
0xF	Invalid

1.6.2 MD-REQ-414695/A-LidleSt

LidleSt: This signal is sent from the server to the client to indicate the feature status or the idle time that engine will keep running.

Signal Parameter	Description
0x0:	NULL. Driver Selectable Idle is not configured and Client should use stored values to determine configuration
0x1 - 0xF0:	Idle Time. Sent by server to inform client which time to display as the current selection.
0xF1	Not Used
0xF2	Indefinite Idle. Sent by server to indicate indefinite idle currently active.
0xF3- 0xFF:	Not used

1.6.3 MD-REQ-414881/A-LidleType

This signal is used by the client to determine if the client should overwrite the feature disable configuration value.

1.6.4 MD-REQ-414886/A-LimccTxt

LimccTxt: This signal is sent form the server to the client with particular information for the user.

Signal Parameter	Definitions
0x0	No Message
0x1	Message 1
0x2	Message 2
0x3	Message 3
0x4	Message 4
0x5	Message 5
0x6	Message 6
0x7	Message 7

For proper message text , refer to HMI specifications.

1.6.5 MD-REQ-414887/A-LimccSt

LimccSt: This signal is sent from the server to the client to indicate imcc feature status.

Signal Parameter	Parameter definition
0x0	Off: Imcc is inactive

0x1	OnNotActive
0x2	OnActive
0x3	OnSuspended
0x4	Deactivated
0x5-0x7	Notused: Client should ignore these values

1.6.6   MD-REQ-427928/A-LidleMnu

LidleMnu: This signal is sent from the server to the client to control hen Idle Menu is to be displayed by the client.

Signal Parameter	Description
0x0	No: Do not show the Idle Menu in HMI.
0x1	Yes: Display the Idle Menu in HMI screen.

2 General Requirements

2.1 IMCC-REQ-414889/A-Power Mode Operation

The feature should be accessible for interaction to the user while signal IgnSt is 0x4 (Run) and 0x8 (Start).

2.2 IMCC-REQ-414902/B-Determine Active Feature

In vehicles equipped with both Driver Selectable Idle and IMCC, the decision on which feature is active is done through the signal LimccSt.

When this signal is 0x0(Off), 0x3 (OnSuspended) or 0x4(Deactivated), the Driver Selectable Idle should be active to the user and Client shall allow the user to fully engage with this feature. When LimccSt = 0x1(OnNotActive) or 0x2(OnActive), IMCC is active. Driver Selectable Idle shall appear grayed out or not displayed at all. Refer to HMI for proper screen layout. IMCC requirement and interface is active during this time.

3 Functional Definition

3.1 REQ-414859/A-Driver Selectable Idle

3.1.1 Overview

Driver Selectable Idle is a feature that allows the vehicle operator to choose the length of time the vehicle will idle before it shuts down.

3.1.2 Requirements

3.1.2.1 *IMCC-REQ-414877/A-User Input Values*

The client shall use LidleRq parameters 0x1 to 0xF0 to inform the server of user selected choice of idle time length.

The client shall use LidleRq parameters 0xF2 to inform the server that the user has selected indefinite time for idle time length.

3.1.2.2 *IMCC-REQ-414878/A-Actual Idle Time*

The client shall use the data provided by LidleSt to know the real actual idle time. This time could be provided to the user or client can use it for internal purposes. Refer to HMI specs for display requirements.
LidleSt = 0x0 - Idle time is not configured hence nothing for client to do.
LidleSt = 0x1 to 0xF0 : This is the active idle time length in minutes. refer to database to convert this number to Dec.
Lidle =0xF2 : Idle time has been configured to "Idle Indefinitely"

3.1.2.3 *IMCC-REQ-414879/A-Requesting Idle Time Length Update*

The client shall wait for a value to remain unchanged for 500ms before the client sends LidleRq to the server. The client shall transmit this request for 100ms in the communication bus.

3.1.2.4 *IMCC-REQ-414880/A-True Configuration*

While there could be a configuration to enable or disable the feature through diagnostics spec, this feature uses signals that could override the state provided by diagnostics spec.
Even if the feature is disabled through such means, config values in diagnostics, the client shall read the bus and if it detects either of the two signals below with values other than NULL, that means that the feature is enabled per the table configuration.

Two signals to check:
LidleType
LidlleSt

|		LidleSt	
		NULL	non-NULL
LidleType	NULL	Use stored value	Selectable Idle & Use stored value
	Keyed	None	None
	Keyless	"30min Max Idle" option	Selectable Idle w/ Idle Indefinitely
	Fleet	None	Selectable Idle w/out Idle Indefinitely

3.1.3   Use Cases

3.1.3.1   IMCC-UC-REQ-414899/A-Idle Timer Value Change

Actors	User
Pre-conditions	Driver Selectable Idle is active. Some random timer has been user selected already for the idle.
Scenario Description	User changes the Idle time.
Post-conditions	Client confirms that the user selected Idle time stays active for longer than 500ms. Client requests the new Idle Timer. Client gets updated from the server for the currently active timer.
List of Exception Use Cases	
Interfaces	Client HMI interface

3.1.4   White Box Views
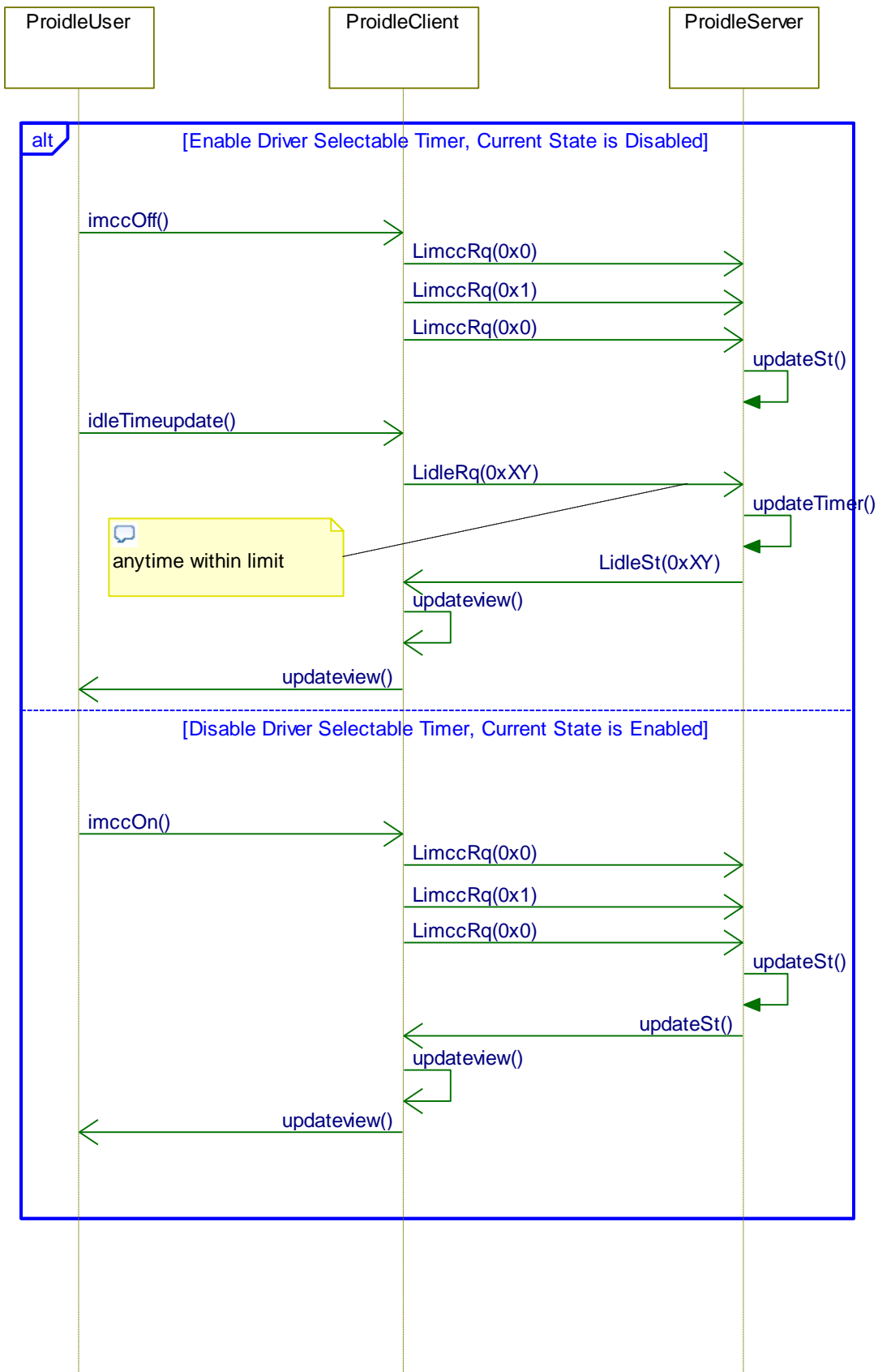
3.1.4.1   Activity Diagrams

3.1.4.1.1   IMCC-ACT-REQ-414909/A-Driver Selectable Idle
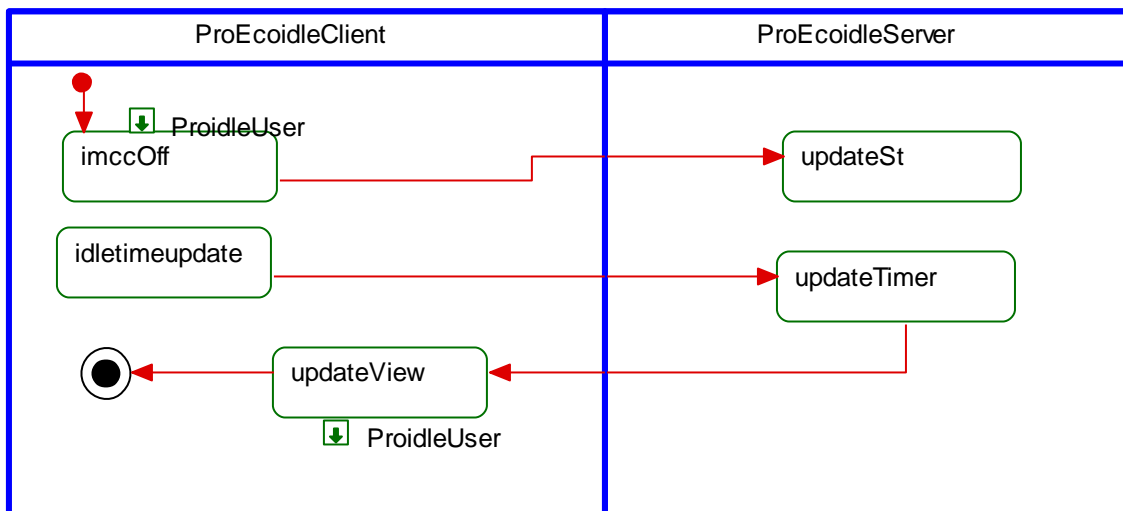
3.1.4.2 Sequence Diagrams

3.1.4.2.1 IMCC-SD-REQ-414910/B-Driver Selectable Idle

3.2 IMCC-FUN-REQ-427941/A-Driver Selectable Idle Menu

3.2.1 Objective

In some vehicles, the vehicle could turn off when the ignition key goes outside the vehicle. In other programs, there could be an automatic shutdown if driver seatbelt is unbuckled and driver door opens. Well, for these type of programs , the user might still want to keep the engine running and thus the Driver Selectable Idle feature still executing.
To keep the feature still running, a menu is offered to the user in certain situations where the user can select to keep the feature running, thus avoid vehicle shutdown. The requirement in this function are applicable to those programs. For exact menu content refer to HMI feature spec.

3.2.2 Requirements

3.2.2.1 IMCC-REQ-427948/A-Menu Display

When LidleMnu = 0x1 (Yes) the client shall display Driver Selectable Idle HMI menu.
When LidleMnu = 0x0 (NO) the client shall hide Driver Selectable Idle HMI menu.

3.3 IMCC-REQ-414882/A-Pro Eco Idle

3.3.1 Objective

Pro Eco Idle is a function that controls the vehicle Idle time. The time decision and feature management is done by the server according to internal and external parameters and conditions that server keeps track of.

3.3.2 Requirements

3.3.2.1 IMCC-REQ-414891/B-User changes IMCC State

The client shall transmit LimccRq = 0x1 when IMCC soft button is being pressed.
The client shall transmit LimccRq = 0x0 when IMCC soft button is not being pressed.

3.3.2.2 IMCC-REQ-414892/A-Popup Display

If client receives LimccTxt with any parameter other than 0x0, client shall display appropriate popup to the user.
Client shall confirm popup display by transmitting the signal LimccTxtSt with the value 0x1 for as long as it being actively shown to the user.

3.3.2.3 IMCC-REQ-415897/A-Popup Interrupt

If popup gets interrupted by some other screen changes, client shall transmit LimccTxtSt with the value of 0x0.

3.3.2.4 IMCC-REQ-414893/B-Closing Popup

When popup closes, client shall inform the server of the conditions that triggered its closure. Was it by system timeout, user reject, user accept, etc.
Refer to LimccTxtSt to know all the possible ways of the closures that client needs to inform server.

The signal LimccTxtSt should be transmitted by the client for a minimum time of 100ms before the signal transmits default value again.

3.3.2.5 IMCC-REQ-414894/A-Client Internal Error Detection

If client detects any internal error with can signal related to IMCC, it shall notify the server of such state by transmitting the signal LimccFalt with the parameter 0x1.

3.3.2.6 IMCC-REQ-414895/B-IMCC Status Display

Server provides IMCC status to the client through signal LimccSt.
The client shall set the IMCC HI menu status to OFF if the LimccSt value is 0x0 (Off) or 0x3 (OnSuspended) else

The client shall set the IMCC HI menu status to ON if the LimccSt value is 0x1 (OnNotActive) or 0x2 (OnActive) else
The client shall set the IMCC HI menu status to deselected if the LimccSt value is 0x4 (Deactivated).

3.3.3   Use Cases

3.3.3.1   IMCC-UC-REQ-414900/A-IMCC Enable

Actors	User
Pre-conditions	Vehicle is equipped with IMCC which is currently disabled.
Scenario Description	User selects IMCC in HI menu to become active.
Post-conditions	Client forwards that request to the server. Server enables IMCC and manages vehicle Idle according to its internal requirements.
List of Exception Use Cases	
Interfaces	Client HMI Interface.

#### *3.3.3.2   IMCC-UC-REQ-414901/A-IMCC Disable*

Actors	User
Pre-conditions	Vehicle is equipped with IMCC which is currently enabled. Vehicle is equipped with Driver Selectable Idle feature.
Scenario Description	User selects IMCC in HI menu to become disabled.
Post-conditions	Client forwards that request to the server. IMCC becomes disabled. Driver selectable idle becomes the way to control Idle feature.
List of Exception Use Cases	
Interfaces	Client HMI Interface.

3.3.4 White Box Views
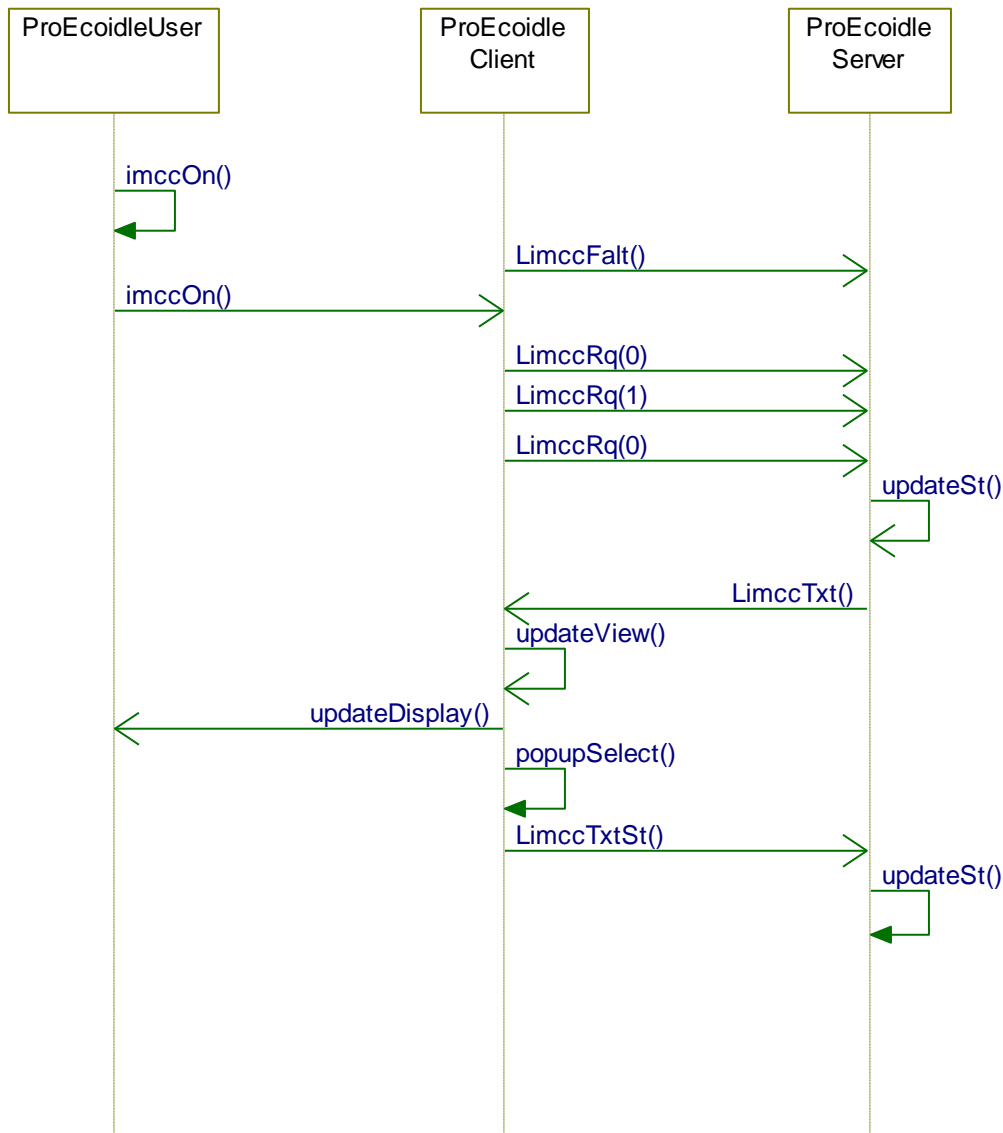
3.3.4.1 Activity Diagram

3.3.4.1.1 IMCC-ACT-REQ-414911/A-IMCC
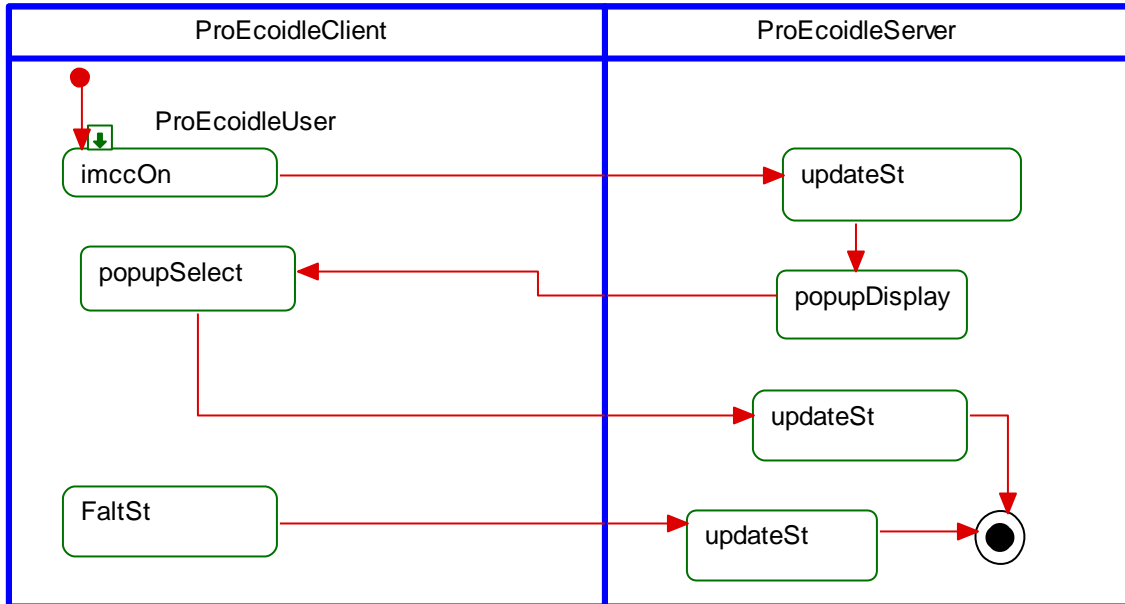
3.3.4.2   Sequence Diagrams

3.3.4.2.1   IMCC-SD-REQ-414912/B-IMCC

4 Appendix: Reference Documents

Reference #	Document Title