Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – Power Flow Display Client v3

APIM Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.0

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Version Date: August 29, 2018

FORD CONFIDENTIAL

Revision History

Date	Version	Notes	
August 29, 2018	1.0	Initial Release	

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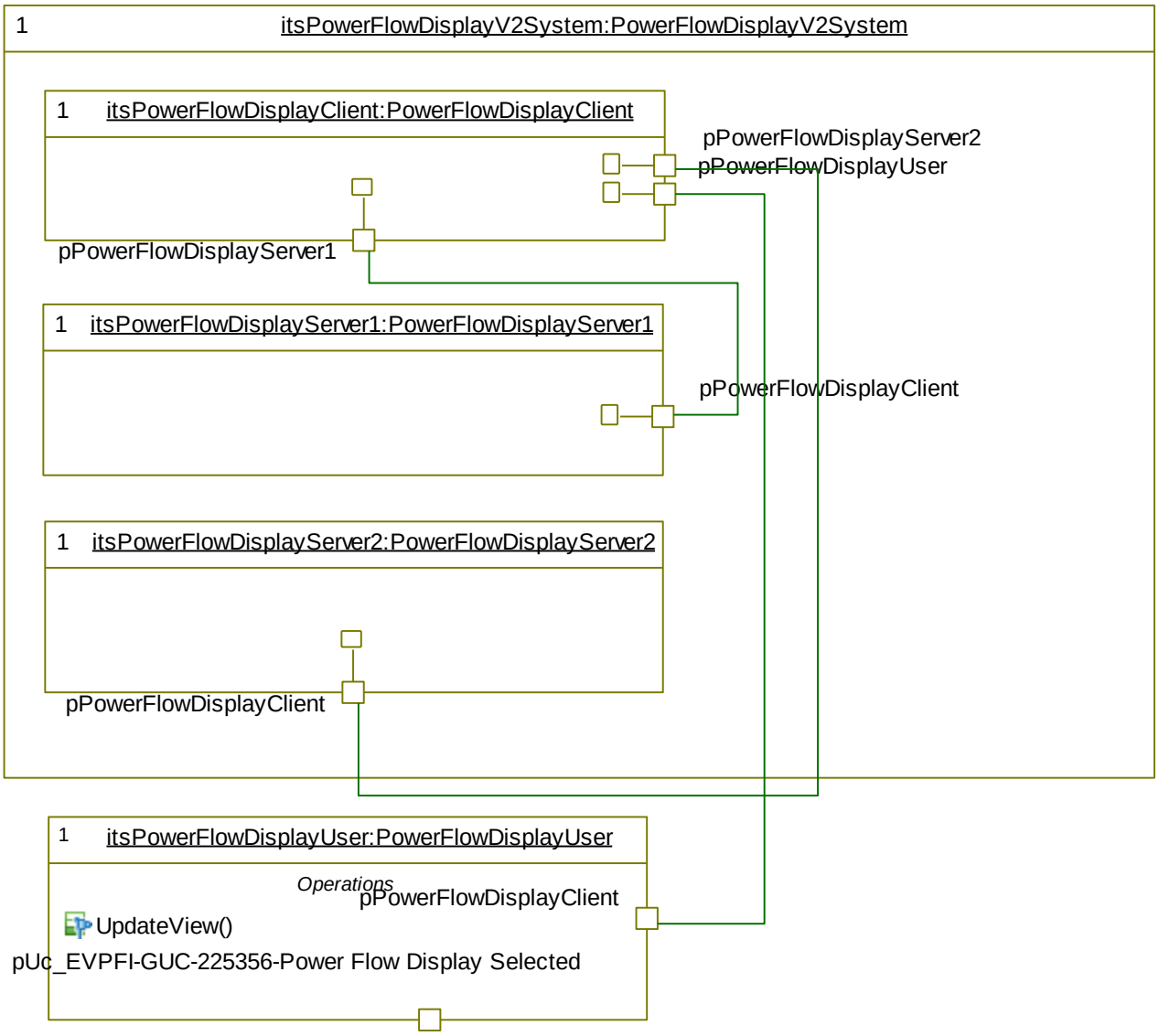
1 Architectural Design

1.1 EVPFI-SV-REQ-320742/A-Power Flow Display System

Internal Block Diagram



1.2 EVPFI-CLD-REQ-320743/A-Power Flow Display Client

The power flow display client outputs power flow information to the user based on data received from the power flow display server1 and power flow display server2. Please refer to the relevant specifications for information on display format/rules.

1.3 PowerFlowDisplayClient Interface

1.3.1 EVPFI-IIR-REQ-320744/A-PowerFlowDisplayClient_Tx

This class does not transmit any signals. However, it provides output to the user.

1.3.2 EVPFI-IIR-REQ-320745/A-PowerFlowDisplayClient_Rx

1.3.2.1 MD-REQ-320746/A-PowerFlow1_St

Message Type: Status

This signal communicates power flow display information.

Name	Literals	Value	Description
PlugStatus	-	-	Status of vehicle plug
	Off_Plug	0x0	
	On_Plug	0x1	
PwrFlowBatt	-		Direction and destination of power flow in and out of the high voltage battery
	NoFlow_PathOff	0x0	
	FlowFromBattToRearWhls	0x1	
	FlowFromRearWhlsToBatt	0x2	
	FlowFromBattToFrontWhls	0x3	
	FlowFromFrontWhlsToBatt	0x4	
	FlowFromBattToAllWhls	0x5	
	FlowFromAllWhlsToBatt	0x6	
	FlowFromWallToBatt	0x7	
	Unused	0x8	
	Unused	0x9	
	Unused	0xA	
	Unused	0xB	
	Unused	0xC	
	Unused	0xD	
	Unused	0xE	
	Unused	0xF	
PwrFlowFuel	-		Fuel/Engine power flow destination
	NoFlow_PathOff	0x0	
	FlowFromFuelToRearWhls	0x1	
	FlowFromFuelToFrontWhls	0x2	
	FlowFromFuelToAllWhls	0x3	
	Unused	0x4	
	Unused	0x5	
	Unused	0x6	
	Unused	0x7	
PwrFlowFuelBatt	-		Engine Charging HV Battery
	NoFlow_PathOff	0x0	
	FlowFromFuelToBatt	0x1	
TextDisplay	-	-	Text label for power flow display
	No_Text	0x0	
	Disp_Hyb_Drive_Txt	0x1	
	Disp_Charg_HV_Batt_Txt	0x2	
	Disp_Idle_Txt	0x3	
	Disp_Idle_with_Chrg_Txt	0x4	
	Disp_Elec_Drv_Txt	0x5	
	Disp_Eng_Drv_Txt	0x6	
	Disp_Remote_Start_Txt	0x7	
	Disp_Charge_Cmplt_Txt	0x8	
	Disp_Fast_Charge_Cmplt_Txt	0x9	
	Disp_Fast_Charge_Txt	0xA	
	Dsply_Rgen_Chrg_Txt	0xB	
	Disp_12	0xC	
	Disp_13	0xD	
	Disp_14	0xE	
	Disp_15	0xF	

1.3.2.2 MD-REQ-320747/A-HEVPHEVPowerFlow_St

Message Type: Status

This signal communicates power flow display information, and only applies to HEV / PHEV architectures. The signal includes information that was not included in *PowerFlow1_St*.

Name	Literals	Value	Description
EngMsgDisplay1	-	-	Highest priority reason engine is on
	No Display	0x0	
	Acceleration	0x1	
	High Speed	0x2	
	Heater Setting	0x3	
	Neutral Gear	0x4	
	Engine Cold	0x5	
	Batt Charging High Voltage	0x6	
	Low Gear	0x7	
	Normal Operation	0x8	
	Oil Maintenance	0x9	
	Fuel Maintenance	0xA	
	Hill Decent Control	0xB	
	Batt Temperature	0xC	
	Drive Mode Selection	0xD	

2 Functional Definition

2.1 EVPFI-FUN-REQ-320749/A-Power Flow Display Active

This function includes use-cases that describe the power flow display feature in an active state.

2.1.1 Requirements

2.1.1.1 EVPFI-REQ-320750/A-Signals with Percent Values - Erroneous Values

Signals with percent definitions should always receive values within a standard percent range: *0-100%* of *-100-100%.*

Individual signal definitions may include additional values outside of this range (i.e., 100.4%, -102.1%, etc); however, these erroneous values will be treated as a faulty signal and not be processed by the display client.

2.1.1.2 EVPFI-REQ-320483/A-Animation to Signal Mapping

		PwrFlowTxt_D_Dsply		EngOnMsg1_D_Dsply		PwFlwFuelDrv_D_Dsply		PwFlwFuelBatt_B_Dsply		PwFlwBatt_D_Dsply		PlgActvArb_B_Dsply										
#	Video	Encoding	Detailed Meaning	Encoding	Detailed Meaning	Encoding	Detailed Meaning	Encoding	Detailed Meaning	Encoding	Detailed Meaning	Encoding	Detailed Meaning	CX482	CX483	U625	U611	CX430	P702	CD542	CX727	U725	Video	#
0	NoFlow	0x0	No Status	0x0	No Display	0x0	NoFlow	0x0	NoFlow	0x0	NoFlow	0x0	Off_plug	1	1	1	1	1	1	1	1	1	NoFlow	0
1	FWD_Hybrid_Drive	!= 0x0	Any Status	!= 0x0	Any Reason	0x2	FlwFromFuelToFrontWhls	0x0	NoFlow	0x3	FlwFromBattToFrontWhls	0x0	Off_plug	1	1	0	0	1	0	1	0	0	FWD_Hybrid_Drive	1
2	RWD_Hybrid_Drive	!= 0x0	Any Status	!= 0x0	Any Reason	0x1	FlwFromFuelToRearWhls	0x0	NoFlow	0x1	FlwFromBattToRearWhls	0x0	Off_plug	0	0	1	1	0	1	0	0	1	RWD_Hybrid_Drive	2
3	AWD_Hybrid_Drive	!= 0x0	Any Status	!= 0x0	Any Reason	0x3	FlwFromFuelToAllWhls	0x0	NoFlow	0x5	FlwFromBattToAllWhls	0x0	Off_plug	1	1	1	1	1	1	1	0	1	AWD_Hybrid_Drive	3
4	FWD_Electric_Drive	!= 0x0	Any Status	0x0	No Display	0x0	NoFlow	0x0	NoFlow	0x3	FlwFromBattToFrontWhls	0x0	Off_plug	1	1	0	0	1	0	1	0	0	FWD_Electric_Drive	4
5	RWD_Electric_Drive	!= 0x0	Any Status	0x0	No Display	0x0	NoFlow	0x0	NoFlow	0x1	FlwFromBattToRearWhls	0x0	Off_plug	0	0	1	1	0	1	0	1	1	RWD_Electric_Drive	5
6	AWD_Electric_Drive	!= 0x0	Any Status	0x0	No Display	0x0	NoFlow	0x0	NoFlow	0x5	FlwFromBattToAllWhls	0x0	Off_plug	1	1	1	1	1	1	1	1	1	AWD_Electric_Drive	6
7	FWD_Regen	!= 0x0	Any Status	0x0	No Display	0x0	NoFlow	0x0	NoFlow	0x4	FlwFromFrontWhlsToBatt	0x0	Off_plug	1	1	0	0	1	0	1	0	0	FWD_Regen	7
8	RWD_Regen	!= 0x0	Any Status	0x0	No Display	0x0	NoFlow	0x0	NoFlow	0x2	FlwFromRearWhlsToBatt	0x0	Off_plug	0	0	1	1	0	1	0	1	1	RWD_Regen	8
9	AWD_Regen	!= 0x0	Any Status	0x0	No Display	0x0	NoFlow	0x0	NoFlow	0x6	FlwFromAllWhlsToBatt	0x0	Off_plug	1	1	1	1	1	1	1	1	1	AWD_Regen	9
10	FWD_Regen_EngineOn	!= 0x0	Any Status	!= 0x0	Any Reason	0x0	NoFlow	0x0	NoFlow	0x4	FlwFromFrontWhlsToBatt	0x0	Off_plug	1	1	0	0	1	0	1	0	0	FWD_Regen_EngineOn	10
11	RWD_Regen_EngineOn	!= 0x0	Any Status	!= 0x0	Any Reason	0x0	NoFlow	0x0	NoFlow	0x2	FlwFromRearWhlsToBatt	0x0	Off_plug	0	0	1	1	0	1	0	0	1	RWD_Regen_EngineOn	11
12	AWD_Regen_EngineOn	!= 0x0	Any Status	!= 0x0	Any Reason	0x0	NoFlow	0x0	NoFlow	0x6	FlwFromAllWhlsToBatt	0x0	Off_plug	1	1	1	1	1	1	1	0	1	AWD_Regen_EngineOn	12
13	FWD_Regen_EngineChrg	!= 0x0	Any Status	!= 0x0	Any Reason	0x0	NoFlow	0x1	FlwFromFuelToBatt	0x4	FlwFromFrontWhlsToBatt	0x0	Off_plug	1	1	0	0	1	0	1	0	0	FWD_Regen_EngineChrg	13
14	RWD_Regen_EngineChrg	!= 0x0	Any Status	!= 0x0	Any Reason	0x0	NoFlow	0x1	FlwFromFuelToBatt	0x2	FlwFromRearWhlsToBatt	0x0	Off_plug	0	0	1	1	0	1	0	0	1	RWD_Regen_EngineChrg	14
15	AWD_Regen_EngineChrg	!= 0x0	Any Status	!= 0x0	Any Reason	0x0	NoFlow	0x1	FlwFromFuelToBatt	0x6	FlwFromAllWhlsToBatt	0x0	Off_plug	1	1	1	1	1	1	1	0	1	AWD_Regen_EngineChrg	15
16	FWD_Engine_Drive	!= 0x0	Any Status	!= 0x0	Any Reason	0x2	FlwFromFuelToFrontWhls	0x0	NoFlow	0x0	NoFlow	0x0	Off_plug	1	1	0	0	1	0	1	0	0	FWD_Engine_Drive	16
17	RWD_Engine_Drive	!= 0x0	Any Status	!= 0x0	Any Reason	0x1	FlwFromFuelToRearWhls	0x0	NoFlow	0x0	NoFlow	0x0	Off_plug	0	0	1	1	0	1	0	0	1	RWD_Engine_Drive	17
18	AWD_Engine_Drive	!= 0x0	Any Status	!= 0x0	Any Reason	0x3	FlwFromFuelToAllWhls	0x0	NoFlow	0x0	NoFlow	0x0	Off_plug	1	1	1	1	1	1	1	0	1	AWD_Engine_Drive	18
19	FWD_Engine_Charg	!= 0x0	Any Status	!= 0x0	Any Reason	0x2	FlwFromFuelToFrontWhls	0x1	FlwFromFuelToBatt	0x0	NoFlow	0x0	Off_plug	1	1	0	0	1	0	1	0	0	FWD_Engine_Charg	19
20	RWD_Engine_Charg	!= 0x0	Any Status	!= 0x0	Any Reason	0x1	FlwFromFuelToRearWhls	0x1	FlwFromFuelToBatt	0x0	NoFlow	0x0	Off_plug	0	0	1	1	0	1	0	0	1	RWD_Engine_Charg	20
21	AWD_Engine_Charg	!= 0x0	Any Status	!= 0x0	Any Reason	0x3	FlwFromFuelToAllWhls	0x1	FlwFromFuelToBatt	0x0	NoFlow	0x0	Off_plug	1	1	1	1	1	1	1	0	1	AWD_Engine_Charg	21
22	Engine_Charging	!= 0x0	Any Status	!= 0x0	Any Reason	0x0	NoFlow	0x1	FlwFromFuelToBatt	0x0	NoFlow	0x0	Off_plug	1	1	1	1	1	1	1	0	1	Engine_Charging	22
23	Vehicle_On_Engine_Off	!= 0x0	Any Status	0x0	No Display	0x0	NoFlow	0x0	NoFlow	0x0	NoFlow	0x0	Off_plug	1	1	1	1	1	1	1	1	1	Vehicle_On_Engine_Off	23
24	Vehicle_On_Engine_On	!= 0x0	Any Status	!= 0x0	Any Reason	0x0	NoFlow	0x0	NoFlow	0x0	NoFlow	0x0	Off_plug	1	1	1	1	1	1	1	0	1	Vehicle_On_Engine_On	24
25	OnPlug	don't care	don't care	don't care	don't care	don't care	don't care	don't care	don't care	!= 0x7	**Not** FlwFromWallToBatt	0x1	On_plug	1	1	1	1	1	0	1	1	0	OnPlug	25
26	OnPlug_Charging	don't care	don't care	don't care	don't care	don't care	don't care	don't care	don't care	0x7	FlwFromWallToBatt	0x1	On_plug	1	1	1	1	1	0	1	1	0	OnPlug_Charging	26
27	eRAD_Hybrid_Drive	!= 0x0	Any Status	!= 0x0	Any Reason	0x2	FlwFromFuelToFrontWhls	0x0	NoFlow	0x5	FlwFromBattToAllWhls	0x0	Off_plug	0	1	0	0	0	0	1	0	0	eRAD_Hybrid_Drive	27

2.1.2 Use Cases

2.1.2.1 EVPFI-UC-REQ-320751/A-Power Flow Display Selected

Linked Elements
EVPFI-REQ-320750/A-Signals with Percent Values - Erroneous Values

Actors	User
Pre-conditions	Ignition status is equal to Run.
Scenario Description	The user selects the power flow display.
Post-conditions	The power flow display is active. Current power flow information is displayed to the user.
List of Exception Use Cases	E1 – Absense of new Power Flow data
Interfaces	G-HMI, Vehicle System Interface

2.1.2.2 EVPFI-UC-REQ-320752/A-Absence of new Power Flow data

Linked Elements
EVPFI-REQ-320750/A-Signals with Percent Values - Erroneous Values

Actors	User
Pre-conditions	Same as normal use case
Scenario Description	The user selects the power flow display and there is no new/updated data being sent to this display.
Post-conditions	The display functions as defined in the relevant HMI specification.

List of Exception Use Cases	N/A
Interfaces	G-HMI, Vehicle System Interface

2.1.2.3 EVPFI-UC-REQ-320753/A-Vehicle power mode change for Power Flow Display

Linked Elements
EVPFI-REQ-320750/A-Signals with Percent Values - Erroneous Values

Actors	User
Pre-conditions	Ignition status is equal to run. Power Flow display is active.
Scenario Description	Ignition Status changes to a value less than run.
Post-conditions	The display functions as defined in the relevant HMI specification.
List of Exception Use Cases	N/A
Interfaces	G-HMI, Vehicle System Interface

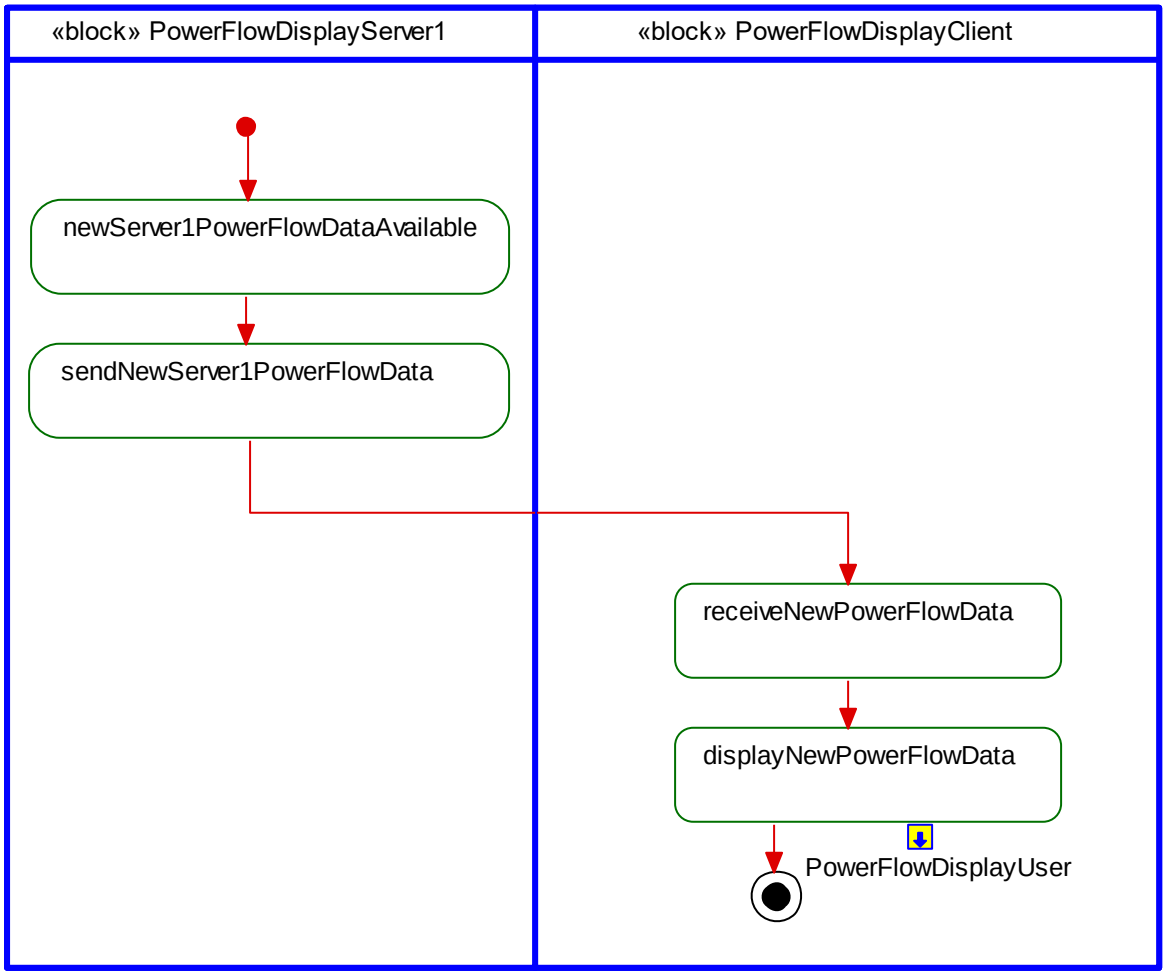
2.1.3 White Box View

2.1.3.1 Activity Diagrams

2.1.3.1.1 EVPFI-ACT-REQ-320754/A-Power Flow Display Selected

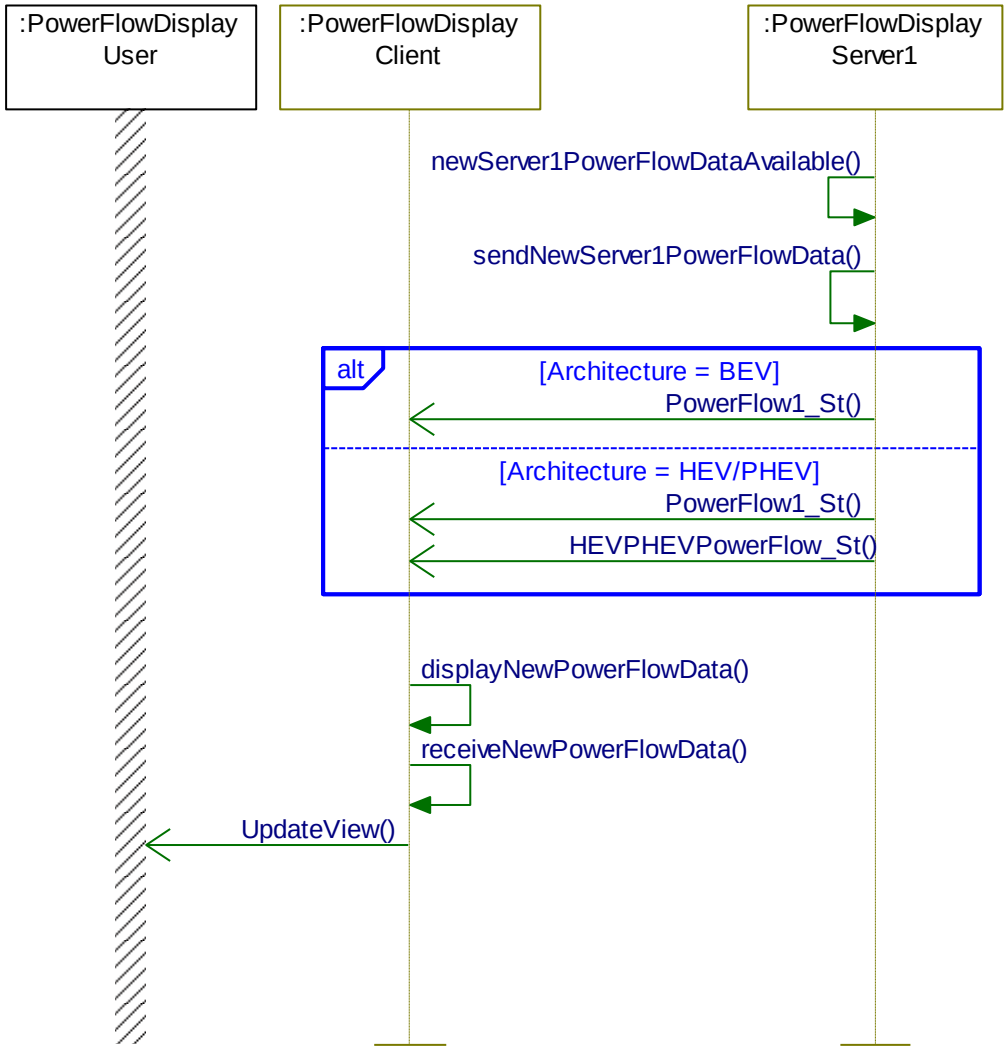
Linked Elements
EVPFI-SD-REQ-320755/A-Power Flow Display Selected

ActivityDiagram



2.1.3.2 Sequence Diagrams

2.1.3.2.1 EVPFI-SD-REQ-320755/A-Power Flow Display Selected



3 Appendix: Reference Documents

Reference #	Document Title
1	
2	
3	
4	
5	