

1. HUD V2I LITE IOD – FNV2

1. Functional Description

This STSS handles the functions associated with the V2I LITE feature. V2I LITE (Vehicle to Infrastructure) Floating IOD (Information on Demand) provides display of Traffic Light information by IVI (in-vehicle infotainment system). When the information is available, V2I LITE IOD displays the corresponding UI in HUD. HUD receives the pre-defined CAN signals from IVI.

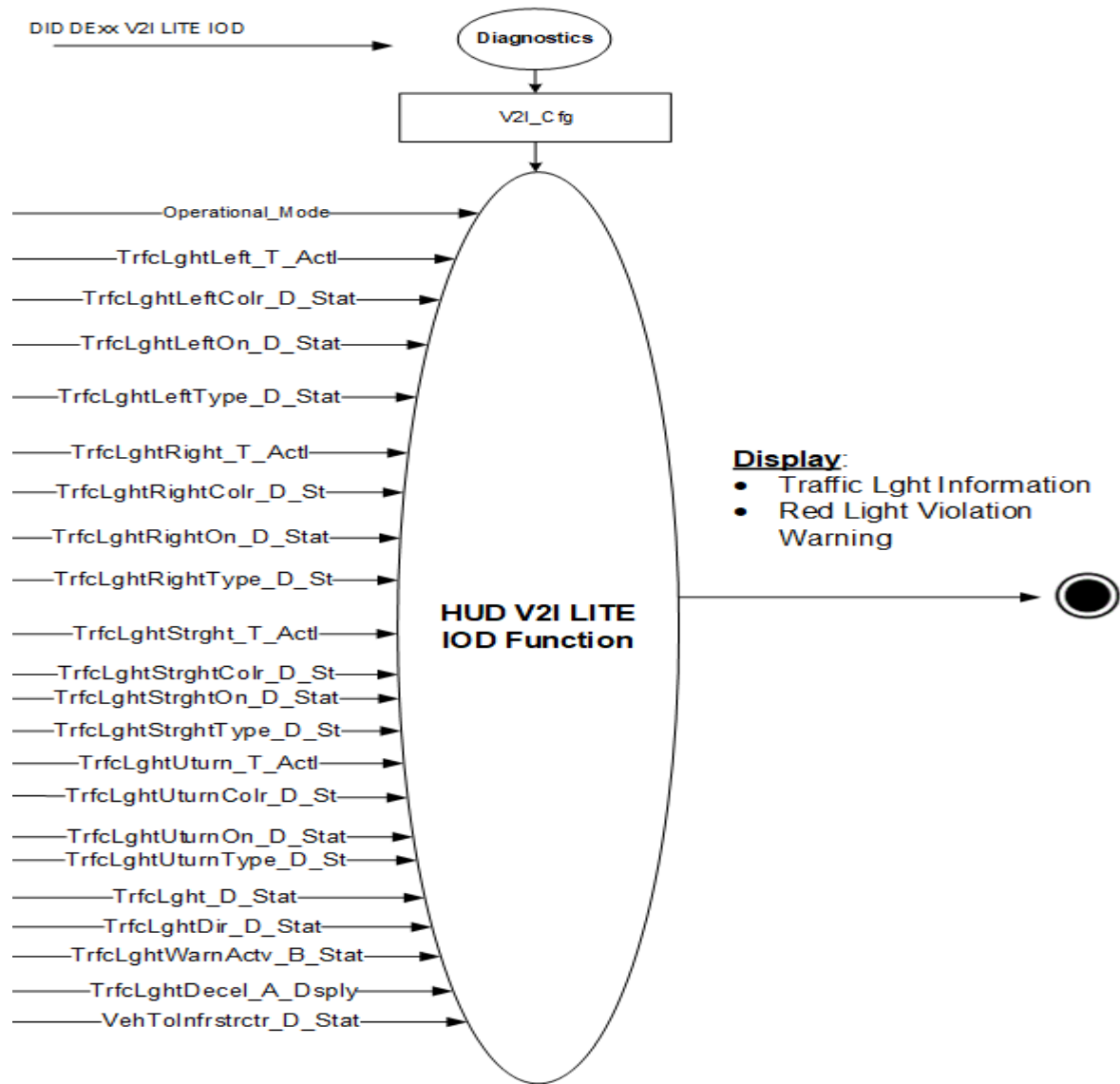
HUD support following 2 V2I LITE features:

- 1. Traffic Light Information (TLI)
- 2. Red Light Violation Warning

1. Interfaces

- 1. [REQ-436907/A-Interface Context Diagram \(I/O Block Diagram\)](#)

V2I LITE IOD Function Context Diagram



2. Inputs

1. INTERNAL:

1. Signals are divided into two messages, 0x276 (TrafficLight_Data_2) & 0x273 (TrafficLight_Data_1)
2. CAN Bus Signal Inputs from V2I LITE APP on APIM(SYNC+)

1. MUX message on the CAN Bus

1. SIG-REQ-436879/A-TrfcLghtLeft_T_Actl Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtLeft_T_Actl	8		second	1	0		0 (0x0)	253 (0xFD)
		NoDataExists				0xFE		
		Faulty				0xFF		



2. SIG-REQ-436880/A-TrfcLghtLeftColr_D_Stat Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtLeftColr_D_Stat	3		SED	1	0		0 (0x0)	7 (0x7)
		Inactive				0x0		
		Red				0x1		
		Orange				0x2		
		Green				0x3		
		NotUsed_1				0x4		
		NotUsed_2				0x5		
		NoDataExists				0x6		
		Faulty				0x7		

3. SIG-REQ-436881/A-TrfcLghtLeftOn_D_Stat Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtLeftOn_D_Stat	3		SED	1	0		0 (0x0)	7 (0x7)
		Inactive				0x0		
		On				0x1		
		Blink				0x2		
		FocusedOn				0x3		
		FocusedBlink				0x4		
		NotUsed				0x5		
		NoDataExist				0x6		
		Faulty				0x7		

4. SIG-REQ-436882/A-TrfcLghtLeftType_D_Stat Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtLeftType_D_Stat	2		SED	1	0		0 (0x0)	3 (0x3)
		Inactive				0x0		
		RoundBall				0x1		
		DirectionalArrow				0x2		
		Faulty				0x3		

5. SIG-REQ-436883/A-TrfcLghtRight_T_Actl Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtRight_T_Actl	8		second	1	0		0 (0x0)	253 (0xFD)
		NoDataExists				0xFE		
		Faulty				0xFF		

6. SIG-REQ-436884/A-TrfcLghtRightColr_D_St Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
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TrfcLghtRightColr_D_St	3		SED	1	0		0 (0x0)	7 (0x7)
		Inactive				0x0		
		Red				0x1		
		Orange				0x2		
		Green				0x3		
		NotUsed_1				0x4		
		NotUsed_2				0x5		
		NoDataExists				0x6		
		Faulty				0x7		

7. SIG-REQ-436885/A-TrfcLghtRightOn_D_Stat Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtRightOn_D_Stat	3		SED	1	0		0 (0x0)	7 (0x7)
		Inactive				0x0		
		On				0x1		
		Blink				0x2		
		FocusedOn				0x3		
		FocusedBlink				0x4		
		NotUsed				0x5		
		NoDataExist				0x6		
		Faulty				0x7		

8. SIG-REQ-436886/A-TrfcLghtRightType_D_St Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtRightType_D_St	2		SED	1	0		0 (0x0)	3 (0x3)
		Inactive				0x0		
		RoundBall				0x1		
		DirectionalArrow				0x2		
		Faulty				0x3		

9. SIG-REQ-436887/A-TrfcLghtStrght_T_Actl Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtStrght_T_Actl	8		second	1	0		0 (0x0)	253 (0xFD)
		NoDataExists				0xFE		
		Faulty				0xFF		

10. SIG-REQ-436888/A-TrfcLghtStrghtColr_D_St Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtStrghtColr_D_St	3		SED	1	0		0 (0x0)	7 (0x7)
		Inactive				0x0		
		Red				0x1		
		Orange				0x2		
		Green				0x3		

		NotUsed_1				0x4		
		NotUsed_2				0x5		
		NoDataExists				0x6		
		Faulty				0x7		

11. SIG-REQ-436889/A-TrfcLghtStrghtOn_D_Stat Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtStrghtOn_D_Stat	3		SED	1	0		0 (0x0)	7 (0x7)
		Inactive				0x0		
		On				0x1		
		Blink				0x2		
		FocusedOn				0x3		
		FocusedBlink				0x4		
		NotUsed				0x5		
		NoDataExist				0x6		
		Faulty				0x7		

12. SIG-REQ-436890/A-TrfcLghtStrghtType_D_St Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtStrghtType_D_St	2		SED	1	0		0 (0x0)	3 (0x3)
		Inactive				0x0		
		RoundBall				0x1		
		DirectionalArrow				0x2		
		Faulty				0x3		

13. SIG-REQ-436891/A-TrfcLghtUturn_T_Actl Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtUturn_T_Actl	8		second	1	0		0 (0x0)	253 (0xFD)
		NoDataExists				0xFE		
		Faulty				0xFF		

14. SIG-REQ-436892/A-TrfcLghtUturnColr_D_St Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtUturnColr_D_St	3		SED	1	0		0 (0x0)	7 (0x7)
		Inactive				0x0		
		Red				0x1		
		Orange				0x2		
		Green				0x3		
		NotUsed_1				0x4		
		NotUsed_2				0x5		
		NoDataExists				0x6		
		Faulty				0x7		



15. SIG-REQ-436893/A-TrfcLghtUturnOn_D_Stat Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtUturnOn_D_Stat	3		SED	1	0		0 (0x0)	7 (0x7)
		Inactive				0x0		
		On				0x1		
		Blink				0x2		
		FocusedOn				0x3		
		FocusedBlink				0x4		
		NotUsed				0x5		
		NoDataExist				0x6		
		Faulty				0x7		

16. SIG-REQ-436894/A-TrfcLghtUturnType_D_St Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtUturnType_D_St	2		SED	1	0		0 (0x0)	3 (0x3)
		Inactive				0x0		
		RoundBall				0x1		
		DirectionalArrow				0x2		
		Faulty				0x3		

17. SIG-REQ-436895/A-TrfcLght_D_Stat Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLght_D_Stat	3		SED				0 (0x0)	7 (0x7)
		OffOrNoMatchedLight				0x0		
		One				0x1		
		Two				0x2		
		Three				0x3		
		Four				0x4		
		NotUsed				0x5		
		NoDataExists				0x6		
		Faulty				0x7		

18. SIG-REQ-436896/A-TrfcLghtDir_D_Stat Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtDir_D_Stat	3		SED	1	0		0 (0x0)	7 (0x7)
		Inactive				0x0		
		StraightActivated				0x1		
		LeftActivated				0x2		
		RightActivated				0x3		
		UtrunActivated				0x4		
		NotUsed				0x5		
		NoDataExist				0x6		
		Faulty				0x7		

19. SIG-REQ-436897/A-TrfcLghtWarnActv_B_Stat Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
TrfcLghtWarnActv_B_Stat	1		SED	1	0		0 (0x0)	1 (0x1)
		Off				0x0		
		On				0x1		

20. SIG-REQ-436898/A-VehToInfrstrctr_D_Stat Signal

Signal Name	Size (bits)	Detail	Units	Res.	Offset	State Encoded	Min	Max
VehToInfrstrctr_D_Stat	3		SED	1	0		0 (0x0)	7 (0x7)
		InServiceFunctionOK				0x0		
		InServiceWithoutV2IData				0x1		
		LostConnection				0x2		
		SubComponentUnknownError				0x3		
		NotUsed_1				0x4		
		NotUsed_2				0x5		
		NoDataExists				0x6		
		Faulty				0x7		

2. Outputs
1. INTERNAL:
1. Display the designated UI

1. Function/Performance
1. F-REQ-436917/A-Operational Modes

Mode	Differentiating Vehicle Conditions
Sleep Mode	V2I LITE IOD Disabled
Limited Mode	V2I LITE IOD Disabled
Normal Mode	V2I LITE IOD Enabled / Disabled
Crank Mode	V2I LITE IOD Enabled / Disabled

2. Voltage Levels

Refer to the HUD Features table located in the Operational Modes and Voltage Range Strategies Section in this STSS.

3. Human-Machine Interface

1. Traffic Light Information (TLI)

TLI enables to Driver to be informed the Traffic light information from his/her intention with current light status, phases, countdown, types etc. Basically, four directional information will be provided to customer, Straight, Left, Right & U-turn with same CAN signals set and structure.

Table 1.1 Maneuver and signal descriptions

Maneuver	Signal Name	Description
	TrfcLght_D_Stat	The total number of traffic information (maneuver) lights.
Straight Traffic Light		
	TrfcLghtStrght_T_Actl	The straight traffic light countdown to the current light color (phase).
	TrfcLghtStrghtColr_D_St	The straight traffic light color.
	TrfcLghtStrghtOn_D_Stat	The straight traffic light visual effect
	TrfcLghtStrghtType_D_St	The straight traffic light style.
Left Traffic Light		
	TrfcLghtLeft_T_Actl	The Left traffic light countdown to the current light color (phase).
	TrfcLghtLeftColr_D_Stat	The Left traffic light color.
	TrfcLghtLeftOn_D_Stat	The Left traffic light visual effect.
	TrfcLghtLeftType_D_Stat	The Left traffic light style.
Right Traffic Light		
	TrfcLghtRight_T_Actl	The Right traffic light countdown to the current light color (phase).
	TrfcLghtRightColr_D_St	The Right traffic light color.
	TrfcLghtRightOn_D_Stat	The Right traffic light visual effect.
	TrfcLghtRightType_D_St	The Right traffic light style.
U-turn Traffic Light		
	TrfcLghtUturn_T_Actl	The U-turn traffic light countdown to the current light color (phase).
	TrfcLghtUturnColr_D_St	The U-turn traffic light color.
	TrfcLghtUturnOn_D_Stat	The U-turn traffic light visual effect.
	TrfcLghtUturnType_D_St	The U-turn traffic light style.

2. Red Light Violation Warning

RLVW (Red Light Violation Warning) enables the customer to be notified a warning under the emergency situation, when the vehicle comes to a Green or Yellow Light, t will give a warning for the customer to decelerate before the light changes and avoid the unintentionally violate the traffic rule before Stop Line. HUD may receive the CAN signals as followings.

Table 1.2 RLVW signal descriptions

Signal Name	Description
TrfcLghtDir_D_Stat	The maneuver on which Green Light Optimal Speed Advisory (GLOSA) / Red Light Violation Warning (RLVW) is activated.
TrfcLghtWarnActv_B_Stat	Deceleration rate for Red Light Violation Warning (RLVW).

3. Visual

1. Indicator Graphics / Display Format



2. Indicator Color Coordinates

XXXXXX

3. Indicator Characteristics

XXXXXX

4. Audio

None

5. Switch Control Logic

None.

4. PFM-REQ-436918/A-System Accuracy


Within a fixed 100ms of receiving two messages that the HUD will update the display to the proper status.

5. Operation: Performance and Functional

1. Subsystem Algorithm Flowchart / State Diagram

2. Operation Description (supports algorithm flowchart /state diagram)

1. F-REQ-436919/A-V2I Traffic Light Information

					Ford Motor Company		Subsystem Technology Specific Specification															
Operational_Mode	Normal or Crank																					
V2I_Cfg	Enabled																					
VehToInfrstrctr_D_Stat	InServiceFunctionOK (0x0)																					
Trfclght_D_Stat	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)	One (0x1)					
TrfclghtUturn_T_Actl	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)					
TrfclghtUturnColr_D_St	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)					
TrfclghtUturnOn_D_Stat	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)					
TrfclghtUturnType_D_St	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)					
TrfclghtLeft_T_Actl	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)					
TrfclghtLeftColr_D_Stat	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)					
TrfclghtLeftOn_D_Stat	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)					
TrfclghtLeftType_D_Stat	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)					
TrfclghtStrght_T_Actl	0 to FD*	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)					
TrfclghtStrghtColr_D_St	Red (0x1) OR Orange (0x2) OR Green (0x3)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)					
TrfclghtStrghtOn_D_Stat	On (0x1) OR Blink (0x2) OR FocusedOn (0x3) OR FocusedBlink (0x4)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)					
TrfclghtStrghtType_D_St	RoundBall (0x1)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)					
TrfclghtRight_T_Actl	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)	NoDataExists (0xFE)					
TrfclghtRightColr_D_St	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)					
TrfclghtRightOn_D_Stat	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)	Inactive (0x0) OR NoDataExists (0x6)					
TrfclghtRightType_D_St	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)	Inactive (0x0)					
U Turn Light Countdown	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None					
Left Light Countdown	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None					
Straight Light Countdown	Value of TrfclghtStrght_T_Actl*	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None					
Right Light Countdown	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None					
Traffic Light Information	Display One V2I Straight Light with RoundBall with either Red/Yellow/Green color	Display One V2I Left Light with RoundBall with either Red/Yellow/Green color	Display One V2I Left Light with Arrow with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color	Display One V2I U Turn Light with Arrow with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color	Display One V2I U Turn Light with RoundBall with either Red/Yellow/Green color					

FILE:HUD STSS- V2I LITE IOD V0.1_INITIAL
DRAFT_08192021 (VSEM DRAFT)

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***Note:**

The maximum countdown number can be presented on HUD is two digits (99). Any received value from TrfcLghtXXX_T_Actl bigger than 99 shall be presented as 99 on HUD.

Any received value from TrfcLghtXXX_T_Actl is equal or smaller than 3 seconds need to be hided/concealed.

2. F-REQ-436902/A-V2I Red Light Violation Warning

Operational Mode	V2I_Cfg	VehToInfrstrctr_D_Stat	TrfcLghtWarnActv_B_Stat	TrfcLghtDir_D_Stat	Red Light Violation Warning
Normal or Crank	Enabled	0x0	0x1	0x1 or 0x2 or 0x3 or 0x4	W4411: Red Light Ahead! {ICON}
		0x0	0x1	0x0 or 0x5 or 0x6 or 0x7	None
		0x0	0x0	X	None
		0x1 or 0x2 or 0x3 or 0x4 or 0x5 or 0x6 or 0x7	X	X	None
		All other Cases			None

3. F-REQ-436903/A-V2I LITE IOD Enable/Disable

HUD shall provide the V2I LITE IOD function if VehToInfrstrctr_D_Stat = 0x0(Enabled).

HUD shall not provide the V2I LITE IOD function if VehToInfrstrctr_D_Stat != 0x0 (Disabled).

4. F-REQ-436922/A-RLVW Warning Message

The RLVW need to be arbitrated with other Global Warning Message and the details finalized as followings.

ID	Se.#	System Name	Warn Type	Time Out	LM	ICON*	Message Color	Chime Type	Representative Text
W4411	102	V2I lite-Red Light warning	NGA	n/a	No	TBD	Red	No	Red Light Ahead! {ICON}

5. F-REQ-436923/A-TrfcLghtXXX_T_Actl countdown

The maximum countdown number can be presented on HUD is two digits (99). Any received value from TrfcLghtXXX_T_Actl bigger than 99 shall be presented as 99 on HUD.

6. F-REQ-436924/A-TrfcLghtXXX_T_Actl when hided/concealed

Any received value from TrfcLghtXXX_T_Actl is equal or smaller than 3 seconds need to be hided/concealed.

3. Function Safety Classification (EMC)

Class B

**4. NVM-REQ-436904/A-Memory Storage**

Parameter Name	Description	Value at Battery Connect	Value at Module Wake-up
Operational_Mode	4 state indicator for cluster operational mode.	Limited	Limited, Normal or Crank
TrfcLghtLeft_T_Actl	The Left traffic light countdown to the current light color (phase).	0x0	0x0
TrfcLghtLeftColr_D_Stat	The Left traffic light color.	0x0	0x0
TrfcLghtLeftOn_D_Stat	The Left traffic light visual effect.	0x0	0x0
TrfcLghtLeftType_D_Stat	The Left traffic light style.	0x0	0x0
TrfcLghtRight_T_Actl	The Right traffic light countdown to the current light color (phase).	0x0	0x0
TrfcLghtRightColr_D_St	The Right traffic light color.	0x0	0x0
TrfcLghtRightOn_D_Stat	The Right traffic light visual effect.	0x0	0x0
TrfcLghtRightType_D_St	The Right traffic light style.	0x0	0x0
TrfcLghtStrght_T_Actl	The straight traffic light countdown to the current light color (phase).	0x0	0x0
TrfcLghtStrghtColr_D_St	The straight traffic light color.	0x0	0x0
TrfcLghtStrghtOn_D_Stat	The straight traffic light visual effect	0x0	0x0
TrfcLghtStrghtType_D_St	The straight traffic light style.	0x0	0x0
TrfcLghtUturn_T_Actl	The U-turn traffic light countdown to the current light color (phase).	0x0	0x0
TrfcLghtUturnColr_D_St	The U-turn traffic light color.	0x0	0x0
TrfcLghtUturnOn_D_Stat	The U-turn traffic light visual effect.	0x0	0x0
TrfcLghtUturnType_D_St	The U-turn traffic light style.	0x0	0x0
TrfcLght_D_Stat	The total number of traffic information (maneuver) lights.	0x0	0x0
TrfcLghtDir_D_Stat	The maneuver on which Green Light Optimal Speed Advisory (GLOSA) / Red Light Violation Warning (RLVW) is activated.	0x0	0x0
TrfcLghtWarnActv_B_Stat	Deceleration rate for Red Light Violation Warning (RLVW).	0x0	0x0
VehToInfrstrctr_D_Stat	?	0x0	0x0

5. Reconfigurable Telltale

None

6. Prove Out

Not applicable

7. Message Center Msg

None. Refer to program specific menu structure for display text.



8. Error Handling

1. SR-REQ-436906/A-Missing Message Strategy

The signals will be declared missing as per the Diagnostics section of this SPSS. DTCs states and history will be determined as per the Diagnostics section of this SPSS.

1. If CAN signal VehTolnfrstrctr_D_Stat is not received < 2s, use last value received.
2. If CAN signal VehTolnfrstrctr_D_Stat is not received >= 2s, use 0x6 value.

1. Diagnostics

1. Self-Test

None

2. Engineering Test Mode

None

3. Part II Performance

1. DTC-REQ-436921/A-Supported Diagnostic Trouble Codes (DTCs)

DTC	Description
	None

2. DID-REQ-436920/A-Supported Diagnostic DIDs

None

3. DCR-REQ-436905/A-DID DExx:

Block Num	Block Description	Byte(s)	Bits	State: Description	"0"	"1"	Default	Comments/ Information
PACKETED BLOCKS								
\$xx	Option Content (B&A)			V2I_Cfg	Disabled	Enabled	Enabled	Enabled turns on V2I IOD

*Byte and bit location to be identified in Part II Specification for this HUD

2. Reference Specification

None.

3. Revision History

SPSS Module Revision History

Revision Level	Name	Change Description	Date
1.0	F. Sethi	Initial Draft	8/19/2021