Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – Trailer Settings

Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.5

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Version Date: September 17, 2021

FORD CONFIDENTIAL

Revision History

Date	Version	Notes	
October 22, 2018	**1.0**	**Initial Release**	
June 21, 2019	**1.1**		
	574948/B-Architectural Design		tmertiri: update content. Many changes
	FUR-REQ-324387/B-Trailer Settings Logical Signal Mapping		tmertiri: Added trailer fuel economy signals. Removed LTrlrBrkGain from signals list. Dublicate signal Other signal LTrlrBrkGainSerTx
	TRS-IIR-REQ-323585/B-Trailer Settings Client Rx		tmertiri: Remove signal LTrlrBrkGain. Dublicate functionality of the signal LTrlrBrkGainSerTx. Remove req 323385 since its dublicate of 326167
	TRS-MD-REQ-323372/B-LTrlrAnOffstAng		tmertiri: formatting.
	TRS-MD-REQ-323375/B-LTrlrAidTrgtId		tmertiri: typo fix. Change Target IF to Target ID
	TRS-MD-REQ-324922/B-TrlrSetTp		tmertiri:Added content for Trailer Average Fuel Economy
	TRS-MD-REQ-324922/B-TrlrSetTp		tmertiri:Added content for Trailer Average Fuel Economy
	574949/B-General Requirements		tmertiri:multiple changes
	TRS-REQ-324858/B-Trailer Settings Menu Configurations		tmertiri: rename Btt_cfg to BTT_Full_Cfg. Make changes to table
	TRS-REQ-330236/B-Configuration Related Requirements		tmertiri: removed req 324859. Its similar to 326379
	TRS-REQ-330240/B-When to show Trailer Reverse Guidance Setting		tmertiri:Update conditions
	TRS-REQ-330254/B-Trailer Connected Logic		tmertiri:update content
	TRS-REQ-330255/B-Trailer Disconnected Logic		tmertiri:update content
	TRS-REQ-324861/B-Trailer Connected Detection		tmertiri:update requirement
	TRS-REQ-324886/B-Default Values		tmertiri; added default value for the signals
	TRS-REQ-326376/B-TP related requirements		tmertiri:added new requirement related to Trailer Average Fuel Economy
	TRS-REQ-324859/B-Server 1 Update		tmertiri: added TAFE to list of transmitted data
	TRS-REQ-326378/B-Odometer value		tmertiri: updated odometer digits from 6 to 7.
	TRS-REQ-326380/B-Faulty Odometer Value		tmertiri:added clarification
	TRS-REQ-326416/B-No Active Trailer		tmertiri: added clarification for blank odometer meaning
	TRS-REQ-334551/A-TAFE Sending Data Through TP		tmertiri: new requirement
	TRS-REQ-326529/B-Shifting Out Of Park Gear While In Setup		tmertiri: added clarification
	TRS-REQ-328401/B-Trailer ID		tmertiri: added clarifications
	TRS-REQ-328500/B-Measurements Out Of Range		tmertiri: added clarification
	TRS-REQ-328504/B-Change Trailer Sticker		tmertiri: added clarification
	TRS-REQ-329846/B-HMI Related requirements		tmertiri: remove 329850 and various clarifications
	TRS-REQ-329847/B-Cancel exit function while not in setup		tmertiri: added clarification
	TRS-REQ-329848/B-Cancel function while in setup		tmertiri: added clarification
	TRS-REQ-329849/B-Cancel Setup no		tmertiri: added clarification
	TRS-REQ-329851/B-End setup yes		tmertiri: added clarification
	TRS-REQ-329853/B-Select Trailer Profile as the Active Trailer Profile		tmertiri: clarification and remove Trailer Sway since its not part of the settings
	TRS-REQ-346112/A-Active Trailer Change		tmertiri: new req
	TRS-REQ-329854/B-Add trailer for TBA or TRG Initiated Setup		tmertiri: added clarification
	TRS-REQ-346130/A-Initiating Auto Hitch		tmertiri: new requirement
	TRS-REQ-329855/B-When selecting an existing trailer		tmertiri: added clarification
	TRS-REQ-329856/B-Activate TBA		tmertiri: added clarification
	TRS-REQ-329858/B-Sorting order function		tmertiri: added clarification
	TRS-REQ-329859/B-Non applicable trailers		tmertiri: added clarification
	TRS-REQ-329864/B-Begin setup		tmertiri: added clarification
	TRS-REQ-329881/B-Save or confirm setup trailer measurement		tmertiri: added clarification
	TRS-REQ-329887/B-Sticker Only setup TBA TRG		tmertiri: added clarification
	TRS-REQ-329888/B-Setup sticker trailer settings activation		tmertiri: added clarification
	TRS-REQ-329889/B-Activate TBA/TRG after Measurement and Sticker Setup		tmertiri: added clarification
	TRS-REQ-330294/B-Request to Cancel TBA/TRG Setup		tmertiri: added clarification
	TRS-REQ-330296/B-Complete Setup and Store Calculate Trailer Angle Detection Signals to Trailer Profile		tmertiri: added clarification

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	TRS-REQ-330300/B-Trailer Angle Limit Mapping	tmertiri: added clarification
	TRS-REQ-346100/A-Trailer Name	tmertiri: added clarification
	TRS-REQ-346101/A-Trailer Type	tmertiri: added clarification
	TRS-REQ-346102/A-Save Trailer	tmertiri: added clarification
	TRS-REQ-346103/A-Trailer Brake Type	tmertiri: added clarification
	TRS-REQ-346104/A-Trailer Brake Effort	tmertiri: added clarification
	TRS-REQ-346105/A-Trailer BLIS (BTT) Compatible Trailer Type	tmertiri: added clarification
	TRS-REQ-346106/A-Trailer Blind Spot Detection Length (Measurement E)	tmertiri: added clarification
	TRS-REQ-346107/A-Trailer Backup Setup Measurements (A-D)	tmertiri: added clarification
	TRS-REQ-346108/A-General Sorting Order Function for Listed Trailer Names	tmertiri: added clarification
	TRS-REQ-346109/A-Close TBA/TRG Trailer Selection Menu	tmertiri: added clarification
	TRS-REQ-329860/B-Generic missing signal	tmertiri:updated wording. Added 5 sec condition
	TRS-REQ-332801/B-Trailer Brake Gain Values	tmertiri: updated req to consider ign off status change
	TRS-REQ-332802/B-TBA Status Determination	tmertiri: added Null Status
	TRS-REQ-332803/B-TRG Status Determination	tmertiri: type in req name
	TRS-REQ-332804/B-BttFilSys	tmertiri: update table after removing LBtRightSt signal
	TRS-REQ-334562/A-TAFE Trailer Average Fuel Economy Related Req	tmertiri: new req
	TRS-REQ-334511/A-TAFE LOdo	tmertiri: new req
	TRS-REQ-334512/A-TAFE LFuelCons	tmertiri: new req
	TRS-REQ-334513/A-TAFE Odometer Value	tmertiri: new req
	TRS-REQ-334514/A-TAFE Converted Values	tmertiri: new req
	TRS-REQ-334515/A-TAFE Reset Values	tmertiri: new req
	TRS-REQ-334516/A-TAFE Fuel Economy Data	tmertiri: new req
	TRS-REQ-334517/A-TAFE Total Distance Traveled	tmertiri: new req
	TRS-REQ-334518/A-TAFE Total Fuel Consumed	tmertiri: new req
	TRS-REQ-334544/A-TAFE Displaying Units	tmertiri: new req
	TRS-REQ-337297/A-Data Storing	tmertiri: added clarification
	TRS-REQ-346111/A-Default Trailer TAFE & Odo	tmertiri: new req
	TRS-REQ-346113/A-Odometer 0 Value	tmertiri: new req
	574950/B-Functional Definition	tmertiri: new diagram
	TRS-SD-REQ-328609/B-Delete Trailer	tmertiri:update parameter
	TRS-UC-REQ-332884/B-Trailer Brake Gain Normal Operation	tmertiri: corrected paramter for post condition
	TRS-574955/B-Appendix: Reference Documents	tmertiri: remove HMI SPSS link document reference. It is no longer needed.
Octobre 23, 2019	**1.2**	
	FUR-REQ-324387/C-Trailer Settings Logical Signal Mapping	tmertiri: remove LTrlrSns
	TRS-IIR-REQ-323585/C-Trailer Settings Client Rx	tmertiri:removed LTrlrSns. MD Not needed
	TRS-MD-REQ-323369/B-LOdoCount	tmertiri: rewording definition to make clear the signal purpose
	TRS-MD-REQ-365622/A-LOdo	tmetiri: existing signal. added to the structure. Reorganization
	TRS-MD-REQ-365625/A-LFuelCons	tmetiri: existing signal. added to the structure. Reorganization
	574949/C-General Requirements	tmertiri: changes to various requirements in the structure
	TRS-REQ-330254/C-Trailer Connected Logic	tmertiri: added clarification
	TRS-REQ-330255/C-Trailer Disconnected Logic	tmertiri: added clarification
	TRS-REQ-326380/C-Faulty Odometer Value	tmertiri: added content for LOdo signal
	TRS-REQ-334551/B-TAFE Sending Data Through TP	tmertiri: make changes to decimal notation
	TRS-REQ-346112/B-Active Trailer Change	tmertiri: added clarification
	TRS-REQ-330294/C-Request to Cancel TBA/TRG Setup	tmertiri: added clarification
	TRS-REQ-334515/B-TAFE Reset Values	tmertiri: update wording
	TRS-REQ-334517/B-TAFE Total Distance Traveled	tmertiri: reword to remove statement for calculations to be done at every period
	TRS-REQ-334518/B-TAFE Total Fuel Consumed	tmertiri: reword to remove statement for calculations to be done at every period
	TRS-REQ-334544/B-TAFE Displaying Units	tmertiri: add max display units
	TRS-REQ-365819/A-Content Saving in Client	tmertiri: new requirement. No new content though
	TRS-574955/C-Appendix: Reference Documents	tmertiri: update references

August 13, 2020	**1.3**	
	FUR-REQ-324387/D-Trailer Settings Logical Signal Mapping	tmertiri: new content related to Range per full charge
	TRS-IIR-REQ-323585/D-Trailer Settings Client Rx	tmertiri: new content related to Range per full charge
	MD-REQ-394535/A-LTrlid	tmertiri: new content related to Range per full charge
	MD-REQ-394536/A-LtrlRangeVal	tmertiri: new content related to Range per full charge
	TRS-IIR-REQ-323529/B-Trailer Settings Client Tx	tmertiri: new content related to Range per full charge
	MD-REQ-394533/A-LTrlActive	tmertiri: new content related to Range per full charge
	MD-REQ-394534/A-LTrlReset	tmertiri: new content related to Range per full charge
	TRS-REQ-334551/C-TAFE Sending Data Through TP	tmertiri: added Range per full charge to TP
	TRS-REQ-394543/A-Range Per Full Charge	tmertiri: new content related to Range per full charge
	TRS-REQ-346102/B-Save Trailer	tmertiri: update req
	TRS-REQ-365819/B-Content Saving in Client	tmertiri: add Range per full charge
	574950/C-Functional Definition	tmertiri: new content related to Range per full charge
	TRS-FUN-REQ-394531/A-Range Per Full Charge	tmertiri: new content realted to Range per full charge
	783438/A-Requirements	tmertiri: new content realted to Range per full charge
	TRS-REQ-395606/A-Function Availability	tmertiri: new content related to Range per full charge
	TRS-REQ-394538/A-Store Data	tmertiri: new content related to Range per full charge
	TRS-REQ-394539/A-Active Trailer Update	tmertiri: new content related to Range per full charge
	TRS-REQ-394540/A-Active Trailer Reset	tmertiri: new content related to Range per full charge
	TRS-REQ-394541/A-Invalid Value	tmertiri: new content related to Range per full charge
	TRS-REQ-395570/A-ID Beyond the Range	tmertiri: new content related to Range per full charge
	783439/A-Use Cases	tmertiri: new content realted to Range per full charge
	TRS-UC-REQ-395607/A-Data Update	tmertiri: new content related to Range per full charge
	783440/A-White Box Views	tmertiri: new content realted to Range per full charge
	783441/A-Activity Diagrams	tmertiri: new content realted to Range per full charge
	TRS-ACT-REQ-394559/A-Trailer Range Per Full Charge	tmertiri: new content related to Range per full charge
	783442/A-Sequence Diagrams	tmertiri: new content related to Range per full charge
	TRS-SD-REQ-394560/A-Trailer Range Per Full Charge	tmertiri: new content related to Range per full charge
March 24, 2021	**1.4**	
	574948/C-Architectural Design	tmertiri: various changes to the structure. New signals etc.
	FUR-REQ-324387/E-Trailer Settings Logical Signal Mapping	tmertiri: dded various new signals for btt 5g changes
	TRS-IIR-REQ-323585/E-Trailer Settings Client Rx	tmertiri:adding BTT5G related signals
	MD-REQ-346118/A-LSodLeftSt	tmertiri:added new signal for btt 5g changes
	MD-REQ-346119/A-LSodRightSt	tmertiri:added new signal for btt 5g changes
	MD-REQ-346125/A-LBttRightSt	tmertiri:added new signal for btt 5g changes
	MD-REQ-410850/A-LBttLeftSt	tmertiri:added new signal for btt 5g changes
	MD-REQ-410851/A-SodLSt	tmertiri:added new signal for btt 5g changes
	MD-REQ-410852/A-SodRSt	tmertiri:added new signal for btt 5g changes
	TRS-IIR-REQ-323529/C-Trailer Settings Client Tx	tmertiri:adding BTT5G related signals
	MD-REQ-346122/A-LBttMeasure1	tmertiri:added new signal for btt 5g changes
	879944/A-Internal Variable	tmertiri: added new structure for btt 5g
	MD-REQ-412096/A-TrailerWidthRaw	tmertiri: new md. added for btt 5g changes
	574949/D-General Requirements	tmertiri: added new requirement to the structure
	REQ-346114/A-Default Value Update	tmertiri: added new requirement to clarify people not knowledgeable with the spec
	574950/D-Functional Definition	tmertiri: added new function. Btt 5G
	TRS-FUN-REQ-408698/A-BTT 5G	tmertiri: new content. Btt 5G related
	864623/A-Btt 5G Overview	tmertiri: new content. Btt 5G related
	880137/A-Requirements	tmertiri: new requirements for btt 5g
	TRS-REQ-408700/A-Trailer Type. Sod Unavailable	tmertiri: new content. Btt 5G related
	TRS-REQ-408701/A-Trailer Length	tmertiri: new content. Btt 5G related
	TRS-REQ-408708/A-Conventional Trailer	tmertiri: new content. Btt 5G related
	TRS-REQ-408709/A-Unconventional Trailer	tmertiri: new content. Btt 5G related
	TRS-REQ-409085/A-Trailer Length Not Available	tmertiri: new content. Btt 5G related
	TRS-REQ-409188/A-Trailer Type to Trailer Length Relationship	tmertiri: new content. Btt 5G related
	TRS-REQ-410765/A-Lost Signals	tmertiri: new content. Btt 5G related
	TRS-REQ-408702/A-Delayed Check	tmertiri: new content. Btt 5G related
	TRS-REQ-410846/A-BTT 5G Status	tmertiri: new content. Btt 5G related
	TRS-REQ-410847/A-BTT 5G Configuration	tmertiri: new content. Btt 5G related
	873095/A-Use Cases	tmertiri: new content. Btt 5G related
	TRS-UC-REQ-410734/A-Btt 5G Valid Values Input	tmertiri: new content. Btt 5G related
	TRS-UC-REQ-410735/A-Btt 5G Invalid Values Input	tmertiri: new content. Btt 5G related
	TRS-UC-REQ-410737/A-Btt 5G Invalid Trailer	tmertiri: new content. Btt 5G related
September 17, 2021	**1.5**	

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	574948/D-Architectural Design	tmertiri: added T360 signals
	FUR-REQ-324387/F-Trailer Settings Logical Signal Mapping	tmertiri: removed logical signals SodlSt and SodRSt. Physical names SodLeft_D_Stat and the right. Signal references are removed throughout the whole spec. No longer needed.
	934914/A-Trailer 360 Logical Mapping Table	tmertiri: new content for T360
	TRS-IIR-REQ-323585/F-Trailer Settings Client Rx	tmertiri: added signals for T360
	TRS-MD-REQ-432042/A-LCamraCalibSt	tmertiri: added new signal
	TRS-MD-REQ-432043/A-LTConnectCamera	tmertiri: added new signal
	TRS-MD-REQ-436264/A-LtSetCalib	tmertiri: added new signal
	TRS-IIR-REQ-323529/D-Trailer Settings Client Tx	tmertiri: added signals for T360
	TRS-MD-REQ-432038/A-LTWidth	tmertiri: added new signal
	TRS-MD-REQ-432040/A-LCamraH	tmertiri: added new signal
	TRS-MD-REQ-432044/A-LHitch	tmertiri: added new signal
	TRS-MD-REQ-432041/A-LCamraCalibRq	tmertiri: added new signal
	574949/E-General Requirements	tmertiri:made changes to structure
	TRS-REQ-329860/C-Generic missing signal	tmertiri: added signals for which TBA2 needs to be canceled in case signals go missing.
	956750/A-Trailer Selection Operation While in TBA/TRG	tmertiri: new requirement. added for clarification
	REQ-442397/A-Add new trailer from TBA/TRG trailer select screen when there is no active trailer	tmertiri: new requirement. added for clarification
	REQ-442398/A-Add new trailer from TBA/TRG trailer select screen when there is already an active trailer	tmertiri: new requirement. added for clarification
	REQ-442399/A-Select saved trailer from TBA/TRG trailer select screen when there is no active trailer	tmertiri: new requirement. added for clarification
	REQ-442400/A-Select saved trailer from TBA/TRG trailer select screen when there is already an active trailer	tmertiri: new requirement. added for clarification
	574950/E-Functional Definition	tmertiri: changes in structure
	TRS-REQ-410846/B-BTT 5G Status	tmertiri: removed sodlst and sodrst. no longer needed
	TRS-FUN-REQ-436278/A-Trailer 360	tmertiri: new content
	943344/A-Overview	tmertiri: new content
	945146/A-Requirements	tmertiri: new content
	TRS-REQ-436265/A-TBA2 Calibration	tmertiri: new content
	947650/A-Trailer Angle Detection	tmertiri: new content
	TRS-REQ-437298/A-Requesting TAD Calibration	tmertiri: new content
	TRS-REQ-437299/A-Client Displays TAD Calibration Instructions	tmertiri: new content
	TRS-REQ-437300/A-TAD Calibration Completed	tmertiri: new content
	TRS-REQ-437301/A-User Requests to Cancel during TAD Calibration	tmertiri: new content
	TRS-REQ-437302/A-Client Fails or Cancels TAD Request	tmertiri: new content
	TRS-REQ-432063/A-Camera Calibration Procedure	tmertiri: new content
	TRS-REQ-435517/A-Measurement Setup Cancelation	tmertiri: new content
	934943/A-Use Cases	tmertiri: new content
	TRS-UC-REQ-431697/A-Trailer 360 Soft Button Activation	tmertiri: new content
	TRS-UC-REQ-431698/A-Trailer 360 Soft Button Deactivation	tmertiri: new content
	TRS-UC-REQ-431703/A-TBA2 Trailer Left View selection in TBA or TRG	tmertiri: new content
	TRS-UC-REQ-431705/A-TBA2 Trailer Right View in TBA or TRG	tmertiri: new content
	TRS-UC-REQ-431707/A-Trailer 360 Setup Menu Activation	tmertiri: new content
	TRS-UC-REQ-431711/A-Trailer 360 Measurements - Customer has not entered Trailer Length or Trailer Width	tmertiri: new content
	TRS-UC-REQ-441257/A-Trailer 360 Measurements - Customer has not entered Trailer Hitch to Box measurements	tmertiri: new content
	TRS-UC-REQ-431713/A-Trailer 360 Measurements - Customer has entered trailer type, trailer length, trailer width, and hitch to box measurement	tmertiri: new content
	TRS-UC-REQ-431719/A-Trailer 360 Measurements - Customer has entered all measurements and TAD calibration is complete	tmertiri: new content
	TRS-UC-REQ-431721/A-Trailer 360 Setup Menu Deactivation	tmertiri: new content

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Table of Contents

1 Architectural Design

1.1 TRS-CLD-REQ-324389/B-Trailer Settings Client

Responsibility: Among other duties that the client may have, it provides the users the ability to input data to the system such as entering trailer information such as name, various distances etc (talked in more details later). It also provides a way for the feature to interact by providing several notifications to the user through the display.

1.2 TRS-CLD-REQ-324444/B-Trailer Settings Server 1

Due to this feature development timing schedule and other modules involved in this feature operation timing, it was not possible to acquire new signals between Client and the various other modules involved in this feature (also known as Server 2).

Because of that, Server 1 operates as module in the middle by acquiring signals from Client and sending them to the Server 2.

In addition to module in the middle, Server 1 also acts as display to the user by showing various information provided by Client. More details to follow in the SPSS.

Server 1 is not to be misunderstood with gateway, which is the module in the middle between various busses.

1.3 TRS-CLD-REQ-324391/B-Trailer Settings Server 2

Server 2 is the common name for the modules other than Client and Server 1 that are involved in this feature.

1.4 FUR-REQ-324387/F-Trailer Settings 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.

To help development team, the following requirements will provide a description about what these signals do and their parameter descriptions. However, many of the signals involved in this SPSS provide only a numerical scalar value. To avoid duplicating requirements and adding unintentional errors, for these particular signals I have noted to refer to database for proper value such range, min max etc.

Logical Name	Physical CAN Name
LOdoCount	OdometerMasterValue
LTrlrAnOffstAng	TrlrAnOffst_An_Calc
LTrlrAnOffstDir	TrlrAnOffstDir_D_Calc
LTrlrAnCalib	TrlrAnCalib_B_Complt
LTrlrAidTrgtId	TrlrAidTrgtId_No_Actl
TrailerBackupAssistMode_St	TrlrAidEnbl_D2_Stat
TrailerBackupAssistMode_St	TrlrRvrseEnbl_D2_Stat
TrailerBackupAssist_St	TrlrAidMsgTxt_D2_Rq
TrailerBackupAssist_St	TrlrRvrseMsgTxt_D2_Rq
LTrlrAidTrlrID	TrlrAidTrlrId_No_Rq
LtrlrHitchMsg	TrlrHitch_D_RqMnu
TrlrSetTp	Trailer_Settings_St (Trailer name and Mileage and TRG/TBA/BTT Status. Uses Transport Protocol for data transfer)
LTrlridSel	TrlrIdType_D_Stat

LBttMeasure	Btt_L_Actl2
LTrlrAidE	TrlrAidEnbl_D2_Rq
LTrlrAidSet	TrlrAidSetup_D2_Rq
LTrlrAnMem	TrlrAnOffst_An_Mem
LTrlrAnDirMem	TrlrAnOffstDir_D_Mem
LtrlrTrgPtrnID	TrlrTrgtPtrnId_No_Mem
LTrlrAxleBmpr	TrlrAxleToBmpr_L_Actl
LTrlrBallBmpr	TrlrBallToBmpr_L_Actl
LTrlridNo	TrlrId_No_Actl
LTrlrTrgBmpr	TrlrTrgtToBmpr_L_Actl
LTrlrTrgOff	TrlrTrgtOffst_L_Actl
LTrlrRvrseCancl	TrlrRvrseCancl_B_Rq
LTrlrAidMde	TrlrAidMde_D_Rq
LLifeMde	LifeCycMde_D_Actl
LTrlrBrake	TrlrBrkActCnnct_B_Actl
LTrlrLamp	TrlrLampCnnct_B_Actl
Autohitch_St	TrlrHitchMsgTxt_D_Rq
LTrlrBrkGainSerTx	TrlrBrkGain_No_Actl
LTrlrBrkGainClientTx	TrlrBrkGain_No_Rq
LBttLeftSt	BTTLeft_D_Stat
Lign	Ignition_Status
LOdo	OdoCount
LFuelCons	FuelFlw_Vl_Dsply
LTrlActive	TrlrId_No_ActlMnu
LTrlReset	TrlrRngId_No_RqReset
LTrlid	TrlrRngId_No_Dsply
LTrlRangeVal	TrlrRng_L_Dsply
LSodLeftSt	SodAltLeft_D2_StatAft
LSodRightSt	SodAltRight_D2_StatAft
LBttLeftSt	BttLeft_D_Stat
LBttRightSt	BttRight_D_Stat
LBttMeasure1	Btt_L2_Actl2
TrailerWidthRaw	Internal Variable. No CAN signal association.

In addition to the signal mentioned above, there is a few more data that uses Feature Based Messaging Protocol. For further details, refer to FBMP Content.

1.5 Trailer 360 Logical Mapping Table

This table provides logical to physical mapping of Trailer 360 related can signals. Logical names will be referred in throughout the rest of this documentation.

Logical Name	Physical Name
LTWidth	TrlrWidth_L_Actl
LTCamraH	TrlrCamraHght_L_Actl
LHitch	HitchToTrlrBox_L_Actl
LCamraCalibRq	TrlrCamraCalib_D_Rq
LtSetCalib	TrlrAidSetup_D2_Stat
LCamraCalibSt	TrlrCamraCalib_D_Stat
LTConnectCamera	TrlrISPCnnct_D_Stat

1.6 TRS-IIR-REQ-323585/F-Trailer Settings Client Rx

1.6.1 TRS-MD-REQ-323369/B-LOdoCount

LOdoCount: This signal provides vehicle odometer data. Refer to database for signal parameters.

1.6.2 TRS-MD-REQ-365622/A-LOdo

LOdo: High resolution odometer data. This signal is used for calculating average fuel economy. Refer to req # 334511 for further details.

1.6.3 TRS-MD-REQ-323372/B-LTrlrAnOffstAng

LTrlrAnOffstAng : Magnitude of trailer angle offset from zero. Data sent to Client for storing. This data will be provided to Sever through another transmit signal when need be. Consult with database for signal values.

1.6.4 TRS-MD-REQ-323373/A-LTrlrAnOffstDir

LTrlrAnOffstDir : Direction of trailer angle offset from zero. This data is provided to Client for storage and the client shall send it to server through a different transmit signal when it has been requested.

Signal Value	Value Description
0x0	Null
0x1	Left Or Center
0x2	Right
0x3	Not Used

1.6.5 TRS-MD-REQ-323374/A-LTrlrAnCalib

LTrlrAnCalib : Completion status of trailer angle calibration process.

Signal Value	Value Description
0x0	No
0x1	Yes

1.6.6 TRS-MD-REQ-323375/B-LTrlrAidTrgtId

LtrlrAidTrgtId : The value of the trailer target ID currently being tracked by Server. Refer to database for signal values.

1.6.7 TRS-MD-REQ-323379/A-LTrlrSns

LTrlrSns : Yaw rate trailer angle sensor detection serial number. Refer to database for values.

1.6.8 TRS-MD-REQ-323381/A-LTrlrAidTrlrID

LTrlrAidTrlrID : Request from server to Client for the current trailer id being tracked .

1.6.9 TRS-MD-REQ-324892/A-LLifeMde

This signal indicates the vehicle mode, such as Factory, Transport, Normal etc.

Signal Parameters	Description
0x0	NORMAL
0x1	FACTORY
0x2	Not used
0x3	TRANSPORT
0x4 – 0xF	Not used

1.6.10 TRS-MD-REQ-326166/A-LTrlrBrake

LtrlrBrake: Is a signal sent by the server 2 to the client indicating if a trailer is connected on the trailer brake actuator circuit.

Signal Parameter	Parameter meanings
0x0	No
0x1	Yes

1.6.11 TRS-MD-REQ-326167/A-LTrlrLamp

LTrlrLamp: is sent by Server 2 to the client to indicate if a trailer is connected to trailer lamp circuit.

Signal Parameters	Parameter meanings
0x0	No
0x1	Yes

1.6.12 TRS-MD-REQ-326168/A-Lign

Lign: This signal is sent by server 2 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

1.6.13 TRS-MD-REQ-326337/A-TrailerBackupAssist_St

This signal is used to inform the Trailer Backup Assist system HMI which screen to display to the driver.

Also, this signal is a logical for name for the equivalent TRG signal.

Refer to database and TBA2 signal mapping for further details for this signal.

1.6.14 TRS-MD-REQ-326338/A-TrailerBackupAssistMode_St

This signal is used to communicate the Trailer Backup Assist status for HMI and control algorithm components. This logical signal is a representative of the TRG physical signal as well.

Signal Parameters	Parameter descriptions
0x0	Inactive
0x1	TbaActive
0x2	TbaSetup
0x3	TbaOffTrgSetup
0x4	TbaOffTrgActive
0x5	TbaActiveExpertAvail
0x6	TbaActiveExpertActive
0x7	NotUsed_1

1.6.15 TRS-MD-REQ-326522/A-Autohitch_St

Autohitch_St : This signal is used to inform the Trailer Auto Hitch system HMI in the Client about which screen to display to the driver.

Signal Parameters	Parameter Description
0x01	Message1
…	…
0x3E	Message62
0x3F	Message63

1.6.16 TRS-MD-REQ-332797/A-LTrlrBrkGainSerTx

LTrlrBrkGainSerTx : this signal is sent by the server to the client to indicate the trailer brake Gain. Parameter values are 0-30. Valid data is 0 – 20.
Refer to Trailer Brake Gain Values Req to understand signal purpose.

1.6.17 TRS-MD-REQ-332799/A-LBttLeftSt

LBttLeftSt is sent by the server to the client. It provides details of Left side SOD sensor. This data is to be used with the right side to determine the status of BBT.

Parameters	Value descriptions
0x0	NotDetermined
0x1	Connected
0x2	Pending
0x3	NotConnected
0x4	OffTemp
0x5	Off
0x6	Disabled
0x7	NotUsed

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Refer to BttFiltSys requirement to understand how to use the data.

1.6.18 TRS-MD-REQ-365625/A-LFuelCons

LFuelCons: this signal provides fuel consumed. Refer to req # 334512 for further details.

1.6.19 MD-REQ-394535/A-LTrlid

LTrlid: This signal is sent from the server 2 to the client to indicate the current trailer for which it is sending the trailer range value. Refer to database for signal parameters.

1.6.20 MD-REQ-394536/A-LtrlRangeVal

LtrlRangeVal: this signal is sent form Server 2 to the client to indicate the range value of the particular trailer id. It works in combination of Ltrlid signal. Refer to database for signal parameters.

00-0xFD : Numerical Mileage Content.
0xFE : Faulty
0xFF : No data exists

1.6.21 MD-REQ-346118/A-LSodLeftSt

LSodLeftSt : This signal is sent from the server to the client. It is used to indicate left side Sod status.

Signal Value	Value Description
0	Off
1	BLIS ON Secondary Warn OFF
2	BLIS ON Secondary Warn ON
3	Not used

1.6.22 MD-REQ-346119/A-LSodRightSt

LSodRightSt : This signal is sent from the server to the client. It is used to indicate right side Sod status.

Signal Value	Value Description
0	Off
1	BLIS ON Secondary Warn OFF
2	BLIS ON Secondary Warn ON
3	Not used

1.6.23 MD-REQ-346125/A-LBttRightSt

LBttRightSt is sent by the server to the client. It provides details of Right side SOD sensor.

Parameters	Value descriptions
0x0	NotDetermined
0x1	Connected
0x2	Pending
0x3	NotConnected
0x4	OffTemp
0x5	Off
0x6	Disabled
0x7	BTT5GFault

Refer to Btt 5G on how to make use of the signal parameters.

1.6.24 MD-REQ-410850/A-LBttLeftSt

LBttLeftSt is sent by the server to the client. It provides details of Left side SOD sensor.

Parameters	Value descriptions
0x0	NotDetermined
0x1	Connected
0x2	Pending
0x3	NotConnected
0x4	OffTemp
0x5	Off
0x6	Disabled
0x7	BTT5GFault

Refer to Btt 5G function on how to make use of the signal parameters.

1.6.25 TRS-MD-REQ-432042/A-LCamraCalibSt

LCamraCalibSt : this signal is sent from the server to the client. It is used to indicate camera calibration state.

Parameter	Parameter meaning
0x0	Not calibrating
0x1	Calibrating
0x2	Not used
0x3	Not used

1.6.26 TRS-MD-REQ-432043/A-LTConnectCamera

LTConnectCamera : this signal is sent from the server to the client. It provides the status of Trailer 360 connection.

Parameter	Parameter meaning
0x0	No -Not connected
0x1	Yes - Connected

1.6.27 TRS-MD-REQ-436264/A-LtSetCalib

LtSetCalib : This signal has been added to the feature to support Trailer 360 operation. Client is receiver of this signal.

Value	Description
0x0	Null
0x1	TbaActive
0x2	SetupPrepForAcquisition
0x3	SetupStartAcquisition
0x4	TbaTadMonitor
0x5	SetupAcquisitionAuccess
0x6	NotUsed
0x7	NotUsed

While there are multiple parameters in the signal, only value 0x5 is of significance to the client. The other values are used elsewhere.

1.7 TRS-IIR-REQ-323529/D-Trailer Settings Client Tx

1.7.1 TRS-MD-REQ-323589/A-LTrlridSel

LTrlridSel : Customer selected trailer type of currently active trailer in Client HMI.

0x0	Null
0x1	Conventional
0x2	FifthWheel
0x3	Gooseneck

1.7.2 TRS-MD-REQ-323595/A-LTrlrAidE

LTrlrAidE :
This signal is used to request activation of the Trailer Backup Assist 2 feature.

0x0	Inactive
0x1	ActivateTba
0x2	ActivateTrg
0x3	Deactivate
0x4	NotUsed_1
0x5	NotUsed_2
0x6	NotUsed_3
0x7	NotUsed_4

1.7.3 TRS-MD-REQ-323596/A-LTrlrAidSet

LTrlrAidSet : Signal coordinates setup of the Pro Trailer Backup Assist and Trailer Reverse Guidance Features.

Parameters	Description
0x0	Inactive
0x1	BeginSetup
0x2	EndSetup
0x3	ConfirmSetup
0x4	StickerNotCircled
0x5	ReturnToSetup
0x6	CompleteSetup
0x7	Select Feature
0x8	SettingsCalibration
0x9	CancelRequest
0xA	NotUsed_1
0xB	NotUsed_2
0xC	NotUsed_3
0xD	NotUsed_4

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0xE	NotUsed_5
0xF	NotUsed_6

1.7.4 TRS-MD-REQ-323597/A-LTrlrAnMem

LTrlrAnMem :
Magnitude of trailer angle offset from zero. Data provided from Client's memory.

1.7.5 TRS-MD-REQ-323598/A-LTrlrAnDirMem

LTrlrAnDirMem:
Direction of trailer angle offset from zero. Data provided from Client's memory.

0x0	Null
0x1	Left or Center
0x2	Right
0x3	Not Used

1.7.6 TRS-MD-REQ-323599/A-LtrlrTrgPtrnID

LtrlrTrgPtrnID: Trailer Target Pattern ID number Rx from Server1 and stored in memory of client for a stored trailer.
This data (Trailer Target Pattern ID) is provided back to the server1 from the client through this signal.

1.7.7 TRS-MD-REQ-323600/A-LTrlrAxleBmpr

LTrlrAxleBmpr : Distance from towing vehicle rear bumper to center of trailer axle.

1.7.8 TRS-MD-REQ-323601/A-LTrlrBallBmpr

LTrlrBallBmpr : Distance from vehicle bumper to trailer hitch ball.

1.7.9 TRS-MD-REQ-323602/A-LTrlridNo

LTrlrIdNo : Numerical ID of the trailers stored in Client. Data to be provided to Server.

0: No Active Trailer
1-10 : Named Trailers
11: Default Trailer (not a user made trailer), populated with default settings.

1.7.10 TRS-MD-REQ-323603/A-LTrlrTrgBmpr

LTrlrTrgBmpr : Distance from center of trailer optical target to vehicle bumper.

1.7.11 TRS-MD-REQ-323604/A-LTrlrTrgOff

LTrlrTrgOff : Magnitude of lateral distance offset of center of optical target from trailer center longitudinal axis.

1.7.12 TRS-MD-REQ-323605/A-LTrlrRvrseCancl

LTrlrRvrseCancl : UTT feature cancel signal request from Client to Server1.

Signal Values	Signal Description
0x0	Null
0x1	Cancel

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1.7.13 TRS-MD-REQ-323606/A-LTrlrAidMde

LTrlrAidMde : This signal is used to request a Trailer Backup Assist Mode

Signal Values	Value descriptions
0x0	NoRequest
0x1	Mode_1
0x2	Mode_2
0x3	Mode_3

1.7.14 TRS-MD-REQ-324922/B-TrlrSetTp

TrlrSetTp transfers the data from Client to Server 1 for display.
The data blocks being transferred are:
TBA Status
TRG Status
BTT Status
Trailer Mileage
Trailer Average Fuel Economy
Trailer Name.

Refer to Transfer Protocol (TP) CAN ID 2AC , Signal ID C0 and utilization 0x76 for further details.

1.7.15 TRS-MD-REQ-326169/A-LBttMeasure

LBttMeasure is a signal sent by client to provide measurement E of BTT. Check with database for value meanings.

1.7.16 TRS-MD-REQ-326514/A-LtrlrHitchMsg

Represents a request from the Client to Server2 for the status of Autohitch feature.

Literals description	Value	Description
-	-	Driver input via touchscreen
No Request	0x0	
Cancel Autohitch	0x1	
Turn on Autohitch	0x2	
Turn on TBA	0x3	
Confirm	0x4	
Go to Trailering Domain	0x5	
Not used 1	0x6	
Not used 2	0x7	

1.7.17 TRS-MD-REQ-332798/A-LTrlrBrkGainClientTx

LTrlrBrkGainClientTx : this signal is sent by the client to the server to provide the stored value of trailer brake gain. Refer to database for signal parameters.
Refer to Trailer Brake Gain Values Req to understand signal purpose.

1.7.18 MD-REQ-394533/A-LTrlActive

LTrlActive: is sent from the client to the server to indicate current active trailer. Refer to database for signal parameters.

The information contained in this document is Proprietary to Ford Motor Company.

1.7.19 MD-REQ-394534/A-LTrlReset

LtrlReset: This signal is sent from the client to the server to indicate that the active trailer has been reset. Refer to database for signal parameters.

1.7.20 MD-REQ-346122/A-LBttMeasure1

LBttMeasure1 : This signal is used to acquire trailer length. Refer to database for more details.
The client makes use of this signal and LBttMeasure signal to provide a trailer length data for Btt 5G operation.

1.7.21 TRS-MD-REQ-432038/A-LTWidth

LTWidth: This signal is sent from client to server. It provides the trailer width measurement provided by the user. Refer to database for further details.

1.7.22 TRS-MD-REQ-432040/A-LCamraH

LTCamraH: This signal is sent from client to server. It provides the camera lens height measurement provided by the user. Refer to database for further details.

1.7.23 TRS-MD-REQ-432044/A-LHitch

LHitch: This signal is sent from client to server. It provides the hitch distance from the box if trailer is conventional. Refer to database for further details.

1.7.24 TRS-MD-REQ-432041/A-LCamraCalibRq

LCamraCalibRq: this signal is sent from the client to the server. It is used to request camera calibration event.

Parameter	Parameter meaning
0x0	Calibration not requested
0x1	Calibration requested
0x2	Not used
0x3	Not used

1.8 TRS-IIR-REQ-324837/A-FBMP Content

Feature Description	Feature Number
Effort – Trailer Brake	0x0E11
Mode – Trailer Brake	0x0E10
Trailer Sway	0x0E00

1.8.1 TRS-MD-REQ-324887/A-Feature_St

Feature_St:
As mentioned earlier, some data will need to go from Client through Server 1 to be later retransmitted to server 2 (by the server 1). To achieve this, we have used FBMP Feature_St signal. The data in the “Feature ID Definition” will need to be appended to the Feature_St signal.

Message Type: Status

Represents the current status of a feature (feature selected, feature setting, etc.).

Included Parameters:
FeatureID
Configuration
PersIndex

Name	Literals	Value	Description
FeatureID	-	-	Active feature number
		0x0000 – 0xFFFF	
Configuration	-	-	Active configuration value
		0x0000 – 0xFFFF	
PersIndex	-	-	Indicates which personality profile is active
	PERS_1	0x0	
	PERS_2	0x1	
	PERS_3	0x2	
	PERS_4	0X3	
	VEHICLE	0X4	
	Not Used	0x5	
	Not Used	0x6	
	Not Used	0x7	

1.9 TRS-IIR-REQ-324921/A-Trailer Settings Server 1 Rx

1.9.1 TRS-MD-REQ-324922/B-TrlrSetTp

TrlrSetTp transfers the data from Client to Server 1 for display.
The data blocks being transferred are:
TBA Status
TRG Status
BTT Status
Trailer Mileage
Trailer Average Fuel Economy
Trailer Name.

Refer to Transfer Protocol (TP) CAN ID 2AC , Signal ID C0 and utilization 0x76 for further details.

1.10 Internal Variable

This section contains internal variable methods. These variables don't have a CAN signal. They have been added here, because they either help facilitate feature programming, or it's a needed user input that is used by the feature but does not need to be transmitted on the CAN bus to other modules.

1.10.1 MD-REQ-412096/A-TrailerWidthRaw

TrailerWidthRaw : This is internal variable to client. The client acquires Trailer Width from the user and uses it when its needed.

2 General Requirements

2.1 TRS-REQ-324858/B-Trailer Settings Menu Configurations

Trailer Settings Menu configurations table is a diagram used to identify what menu settings are available based on configurations provided to the vehicle and accessible to Client.

Configuration	
Trailer_Brake_Cfg(0x0 False, 0x1 True)	Trailer Brake Settings Configuration
Setup_Cfg(0x0 False, 0x1 True)	Trailer Type Setup Configuration
BTT_Full_Cfg(0x0 False, 0x1 True)	Trailer Blind Spot Configuration
TBA_Cfg (0x0 False, 0x1 True)	Trailer Backup Assist Configuration
TRG_Cfg(0x0 False, 0x1 True)	Trailer Reverse Guidance Configuration
Trailer_Measurement_Cfg (0x0 NoMeasurements, 0x1 Measurements, 0x2 Sticker)	Trailer Measurement Setup Configuration
AutoHitch (Cfg) (0x0 False, 0x1 True)	
APIM_AutoFeatureSelect_Cfg (0x0 False, 0x1 True)	Influences HMI options to switch between AH/TBA
Trailer_Lighting_Cfg (0x0 False, 0x1 True)	Trailer Lighting Configuration
TBA_5thWheel_Support_Cfg (0x0 False, 0x1 True)	5th wheel trailer type configuration
Trailer_Settings_Cfg	Trailer Settings Feature Cfg

Setting Feature Available	Trailer_Settings_Cfg	Trailer_Brake_Cfg	Setup_Cfg	BTT_Full_Cfg	TBA_Cfg	TRG_Cfg	TBA_Cfg = TRUE OR TRG_Cfg = TRUE	Trailer_Measurement_Cfg
Trailer Name	TRUE	X	X	X	X	X	X	X
Trailer Type	TRUE	X	TRUE	X	X	X	X	X
Trailer Brake Type	TRUE	TRUE	X	X	X	X	X	X
Trailer Brake Effort	TRUE	TRUE	X	X	X	X	X	X
Trailer Brake Gain	TRUE	TRUE	X	X	X	X	X	X
Trailer Mileage	TRUE	X	X	X	X	X	X	X
Trailer Blind Spot Detection	TRUE	X	X	TRUE	X	X	X	X
Trailer Reverse Guidance	TRUE	X	X	X	X	TRUE	X	0x1 Measure

								| 0x2 Sticker
Pro Trailer Backup AssistTM	TRUE	X	X	X	TRUE	X	X	X
Delete Trailer	TRUE	X	X	X	X	X	X	X
Trailer Backup Setup	TRUE	X	X	X	X	X	TRUE	0x1 Measure | 0x2 Sticker
Change Trailer Sticker	TRUE	X	X	X	X	X	TRUE	0x1 Measure | 0x2 Sticker
Trailer Angle Limit	TRUE	X	X	X	TRUE	X	X	X
X - Don't Care								

2.2 TRS-REQ-330236/B-Configuration Related Requirements

2.2.1 TRS-REQ-330237/A-When to show Trailer Blind Spot Detection Setting

Trailer Blind Spot Detection should only be shown when the feature is configured on, and the selected trailer has trailer type LTrlridSel =Conventional

2.2.2 TRS-REQ-330238/A-When to show Pro Trailer Backup Assist Setting

Pro Trailer Backup Assist should only be shown when the feature is configured on, and the selected trailer has trailer type LTrlridSel =Conventional OR ((when trailer type LTrlridSel is Fifth Wheel or Gooseneck) AND TBA_5thWheel_Support_Cfg = TRUE)

2.2.3 TRS-REQ-330240/B-When to show Trailer Reverse Guidance Setting

Trailer Reverse Guidance should only be shown when the feature is configured on, and the selected trailer has trailer type LTrlridSel =Conventional .

2.2.4 TRS-REQ-330241/A-When to show Trailer Backup Setup Setting

Trailer Backup Setup should only be shown when the features listed in the table above are configured on for this setting, and the selected trailer has trailer type LTrlridSel =Conventional and the saved value for the selected trailer for LTrlrAnDirMem is = 0.

2.2.5 TRS-REQ-330242/A-When to show Change Trailer Sticker Setting

Change Trailer Sticker should only be shown when the features listed in the table above are configured on for this setting, and the selected trailer has trailer type LTrlridSel =Conventional and the saved value for the selected trailer for LTrlrAnDirMem is > 0.

2.2.6 TRS-REQ-330254/C-Trailer Connected Logic

Trailer_Connected_Flag is ACTIVE at module wake up

Trailer connection state before Ign Cycle	After Ign Cycle	
Trailer ID	Notification On	Notification Off
Id = 0	Default Trailer (ID 11) & Notify user	Default Trailer (ID 11) & Dont Notify user
Id 1-11	Connect Same Trailer as before Ign Cycle. **Don't notify user**	Connect Same Trailer as before Ign Cycle. Don't notify user

In case Trailer ID 1-11 is connected, Client should wait for 10 sec and if the connection is still valid, the client shall send Transfer Protocol Data content to Server 1. If there is no trailer connected after 10 sec, then set No Active Trailer (Trailer ID = 0)

Trailer_Connected_Flag transitions from inactive to active after wake up.

Trailer_Connected_Flag	Notification On	Notification Off
Inactive ->Active	Notify User Select previous trailer and {Previous active trailer name} based on previously active trailer	If an active trailer (1-11) is selected, that trailer should remain active & Don't Notify user. Otherwise select the default trailer (11) & don't notify user.

Note: TRS-REQ-346112/A-Active Trailer Change
This requirement can prevent the active trailer from changing or prevent the trailer connected notification.

2.2.7 TRS-REQ-330255/C-Trailer Disconnected Logic

Trailer_Connected_Flag is set per TRS-REQ-324861-Trailer Connected Detection.

The Client should monitor when the Trailer_Connected_Flag transitions from ACTIVE to INACTIVE. The active trailer should only be set to No Active Trailer when a trailer disconnect event has occurred and TrailerBackupAssist_St == 0x0 | 0x1 and when the Vehicle Speed is < 5 kph. If a trailer disconnect event has occurred and the above conditions are not met, the client should wait to set the active trailer to No Active Trailer until the conditions are met. The trailer disconnect event can be cleared if the Trailer_Connect_Flag transitions from INACTIVE to ACTIVE, then no change should be made to the active trailer when the above conditions are met.

Selecting trailer should follow TRS-REQ-329853

2.3 TRS-REQ-324860/A-Trailer Name properties

Client shall be able to store 11 names.
Each name shall be no more than 20 characters long.

2.4 TRS-REQ-324861/B-Trailer Connected Detection

Client shall make use of the signals provided by Server 2 and the various configurations in the system to provide the user with information on whether any trailer is connected or disconnected.

Operational_Mode	Trailer_Brake_Cfg	**Trailer_Lighting_Cfg**	LTrlrBrake	**LTrlrLamp**	Trailer_Connected_Flag
Normal or Crank	Enabled (0x1)	X	Yes (0x1)	X	ACTIVE
	X	Enabled (0x1)	X	0x1 (Yes)	ACTIVE
All Other Cases					INACTIVE

(Trailer_Brake_Cfg AND LTrlrBrake Signal) OR (Trailer_Lighting_Cfg AND LTrlrLamp Signal)

If both lamp and brake lights transition from 0 to 1, only one popup should be displayed to the user.

2.5 TRS-REQ-324863/A-Updating Trailer Types

If a user changes the trailer type from Conventional to 5W/GN or from 5W/GN to Conventional, all TBA/TRG setting parameters and BTT trailer settings should be reset to default values.

2.6 TRS-REQ-324864/A-Trailer Mileage

Client shall keep track of distance traveled and when a trailer is connected to the vehicle the distance traveled should be stored and linked to the active trailer.

2.7 TRS-REQ-324886/B-Default Values

The below values are default parameters related to trailers and their settings.

Description	Logical Signal Name	Initial Value for New Trailer
Trailer ID Number	LTrlridNo	0x0
Trailer Name	See TRS-REQ-326376	Blank
Trailer Mileage	See TRS-REQ-326376	0x0
Trailer Brake Type	BrakeType FBMP	0x0
Trailer Brake Effort	BrakeEffort FBMP	Low
Trailer Type	LTrlridSel	0x0
TBA Measurement A	LTrlrBallBmpr	0x0
TBA Measurement B	LTrlrTrgBmpr	0x0
TBA Measurement C	LTrlrTrgOff	0x0
TBA Measurement D	LTrlrAxleBmpr	0x0
BTT Measurement E	LBttMeasure	0x7E (No_Data_Exists)
Trailer Target ID	LtrlrTrgPtrnID	0x0
Trailer Angle Offset	LTrlrAnMem	0x0
Trailer Angle Direction	LTrlrAnDirMem	0x0
TBA Mode Setting	LTrlrAidMde	0x0
TBA Activation Request	LTrlrAidE	0x0
TBA Setup Request	LTrlrAidSet	0x0
TRG Cancel Request	LTrlrRvrseCancl	0x0

2.8 REQ-346114/A-Default Value Update

This requirement tries to describe more clearly than already has, the different conditions when we apply 0x7E or 0x7F of the LBttMeasure. These situations have been encountered by various individuals, so we thought to include the situations in a single requirement.

Default Trailer Selected --> 0x7E
No Active Trailer Selected --> 0x7E
New Trailer --> Enter Trailer Name --> Enter Trailer Type --> Save --> 0x7F --> Enter valid measurements
If trailer type changed from Conventional to Gooseneck or 5W --> 0x7F
If there is an active trailer with valid measurements --> Disconnect Trailer --> 0x7E?
When we select a trailer with valid measurements, we send measurements regardless of whether connected or not.

2.9 TRS-REQ-324893/A-Mode Reset

When vehicle life cycle indicated by LLifeMde signal changes from Factory or Transport to Normal mode, the client shall reset all trailer related settings to default and select “No Active Trailer” as the active trailer.

2.10 TRS-REQ-326376/B-TP related requirements

2.10.1 TRS-REQ-324859/B-Server 1 Update

Whenever a trailer becomes active or there are changes to active trailer parameters, such as update TBA status, TRG status, BTT status, Trailer mileage and TAFE or name, the Client shall update Server 1 with all the relevant information: TBA status, TRG status, BTT status, mileage, Trailer Average Fuel Economy and Trailer Name content.

2.10.2 TRS-REQ-326377/A-Trailer Name Length

Client should be able to send a variable string of up to 30 characters + Null to Server 1 for trailer name.

2.10.3 TRS-REQ-326378/B-Odometer value

Client shall send a 7 (seven) digits string of odometer value to Server 1.
Leading 0s should be replaced with the character 0x32 in ASCII table (space character). The units (metric or imperial) of the odometer value (which is in string format) should be the units that the client is currently using.

In case trailer data gets reset or a new trailer with 0 mileage has been connected, the Client can show and can transmit a value of 0 (6 space + 0).

There should not be any decimal value, but full numbers only.

2.10.4 TRS-REQ-326380/C-Faulty Odometer Value

If an error value is received by LOdoCount signal (Hex value of signal 0xFFFFFF) , the client shall send a string of "---" characters as content of odometer value.

If an error value is received by LOdo signal (Hex value of signal 0xFF) , the client shall send a string of "---" characters as content of odometer value and also for average fuel economy content.

2.10.5 TRS-REQ-326416/B-No Active Trailer

If a blank or No Active Trailer is active in Client, the client shall send "No Active Trailer" as trailer name and blank odometer data, 7 space (asci 0x32) characters.

2.10.6 TRS-REQ-334551/C-TAFE Sending Data Through TP

Client shall send the Trailer Average Fuel Economy to Server 1 through Transport Protocol.

Different vehicle types have different string length requirements.

In PHEV vehicles as configured in the client (details provided in client diagnostics specs), Client shall send up to 5 characters in the format XYZ.W .

In Non PHEV, the client should send up to 4 characters, XY.Z .

There should not be any leading 0, unless the value being sent is less than 1.
*Decimal notation is localized, some countries use comma (,) and some others used period (.). SYNC has implemented period (.) notation.

2.10.6.1 TRS-REQ-394543/A-Range Per Full Charge

Whenever a trailer ID is active, client shall forward to Server 1 through TP the data it receives through signal LTrlRangeVal for the particular active trailer. Basically, no matter what trailer info is coming from server 2, client shall only send to server 1 only the info for the active trailer. (The server 2 may send to client all the range values for all the available trailers, hence we need to make a distinction between active trailer and other trailers.)

2.11 TRS-REQ-326497/A-Server 2 update

Client shall update the CAN Signal content that are intended for Server 2 at the same time (within a CAN message) .

2.12 TRS-REQ-326529/B-Shifting Out Of Park Gear While In Setup

Setup operation should be available only in while gear is in Park. If during setup the gear is moved from Park mode then screen 89 in Client HMI shall indicate that they need to be in park gear to continue Setup process.

2.13 TRS-REQ-328401/B-Trailer ID

Trailer ID is a numerical value that client needs to associate with each trailer, which than is provided to the server through the signal LTrlrIdNo.
ID 0 is not associated with any trailer. (No Active Trailer)
ID 11 is associated with Default Trailer. The data that default trailer uses is default values as described in req 324886.
ID 1 through 10 are associated with respective trailers stored by the client.
If a trailer gets deleted, that ID becomes available. If a new trailer gets stored, the new trailer will acquire any available ID.

2.14 TRS-REQ-328500/B-Measurements Out Of Range

When measurements are out of range, as specified by user selection and input, then LBttMeasure should get set to 0x7F (faulty) for requested trailer profile.

If the requested trailer profile is selected as the active trailer profile then server 2 should be updated.

If the requested trailer profile is not active (selected through view/edit trailer) then only the trailer profile value should be updated and server 2 is not updated until that trailer is selected as active.

2.15 TRS-REQ-328504/B-Change Trailer Sticker

If the requested trailer profile is not the active trailer profile (selected via view/edit), then the requested trailer profile should be set to the active trailer profile and server 2 should be updated with the newly active trailer profile.

If sticker gets relocated as indicated by user, then reset TBA/TRG settings to the default values per TRS-REQ-324886 for the active trailer profile:
LTrlrAnMem
LTrlrAnDirMem
LtrlrTrgPtrnID
The previously entered values for LTrlrAxleBmpr, LTrlrBallBmpr, LTrlrTrgBmpr, LTrlrTrgOff should be retained, but the user will need to reconfirm them.

2.16 TRS-REQ-329846/B-HMI Related requirements

These requirements are related to Client behavior while the user operates the feature in certain HMI screens. These requirements should be matched with proper screen layout to better understand the client operation.

2.16.1 TRS-REQ-329847/B-Cancel exit function while not in setup

The Client should send LTrlrAidE equal to 0x3 (deactivate). The client should hold the value until it receives a response from server 2 of TrailerBackupAssist_St equal to 0x0 or 0x1 or 0x5.

Once client receives TrailerBackupAssist_St (0x0 or 0x1 or 0x5), the client should send LTrlrAidE equal to 0x0 (Inactive) .

2.16.2 TRS-REQ-329848/B-Cancel function while in setup

When TrailerBackupAssist_St= 0x1B (setup canceled) and user presses close, then the client should send LTrlrAidSet 0x0 (inactive). This value should be held until another requirement changes it.

2.16.3 TRS-REQ-329849/B-Cancel Setup no

When TrailerBackupAssist_St equals 0x1C and the user presses No, then the client should send LTrlrAidSet 0x5 (ReturnToSetup). This value should be held until TrailerBackupAssist_St transitions to 0x1A, then LTrlrAidSet should be set to 0x1(BeginSetup). This value should be held until another requirement changes it.

2.16.4 TRS-REQ-329851/B-End setup yes

When TrailerBackupAssist_St equals 0x1C and the user presses Yes, then the client should send LTrlrAidSet 0x2 (EndSetup). This value should be held until another requirement changes it.

2.16.5 TRS-REQ-329853/B-Select Trailer Profile as the Active Trailer Profile

The requested trailer profile should be selected as the active trailer profile and all saved signals associated with the trailer profile should be updated to server 1 and 2. The signals associated with a trailer profile are:

LTrlrAnMem
LTrlrAnDirMem
LtrlrTrgPtrnID
LtrlrAxleBmpr
LTrlrBallBmpr
LTrlrTrgBmpr
LTrlridNo
LTrlrTrgOff
LTrlrAidMde
LBttMeasure
LTrlridSel
BrakeType FBMP
BrakeEffort FBMP
TrlrSetTp

The LTrlridNo of the newly selected active trailer should be stored as the Last_Active_Trailer_ID to be checked on the next ignition cycle.

2.16.6 TRS-REQ-346112/B-Active Trailer Change

The Trailer Connected Notification (pop-up) should be suppressed when TBA is Active (TrailerBackupAssist_St >=2) or when the New Trailer Setup Process is active.

When TrailerBackupAssist_St is greater than 0x2 (Trailer Selection Menu) or when a new trailer is being added, the trailer connection logic should not be able to change the active trailer.

Note: TBA can request a trailer ID to be changed when TrailerBackupAssist_St = 0x2.

2.16.7 TRS-REQ-329854/B-Add trailer for TBA or TRG Initiated Setup

When Add Trailer is selected the Client needs to remember the value of TBA Mode or TRG mode per TRS-REQ-329857 which will be required to activate the correct feature at the end of the setup flow. The client then needs to execute the Cancel Function (REQ-329847/A-Cancel exit function while not in setup).

2.16.8 TRS-REQ-346130/A-Initiating Auto Hitch

When TrailerBackupAssist_St = 0x2 (TrailerMenu) and the user presses the Trailer Autohitch button, the client should transmit DriverInput (0x2 Turn on Autohitch) per Feature – Auto Hitch SPSS until TrailerBackupAssist_St is not equal 0x2.

2.16.9 TRS-REQ-329855/B-When selecting an existing trailer

When an existing trailer is selected and TrailerBackupAssist_St is equal to 0x2, the client needs to send LTrlrAidE equal to 0x1 (ActivateTba) if TBA mode is active per TRS-REQ-329854 or LTrlrAidE equal to 0x2 (ActivateTrg) if TRG mode is active. This value should be held until TrailerBackupAssist_St is > 0x2, then LTrlrAidE should be set to 0x0 (Inactive).

If Trailer_Measurement_Cfg is equal to 0x0 (NoMeasurement) or ((Trailer Type is equal to 5th wheel or Gooseneck) and TBA_5thWheel_Support_Cfg is equal to true), then the client should also store LTrlrAnDirMem equal to 0x1 for the active trailer profile (selected as active per TRS-REQ-329853) when TrailerBackupAssist_St is > 0x2 and server 2 should be updated.

2.16.10 TRS-REQ-329856/B-Activate TBA

When activating TBA or TRG after add trailer was selected from screen 3, 90 or 98, the state of TBA Mode or TRG mode needs to be remembered per TRS-REQ-329857 in order to activate the correct feature.

When TrailerBackupAssist_St <= 0x2, the client should send the activation request LTrlrAidE (0x1 ActivateTba) for TBA Mode or send LTrlrAidE (0x2 ActivateTrg) for TRG mode for the remembered mode. The client will hold this request value until TrailerBackupAssist_St > 0x2, then the client should set LTrlrAidE to 0x0 (Inactive) and the remembered state of TBA mode or TRG mode should be reset.

If (Trailer_Measurement_Cfg is equal to 0x0 (NoMeasurement) or ((Trailer Type is equal to 5th wheel or Gooseneck) and TBA_5thWheel_Support_Cfg is equal to true) then the client should also store LTrlrAnDirMem equal to 0x1 for the active trailer profile (selected as active per TRS-REQ-329853) when TrailerBackupAssist_St is > 0x2 and server 2 should be updated.

2.16.11 TRS-REQ-329857/A-Determine TBA or TRG mode

The signals parameters below tell to the client what feature mode is running , TBA mode or TRG mode.

TBA_MODE
TrailerBackupAssistMode_St
0x1 - TbaActive
0x2 - TbaSetup
0x5 - TbaActiveExpertAvail
0x6 - TbaActiveExpertActive

TRG_MODE
TrailerBackupAssistMode_St
0x3 TbaOf fTrgSetup
0x4 TbaOf fTrgActive

2.16.12 TRS-REQ-329858/B-Sorting order function

Follow general sorting for the applicable trailers per TRS-REQ-346108. Any expectations defined below take precedence over the general sorting rules.
If (Trailer_Measurement_Cfg = 0x1 or 0x2)
    Display all conventional trailers with LTrlrAnDirMem !=0
Else
    Display all conventional Trailers

If (TBA_5thWheel_Support_Cfg = True)
    Also Display all 5th Wheel/Gooseneck Trailers

If (TrlrAidTrlrId_No_Rq = A Valid Stored Trailer ID)
    Sort that trailer ID to the top of the list

2.16.13 TRS-REQ-329859/B-Non applicable trailers

Trailer Types Compatible with TBA/TRG are [TrailerType = Conventional | ((TrailerType = 5thWheel | Trailer Type = Gooseneck) & TBA_5thWheel_Support_Cfg = True)]

2.16.14 TRS-REQ-329864/B-Begin setup

If the requested trailer profile is not the active trailer profile (selected via view/edit), then the requested trailer profile should be set to the active trailer profile and server 2 should be updated with the newly active trailer profile.

The Client should send LTrlrAidSet equal to 0x1 begin setup to server 2. This value should be held until a following requirement changes it.

Client should send trailer information with default parameters for the following signals per TRS-REQ-324886:

LTrlrAxleBmpr
LTrlrBallBmpr
LTrlrTrgBmpr
LTrlrTrgOff
LTrlrAnDirMem
LTrlrAnMem
LtrlrTrgPtrnID

2.16.15 TRS-REQ-329881/B-Save or confirm setup trailer measurement

Send LTrlrAidSet 0x3 - confirm setup. This value should be held until another requirement changes it.

The user entered values should be saved to the active trailer profile for:
LTrlrAxleBmpr
LTrlrBallBmpr
LTrlrTrgBmpr
LTrlrTrgOff

2.16.16 TRS-REQ-329887/B-Sticker Only setup TBA TRG

When activating TBA or TRG after add trailer was selected from screen 3, 90 or 98, the state of TBA Mode or TRG mode needs to be remembered per TRS-REQ-329857 in order to activate the correct feature.

When TrailerBackupAssist_St is equal to 0x1A (SetupBegin), the client should send the activation request LTrlrAidE (0x1 ActivateTba) for TBA Mode or send LTrlrAidE (0x2 ActivateTrg) for TRG mode for the remembered mode. The client will hold this request value until TrailerBackupAssist_St is not equal to 0x1A (SetupBegin), then the client should set LTrlrAidE to 0x0 (Inactive) and LTrlrAidSet equal to 0x0 (Inactive) and the client should store 0x1 for LTrlrAnDirMem for the active trailer profile and server 2 should be updated. The remembered state of TBA mode or TRG mode should also be reset.

2.16.17 TRS-REQ-329888/B-Setup sticker trailer settings activation

When TrailerBackupAssist_St is equal to 0x1A (BeginSetup), the client should set LTrlrAidSet equal to 0x8 (SettingsCalibration). This value should be held until TrailerBackupAssist_St does not equal 0x1A (BeginSetup). After TrailerBackupAssist_St does not equal 0x1A, the client should store LTrlrAnDirMem equal to 0x1 for the active trailer profile and the client should set LTrlrAidSet equal to 0x0 (Inactive).

2.16.18 TRS-REQ-329889/B-Activate TBA/TRG after Measurement and Sticker Setup

When activating TBA or TRG after add trailer was selected from screen 3, 90 or 98, the state of TBA Mode or TRG mode needs to be remembered per TRS-REQ-329857 in order to activate the correct feature.

When TrailerBackupAssist_St = 0x1F and the user closes the screen, send the activation request LTrlrAidE (0x1 ActivateTba) for TBA Mode or send LTrlrAidE (0x2 ActivateTrg) for TRG mode for the remembered mode. The client should hold this request value until TrailerBackupAssist_St != 0x1F, then the client should set LTrlrAidE to 0x0 (Inactive) and the remembered state of TBA mode or TRG mode should be reset.

If neither TBA or TRG was used to start the feature setup (no previous value of TBA mode or TRG mode set), then follow HMI to return to Trailer Settings

2.16.19 TRS-REQ-330294/C-Request to Cancel TBA/TRG Setup

If TrailerBackupAssist_St is 0x0 or 0x1, then the cancel request should not be sent. Otherwise set LTrlrAidSet to 0x9 (CancelRequest). This value should be held until TrailerBackupAssist_St is equal to 0x1C (CancelSetup), after which LTrlrAidSet should be set to 0x1 (BeginSetup) and held until another requirement changes it.

2.16.20 TRS-REQ-330295/A-Edit measurements

When edit measurements is selected, the previously entered measurements should be maintained as the initial value for each measurement screen.

2.16.21 TRS-REQ-330296/B-Complete Setup and Store Calculate Trailer Angle Detection Signals to Trailer Profile

When the user presses close, the client should do the following routine (this routine should run until it is complete, even if the screen changes):

If LTrlrAnCalib = 0x1 Yes then Set LTrlrAnMem = LTrlrAnOffstAng, LTrlrAnDirMem = LTrlrAnOffstDir , and LtrlrTrgPtrnID = LTrlrAidTrgtId
(

Client shall populate the contents of these signals
LTrlrAnMem
LTrlrAnDirMem
LtrlrTrgPtrnID

With the reciprocal data provided by the server through the signals
LTrlrAnOffstAng ,
LTrlrAnOffstDir ,
LTrlrAidTrgtId.

The values of LTrlrAnMem, LTrlrAnDirMem and LtrlrTrgPtrnID should be stored to the active trailer profile.

)

2.16.22 TRS-REQ-330298/A-List BLIS Trailers

Only display Trailers with a Valid entered LBttMeasure measurement. A valid measurements is >= 0x9 and <=0x65.
Do not display Default trailer.

2.16.23 TRS-REQ-330300/B-Trailer Angle Limit Mapping

Internal	CAN Encoding	Description	Selected Setting (HMI)
LTrlrAidMde	0x0	Not Requested	Normal Control Angle
	0x1	Mode1	Max Control Angle
	0x2	Mode2	
	0x3	Mode3	

Updated signal value is to be sent when the user clicks on “Back” icon in HMI screen.

2.16.24 TRS-REQ-346100/A-Trailer Name

When adding a new trailer, the entered trailer name should not be stored until the trailer profile is requested to be saved by the user. When the profile is saved, the trailer name should be sent to Server 1 per TRS-REQ-324859

When an existing active trailer profile is edited, the trailer name field should be updated when the user confirms the trailer name and server 1 should be updated.

When an existing non-active (view/edit trailer) is edited, the trailer name field should be updated to the requested trailer profile when the user confirms the trailer name, but server 1 is not updated until that trailer is selected as active.

2.16.25 TRS-REQ-346101/A-Trailer Type

Trailer Type maps to signal: LTrlridSel

When adding a new trailer, the entered trailer type should not be stored until the trailer profile is requested to be saved by the user. When the profile is saved, the trailer type should be sent to Server 2 per TRS-REQ-326497.

When an existing active trailer profile is edited, the trailer type field should be updated in the requested trailer profile when the user confirms the value and server 2 should be updated

When an existing non-active (view/edit trailer) is edited, the trailer name field should be updated to the requested trailer profile when the user confirms the value, but server 2 is not updated until that trailer is selected as active.

If a vehicle only supports one trailer type (Setup_Cfg = False), the trailer type should be set to Conventional.

2.16.26 TRS-REQ-346102/B-Save Trailer

When a trailer is saved to memory, the trailer profile should be created and selected as the active trailer profile. The Trailer ID should be set per TRS-REQ-328401. The CAN signals for the trailer profile should be sent per TRS-REQ-329853. Trailer Name and Trailer Type should be set to the user entered values. All other trailer profile values should be set to the default values per TRS-REQ-324886.

Server 1 and 2 should be updated per TRS-REQ-324859 and TRS-REQ-326497, respectively.

Client shall generate the signal LBttMeasure with a value of 0x7F

2.16.27 TRS-REQ-346103/A-Trailer Brake Type

Trailer Brake Type maps to signal: BrakeType FBMP sent per TRS-IIR-REQ-324837/A-FBMP Content [Mode – Trailer Brake]

When adding a new trailer, the entered trailer brake type should be sent to Server 1 per TRS-IIR-REQ-324837 when the user confirms the value

When an existing active trailer profile is edited, the trailer brake type field should be updated in the requested trailer profile when the user confirms the value and server 1 should be updated

When an existing non-active (view/edit trailer) is edited, the trailer brake type should be updated to the requested trailer profile when the user confirms the value, but server 1 is not updated until that trailer is selected as active.

2.16.28 TRS-REQ-346104/A-Trailer Brake Effort

Trailer Brake Effort maps to signal: BrakeEffort FBMP sent per TRS-IIR-REQ-324837/A- [Effort – Trailer Brake]

When adding a new trailer, the entered trailer brake effort should be sent to Server 1 per TRS-IIR-REQ-324837 when the user confirms the value

When an existing active trailer profile is edited, the trailer brake effort field should be updated in the requested trailer profile when the user confirms the value and server 1 should be updated

When an existing non-active (view/edit) is edited, the trailer brake effort should be updated to the requested trailer profile when the user confirms the value, but server 1 is not updated until that trailer is selected active.

2.16.29 TRS-REQ-346105/A-Trailer BLIS (BTT) Compatible Trailer Type

Trailer Blind Spot Detection (Trailer BLIS) is only compatible with the conventional trailer type.

2.16.30 TRS-REQ-346106/A-Trailer Blind Spot Detection Length (Measurement E)

Trailer Blind Spot Detection Measurement E maps to signal: LBttMeasure

When adding a new trailer, the entered Trailer BLIS Length should be sent to Server 2 per TRS-REQ-326497.

When an existing active trailer profile is edited, the Trailer BLIS Length should be updated in the requested trailer profile when the user confirms the value and server 2 should be updated

When an existing non-active (view/edit) is edited, the Trailer BLIS Length should be updated to the requested trailer profile when the user confirms the value, but server 2 is not updated until that trailer is selected active.
The user entered/displayed value should be converted and scaled to LBttMeasure appropriately.

2.16.31 TRS-REQ-346107/A-Trailer Backup Setup Measurements (A-D)

Measurement A maps to signal: LTrlrBallBmpr
Measurement B maps to signal: LTrlrTrgBmpr
Measurement C maps to signal: LTrlrTrgOff
Measurement D maps to signal: LTrlrAxleBmpr

When adding a new trailer the initial value of each measurement should be set per the SYNC4_TBA_Trailer_Measurements document.

When editing an existing trailer (change trailer sticker), the initial value for each measurement should be set to the previously store value in the trailer profile.

The min/max trailer measurements should be set per the SYNC4_TBA_Trailer_Measurements document. The measurement C limits are based on the user entered measurements A and B, and should be updated anytime they change.

The Trailer Backup Setup measurements can only be set for an active trailer. If the Trailer Backup Setup Measurements are entered via a view/edit trailer, that trailer should be selected as the active trailer.

Server 2 should be updated per TRS-REQ-326497 when each measurement is confirmed.

2.16.32 TRS-REQ-346108/A-General Sorting Order Function for Listed Trailer Names

The list of user entered trailers should be sorted as follows:

- The last active trailer should be shown first. If no active trailer (none) was selected last, then there was no last active trailer
- Then the user entered trailers should be sorted in alphabetical order

2.16.33 TRS-REQ-346109/A-Close TBA/TRG Trailer Selection Menu

The TBA/TRG Trailer selection menu (refer to HMI spec for specific screens) should be shown when TrailerBackupAssist_St = 0x2 (SelectTrailer). When TrailerBackupAssist_St != 0x2 (SelectTrailer), the TBA/TRG Trailer selection menu should not be shown.

2.17 TRS-REQ-329860/C-Generic missing signal

If TrlrAidEnbl_D2_Stat and TrlrAidMsgTxt_D2_Rq signals go missing for longer than 5 (five) seconds, then client should exit TBA2.

2.18 TRS-REQ-332801/B-Trailer Brake Gain Values

Client shall save the valid data that is sent by the server through signal LTrlrBrkGainSerTx after a trailer has been de-activated or Ignition is changed to Off if LTrlrBrkGainClientTx is 28 or 29 otherwise don't save the data.

The client shall send the data stored above through the signal LTrlrBrkGainClientTx back to the server under the conditions specified in the table below.

The table below describes what values the client should send through LTrlrBrkGainClientTx.

0-20	Sent immediately after a previously created trailer is re-activated. Value is determined based on the last known gain for that trailer. These values should be sent until the server transmitted signal LTrlrBrkGainSerTx matches the value of what the client is currently sending through LTrlrBrkGainClientTx.
21-27	Unused
28	First time a specific trailer is activated. Also this is send when there are no values stored for LTrlrBrkGainClientTx.
29	While trailer remains active, after confirming request for change has been honored
30	No trailer active. Default value.

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2.19 TRS-REQ-332802/B-TBA Status Determination

TBA_Status_St is the status of the Pro Trailer Backup Assist Feature. Its value is determined from the conditions described in the table below.

Status	Condition
Not Setup	TBA_Cfg = Enabled & LTrlrAnDirMem [ActiveTrailer] =0
Ready	TBA_Cfg = Enabled & LTrlrAnDirMem [ActiveTrailer] !=0
Null	All other conditions

2.20 TRS-REQ-332803/B-TRG Status Determination

TRG_Status_St is the status of the Pro Trailer Backup Assist Feature. Its values are determined from the conditions described in the table below.

Status	Condition
Not Setup	TRG_Cfg = Enabled & LTrlrAnDirMem [ActiveTrailer] =0
Ready	TRG_Cfg = Enabled & LTrlrAnDirMem [ActiveTrailer] !=0
Null	All other conditions

2.21 Trailer Selection Operation While in TBA/TRG

2.21.1 REQ-442397/A-Add new trailer from TBA/TRG trailer select screen when there is no active trailer

Client must update LTrlridNo from current value to new value before or at the same time as LTrlrAidE = ActivateTba is sent LTrlrAnDirMem must be 0x0 Null when LTrlridNo is first sent with new value and then updated to 0x1 when TrlrAidMsgTxt_D2_Rq > 2

2.21.2 REQ-442398/A-Add new trailer from TBA/TRG trailer select screen when there is already an active trailer

Client must update LTrlridNo from current value to new value before or at the same time as LTrlrAidE = ActivateTba is sent LTrlrAnDirMem must be 0x0 Null when LTrlridNo is first sent with new value and then updated to 0x1 when TrlrAidMsgTxt_D2_Rq > 2

2.21.3 REQ-442399/A-Select saved trailer from TBA/TRG trailer select screen when there is no active trailer

Client must update LTrlridNo from current value to new value at the same time as LTrlrAidE = ActivateTba is sent LTrlrAnDirMem must be updated to the saved value at the same time when LTrlridNo is first sent with new value.

2.21.4 REQ-442400/A-Select saved trailer from TBA/TRG trailer select screen when there is already an active trailer

Client must update LTrlridNo from current value to new value at the same time as LTrlrAidE = ActivateTba is sent LTrlrAnDirMem must be updated to the saved value at the same time when LTrlridNo is first sent with new value.

2.22 TRS-REQ-332804/B-BttFilSys

BttFilSys describes the overall BTT value based on left sensor.

LBttLeftSt Signal	BttFilSys (internal variable)
NotDetermined (0x0)	ON (0x1)

Connected (0x1)	ON (0x1)
Pending (0x2)	ON (0x1)
NotConnected (0x3)	ON (0x1)
OffTemp (0x4)	ON (0x1)
Off (0x5)	OFF (0x0)
Disable (0x6)	DISABLED (0x2)
NotUsed (0x7)	OFF (0x0)
Missing	FAULT (0x3)
Don't care	FAULT (0x3)
All Other Cases	FAULT (0x3)

This value is generated by client.

2.23 TRS-REQ-332805/A-BTT Status

Client sends Btt Status through Transfer Protocol. Its values are determined like in the table below.

Status	Condition
Ready	BTT_Full_Cfg = Enabled & LTrlridSel [ActiveTrailer] = Conventional & LBttMeasure [ActiveTrailer] > 0x08 & LBttMeasure [ActiveTrailer] < 0x66 & BttFilSys = 0x1 (On)
Not Available	BTT_Full_Cfg = Enabled & (LBttMeasure [ActiveTrailer] = 0x7F | BttFilSys = (0x2 (Disabled) | 0x3 (Fault)))
Not Setup	BTT_Full_Cfg = Enabled & LTrlridSel [ActiveTrailer] = Conventional & LBttMeasure [ActiveTrailer] = 0x7E
Off	BTT_Full_Cfg = Enabled & BttFilSys = 0x0 (Off)

2.24 TRS-REQ-334562/A-TAFE Trailer Average Fuel Economy Related Req

2.24.1 TRS-REQ-334511/A-TAFE LOdo

LOdo provides high accuracy odometer value to the client. The client shall use the data provided by this signal to calculated average fuel economy.

Detail	Units	Res.	State Encoded	Min	Max
	meters	.2		0 (0x00)	50.8 (0xFE)
Invalid			0xFF		

LOdo signal value is 256 steps, transition from 254 to 0 is two steps for the client. A 255 (0xFF) is used only in error handling of invalid data.
A transition from 254 to 0, is considered two steps for a total value of 0.4 meters change in distance traveled.

2.24.2 TRS-REQ-334512/A-TAFE LFuelCons

LFuelCons: this signal is received by client. It tells the amount of fuel consumed since ignition started. At every ignition cycle, this signal starts with a value of 0.

Units	Resolution	Min	Max
microL	25	0 (0x00)	25575 (0x3FF)

2.24.3 TRS-REQ-334513/A-TAFE Odometer Value

The user may be given the ability to manually change the value of trailer distance traveled.
For this feature, Trailer Average Fuel Economy, only recorded trailer travel data should be used in the calculations, not user generated value.

Tracking of distance traveled and fuel consumed should be done when a trailer is connected to the vehicle. Any particular data generated should be started and linked to the connected trailer.

2.24.4 TRS-REQ-334514/A-TAFE Converted Values

The source of the data used for calculating trailer average fuel economy are distance traveled in meters and fuel consumed in microliters. These are not the units that the final results should be displayed though.

The units to be displayed are provided by FBPM Feature ID 0901.
Refer to Settings in Centerstack for further details on FBMP operation and feature ID 0901.

1- Miles and Gallons
2- Miles and Gallons UK units
3- Liter/100 Km
4- Km/Liter

Average Fuel Economy algorithm shall introduce less than 0.1% error to displayed value.
Shall use kilometer to miles conversion constant of 1/1.609344
Shall use liters to U.S. gallons conversion constant of 1/3.785412
Shall use U.S. gallons to U.K. gallons conversion constant of 0.8326725
Values for each Trailer Average Fuel Economy shall be retained through a Battery Disconnect during key OFF/ACC

2.24.5 TRS-REQ-334515/B-TAFE Reset Values

When a trailer has no average fuel economy data, such as when it is first connected or when trailer data has gone through a reset, the client shall send a value of "---" (3 dash-es) for the first 20 seconds AND 100 meters.

2.24.6 TRS-REQ-334516/A-TAFE Fuel Economy Data

To calculate average fuel economy, total distance traveled (TDT) and total fuel consumed (TFC) for a particular trailer should be stored in internal memory of the client with that particular trailer dataset. Attention must be paid in case of overflow, since the numbers may exceed allocated memory byte size.

2.24.7 TRS-REQ-334517/B-TAFE Total Distance Traveled

Total Distance Traveled (TDT) is the sum of Current Ignition Distance Traveled (CIDT) and Previous Ignition Distance Traveled (PIDT).

The signal that provides distance traveled during the trip is LOdo. This signals max value is up to 50.8m, so client needs to keep track of signal parameter rollover for proper distance tracking. Since LOdo is a periodic signal, at each time the value is received, a new distance should be calculated. This frequency though depends on Client abilities and is left to developers to define the frequency of data accumulation. The important part is to not miss any data.

CIDT = LOdo – Previous LOdo
If LOdo < Previous LOdo //if signal rollover happens
CIDT = LOdo+256 - PreviousLOdo.

TDT =CIDT+PIDT
Calculation above provides the total counter of the odometer value as provide by the can signal. To get the real distance traveled calculations below need to be considered:
Distance in KM = TDT /5000

2.24.8 TRS-REQ-334518/B-TAFE Total Fuel Consumed

Total Fuel Consumed (TFC) is the sum of Current Ignition Fuel Consumed (CIFC) and Previous Ignition Fuel Consumed (PIFC)

The signal that provides this data is LFuelCons. While the signal provides a large value for fuel consumption, we need to protect the variables for any rollover scenario. Since LFuelCons is a periodic signal, a new fuel consumption value needs to be calculated at appropriate timings do no data acquisition is missed. The frequency of data calculation is left to developers.

CIFC = LFuelCons – Previous LFuelCons
If LFuelCons < Previous LFuelCons //if signal parameter rollover happens
CIFC = LFuelCons +1024 - Previous LFuelCons.

TFC= CIFC+PIFC

The values above describe the total raw value as provided by the can signal. To get the physical quantity of the fuel consumed, the below calculations need to done:

Liter Fuel Consumed = TFC /40000 .

2.24.9 TRS-REQ-334544/B-TAFE Displaying Units

As mentioned earlier, the values shown will depend on the vehicle settings. To get Fuel and Distance data converted from one unit to another, below information should be followed.

When Feature Number 0x0901 is Miles and Gallons :
Fuel in Gallons = Fuel in Liters /3.785412
Distance in Miles = Distance in Km /1.609344
Average Fuel Consumption = Distance in Miles / Fuel in Gallons.
Max display value for this setting should be 99.9 units.

When Feature Number 0x0901 is Miles and Gallons (UK only) :
Fuel in UK Gallons = Fuel in Liters * 0.2199688
Distance in Miles = Distance in Km /1.609344
Average fuel Consumption = Distance in Miles/Fuel in UK Gallons
Max display value for this setting should be 99.9 units.

When Feature Number 0x0901 is Liter/100 km :
Fuel in Liters
Distance in Kilometers
Average Fuel Consumption = 100 * Fuel in Liters / Distance in Km
Max display value for this setting should be 99.9 units.

When Feature Number 0x0901 is km /Liter:
Distance in Kilometers
Fuel in Liters
Average Fuel Consumption = Distance in Km / Fuel in Liters.
Max display value for this setting should be 99.9 units.

For EV and Hybrids max display units, no matter what unit type is being displayed, should be 999.9

2.25 TRS-REQ-337297/A-Data Storing

Data that is changeable but need to be retained after an ignition cycle or a power loss, such as odometer values, or average fuel economy data, will need to be store in non volatile memory at least once when ignition status changes to off, the storing can also happen while ignition is in run state.

2.26 TRS-REQ-346111/A-Default Trailer TAFE & Odo

Client should store TAFE and ODO values for default trailer. The client should give the user the ability to reset these values.

2.27 TRS-REQ-346113/A-Odometer 0 Value

For trailer ID = 0, client should not show any Odometer value or TAFE, 0 value or any other value.

For any new trailer, once it is connected, client can show 6 (six) spaces plus a 0 for 0 mileage until that value changes. For any trailer already connected that goes through a data reset, the client can show 6 (six) spaces plus a 0 for 0 mileage until that value changes.

This values displayed on Client HMI, should be the same transmitted through TP for consistency.

2.28 TRS-REQ-365819/B-Content Saving in Client

The Client shall store the data below so that it is available after any restart, due to module power cycle. Some of the data is linked to specific trailer and some is in general.

Active Trailer
Trailer Name
Trailer Distance
Trailer Distance value that is used to calculate Fuel Economy.
Trailer Fuel
Trailer Average Fuel Economy
Connection Notifications (whether on or off)
Trailer Brake Gain
Trailer BLIS Length
Trailer Brake Type
Trailer Brake Effort
Range per Full Charge (where applicable in the program)

Data used in these signals:
LTrlrAxleBmpr
LTrlrBallBmpr
LTrlrTrgBmpr
LTrlrTrgOff

LTrlrAnOffstAng
LTrlrAnOffstDir
LtrlrAidTrgtId
LTrlridSel
LTrlrIdNo

3 Functional Definition

3.1 TRS-FUN-REQ-332818/A-Trailers Operations

3.1.1 Use Cases

3.1.1.1 TRS-UC-REQ-324888/A-Add New Trailer

Actors	Vehicle occupant
Pre-conditions	Vehicle is on. There are less than the max number of trailers stored in the system.
Scenario Description	User navigates through the HMI menu and enters new trailer name (s) and relevant settings.
Post-conditions	Upon saving the changes, the last modified trailer becomes active. Client forwards the trailer name and mileage (0 value) to Server 1. Client forwards all settings associated with the trailer to Server 2. Default data is transmitted if no data has been populated yet.
List of Exception Use Cases	
Interfaces	HMI Vehicle System Interface.

3.1.1.2 TRS-UC-REQ-324889/A-Select Trailer

Actors	Vehicle occupant
Pre-conditions	Vehicle is on. There are multiple trailers stored in the system.
Scenario Description	User navigates through the HMI menu and selects their choice of active trailer.
Post-conditions	Upon saving the changes, the last modified trailer becomes active. Client forwards the trailer name and mileage (0 value) to Server 1. Client forwards all settings associated with the trailer to Server 2. Default data is transmitted if no data has been populated yet.
List of Exception Use Cases	
Interfaces	HMI Vehicle System Interface.

3.1.1.3 TRS-UC-REQ-324890/A-Trailer Type Change

Actors	Vehicle occupant
Pre-conditions	Vehicle is on. There are one or many trailers stored in the system.
Scenario Description	User navigates through the HMI menu and changes the trailer type from 5W/GN to Conventional or vice versa.
Post-conditions	All TBA/TRG and BTT parameters are reset to default values.

List of Exception Use Cases	
Interfaces	HMI Vehicle System Interface.

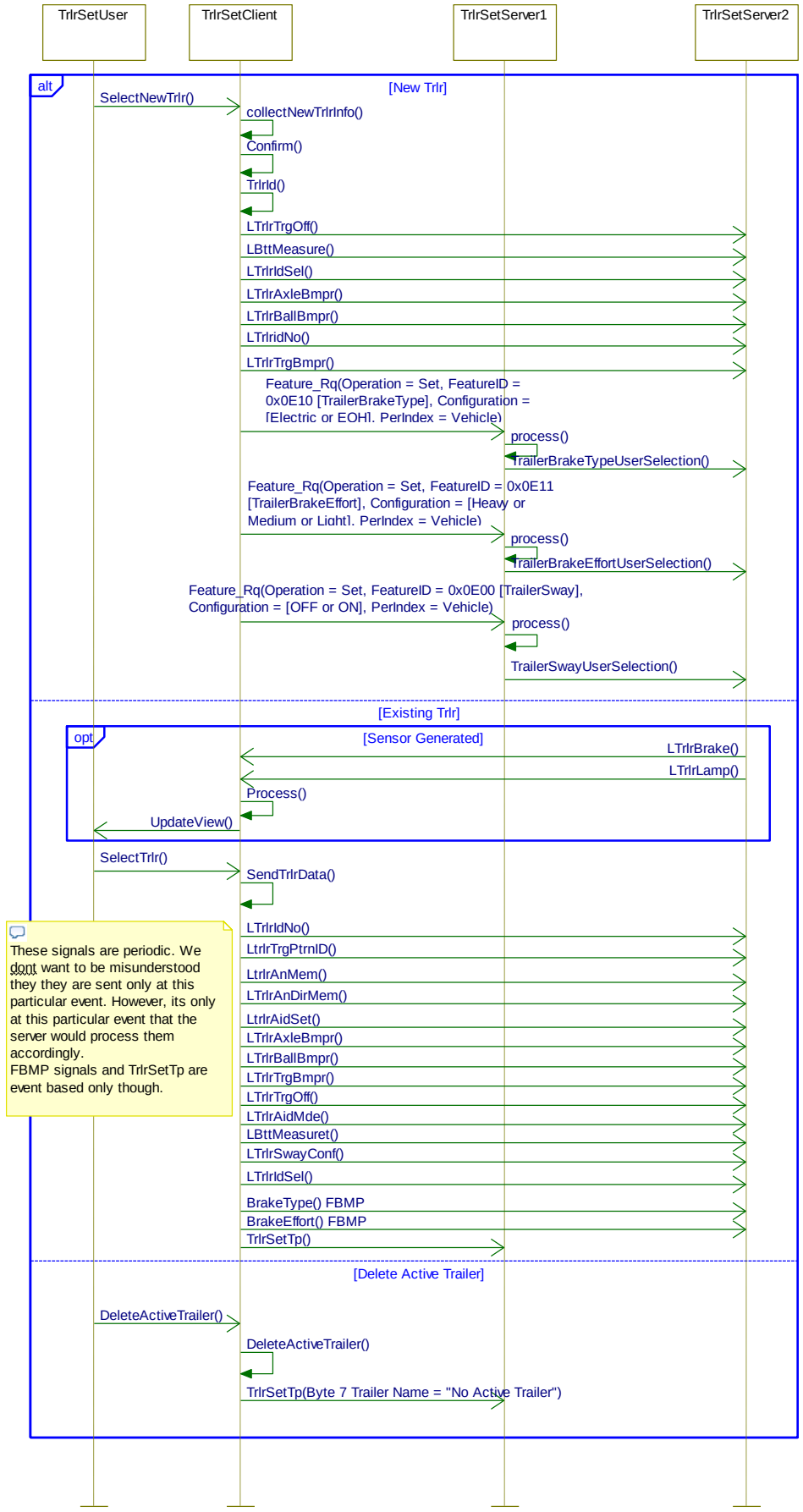
3.1.1.4 TRS-UC-REQ-324891/A-Delete Trailer

Actors	Vehicle occupant
Pre-conditions	Vehicle is on. There is at least one trailer stored in the system.
Scenario Description	User navigates through the HMI menu and selects a trailer to delete
Post-conditions	Trailer and all its related settings and configurations are deleted.
List of Exception Use Cases	
Interfaces	HMI Vehicle System Interface.

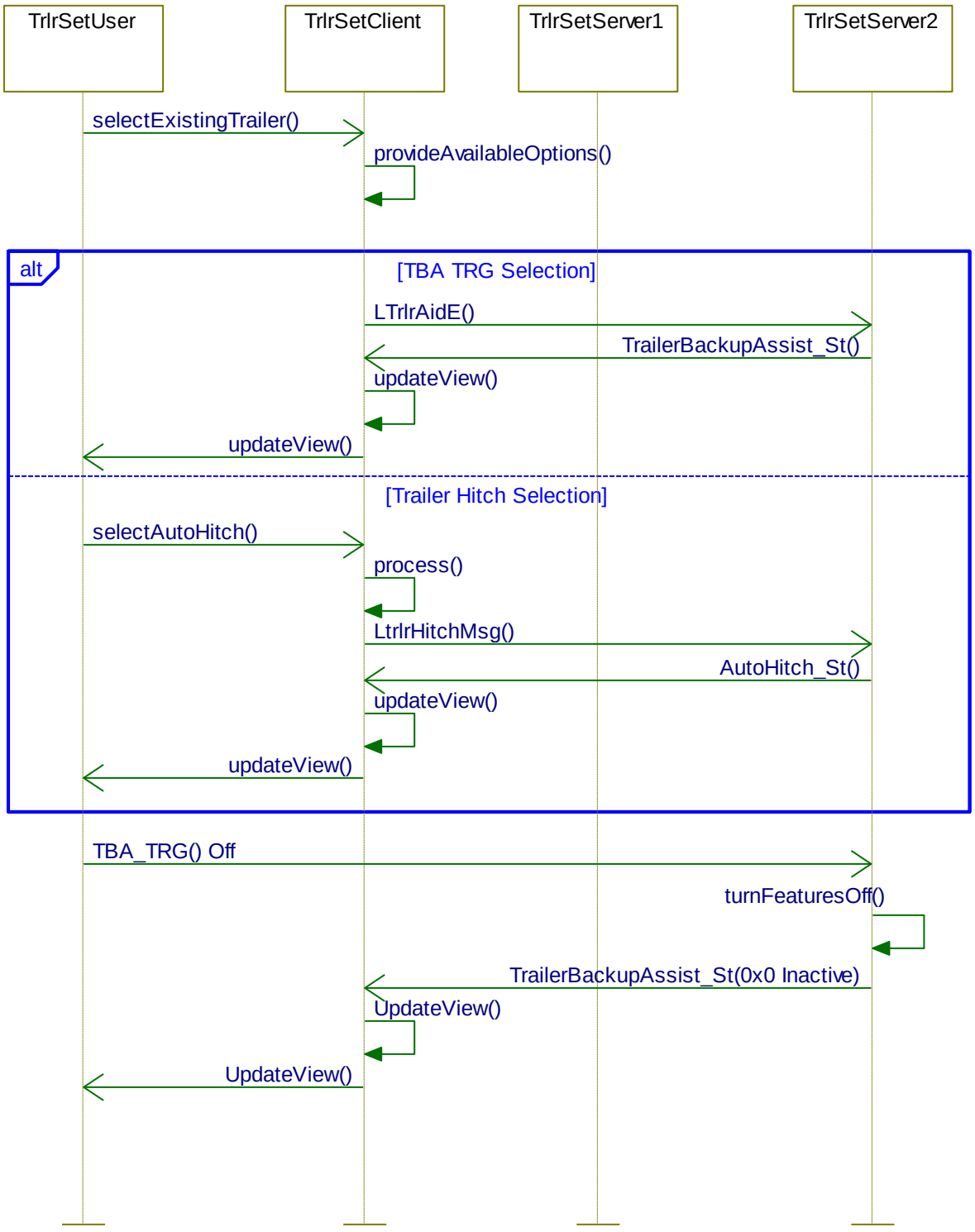
3.1.2 White Box Views

3.1.2.1 Sequence Diagrams

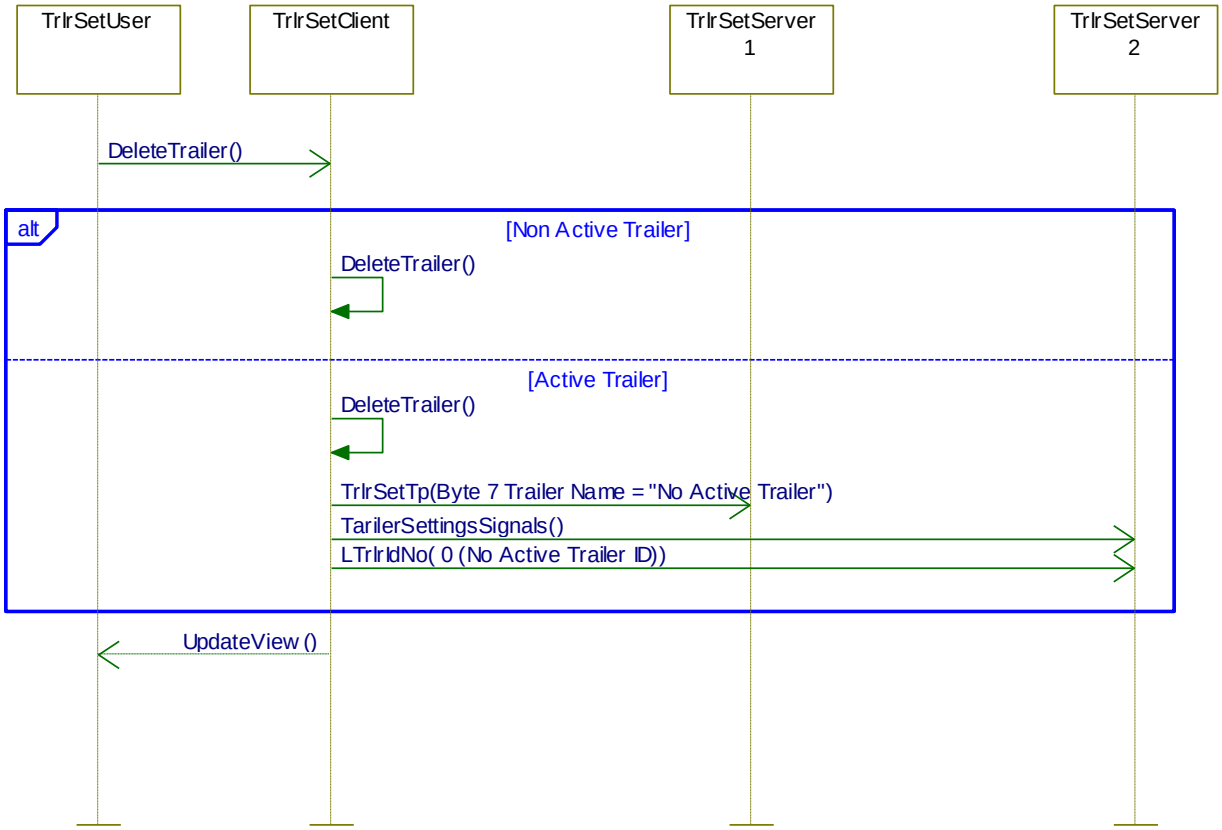
3.1.2.1.1 TRS-SD-REQ-324925/A-Add New Trailer SD


TrlrSetUser
TrlrSetClient
TrlrSetServer1
TrlrSetServer2
alt
[New Trlr]
SelectNewTrlr()
collectNewTrlrInfo()
Confirm()
TrlrId()
LTrlrTrgOff()
LBttMeasure()
LTrlrIdSel()
LTrlrAxleBmpr()
LTrlrBallBmpr()
LTrlridNo()
LTrlrTrgBmpr()
Feature_Rq(Operation = Set, FeatureID = 0x0E10 [TrailerBrakeType], Configuration = [Electric or EOH], PerIndex = Vehicle)
process()
TrailerBrakeTypeUserSelection()
Feature_Rq(Operation = Set, FeatureID = 0x0E11 [TrailerBrakeEffort], Configuration = [Heavy or Medium or Light], PerIndex = Vehicle)
process()
TrailerBrakeEffortUserSelection()
Feature_Rq(Operation = Set, FeatureID = 0x0E00 [TrailerSway], Configuration = [OFF or ON], PerIndex = Vehicle)
process()
TrailerSwayUserSelection()
[Existing Trlr]
opt
[Sensor Generated]
LTrlrBrake()
LTrlrLamp()
Process()
UpdateView()
SelectTrlr()
SendTrlrData()
These signals are periodic. We dont want to be misunderstood they they are sent only at this particular event. However, its only at this particular event that the server would process them accordingly.
FBMP signals and TrlrSetTp are event based only though.
LTrlrIdNo()
LtrlrTrgPtrnID()
LtrlrAnMem()
LTrlrAnDirMem()
LtrlrAidSet()
LTrlrAxleBmpr()
LTrlrBallBmpr()
LTrlrTrgBmpr()
LTrlrTrgOff()
LTrlrAidMde()
LBttMeasuret()
LTrlrSwayConf()
LTrlrIdSel()
BrakeType() FBMP
BrakeEffort() FBMP
TrlrSetTp()
[Delete Active Trailer]
DeleteActiveTrailer()
DeleteActiveTrailer()
TrlrSetTp(Byte 7 Trailer Name = "No Active Trailer")

3.1.2.1.2 TRS-SD-REQ-326528/A-TBA TRG Trailer Selection

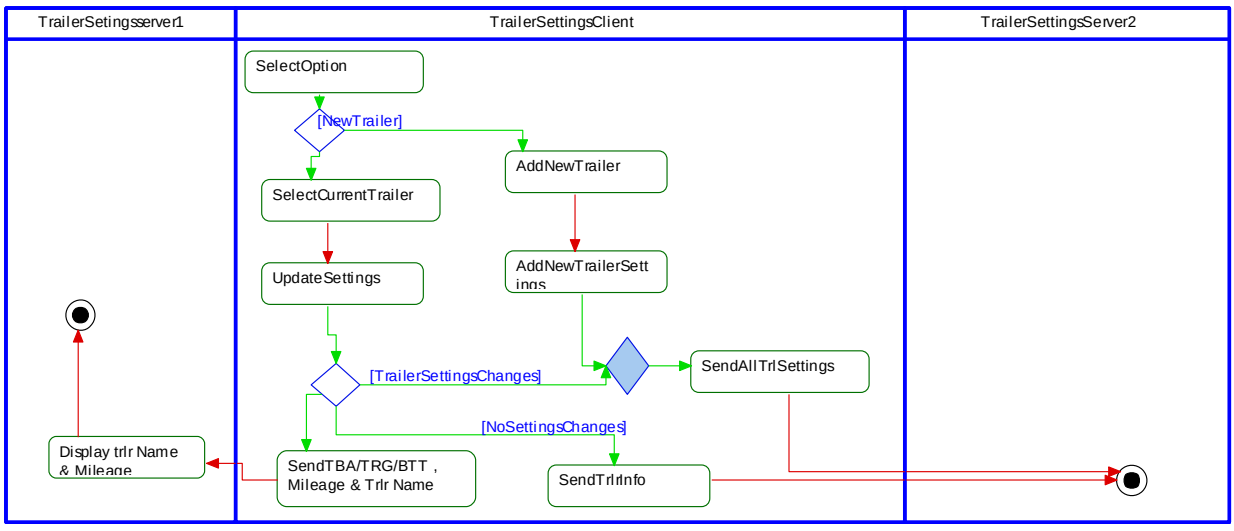


3.1.2.1.3 TRS-SD-REQ-328609/B-Delete Trailer



3.1.2.2 Activity Diagrams

3.1.2.2.1 TRS-ACT-REQ-324926/A-Add New Trailer AD



3.2 TRS-FUN-REQ-332881/A-Trailer Brake Gain

3.2.1 TRS-UC-REQ-332882/A-No Trailer Selection

Actors	User
Pre-conditions	Ignition is On Trailer available in trailer settings configuration. Trailer Brake data already available for the trailers.
Scenario Description	User drives the vehicle but never selects any trailer. User turns ignition Off.
Post-conditions	Client sends this signal LTrlrBrkGainClientTx with a value of 30.
List of Exception Use Cases	
Interfaces	

3.2.2 TRS-UC-REQ-332883/A-Trailer Setup For First Time

Actors	User
Pre-conditions	Ignition is On There are no trailers stored in trailer settings menu .
Scenario Description	User adds a trailer in the settings. Server provides a trailer brake gain value to the client.
Post-conditions	Once a trailer is active Client sends this signal LTrlrBrkGainClientTx with a value of 28. When trailer gets deactivated, the client shall save the value provided by the server through the signal LTrlrBrkGainSerTx.
List of Exception Use Cases	
Interfaces	

3.2.3 TRS-UC-REQ-332884/B-Trailer Brake Gain Normal Operation

Actors	User
Pre-conditions	Ignition is On Trailer available in trailer settings configuration. Trailer Brake data already available for the trailers.
Scenario Description	User selects a trailer. Client send trailer brake gain data to the server through the signal LTrlrBrkGainClientTx with a valid value of 0 -20.
Post-conditions	Once server confirms the value by sending back the same value through the signal LTrlrBrkGainSerTx, client stops sending the previous value and instead now it sends a value of 29 through the signal LTrlrBrkGainClientTx.
List of Exception Use Cases	
Interfaces	

3.2.4 TRS-UC-REQ-332885/A-Brake Gain Server Unresponsive

Actors	User
Pre-conditions	Ignition is On Trailer available in trailer settings configuration. Trailer Brake data already available for the trailers.
Scenario Description	User selects a trailer. Client send trailer brake gain data to the server through the signal LTrlrBrkGainClientTx with a valid value of 0 -20.
Post-conditions	Server doesn't confirm the value received. Client will keep sending the signal LTrlrBrkGainClientTx with the data it has stored previously. Client will not store data provided by LTrlrBrkGainSerTx when trailer gets deactivated.
List of Exception Use Cases	
Interfaces	

3.3 TRS-FUN-REQ-394531/A-Range Per Full Charge

3.3.1 Requirements

3.3.1.1 TRS-REQ-395606/A-Function Availability

The vehicles that will have this function, is determined through DID configuration. For the vehicles that aren't configured , none of the requirements of this function should be executed.

3.3.1.2 TRS-REQ-394538/A-Store Data

When Ltrlid is received with a non zero value, the client shall store the range per full charge provided by signal LTrlRangeVal for the trailer provided in Ltrlid signal. The data storing can be done so that content stays upon ignition cycles.

3.3.1.3 TRS-REQ-394539/A-Active Trailer Update

When the client sets a specific trailer as active, the client shall update the server with the trailer name through LTrlActive signal.

3.3.1.4 TRS-REQ-394540/A-Active Trailer Reset

When the user deletes a trailer or reset an active trailer, the client shall send the signal LtrlReset with the trailer id as a parameter. The client shall transmit this way for 500ms.

3.3.1.5 TRS-REQ-394541/A-Invalid Value

When LtrlRangeVal comes is missing or has an invalid data for a specific trailer ID, the client shall continue to use last known value.

3.3.1.6 TRS-REQ-394543/A-Range Per Full Charge

Whenever a trailer ID is active, client shall forward to Server 1 through TP the data it receives through signal LTrlRangeVal for the particular active trailer. Basically, no matter what trailer info is coming from server 2, client shall only send to server 1 only the info for the active trailer. (The server 2 may send to client all the range values for all the available trailers, hence we need to make a distinction between active trailer and other trailers.)

3.3.1.7 TRS-REQ-395570/A-ID Beyond the Range

LtrlActive, LTrlReset and LTrlid have values that go up to 15, meaning the signals can accommodate up to 16 trailers, but currently Client only accommodates 11 and the 11 is default trailer. If any trailer ID is sent by the server which is above the range, such as ID 12 (meaning the 12th trailer) that ID needs to get ignored and client shouldn't act on anything in particular when those ID get delivered.

3.3.2 Use Cases

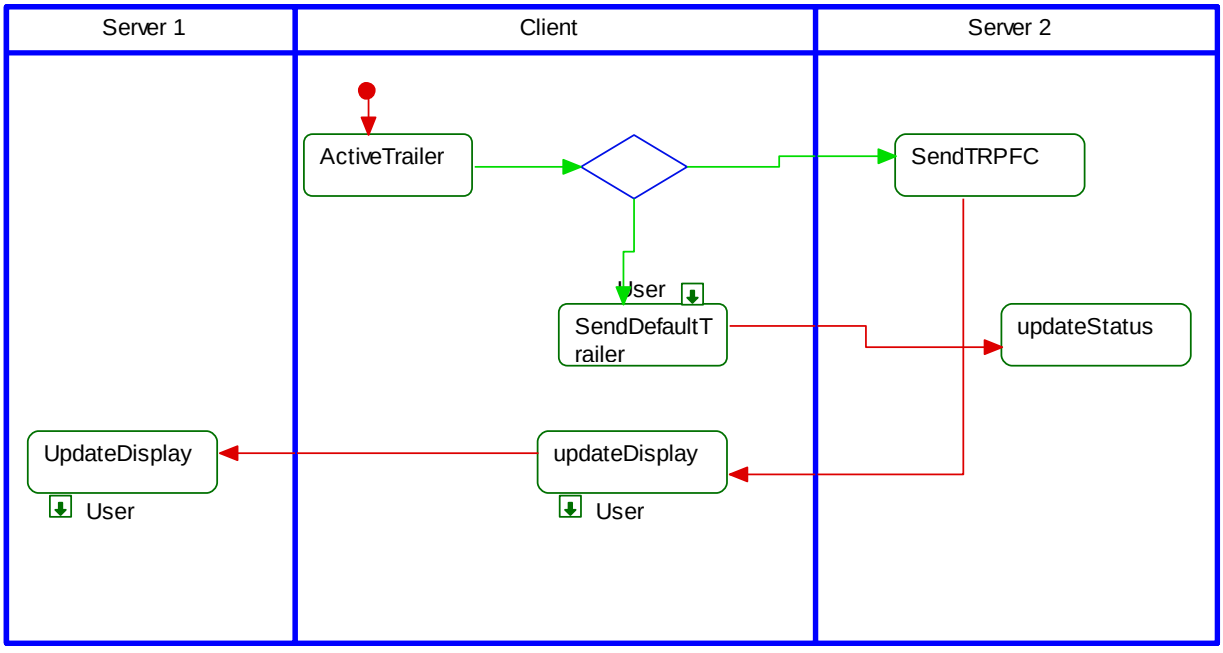
3.3.2.1 TRS-UC-REQ-395607/A-Data Update

Actors	Vehicle user
Pre-conditions	Vehicle is BEV Vehicle has trailer configured
Scenario Description	User selects the trailer. Server 2 sends Range per Full Charge to be displayed.
Post-conditions	Client displays received content. Client forwards received content through TP to Server 1 for display on Server 1 as well.
List of Exception Use Cases	
Interfaces	Client HMI, Server 1

3.3.3 White Box Views

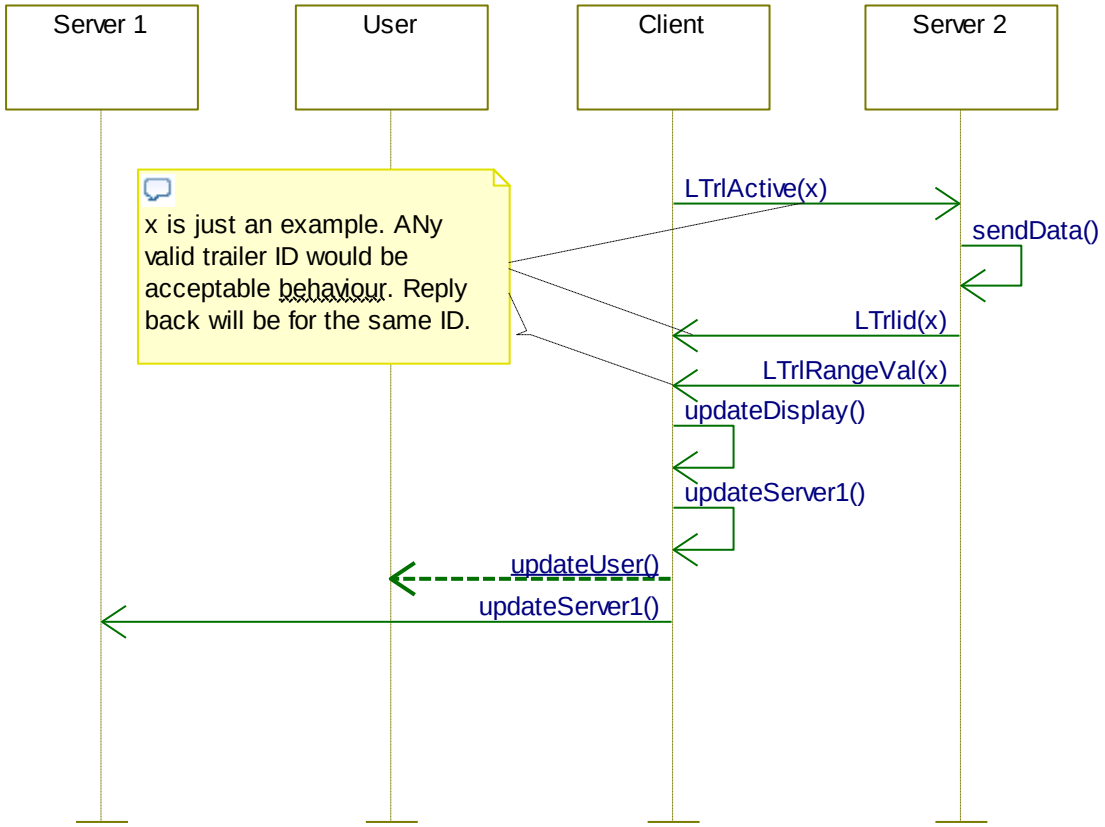
3.3.3.1 Activity Diagrams

3.3.3.1.1 TRS-ACT-REQ-394559/A-Trailer Range Per Full Charge



3.3.3.2 Sequence Diagrams

3.3.3.2.1 TRS-SD-REQ-394560/A-Trailer Range Per Full Charge



3.4 TRS-FUN-REQ-408698/A-BTT 5G

3.4.1 Btt 5G Overview

BTT 5G is a feature that makes use of radars to extend the trailer detection length further than what's being done with BTT feature.
The rest of this function will provide further requirements on how the Client shall communicate with Server to provide BTT 5G feature.

3.4.2 Requirements

3.4.2.1 TRS-REQ-408700/A-Trailer Type. Sod Unavailable

When user selects Fifth Wheel trailer or Gooseneck trailer on Client HMI, the client shall look at LSodLeftSt and LSodRightSt. Only when LSodLeftSt is 0x0 (standby) and LSodRightSt is 0x0 (standby) shall the Trailer Length be processed.

If LSodLeftSt and LSodRightSt have values other than 0x0, or client is unable to receive the values at all, such as when signals go missing, the client could display a Popup. Exact wording and other details can be found in HMI specification.

3.4.2.2 TRS-REQ-408701/A-Trailer Length

Client acquires Trailer Length from the user provided data. It then sends this data to the server.
Due to the changes being made to the feature, we have two signals to provide this trailer length:

LBttMeasure
LBttMeasure1

The values of these signals will depend on trailer types and additional conditions provided here.

3.4.2.2.1 TRS-REQ-408708/A-Conventional Trailer

For Conventional Trailers:
Maximum length of conventional trailer is 33 ft. Any value larger than 33 ft and LBttMeasure shall be set to 0x7F.

LBttMeasure1 shall be set to 0x7F when trailer type is conventional.

For trailer widths greater than 8.5 ft, client shall set LBttMeasure to 0x7F.

3.4.2.2.2 TRS-REQ-408709/A-Unconventional Trailer

If **TrailerType** is gooseneck or 5th wheel, and client receives the signals **LSodLeftSt & LSodRightSt** with the value as standby (0x0), then the minimum valid length shall be 20 feet (6.1m) and the maximum valid length shall be 50 feet (15.2m).

If client is not able to read **LSodLeftSt & LSodRightSt**, or if trailer length is less than 20 feet or greater than 50 feet, **LBttMeasure1** shall be invalid. For an invalid input, the client shall set **LBttMeasure1** equal to hx7F.

If **TrailerWidthRaw** is greater than 8.5ft (2.6m), then client shall set **LBttMeasure1** = hx7F.

3.4.2.2.3 TRS-REQ-409085/A-Trailer Length Not Available

If the length of a trailer has not been entered, client shall set **LBttMeasure** and **LBttMeasure1** equal to NO DATA EXISTS (hx7E) for the respective trailer type.

3.4.2.2.4 TRS-REQ-409188/A-Trailer Type to Trailer Length Relationship

TrailerType	LBttMeasure	LBttMeasure1
Conventional	Valid (3-33ft)	0x7F – Invalid (unsupported trailer type)
Conventional	hx7F - Invalid (less then 3ft or greater than 33ft)	0x7F – Invalid (unsupported trailer type)
Conventional	hx7E – No Data	0x7F – Invalid (unsupported trailer type)
5th Wheel or Gooseneck	Don't Care	Valid (20-50ft)
5th Wheel or Gooseneck	hx7F - Invalid (unsupported trailer type)	0x7F - Invalid (less then 20ft or greater than 50ft)
5th Wheel or Gooseneck	hx7F - Invalid (unsupported trailer type)	0x7E – No Data
5th Wheel or Gooseneck	hx7F - Invalid (unsupported trailer type)	0x7F – Invalid (no AUX radars)
Not Inputted	hx7E – No Data or	hx7E – No Data or

3.4.2.3 TRS-REQ-410765/A-Lost Signals

If LBttLeftSt & LBttRightSt signals go missing for a 5 period timeframe, the client shall notify the user. A diagnostic code could be set. Refer to HMI per proper notification requirements.

3.4.2.4 TRS-REQ-408702/A-Delayed Check

Client shall not read or not process BTT5G CAN signals **LSodLeftSt & LSodRightSt** for up to 1.5 seconds, after vehicle ignition status becomes ON. This gives the server enough time to calibrate and check itself. The signal content is not reliable until after 1.5 seconds.

3.4.2.5 TRS-REQ-410846/B-BTT 5G Status

APIM shall know BTT5G feature status from **LSodAltSt**, **BttFault**, and **LBttMeasure1.** LSodAltSt, BttFault, and LBttMeasure1 rows are AND-ed.

BTT5G Feature Status	LSodAltSt	BttFault	LBttMeasure1
Active	0x1 or 0x2	0x0 or 0x1 or 0x2	Hx0A to Hx66
Inactive	0x0	Don't Care	Hx7E
	Don't Care	0x3 or 0x4 or 0x5 or 0x6	Don't Care
Fault	0x3 or missing	0x7 (BTT5G Fault)	Hx0A to Hx66
	0x3	0x7 (BTT5G Fault)	Hx7F or Hx00 to H09 or Hx67 to Hx7D

LSodLeftSt & LSodRightSt are ANDed to provide the final result that can be used for LSodAltSt.
LBttLeftSt & LBttRightSt are ANDed to provide the final result that can be used for BttFault.

3.4.2.6 TRS-REQ-410847/A-BTT 5G Configuration

When BTT5G is disabled per VSCS then client shall ignore any CAN signals or logic that has the ability to modify the state of this feature.

3.4.3 Use Cases

3.4.3.1 TRS-UC-REQ-410734/A-Btt 5G Valid Values Input

Actors	Vehicle Occupant
Pre-conditions	• Vehicle is in Run/Start • BTT5G radars are connected and available on the bus.
Scenario Description	User enters an unconventional trailer, equal to or larger than 20ft, or equal to or smaller than 50.
Post-conditions	System accepts the input data and feature operates properly.
List of Exception Use Cases	E1 – Vehicle is not RUN/START E2 – Loss of communication with BTT5G radars
Interfaces	

3.4.3.2 TRS-UC-REQ-410735/A-Btt 5G Invalid Values Input

Actors	Vehicle Occupant
Pre-conditions	• Vehicle is in Run/Start • BTT5G radars are connected and is available on the bus.
Scenario Description	User enters an unconventional trailer, larger than 50ft or smaller than 20.
Post-conditions	User gets information indicating that data length is not supported by BLIS.
List of Exception Use Cases	E1 – Vehicle is not RUN/START E2 – Loss of communication with BTT5G radars
Interfaces	

3.4.3.3 TRS-UC-REQ-410737/A-Btt 5G Invalid Trailer

Actors	Vehicle Occupant
Pre-conditions	• Vehicle is in Run/Start • BTT5G radars are connected and is available on the bus.
Scenario Description	User enters a conventional trailer, larger than 33 ft.
Post-conditions	User gets information indicating that data length is not supported by BLIS.
List of Exception Use Cases	E1 – Vehicle is not RUN/START
Interfaces	

3.5 TRS-FUN-REQ-436278/A-Trailer 360

3.5.1 Overview

Trailer 360 is an additional menu to Trailer Settings feature. This new change becomes operational and fully functional and requirements below fully applicable only when LTConnectCamera is Yes.

3.5.2 Requirements

3.5.2.1 TRS-REQ-436265/A-TBA2 Calibration

To initiate a TBA2 calibration (refer to client HMI spec when this step is needed), client follows the below process:
Client transmits LTrlrAidSet 0x01
Client shall transmit signal above (LTrlrAidSet) with parameter 0x01 until client receives the signal LtSetCalib =0x5
Once signal LtSetCalib comes with the value 0x5, client shall retransmit LTrlrAidSet with the value 0x00

3.5.2.2 Trailer Angle Detection

Trailer Angle Detection (TAD) Calibration is an activity that Trailer settings needs to do before Trailer 360 can be activated. Once we have a successful TAD, Trailer 360 does a Camera Calibration and then user can fully interface and benefit from Trailer 360 feature. TAD calibration is done through a multitude of signals described below. Some of the signals however are main components of TBA2 and this feature being closely related to TBA2, the TBA2 signals have not been redefined in Trailer Settings.

3.5.2.2.1 TRS-REQ-437298/A-Requesting TAD Calibration

To initiate TAD calibration client transmits the following signal with the parameter below:
TrlrAidSetup_D2_Rq = 0x01 (Begin Setup)

The information contained in this document is Proprietary to Ford Motor Company.

3.5.2.2.2 TRS-REQ-437299/A-Client Displays TAD Calibration Instructions

Showing calibration instructions is done per server request. The server will send the following signals:
TrlrAidSetup_D2_Stat > 0x00 and TrlrAidSetup_D2_Stat<0x05
TrlrAidEnbl_D2_Stat = 0x03 (TBAOffTRGSetup)

The instructions displayed in client HMI will be displayed according to TrlrAidMsgTxt_D2_Stat signal. Reference the HMI status coding spec for displaying the TAD calibration instructions (SYNC4_TBA2_HmiStatus_Coding)

If (Trailer_Measurement_Cfg is equal to 0x0 (NoMeasurement) or ((Trailer Type is equal to 5th wheel or Gooseneck) and TBA_5thWheel_Support_Cfg is equal to true) then the client should also store LTrlrAnDirMem equal to 0x1 for the active trailer profile when TrailerBackupAssist_St is > 0x2 and server 2 should be updated.

3.5.2.2.3 TRS-REQ-437300/A-TAD Calibration Completed

If client sends the following signal:
TrlrAidSetup _D2_Stat = 0x05 (SetupAcquisitionSuccess)

Client shall proceed with the signals like below:
-TrlrAidSetup_D2_Rq = 0x0
-TrlrRvrseCancl_B_Rq = 0x0

3.5.2.2.4 TRS-REQ-437301/A-User Requests to Cancel during TAD Calibration

If the user selects the cancel button during the TAD calibration, then client shall send the following signal:
TrlrRvrseCancl_B_Rq = 0x01

3.5.2.2.5 TRS-REQ-437302/A-Client Fails or Cancels TAD Request

If one of the following conditions is met:

- Server has not responded to the TrlrAidSetup_D2_Rq signal after 5 seconds (TrlrAidSetup_D2_Stat has not changed or TrlrAidEnbl_D2_Stat has not change after 5 seconds) OR
- TrlrAidSetup _D2_Stat changes from a value between 0x1 and 0x4 to 0x0

Then client shall send the following signals:
TrailerAidSetup_D2_Rq = 0x0
TrlrCamraCalib_D_Rq = 0x0
TrlrRvrseCancl_B_Rq = 0x0

3.5.2.3 TRS-REQ-432063/A-Camera Calibration Procedure

Upon successful TBA2 calibration, client requests camera calibration through the signal LCamraCalibRq- 0x1 (Calibration request).

Upon server transmitting the signal LCamraCalibSt 0x1(calibrating) the Client shall change the value of LCamraCalibRq- 0x0 (Calibration not requested) .

3.5.2.4 TRS-REQ-435517/A-Measurement Setup Cancelation

If measurement setup is canceled, reset the signals below to 0.
TrlrCamraCalib_D_Rq = 0x00 (No Request)
TrlrAidSetup_D2_Rq = 0x00 (Inactive)

3.5.3 Use Cases

3.5.3.1 TRS-UC-REQ-431697/A-Trailer 360 Soft Button Activation

Actors	Vehicle Occupant
Pre-conditions	Trailer 360 system is not connected Vehicle in Run/Start
Scenario Description	Trailer 360 system becomes connected to the vehicle.
Post-conditions	Various views soft buttons become available. For a complete list refer to HMI documentation.
List of Exception Use Cases	E1 – Vehicle is not RUN/START E2 – Loss of communication with IPMB module E3 – Valid camera video signal not present
Interfaces	

3.5.3.2 TRS-UC-REQ-431698/A-Trailer 360 Soft Button Deactivation

Actors	Vehicle Occupant
Pre-conditions	Trailer 360 system is connected Vehicle in Run/Start
Scenario Description	Trailer 360 system becomes disconnected to the vehicle
Post-conditions	Trailer 360 soft buttons become deactivated.
List of Exception Use Cases	E1 – Vehicle is not RUN/START E2 – Loss of communication with IPMB module E3 – Valid camera video signal not present
Interfaces	

3.5.3.3 TRS-UC-REQ-431703/A-TBA2 Trailer Left View selection in TBA or TRG

Actors	Vehicle Occupant
Pre-conditions	Vehicle in Run/Start Customer is in TBA or TRG
Scenario Description	Customer presses the TBA2 Trailer Left View soft button
Post-conditions	Client requests Trailer Left View. Server responds back with the requested view.
List of Exception Use Cases	
Interfaces	

3.5.3.4 TRS-UC-REQ-431705/A-TBA2 Trailer Right View in TBA or TRG

Actors	Vehicle Occupant
Pre-conditions	Vehicle in Run/Start

	Customer is in TBA or TRG
Scenario Description	Customer presses the TBA2 Trailer Right view soft button
Post-conditions	Client requests TBA2 Trailer Right View Server replies back with the view status.
List of Exception Use Cases	E1 – Vehicle is not RUN/START E2 – Loss of communication with IPMB module E3 – Valid camera video signal not present
Interfaces	

3.5.3.5 TRS-UC-REQ-431707/A-Trailer 360 Setup Menu Activation

Actors	Vehicle Occupant
Pre-conditions	Trailer 360 system is not connected Vehicle in Run/Start
Scenario Description	Trailer 360 system becomes connected to the vehicle.
Post-conditions	The Trailer 360 setup menu shall become available in the trailer profile settings menu.
List of Exception Use Cases	E1 – Vehicle is not RUN/START E2 – Loss of communication with IPMB module E3 – Valid camera video signal not present
Interfaces	

3.5.3.6 TRS-UC-REQ-431711/A-Trailer 360 Measurements - Customer has not entered Trailer Length or Trailer Width

Actors	Vehicle Occupant
Pre-conditions	Trailer 360 system is connected Trailer Length has not been entered Trailer Width has not been entered Vehicle in Run/Start
Scenario Description	The customer has entered the Trailer 360 setup menu and has not previously entered Trailer Length
Post-conditions	Client shall provide the user with the option to enter Trailer Length and Trailer Width.
List of Exception Use Cases	E1 – Vehicle is not RUN/START E2 – Loss of communication with IPMB module E3 – Valid camera video signal not present
Interfaces	

3.5.3.7 TRS-UC-REQ-441257/A-Trailer 360 Measurements - Customer has not entered Trailer Hitch to Box measurements

Actors	Vehicle Occupant
Pre-conditions	Trailer type is conventional Trailer 360 system is connected Trailer hitch content has not been entered by the user. Vehicle in Run/Start

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Scenario Description	The customer has entered the Trailer 360 setup menu.
Post-conditions	Client shall provide the user with the option to enter missing Trailer Hitch content.
List of Exception Use Cases	E1 – Vehicle is not RUN/START E2 – Loss of communication with IPMB module E3 – Valid camera video signal not present
Interfaces	

3.5.3.8 TRS-UC-REQ-431713/A-Trailer 360 Measurements - Customer has entered trailer type, trailer length, trailer width, and hitch to box measurement

Actors	Vehicle Occupant
Pre-conditions	Trailer Camera Height has been entered Trailer Type has been entered Trailer Length has been entered Trailer Width has been entered Trailer Hitch to Box measurement has been entered if it is a conventional trailer Vehicle in Run/Start
Scenario Description	The customer has confirmed all Trailer 360 measurements.
Post-conditions	Client shall send the data to the server.
List of Exception Use Cases	E1 – Vehicle is not RUN/START E2 – Loss of communication with IPMB module E3 – Valid camera video signal not present
Interfaces	

3.5.3.9 TRS-UC-REQ-431719/A-Trailer 360 Measurements - Customer has entered all measurements and TAD calibration is complete

Actors	Vehicle Occupant
Pre-conditions	Trailer 360 system is connected Trailer 360 measurements have been entered Vehicle in Run/Start
Scenario Description	Angle calibration has been completed. Camera calibration to start.
Post-conditions	Client request camera calibration. Server provides calibration status complete state. Client stops calibration request. Server provides camera view.
List of Exception Use Cases	E1 – Vehicle is not RUN/START E2 – Loss of communication with IPMB module E3 – Valid camera video signal not present
Interfaces	

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3.5.3.10 TRS-UC-REQ-431721/A-Trailer 360 Setup Menu Deactivation

Actors	Vehicle User
Pre-conditions	Client and Server are configured for Trailer 360 Vehicle is in Run/Start
Scenario Description	Trailer 360 becomes disconnected.
Post-conditions	The Trailer 360 setup menu shall become unavailable. Client HMI screen might display a message. Refer to HMI spec for further details.
List of Exception Use Cases	E1 – Vehicle is not RUN/START E2 – Loss of communication with IPMB module E3 – Valid camera video signal not present.
Interfaces	

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4 Appendix: Reference Documents

Reference #	Document Title
1	Transport Protocol APIM SPSS v1.19 and later.
2	Feature Based Messaging Protocol APIM SPSS v 1.3 and later
3	SYNC4_TBA_Trailer_Measurements v1.0 and later.
4	SYNC4_TBA2_HmiStatus_Coding v1.0 and later.