Research & Vehicle Technology
"Infotainment Systems Product Development"

Feature – Power Management

APIM Infotainment Subsystem Part Specific Specification (SPSS)

Version 1.18

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Version Date: September 28, 2022

FORD CONFIDENTIAL

Revision History

Date	Version	Notes	
May 30, 2013	**1.0**	**Initial Release**	
October 24, 2013	**1.1**		
	PWRMAN-GREQ-289985-2-MMInactive_Sleep Power Mode Diagram		<jmyslin2> Update to include Extended Play to exit MMInactive state
	PWRMAN-GREQ-40686-3-EFP Load Shed		jmyslin2 - Updated requirement so EFP not supporting load shed for infotainment
	PWRMANv2-GREQ-278270-2-EFP Load Shed		jmyslin2: updated to state load shed functionality not supported by EFP
	PWRMAN-GREQ-60372-4-Button Activation in Sleep Power Mode		<jmyslin2> specifically called out EFP Power and Eject buttons to wake up the bus
	PWRMAN-GREQ-293723-2-Legacy vehicles support		<Richard Englart> updated requirement
	PWRMAN-GREQ-293730-2-Legacy vehicles support 2		<Richard Englert> Requirement deleted
	PWRMAN-GREQ-293731-2-Special clause for F-150 Raptor splash screen		<Richard Englert> Requirement Deleted
	PWRMAN-GREQ-293732-2-Purpose of DE01 Byte 3		<Richard Englert> Updated Requirement
	PWRMAN-GREQ-293733-2-Animations Table		<Richard Englert> Updated Requirement
	PWRMAN-GREQ-293734-2-Registry requirements		<Richard Englert> Updated Requirement
	PWRMAN-GREQ-293735-2-Custom splash screens provisioned or included in base image		<Richard Englert> Updated Requirement
	PWRMAN-GREQ-293736-2-Graphics beyond splash screens		<Richard Englert> Updated Relaed
	PWRMAN-GREQ-293737-2-Prevent mis-application		<Richard Englert>
	PWRMAN-GREQ-298078-2-Splash Screen Playback		<Richard Englert> Updated requirement
	PWRMAN-GREQ-304564-1-Special clause for F-150 Raptor splash screen		<Richard Englert> New Requirement
August 14, 2014	**1.2**		
	STR-090277/B-Architecture Design (TcSE ROIN-289962)		Updated Power Mode States with System State information
December 9, 2015	**1.3**		
	PWRMAN-SR-REQ-014466/D-Network Management (TcSE ROIN-40615-5)+		<JM> Updated for Remote CD
	PWRMANv2-SR-REQ-014519/F-Transport Mode (TcSE ROIN-278271-1)		<JM> updated Transport Mode requirement so that Transport mode is only exited while Transport Mode is active when the engine is running in CGEA 1.3
	PWRMAN-SR-REQ-030665/C-Button Activation in Sleep Power Mode (TcSE ROIN-60372-4)+		<jmyslin2> added clarification that the System Master receives Power and Eject buttons within T1 Ready to Receive is 100 msec.
	PWRMAN-SR-REQ-030665/E-Button Activation in Sleep Power Mode (TcSE ROIN-60372-4)		<jmyslin2> Updated to include Rear Power Button waking up the info-CAN bus and system master ready to receive within 100 msec of CAN bus wake-up
June 28, 2016	**1.4**		
	PWRMANv3-SR-REQ-033881/C-System Master Power Moding (TcSE ROIN-289984-3)+		<jmyslin2 May 26th, 2016> added in error handling for Crank so HMIAudioMode = ON after crank event ended (for example if AHU resets during crank it will see HMIAudioMode = ON right after crank ends)
	PWRMAN-FUN-REQ-033906/C-Load Shed Strategy (TcSE ROIN-289949-1)		<jmyslin2> Someone load shed requirements where removed from earlier specs but they are added back in
September 26, 2016	**1.5**		
	PWRMAN-FUN-REQ-233261/B-Phone as a Key - Phone Charging Power Moding		<jmyslin2> New function for modules that can charge a Phone (ex with USB ports) to support the Phone as a Key power moding for phone charging ports. Needs to be supported if on a vehicle with Phone as a Key
February 1, 2017	**1.6**		
	PWRMAN-FUN-REQ-235503/B-Key Off Load Power Management		<Sibu Varughese / jmyslin2> Updates per Sibu Varughese from Power Supply on supporting the KOL Mode power mode signal.

	PWRMAN-FUN-REQ-235584/A-Factory Mode	<Sibu Varughese / jmyslin2> Updates per Sibu Varughese for infotainment Factory mode
November 13, 2017	**1.7**	
	PWRMAN-IIR-REQ-212171/D-Power Management Interface Requirements - APIM Gen 3	<jmyslin2> added Factory mode to the encoding for lifecyclemode_D_Actl
	MD-REQ-273358/A-HMIAudioMode	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273495/A-Veh_Lock_Status	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273497/A-DriverDoorStatus	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273720/A-PassengerDoorStatus	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273721/A-CarMode+	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273721/B-CarMode	<jmyslin2> clarification added for CGEA 1.2, C1MCA and CGEA 1.3 for CarMode
	MD-REQ-273722/A-_Battery_Mgmt_2	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273727/A-ActvNse_B_Actv	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273747/A-PwPckTq_D_Stat	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273748/A-Eng_D_Stat	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273749/A-Audio_AMP.St	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273750/A-Ignition_Status	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273762/A-Delay_Acc	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273763/A-PrsnIDevChrgEnbl_B_Rq	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	MD-REQ-273764/A-KeyOffMde_D_Actl.St	<jmyslin2> Put interface table description in MD form. Not requirement content change and only a clarification and formatting update
	PWRMAN-SR-REQ-014466/H-Network Management (TcSE ROIN-40615-5)	<jmyslin2> added clarification for EFP on info-CAN
	PWRMAN-SR-REQ-014509/E-Infotainment Components Load Shed State requirements (TcSE ROIN-66172-3)	<jmyslin2> added clarifications to requirement
	PWRMAN-SR-REQ-014512/C-Load Shed and High Criticality features (TcSE ROIN-40683-3)	<jmyslin2> updated load shed requirement for phone as a key phone charging
	PWRMAN-SR-REQ-235509/I-KOL Mode Signal power management usage	<jmyslin2> updated additional definitions for critical battery usages for the Infotainment System Master
April 6, 2018	**1.8**	
	MD-REQ-273358/B-HMIAudioMode	<jmyslin2> Formatting Update. No content change
	MD-REQ-295565/A-VehOnSrc_D_Stat	<jmyslin2> New power mode signal
	MD-REQ-295417/A-KeyOffPwMde_D_Stat	<jmyslin2> New MD interface requirement
	MD-REQ-295418/A-InfoSysMasterPw_D_Stat	<Jmyslin2> New MD interface requirement
	PWRMAN-FUN-REQ-235503/C-Key Off Load Mode signal Power Management	<jmyslin2> Updated name of function
	PWRMAN-SR-REQ-235509/J-KOL Mode Signal power management usage	<jmyslin2> Nothing changed. Power supply added requirements then removed them so this rev level is the same as the previous.

	PWRMAN-FUN-REQ-295539/A-OTA VehOnSrc_D_Stat Power Moding	<jmyslin2> New Function for OTA VehOnSrc_D_Stat power moding
	PWRMAN-FUN-REQ-295414/A-Key OFF Power Moding - ECG and Infotainment System Master	<jmyslin2> New function to support Key OFF power moding for features such as over the air updates for FNV2
	PWRMAN-CLD-REQ-295454/A-ISM KeyOff Power Mode Server	<Jmyslin2> New Class Description
	PWRMAN-CLD-REQ-295455/A-ECG KeyOff Power Mode Client/Master	<jmyslin2> New Class Description
	PWRMAN-SR-REQ-298572/A-CAN bus while Ethernet Network is awake	<jmyslin2> New Requirement
	PWRMAN-STM-REQ-298575/A-ISM Power Moding State Diagram	<jmyslin2> New requirement
	PWRMAN-SR-REQ-298568/A-ECG usage of KeyOffPwMde_D_Stat signal	<jmyslin2> new requirement
	PWRMAN-SR-REQ-298258/A-ISM usage of KeyOffPwMde_D_Stat signal	<jmyslin2> New requirement
	PWRMAN-SR-REQ-295421/A-ISM usage of the InfoSysMasterPw_D_Stat signal	<jmyslin2> New requirement
	PWRMAN-SR-REQ-298569/A-ECG usage of the InfoSysMasterPw_D_Stat signal	<jmyslin2> New Requirement
	PWRMAN-SR-REQ-295462/A-ISM Powered up locally to support an ECG controlled Key-Off feature	<jmyslin2> New requirement
	PWRMAN-SR-REQ-295464/A-ISM internal hardware shutdown for hardware not needed for Key Off feature	<jmyslin2> New Requirement
	PWRMAN-SR-REQ-295465/A-Vehicle Low Power states and impact on ISM when KeyOffPwMde_D_Stat = ON	<jmyslin2> new requirement
	PWRMAN-SR-REQ-295419/A-OTA Network Management	<jmyslin2> New requirement
	PWRMAN-SD-REQ-298341/A-System Start up for ECG initiated Key Off feature	<jmyslin2> new requirement
May 8, 2019	**1.9**	
	MD-REQ-273495/B-Veh_Lock_Status	MBORREL4: Corrected encodings
	MD-REQ-273721/C-LifeCycMde_D_Actl / CarMode	<jmyslin2> added additional detail with Life Cycle mode signal. No content change, clarification only
	PWRMAN-SR-REQ-014468/D-Bus wake-up transition times from Sleep Power Mode (TcSE ROIN-40700-3)	<jmyslin2> added a comment for ready to receive. No content change
	PWRMAN-SR-REQ-014473/C-System Master timing to send HMIAudioMode (TcSE ROIN-40705-2)+	<jmyslin2> Added a note about predictive triggers when the Infotainment System Master boot-up time is longer than the timing in the requirement
	PWRMAN-SR-REQ-014473/D-System Master timing to send HMIAudioMode (TcSE ROIN-40705-2)+	jmyslin2 - added note about approach detection predictive trigger signals
	PWRMAN-SR-REQ-014473/E-System Master timing to send HMIAudioMode (TcSE ROIN-40705-2)	<jmyslin2> removed comment to set HMIAudioMode = ON when ready to support command and controls since SYNC is not doing it this way currently
	PWRMAN-SR-REQ-014477/D-Infotainment System States (TcSE ROIN-40610-3)	<jmyslin2> Updated chimes through the audio system, phone as a key, ECG key off power moding
	PWRMANv2-SR-REQ-014519/I-Transport Mode (TcSE ROIN-278271-1)	<jmyslin2> No content change. Only added LifeCycMde_D_Actl signal name update
	PWRMAN-SR-REQ-014520/G-Transport Mode and CGEA Chimes (TcSE ROIN-40663-3)	<jmyslin2> No content change. Updated requirement to add LifeCycMde_D_Actl for naming only
	PWRMAN-FUN-REQ-350922/A-Existing Transport Mode to Normal Mode and restoring factory defaults	<jmyslin2> New function for exiting transport mode
	PWRMAN-SR-REQ-346790/A-Exiting Transport Mode to Normal Mode and restoring Factory Defaults	jmyslin2 - New requirement for APIM restoring factory defaults when exit transport mode to normal mode
January 21, 2020	**1.10**	
	STR-345588/C-Interface Requirements - APIM	jmyslin2: updated name
	PWRMAN-IIR-REQ-212171/F-Power Management Interface Requirements - APIM	jmyslin2: added MD's
	MD-REQ-273358/C-HMIAudioMode	<jmyslin2> added clarification on signal name
	MD-REQ-372099/A-Remote_Start_Status	<jmyslin2> New MD for remote start status
	MD-REQ-372100/A-PlgActvArb_B_Dsply	<jmyslin2> New MD for whether charge cord is plug in or not
	MD-REQ-372987/A-RearLeftDoorStatus	<jmyslin2> New MD for rear left door status
	MD-REQ-372988/A-RearRightDoorStatus	<jmyslin2> New MD for the rear right door status
	MD-REQ-372989/A-TailgateDecklidStatus	<jmyslin2> New MD for the tailgate/decklid status
	MD-REQ-372990/A-LiftgateStatus	<jmyslin2> New MD for the liftgate status
	PWRMAN-CLD-REQ-031234/B-System Power Mode Master - APIM (TcSE ROIN-282928-1)	jmyslin2: added predictive trigger requirement

	PWRMAN-SR-REQ-324997/B-Predictive Triggers - APIM	<jmyslin2> added additional predictive triggers
	PWRMAN-SR-REQ-233262/E-Phone as a Key - Phone Charging power moding	<jmyslin2> added clarification. No content change
February 25, 2020	**1.11**	
	PWRMAN-IIR-REQ-212171/G-Power Management Interface Requirements - APIM	jmyslin2: added new signals for Stop Mode and Clear Exit Assist
	MD-REQ-273764/B-KeyOffMde_D_Actl.St	jmyslin2: no change, ignore revision
	MD-REQ-378492/A-PwLoApim_T_Actl	jmyslin2: New MD requirement
	MD-REQ-359588/A-ClrExitAsstActv_B_Rq	jmyslin2: New MD for Clear Exit Assist
	PWRMAN-SR-REQ-324997/C-Predictive Triggers - APIM	jmyslin2: added note about remembering the last signal state
	PWRMAN-SR-REQ-014477/E-Infotainment System States (TcSE ROIN-40610-3)	jmyslin2: updated requirement with Stop Mode
	STR-090280/H-Functional Definition (TcSE ROIN-289966)	jmyslin2: added Stop Power Mode function, added Clear Exit Assist power mode function
	PWRMAN-SR-REQ-014509/F-Infotainment Components Load Shed State requirements (TcSE ROIN-66172-3)	jmyslin2: added clarification to the requirement for SYNC 4.2
	PWRMAN-FUN-REQ-377259/A-Stop Mode	<jmyslin2> New function for Stop Mode
	PWRMAN-REQ-377764/A-Stop Mode - Powering down internal power sources	<jmyslin2> New Requirement
	PWRMAN-SR-REQ-377933/A-Battery State of Charge Server usage of PwLoApim_T_Actl signal	jmyslin2: New Requirement
	PWRMAN-SR-REQ-379474/A-Infotainment System Master internal timer based on the PwLoApim_T_Actl signal	jmyslin2: New requirement
	PWRMAN-SR-REQ-377707/A-Entering Stop Mode via the PwLoApim_T_Actl signal	<jmyslin2> New requirement
	PWRMAN-SR-REQ-377932/A-Exiting Stop Mode via the PwLoApim_T_Actl signal	<jmyslin2> New Requirement
	PWRMAN-SR-REQ-378156/A-Additional usage of PwLoApim_T_Actl signal by Infotainment System Master	jmyslin2: new requirement
	PWRMAN-SR-REQ-378158/A-Infotainment System Reset from Stop Mode	jmyslin2: New requirement
	PWRMAN-SR-REQ-378157/A-Transport and Factory Mode - Stop Mode	jmyslin2: new requirement
	PWRMAN-FUN-REQ-361257/A-Clear Exit Assist Power Moding	<jmyslin2> New function for Clear Exit Assist Power Moding
	PWRMAN-SR-REQ-359648/A-Clear Exit Assist Power Moding	<jmyslin2> New clear exit assist power mode requirement
	PWRMAN-SR-REQ-359676/A-MMInactive Sleep_Standby Clear Exit Assist Power Mode Diagram	<jmyslin2> New Clear Exit Assist power mode requirement
March 17, 2020	**1.12**	
	VS-CLD-REQ-359585/A-Clear Exit Assist Warning Client	<jmyslin2> New class description for Clear Exit Assist
	VS-CLD-REQ-359586/A-Clear Exit Assist Warning Server	<jmyslin2> New Class Description for Clear Exit Assist
	PWRMAN-CLD-REQ-359656/A-Infotainment System Master	<jmyslin2> New Class Description
	STR-090280/I-Functional Definition (TcSE ROIN-289966)	jmyslin2: added Stop Mode variant 2
	PWRMAN-FUN-REQ-377259/B-Stop Mode - External module provides timer	jmyslin2: No content change, name update only
	PWRMANv2-FUN-REQ-383672/A-Stop Mode variant 2 - infotainment internal timer	jmyslin2: new infotainment internal Stop Mode variant 2
	PWRMAN-SR-REQ-383673/A-Applicable Stop Mode variant	jmyslin2: new stop mode variant 2 requirement
	PWRMANv2-SR-REQ-383674/A-Internal Stop Mode timer	jmyslin2: New Stop Mode variant 2 requirement
	PWRMANv2-SR-REQ-383675/A-Entering Stop mode	jmyslin2: new Stop Mode variant 2 requirement
	PWRMANv2-SR-REQ-383676/A-Exiting Stop mode	jmyslin2: New Stop Mode variant 2 requirement
September 23, 2020	**1.13**	
	RSOAv2-CLD-REQ-360906/B-RearSeatOccupantAlertV2InterfaceClient	ndecia - corrected class description name
	PWRMAN-UC-REQ-033910/C-Entering Transport Mode Low Power State (TcSE ROIN-289902-1)	jmyslin2: updated use case with a note on the HMI
	RSOA-FUN-REQ-398359/A-Rear Seat Occupant Alert v2 Interface Client Power Management	ndecia: new function added to define interface client's internal power management strategy
	STR-803736/A-Requirements	ndecia: new function added to define interface client's internal power management strategy
	REQ-398360/A-Power Management Signaling of the Rear Seat Occupant Alert v2 Interface Client	ndecia: new functional requirement added to define interface client's internal power management strategy
March 4, 2021	**1.14**	
	PWRMAN-SR-REQ-324997/D-Predictive Triggers - APIM	jmyslin2: added departure timer predictive triggers

	STR-090280/K-Functional Definition (TcSE ROIN-289966)	jmyslin2: removed Welcome and Farewell Configuration as not sure it applies (might have been SYNC Gen 2)
	PWRMAN-UC-REQ-033910/D-Entering Transport Mode Low Power State (TcSE ROIN-289902-1)	jmyslin2: clarification only
	PWRMAN-UC-REQ-033911/C-Exiting Transport Mode Low Power State by changing vehicle power mode state (TcSE ROIN-289903-1)	jmyslin2: added clarifications. No content change
	PWRMAN-UC-REQ-033912/C-Exiting Transport Mode Low Power State when vehicle is no longer in Transport Mode (TcSE ROIN-289906-1)	jmyslin2: Clarification only
	PWRMANv2-SR-REQ-014519/J-Transport Mode (TcSE ROIN-278271-1)	jmyslin2: clarified requirement, no content change
July 19, 2021	**1.15**	
	PWRMAN-IIR-REQ-212171/H-Power Management Interface Requirements - APIM	jmyslin2: added MD's
	MD-REQ-273358/D-HMIAudioMode	jmyslin2: no change at all, ignore the revision
	MD-REQ-414683/A-ChrgGoTTouchEnbl_B_Rq	jmyslin2: new MD
	MD-REQ-414685/A-ChrgStat_D2_Dspl	jmyslin2: new MD
	MD-REQ-414684/A-ChrgStat_D3_Dspl	jmyslin2: new MD
	PWRMAN-SR-REQ-324997/E-Predictive Triggers - APIM	jmyslin2: per power supply updated so CAN bus off while Remote Start active will start the predictive trigger countdown
	PWRMAN-SR-REQ-014466/I-Network Management (TcSE ROIN-40615-5)	jmyslin2: updated requirement with the APIM PDC network management
	PWRMAN-SR-REQ-014468/E-Bus wake-up transition times from Sleep Power Mode (TcSE ROIN-40700-3)	jmyslin2: updated requirement
	PWRMAN-SR-REQ-014469/D-Bus wake-up transition times from Unpowered Mode (TcSE ROIN-40701-3)	jmyslin2: updated requirement
	PWRMAN-REQ-033882/C-MMInactive_Sleep Power Mode Diagram - Welcome_Farewell (TcSE ROIN-289985-2)	jmyslin2: added note, no content change
	PWRMAN-SR-REQ-014509/G-Infotainment Components Load Shed State requirements (TcSE ROIN-66172-3)+	jmyslin2: updated requirement for Phoenix architecture
	PWRMAN-SR-REQ-014509/H-Infotainment Components Load Shed State requirements (TcSE ROIN-66172-3)	jmyslin2: corrected typ and for Phoenix architecture comments changed Chime_Source from Inactive to Cluster
	PWRMAN-SR-REQ-014520/H-Transport Mode and CGEA Chimes (TcSE ROIN-40663-3)	jmyslin2: updated requirement for Phoenix architecture
	PWRMAN-SR-REQ-346790/B-Exiting Transport Mode to Normal Mode and restoring Factory Defaults	jmyslin2: added clarification on language
	PWRMAN-FUN-REQ-422137/A-Delivery Assist - Power Moding	jmyslin2: new function for delivery assist power moding
	MD-REQ-422174/A-DelvrAsstExtndWak_D_Rq	jmyslin2: new MD for delivery assist
	PWRMAN-UC-REQ-422231/A-Driver powers up the infotainment system while Delivery Assist Stop Mode is active	jmyslin2: new delivery assist use case
	PWRMAN-UC-REQ-422232/A-Driver powers up the infotainment system after the Delivery Assist Stop Mode times out	jmyslin2: new delivery assist use case
	PWRMAN-SR-REQ-422176/A-Entering Delivery Assist Stop Mode	jmyslin2: new requirement for delivery assist stop mode
	PWRMAN-SR-REQ-422175/A-Exiting Delivery Assist Stop Mode	jmyslin2: new Delivery Assist requirement
September 22, 2021	**1.16**	
	PWRMAN-SR-REQ-324997/F-Predictive Triggers - APIM	jmyslin2: update requirement for new predictive triggers for welcome CAN signals
	PWRMAN-SR-REQ-014509/I-Infotainment Components Load Shed State requirements (TcSE ROIN-66172-3)	jmyslin2: updated for the Phoenix architecture for load shed
	PWRMAN-SR-REQ-235509/K-KOL Mode Signal power management usage	jmyslin2: updated requirement for PAC on Phoenix architecture for the AHU_Chime_Supported signal
	PWRMAN-FUN-REQ-443537/A-Rear Seat Occupant Alert - variant when RSOA Interface Client is not responsible for RSOA chime	jmyslin2 / ndecia - new release for rear seat occupant alert
	RSOA-REQ-443519/A-Display Only Power Mode Extension (for variant when RSOA Interface Client is not responsible for RSOA Chime)	ndecia: updated to add further details of specific events to be tracked and reported
August 8, 2022	**1.17**	
	PWRMAN-IIR-REQ-212171/I-Power Management Interface Requirements - APIM	jmyslin2: added perimeter alarm signal
	MD-REQ-273763/B-PrsnlDevChrgEnbl_B_Rq	jmyslin2: no update, ignore revision

	MD-REQ-486457/A-Perimeter_Alarm_Status	jmyslin2: new MD
	PWRMAN-SR-REQ-014501/C-Extended Play Configuration Times (TcSE ROIN-40653-1)	jmyslin2: deleted comment on extended play up to 1 hour. Times will be defined in the diagnostic spec and configured there
	PWRMANv2-SR-REQ-383674/B-Internal Stop Mode timer	jmyslin2: updated typo
	RSOA-REQ-443519/B-Display Only Power Mode Extension (for variant when RSOA Interface Client is not responsible for RSOA Chime)	ndecia: new requirement to extend display only power mode
	PWRMAN-FUN-REQ-486437/A-Sentinel / Integrated Security Cameras (ISC) Power Moding	jmyslin2: new function for Sentinel
	PWRMAN-UC-REQ-486459/A-Enter Sentinel Power Mode for possible intrusion event	jmyslin2: new use case for Sentinel Power Mode
	PWRMAN-UC-REQ-486797/A-Exit Sentinel Power Mode - Sentinel Setting Disabled	jmyslin2: new use case Sentinel Power Mode
	PWRMAN-UC-REQ-486798/A-Exit Sentinel Power Mode - Timer Expires	jmyslin2: new use case Sentinel Power Mode
	PWRMAN-UC-REQ-486817/A-Exit Sentinel Power Mode - No Recording Storage Device available	jmyslin2: new use case for Sentinel Power Mode
	PWRMAN-UC-REQ-488157/A-Exit Sentinel Power Mode - Record to Storage Device Setting is Disabled	jmyslin2: new use case for Sentinel Power Mode
	PWRMAN-SR-REQ-486469/A-Power States when Sentinel Power Mode is Not Supported	jmyslin2: New Sentinel power mode requirement
	PWRMAN-SR-REQ-486497/A-Entering Sentinel Power Mode	jmyslin2: new requirement for Sentinel power mode
	PWRMAN-SR-REQ-486537/A-Exiting Sentinel Power Mode	jmyslin2: new requirement for exiting Sentinel power mode
	PWRMAN-TMR-REQ-486516/A-T_SentinelPwrMde	jmyslin2: new Sentinel power mode timing requirement
	PWRMAN-STM-REQ-487717/A-Sentinel Power Mode State Diagram	jmyslin2: new Sentinel power mode state diagram
September 28, 2022	**1.18**	
	PWRMAN-SR-REQ-295465/B-Vehicle Low Power states and impact on ISM when KeyOffPwMde_D_Stat = ON	jmyslin2: removed transport mode as a condition for this requirement

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1 Architecture Design

1.1 Interface Requirements - APIM

1.1.1 PWRMAN-IIR-REQ-212171/I-Power Management Interface Requirements - APIM

1.1.1.1 MD-REQ-273358/D-HMIAudioMode

Message Type: Status

Signal sent by the System Master to the Infotainment modules to indicate the power mode status of the infotainment system.

Logical Signal Name	Literals	Value	Description
HMIAudioMode / HMI_HMIMode_St	Inactive	0x0	
	OFF	0x1	
	ON	0x2	
	Reserved	0x3	N/A to Global Infotainment
	Reserved	0x4	N/A to Global Infotainment
	Load Shed Active	0x5	

1.1.1.2 MD-REQ-273495/B-Veh_Lock_Status

Message Type: Status

Signal to the infotainment system indicating the lock status of the vehicle

Logical Signal Name	Literals	Value	Description
Veh_Lock_Status	Lock Double	0x0	
	Lock All	0x1	
	Unlock All	0x2	
	Unlock Driver	0x3	

1.1.1.3 MD-REQ-273497/A-DriverDoorStatus

Message Type: Status

Signal to indicate if the front driver door is closed or ajar.

Logical Signal Name	Literals	Value	Description
DriverDoorStatus	Closed	0x0	
	Ajar	0x1	

1.1.1.4 MD-REQ-273720/A-PassengerDoorStatus

Message Type: Status

Signal to indicate if the front passenger door is closed or ajar.

Logical Signal Name	Literals	Value	Description
PassengerDoorStatus	Closed	0x0	
	Ajar	0x1	

1.1.1.5 MD-REQ-273721/C-LifeCycMde_D_Actl / CarMode

Message Type: Status

This signal defines what Car Mode / Life Cycle Mode state is active in the vehicle.

Note: In CAN dB CarMode is used for CGEA 1.2 and C1MCA, and LifeCycMde_D_Actl is used for CGEA 1.3 but in the SPSS CarMode is just the logical signal name representing both

Logical Signal Name	Literals	Value	Description
LifeCycMde_D_Actl / CarMode /	Normal	0x0	
	Factory	0x1	
	Not Used	0x2	
	Transport	0x3	

1.1.1.6 MD-REQ-273722/A-_Battery_Mgmt_2

Message Type: Status

Signals received by the System Master to determine if a load shed event is occurring.

Logical Signal Name	Literals	Value	Description
Batt_Lo_SoC_B	Inactive	0x0	
	Active	0x1	
Batt_Crit_SoC_B	Inactive	0x0	
	Active	0x1	
Shed_Level_Req	No_Shed	0x0	
	SHED1	0x1	
	SHED2_TRANS	0x2	
	SHED2_CONTIN	0x3	
	SOON_ENG_OFF	0x4	
	SHED_ENG_OFF	0x5	
Shed_T_Eng_OFF_B	Inactive	0x0	
	Active	0x1	
Shed_Drain_Eng_Off_B	Inactive	0x0	
	Active	0x1	

1.1.1.7 MD-REQ-273727/A-ActvNse_B_Actv

Message Type: Status

The Active Noise Cancellation Server sends this signal to indicate ANC status

Logical Signal Name	Literals	Value	Description
ActvNse_B_Actv	Inactive / OFF	0x0	Set OFF when the ANC Server is not transmitting a cancellation or enhancement signal or its output is switched off
	Active	0x1	Set Active when the ANC server is producing a cancellation or enhancement signal and its output is active

1.1.1.8 MD-REQ-273747/A-PwPckTq_D_Stat

Message Type: Status

Signal sent to the Infotainment System indicating the engine torque status

Logical Signal Name	Literals	Value	Description
PwPckTq_D_Stat	Off Tq Not Available	0x0	
	On Tq Not Available	0x1	
	Strt In Prg No Tq	0x2	
	On Tq Available	0x3	

1.1.1.9 MD-REQ-273748/A-Eng_D_Stat

Message Type: Status

Signal indicating the engine status

Logical Signal Name	Literals	Value	Description
Eng_D_Stat	EngOff	0x0	
	EngON	0x1	
	EngAutoStopped	0x2	
	NotUsed	0x3	

1.1.1.10 MD-REQ-273749/A-Audio_AMP.St

Message Type: Status

Power Mode signal sent by Audio Power Mode master to the modules producing audio in the infotainment system

Logical Signal Name	Literals	Value	Description
Audio_AMP.St	NoDataExists	0x0	
	OFF (no audio)	0x1	
	Partial_AMP_Audio	0x2	
	ON (all speakers)	0x3	

1.1.1.11 MD-REQ-273750/A-Ignition_Status

Message Type: Status

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

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

1.1.1.12 MD-REQ-273762/A-Delay_Acc

Message Type: Status

Signal sent to the infotainment system indicating the status of delayed accessory

Logical Signal Name	Literals	Value	Description
Delay_Acc	OFF	0x0	
	ON	0x1	

1.1.1.13 MD-REQ-273763/B-PrsnlDevChrgEnbl_B_Rq

Message Type: Status

Phone as a Key power mode signal

Logical Signal Name	Literals	Value	Description
PrsnlDevcChrgEnbl_B_Rq	Inactive	0x0	
	Active	0x1	

1.1.1.14 MD-REQ-273764/B-KeyOffMde_D_Actl.St

Message Type: Status

Signal to manage Key Off Load of the vehicle

Logical Signal Name	Literals	Value	Description
KeyOffMde_D_Actl.St	Normal	0x0	
	Factory	0x1	
	Transport	0x2	
	Hibernate	0x3	
	Critical Battery	0x4	

1.1.1.15 MD-REQ-295565/A-VehOnSrc_D_Stat

Message Type: Status

Signal used for OTA (over the air) events. Details of signal usages reference the OTA specifications

Logical Signal Name	Literals	Value	Description
VehOnSrc_D_Stat	OFF	0x0	
	Manual	0x1	
	RemoteStart	0x2	
	RemoteParkAssist	0x3	
	OverTheAir	0x4	

1.1.1.16 MD-REQ-295417/A-KeyOffPwMde_D_Stat

Message Type: Status

Signal sent from the ECG to the ISM (Infotainment System Master) indicating if the ECG requires the ISM to be powered on or not.

Logical Signal Name	Literals	Value	Description
KeyOffPwMde_D_Stat	Inactive	0x0	The ECG does not require that the ISM be powered up
	ON	0x1	Used to power up the ISM for ECG initiated key off features
	…	…	
	Reserved	0x7	

1.1.1.17 MD-REQ-295418/A-InfoSysMasterPw_D_Stat

Message Type: Status

Signal sent from the infotainment system master (ISM) indicating if the infotainment system master is powered up and ready to support network commands

Logical Signal Name	Literals	Value	Description
InfoSysMasterPw_D_Stat	Inactive	0x0	ISM application software is not fully powered up
	ISM Powered ON	0x1	ISM is application software is fully powered up
	…	…	
	Reserved	0x7	

1.1.1.18 MD-REQ-324998/A-VehWlcmFrwlMde_D_Stat

Message Type: Status

Signal sent indicating a user is approaching the vehicle

Logical Signal Name	Literals	Value	Description
VehWlcmFrwlMde_D_Stat	Null	0x0	
	Approach	0x1	Used for infotainment predictive trigger power moding
	IlluminatedEntry	0x2	
	CourtesyLightingAll	0x3	
	CourtesyLightingDelayAll	0x4	
	CourtesyLightingExtended	0x5	
	CourtesyLightingDelayExt	0x6	
	IlluminatedExit	0x7	

1.1.1.19 MD-REQ-372099/A-Remote_Start_Status

Message Type: Status

Signal to indicate if Remote Start is active on the vehicle.

Logical Signal Name	Literals	Value	Description
Remote_Start_Status	Null	0x0	
	Remote	0x1	Remote start is active
	Unknown	0x2	
	Invalid	0x3	

1.1.1.20 MD-REQ-372100/A-PlgActvArb_B_Dsply

Message Type: Status

Signal to indicate if the vehicle electric charge cord is plugged in or not

Logical Signal Name	Literals	Value	Description
PlgActvArb_B_Dsply	OFF	0x0	Charge cord unplugged
	ON	0x1	Charge cord plugged in

1.1.1.21 MD-REQ-372987/A-RearLeftDoorStatus

Message Type: Status

Signal to indicate if the Rear Left Door is closed or ajar.

Logical Signal Name	Literals	Value	Description
RearLeftDoorStatus / DrStatRl_B_Actl	Closed	0x0	
	Ajar	0x1	

1.1.1.22 MD-REQ-372988/A-RearRightDoorStatus

Message Type: Status

Signal to indicate if the Rear Right Door is closed or ajar.

Logical Signal Name	Literals	Value	Description
RearRightDoorStatus / DrStatRr_B_Actl	Closed	0x0	
	Ajar	0x1	

1.1.1.23 MD-REQ-372989/A-TailgateDecklidStatus

Message Type: Status

Signal to indicate if the Tailgate/Decklid is closed or ajar.

Logical Signal Name	Literals	Value	Description
TailgateDecklidStatus / DrStatTgate_B_Actl	Closed	0x0	
	Ajar	0x1	

1.1.1.24 MD-REQ-372990/A-LiftgateStatus

Message Type: Status

Signal to indicate if the Liftgate is closed or ajar.

Logical Signal Name	Literals	Value	Description
LiftgateStatus / DrStatInnrTgate_B_Actl	Closed	0x0	
	Ajar	0x1	

1.1.1.25 MD-REQ-378492/A-PwLoApim_T_Actl

Message Type: Status

Signal informing the Infotainment System Master how long it can stay in Stop Mode

Logical Signal Name	Literals	Value	Description
PwLoApim_T_Actl	0 minute	0x0	Shutdown if in Stop Mode to Sleep Mode
	1 minute	0x1	
	2 minutes	0x2	
	3 minutes	0x3	
	4 minutes	0x4	
	…	…	

	2,047 minutes	0x7FF	34 hours, 7 minutes

1.1.1.26 MD-REQ-359588/A-ClrExitAsstActv_B_Rq

Message Type: Request

Request signal from the Clear Exit Assist Warning Server to the Clear Exit Assist Warning Client / Infotainment System Master to remain powered up to display the clear exit assist warning HMI

Logical Signal Name	Literals	Value	Description
ClrExitAsstActv_B_Rq	False	0x0	
	True	0x1	

1.1.1.27 MD-REQ-414683/A-ChrgGoTTouchEnbl_B_Rq

Message Type: Request

Logical Signal Name	Literals	Value	Description
ChrgGoTTouchEnbl_B_Rq	No Request	0x0	
	Request	0x1	

1.1.1.28 MD-REQ-414685/A-ChrgStat_D2_Dspl

Message Type: Status

Logical Signal Name	Literals	Value	Description
ChrgStat_D2_Dsply	Don't care	0x0-0xA	
	Cabin Preconditioning	0xB	
	Don't Care	0xC – 0xF	

1.1.1.29 MD-REQ-414684/A-ChrgStat_D3_Dspl

Message Type: Status

Logical Signal Name	Literals	Value	Description
ChrgStat_D3_Dsply	Don't care	0x0-0xA	
	Cabin Preconditioning	0xB	
	Don't care	0xC – 0x1F	

1.1.1.30 MD-REQ-486457/A-Perimeter_Alarm_Status

Message Type: Status

Signal from the Perimeter Alarm Server with the status of Perimeter Alarm

Logical Signal Name	Literals	Value	Description
Perimeter_Alarm_Status	Disarmed	0x0	
	Prearmed	0x1	
	Armed	0x2	
	Activated	0x3	

1.2 Interface Requirements - APIM Gen 3 (CGEA 1.2 / C1MCA only)

1.2.1 PWRMAN-IIR-REQ-212172/A-Power Management Interface Requirements - APIM Gen 3 (CGEA 1.2 / C1MCA only)

Method	Notes	Parameters
PowerMode.St()	Signal sent to the Infotainment System indicating the power mode state of the vehicle	0x0 KeyOut 0x1 Not Used 0x2 Not Used 0x3 Not Used 0x4 Accessory_1 0x5 Not Used 0x6 IgnitionOn_2 0x7 Running_2 0x8 Not Used 0x9 Crank_3
PowerModeQF	Quality factor for power mode information.	0x0 PowerModeUndefined 0x1 PowerModeEvaluatInProgress 0x2 Not Defined 0x3 OK
PowerModeUB	Used to tell the System Master the Update Bit information of the PowerMode data.	0x0 Inactive 0x1 Active (fresh data – written data)
Lock_Status	Signal indicating if the Door is locked and unlocked	0x0 Unknown 0x1 Lock 0x2 Unlock 0x3 Lock 0x4 Reserved 0x5 Unlock
LockStatusValid	Determines if the door lock status is valid.	0x0 Invalid 0x1 Valid

Note: these signals are for C1MCA and CGEA 1.2 only

1.3 PWRMAN-CLD-REQ-030648/A-Non-SDLC Gateway (TcSE ROIN-202508-1)

If the gateway for the infotainment bus is not the Smart DLC gateway then requirements pertaining to the "Non-Smart DLC Gateway" apply to that gateway module.

Note: Smart DLC Gateway requirements are not covered in the Power Management section of the SPSS

1.4 PWRMAN-CLD-REQ-031234/B-System Power Mode Master - APIM (TcSE ROIN-282928-1)

The System Power Mode Master is responsible for controlling most infotainment features/functions and power management of the infotainment system

1.4.1 PWRMAN-REQ-031235/B-APIM Deep Sleep Mode during Transport Mode (TcSE ROIN-282927-2)

Per power supply requirement "APIM(SYNC) KOL Transport requirement.doc" (will become an SDS requirement in future) the APIM module will have to determine if it needs to enter Deep Sleep Mode while Transport Mode is active to meet the power supply KOL current requirements. During deep sleep mode the APIM module shall be capable of supporting network bus activity when the bus is active and exiting deep sleep mode when the conditions are met as described below.

Deep Sleep Mode is when the APIM module will switch off all internal APIM peripherals and components into an unpowered state. The APIM module will only be responsive to a Network Wake-Up while in this power state. See the APIM module hardware specifications for details and Deep Sleep Mode KOL targets.

While in a valid Transport Mode state with HMIAudioMode = OFF the APIM module shall wait 5 minutes after the network bus goes to sleep and then shall enter deep sleep mode. A valid Transport Mode state is when APIM module (ie system master) would turn HMIAudioMode = OFF because of Transport mode as called out in requirements PWRMAN-GREQ-40660-3-Transport Mode / PWRMANv2-GREQ-278271-1-Transport Mode. During Deep Sleep Mode the APIM module shall keep HMIAudioMode = OFF when the CAN bus is active.

The APIM module shall exit deep sleep mode when network bus wakes up and is no longer in a valid Transport Mode state and the conditions are met to set HMIAudioMode = ON. The APIM module (ie system master) would no longer be in a valid Transport Mode state when the APIM module would not require HMIAudioMode = OFF because of Transport Mode as called out in requirements PWRMAN-GREQ-40660-3-Transport Mode / PWRMANv2-GREQ-278271-1-Transport Mode. The APIM module shall return to normal operation no longer than 1 minute and 30 seconds after the deep sleep exit conditions are met.

Transport Mode shall only be supported when configured ON as defined in the APIM Infotainment Diagnostic Specification.

1.4.2 PWRMAN-SR-REQ-324997/F-Predictive Triggers - APIM

If the Infotainment System Master cannot meet the boot up timing requirements called out in requirement "PWRMAN-SR-REQ-014472-System Master transition time from Standby to Functional Power Mode" then the Infotainment System Master shall utilize predictive triggers to power up the Infotainment System Master.

When a predictive trigger occurs the Infotainment System Master power shall power up internally to Display Only Mode such that if a trigger to go to Functional Power Mode occurs (ex ignition_status goes to Run/Acc) the Infotainment System Master can quickly turn on. Once a predictive trigger occurs it is recommended that the Infotainment System Master power up to Display Only mode for 3 minutes and then power back down unless another trigger occurs taking it out of Display Only mode (ex Ignition_Status changes from OFF to Run/Acc taking it to Functional Power Mode).

The default predictive trigger time is for 3 minutes. This value shall be configurable between 0 and 10 mintutes.

The following predictive triggers shall be supported when:

- Pre-condition: The Infotainment System Master is powered off with HMIAudioMode = OFF in Standby low power mode or Sleep Power Mode
- Predictive Trigger Events:

- The DriverDoorStatus (DrStatDrv_B_Actl), or PassengerDoorStatus (DrStatPsngr_B_Actl), or RearLeftDoorStatus (DrStatRl_B_Actl), or RearRightDoorStatus (DrStatRr_B_Actl), or TailgateDecklidStatus (DrStatTgate_B_Actl,), LiftgateStatus (DrStatInnrTgate_B_Actl) signal changes from Closed to Ajar, OR
- The Veh_Lock_Status signal changes from Lock to Unlock, OR
- The approach detection signal VehWlcmFrwlMde_D_Stat equals Approach, OR
- The Remote_Start_Status signal equals Remote,
  - While Remote_Start_Status = Remote the Infotainment System Master powers up to Display Only mode and stays powered up as long as Remote_Start_Status = Remote
  - Once Remote_Start_Status change from Remote to not equal to Remote, or the CAN bus goes to sleep then the 3 minute timer to exit Display Only shall begin

OR

- The signal PlgActvArb_B_Dsply changes from 0x01 ON (ie charge cord plugged in) to 0x00 OFF (ie charge cord unplugged), OR
- The Departure time signals (with charger connected) are set as “ChrgGoTTouchEnbl_B_Rq = 0x1 Request” AND “ChrgStat_D3_Dspl = 0xB CabinPreconditioning”.
  - While this is true the Infotainment System Master powers up to Display only mode and stays powered up as long as this is true.
  - When ChrgGoTTouchEnbl_B_Rq != 0x1 Request, OR ChrgStat_D3_Dspl != 0xB CabinPreconditioning then the 3 minute timer to exit Display Only shall begin

OR

- The Departure time signals (with charger connected) are set as “ChrgGoTTouchEnbl_B_Rq = 0x1 Request” AND “ChrgStat_D2_Dspl = 0xB CabinPreconditioning”.
  - While this is true the Infotainment System Master powers up to Display only mode and stays powered up as long as this is true
  - When ChrgGoTTouchEnbl_B_Rq != 0x1 Request, OR ChrgStat_D2_Dspl != 0xB CabinPreconditioning then the 3 minute timer to exit Display Only shall begin

OR

- Phoenix architecture only (welcome signals):
  - (VehWlcmFrwl_D_Stat = Welcome) AND (VehWlcmFrwlMde_D_Stat = 0x1 Approach, or 0x2 IlluminatedEntry, or 0x3 CourtesyLightingAll, or 0x4 CourtesyLightingDelayAll, or 0x5 CourtesyLightingExtended, or 0x6 CourtesyLightingDelayExt) then the predictive trigger timer is started
    - The predictive trigger event is ended when VehWlcmFrwl_D_Stat != Welcome and VehWlcmFrwlMde_D_Stat != Approach and the predictive trigger timer (ex 3 minutes) has expired, OR
    - The predictive trigger event is ended when VehWlcmFrwlMde_D_Stat = 0x0 Null or 0x7 Illuminated Exit and the predictive trigger time has expired .

- Post-Condition:
  - The Infotainment System Master is in Display Only Mode for 3 minutes (unless noted otherwise in the P06 APIM spec)
- Remembering the last signal state between bus wake-up events:
  - When ignition is OFF, the infotainment network bus might wake up and go back to sleep a number of times and signals may be missing (if signals originate on different network buses). For the predictive triggers, so that the last state can be remembered for a transition, the infotainment system master shall remember the last state.

Display Only Mode SPSS definition:

- The Infotainment System Master is fully powered up in Standby, can turn on the display and can process CAN commands but HMIAudioMode = OFF
- The display is normally off unless a trigger activates it (ex door open for welcome animation)
- Certain APIM peripherals might be turned off to conserve power.
- The Infotainment System Master can power up quickly to functional power mode (within a second or two)

Note: Reference the P06 APIM spec for exact details of how predictive triggers are implemented on the APIM module. If conflict between the SPSS and P06 then the P06 takes precedence.

1.5 VS-CLD-REQ-359585/A-Clear Exit Assist Warning Client

The Clear Exit Assist Warning Client interfaces with the user via the HMI and interfaces with the Clear Exit Assist Warning Server to determine if HMI updates are needed.

1.6 VS-CLD-REQ-359586/A-Clear Exit Assist Warning Server

The Clear Exit Assist Warning Server is responsible for the control to the Clear Exit Assist function and interfaces with the Clear Exit Assist Warning Client.

1.7 PWRMAN-CLD-REQ-359656/A-Infotainment System Master

1.8 RSOAv2-CLD-REQ-360906/B-RearSeatOccupantAlertV2InterfaceClient

The RearSeatOccupantAlertV2InterfaceClient is responsible for monitoring the status of all rear door signals, arming/disarming the notification trigger, displaying the visual reminder, and requesting the audible alert to be played via the audio system.

2 General Requirements

2.1 PWRMAN-FUN-REQ-014457/A-Infotainment System Power Mode Descriptions (TcSE ROIN-267992-1)

2.1.1 Sleep Node

Sleep Nodes are nodes that are required to function for some application domain specified duration while the vehicle ignition is in the OFF position.

2.1.1.1 PWRMAN-SR-REQ-014458/C-Sleep Node Power Consumption (TcSE ROIN-40618-1)

Sleep nodes shall implement a low power consumption mode (sleep).

2.1.1.2 PWRMAN-SR-REQ-014459/B-Sleep Node Components (TcSE ROIN-40619-1)

All Infotainment System components shall be designated as Sleep Nodes.

2.1.2 Remote Wakeup

A Remote Wakeup is the result of another components Local Wakeup Event

2.1.2.1 PWRMAN-SR-REQ-014460/B-Remote Wake-up processing (TcSE ROIN-40621-1)

All infotainment system components shall process Remote Wakeups

2.1.2.2 PWRMAN-SR-REQ-014461/B-Remote Wake-up Power Mode Transitions (TcSE ROIN-40622-2)

For all infotainment system components, a Remote Wakeup shall result in a transition from Sleep to Standby.

2.1.3 Local Wakeup Event

A Local Wake Event results when a sleep node detects a dedicated local input while in the sleep power mode.

2.1.3.1 PWRMAN-SR-REQ-014462/B-Local Wake-up Network initialization (TcSE ROIN-40624-1)

Local Wake Events shall result in the initialization of the Network by the component processing the Local Wake Event.

2.1.4 Self-Directed Process

A Self-Directed Process results when a sleep node detects a local event while in the sleep or standby power modes and does NOT require information exchange across the network. Not all infotainment system components are required to implement Self-Directed Wakeups. Refer to component engineering specifications for list of Self-Direct Processes.

2.1.4.1 PWRMAN-SR-REQ-014463/B-Self-Directed Process (TcSE ROIN-40626-1)

A Self-Directed Process shall be implemented in parallel with the power moding requirement such that once a Self-Directed Process is launched, transitions to other power modes shall not interrupt the Self-Directed process. For example, the process of ejecting a disc shall not be canceled as the result of a transition to functional mode.

2.1.5 Power Modes

2.1.5.1 PWRMAN-SR-REQ-014464/D-Power Mode States (TcSE ROIN-167435-1)

UNPOWERED

Characteristics of UNPOWERED Mode is insufficient supply voltage to power components.

- This is typically entered with loss of B+. Note when say loss of B+ in the SPSS this does not include normal operations such as warm and cold cranks and their associated voltage dips. Warm and cold crank as defined in Ford specifications shall not send a module into unpowered mode (unless explicitly noted as allowed).

SLEEP

Characteristics of SLEEP Mode are defined as follows:

-- Lowest power consumption mode.
-- Network State set to asleep (inactive), or in "Limp Home" state.
-- Self-Directed Events are valid. No functionality beyond Self-Directed events.
-- Remote Wake-up Events are valid.
-- Local Wake-up Events are valid.
-- Local events whice don't wake up the bus can be active
-- Infotainment System States supported: OFF & Display only mode (if doesn't require the network bus).

STANDBY

Characteristics of STANDBY Mode are defined as follows:

-- Low power consumption mode.
-- Infotainment audio sources are OFF (ex. Media sources, VR, Phone, TA, Prompts). Non-Infotainment features may be active (ex. chimes, clock/welcome/farewell screens, illumination, climate control…).
-- Background tasks may be running (ex. active pre-fetch).
-- Self-Directed Events are valid.
-- Network Bus in Normal Operation. (some module(s) are allowed to go to sleep but remain powered up in Standby locally. See power moding requirements/diagrams for individual modules if this is applicable)
-- Network Bus off condition can occur.
-- Example of Infotainment System States supported: MMInactive / Display Only mode (10 Minute Clock mode, welcome, farewell…), Chime Only power mode mode

Note: in Load Shed mode more internal features may be turned off such as background tasks running that typically operate in Standby. The component functional requirements or ES specs determine what shall be turned off in load shed Standby state.

FUNCTIONAL

Characteristics of FUNCTIONAL Modes are defined as follows:

-- Modules in normal operation and Infotainment system is ON (HMI can be active, sound available, ex infotainment features available: AM/FM, SDARS/DAB, CD, Phone, VR, USB, AUX, BT Audio…).
-- Network Bus in Normal Operation. (some module(s) are allowed to go to sleep but remain powered up in Functional locally. See power moding requirements/diagrams for individual modules if this is applicable)
-- Network Bus State off condition can occur.
-- Infotainment System States supported: MMActive, Extended Play, Phone Mode

2.2 PWRMAN-FUN-REQ-014465/B-Infotainment Network Management (TcSE ROIN-267993-1)

2.2.1 PWRMAN-SR-REQ-014466/I-Network Management (TcSE ROIN-40615-5)

Power Mode State	HMIAudioMode / Multimedia System Signal	Infotainment Components	Module keeps network awake	Comments
Standby	OFF	System Master	Y / N	System Master keeps network awake if need to perform function with multiple modules
		AHU	Y / N	- For Load/Eject AHU to keep bus awake long enough for display modules to read AHU status signals so can update the HMI - The AHU shall keep the network awake as long as Power_Up_Chime_Modules = Active ~~- The AHU shall keep the network awake as long as Demand_PwrModing = ON if Demand Power Moding feature supported and configured on.~~ - When none of the above conditions are true the AHU shall not keep the network awake
		ICP (LIN)	N	
		EFP / ECP (CAN)	N	Reference climate control specifications for EFP climate control network management if EFP contains climate functionality When EFP/ECP is not on the info-CAN bus see "PWRMANv2-GREQ-198326-EFP Power Moding" AND "PWRMAN-GREQ-60372" for additional network management requirements When EFP/ECP on info-CAN bus then EFP/ECP “Module network awake” is always set to No.
		DSP AMP	Y / N	- The DSP AMP shall keep the network awake as long as Power_Up_Chime_Modules = Active ~~- The DSP AMP shall keep the network awake as long as Demand_PwrModing = ON if Demand Power Moding feature supported and configured on.~~ - When none of the above conditions are true the DSP AMP shall not keep the network awake
		RSEM / RACM	N	When modules are on the info-CAN bus
		Non-SDLC Gateway	Y / N	-Whenever the vehicle bus is active then the Non-SDLC Gateway keeps the info-CAN bus active. -The Non-SDLC Gateway applies to the CGEA 1.2 Cluster gateway. Does not apply to CGEA 1.3 Cluster or future architectures
		Cluster	Y / N	The Cluster shall keep the network awake as long as Power_Up_Chime_Modules = Active.
		Remote CD	N	
		AAM	N	
Functional	ON	System Master	Y	
		AHU	Y / N	- The AHU shall keep the network awake as long as Power_Up_Chime_Modules = Active ~~- The AHU shall keep the network awake as long as Demand_PwrModing = ON if Demand Power Moding feature supported and configured on~~. - When none of the above conditions are true the AHU shall not keep the network awake
		ICP (LIN)	Y	
		EFP (CAN)	N	Reference climate control specifications for EFP climate control network management if EFP contains climate functionality See "PWRMANv2-GREQ-198326-EFP Power Moding" AND "PWRMAN-GREQ-60372" for additional network management requirements
		DSP AMP	Y / N	- The DSP AMP shall keep the network awake as long as Power_Up_Chime_Modules = Active ~~- The DSP AMP shall keep the network awake as long as Demand_PwrModing = ON if Demand Power Moding feature supported and configured on.~~

				- When none of the above conditions are true the DSP AMP shall not keep the network awake
		RSEM / RACM	N	When modules our on the info-CAN bus
		Non-SDLC Gateway	Y / N	Non-SDLC Gateway infotainment sleep ready indication based on if the vehicle bus is awake. The Non-SDLC Gateway applies to the CGEA 1.2 Cluster gateway. Does not apply to CGEA 1.3 Cluster or future architectures
		Cluster	Y / N	The Cluster shall keep the network awake as long as Power_Up_Chime_Modules = Active.
		Remote CD	N	
		AAM	N	

Note: additional network management detail may be contained in functional requirements
-- For SWCM see PWRMAN-GREQ-40710-SWCM Power Moding
-- ~~Demand Power Moding is only applicable when configured ON. If not a configuration item to configure ON then consider not supported and Demand_PwrModing signal will not keep the bus awake.~~ Demand Power Moding no longer applies. If already in the code for legacy modules it can remain in there but new modules shall not include it in their code.
-- For the APIM PDC (Phoenix Domain Controller) the System Master and Cluster are the same module so both those requirements apply to APIM PDC

2.3 PWRMAN-FUN-REQ-014467/A-Power Mode Transition Timing (TcSE ROIN-267994-1)

2.3.1 PWRMAN-SR-REQ-014468/E-Bus wake-up transition times from Sleep Power Mode (TcSE ROIN-40700-3)

~~Upon bus awake from sleep mode infotainment modules shall transition to Ready to Receive (T1) within 100 msec.~~

- ~~Note: if a Tx module sends a CAN request to a Rx module before 100 msec has elapsed from bus wake-up then the CAN request may be missed.~~

~~Upon bus awake from sleep mode infotainment modules shall transition to Ready to Transmit (T2) within 150 msec.~~

~~Note: T2 is the FNOS CAN dB attributes ""NodeWakeUpTime". When the attribute NodeWakeUpTime is greater than 0 in the CAN dB then use the CAN dB attributes mentioned above for T1 and T2 otherwise use the SPSS values.~~

Reference the FNOS CAN dB attribute “NodeWakeUpTime” for T2 (ie bus wake-up to Ready to Transmit). T1 is considered the same as T2.

2.3.2 PWRMAN-SR-REQ-014469/D-Bus wake-up transition times from Unpowered Mode (TcSE ROIN-40701-3)

~~Upon bus awake from Unpowered mode modules shall transition to Ready to Receive (T1) within 950 msec.~~

~~Upon bus awake from Unpowered mode modules shall transition to Ready to Transmit (T2) within 1000 msec.~~

~~Note: T2 is the FNOS CAN dB attribute "NodeStartUpTime". When the attribute NoteWakeUpTime is greater than 0 in the CAN dB then use the CAN dB attributes mentioned above for T1 and T2 otherwise use the SPSS values.~~

Reference the FNOS CAN dB attribute “NodeStartUpTime” for T2 (ie bus wake-up from unpowered mode to Ready to Transmit). T1 is considered the same as T2.

2.3.3 PWRMAN-SR-REQ-014470/C-EFP and Cluster transition time to Standby (TcSE ROIN-40702-2)

Upon infotainment bus ready to transmit (T2) the EFP and Cluster shall transition to Standby mode (T3) within 500 msec. Note Functional and Standby mode are the same for the EFP and Cluster.

2.3.4 PWRMAN-SR-REQ-014471/B-Infotainment Components transition time to Standby (TcSE ROIN-40703-3)

Upon infotainment bus ready to transmit (T2) the infotainment modules shall be able to support normal Standby operations (T3) within 500 msec.

If the infotainment component supports HMIAudioMode then the infotainment peripheral shall be able to act upon HMIAudioMode = ON no later then T3.

If the infotainment component supports Audio_Amp then the infotainment peripheral shall be able to act upon Audio_AMP = ON / Partial_AMP_Audio no later then T3.

2.3.5 PWRMAN-SR-REQ-014472/B-System Master transition time from Standby to Functional Power Mode (TcSE ROIN-40704-2)

The System Master shall be able to transition to functional power mode (T4) from standby power mode (T3) within 250 msec of setting the signal HMIAudioMode to 'ON'.

2.3.6 PWRMAN-SR-REQ-014473/E-System Master timing to send HMIAudioMode (TcSE ROIN-40705-2)

The Infotainment System Master shall set the HMIAudioMode signal equal to 'ON' after 500 msec from bus ready to Tx (T2) but no later than 550 msec from bus ready to transmit (T2) if the conditions to enter Functional Power Mode are met.

Note: If the Infotainment System Master cannot meet the timing above (must be OK'd by Ford D&R) then the Infotainment System Master might want to implement predictive triggers such that when the Ignition changes to Run the boot up time could be reduced.

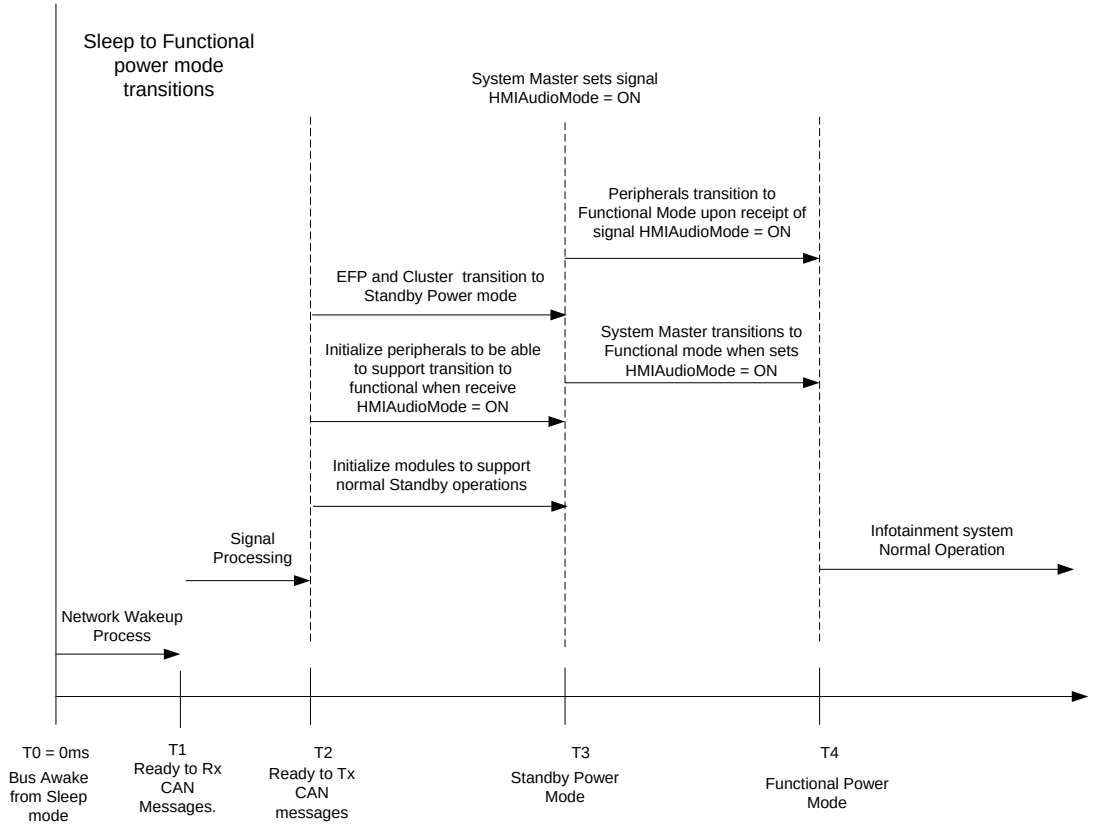
- Ex. If Door Unlock, Door Open or Approach Detection network signals are received by the System Master then those signals could potentially be used as predictive triggers where the System Master boots up internally even if there is no HMI or audio. By the time the user gets in the driver seat and changes ignition to Run the System Master may already be booted up or in the process of booting up reducing the time perceived by the customer for the infotainment system to power up.

2.3.7 PWRMAN-SR-REQ-014474/B-Infotainment components transition time from Standby to Functional Power Mode (TcSE ROIN-40706-2)

The infotainment peripherals (ie AHU, RSE…) shall be able to transition to functional power mode (T4) from Standby power mode (T3) within 250 msec of receiving the signal 'HMIAudioMode = ON'.

2.3.8 PWRMAN-SR-REQ-014475/C-Power Mode transitions Timing Table (TcSE ROIN-40707-2)

Infotainment modules shall follow the Power Mode Transitions as shown in the figure below.



Sleep to Functional Power Mode Transitions

2.4 PWRMAN-FUN-REQ-014476/A-Power Management Infotainment System States (TcSE ROIN-267995-1)

2.4.1 PWRMAN-SR-REQ-014477/E-Infotainment System States (TcSE ROIN-40610-3)

System State	Power Mode State	Condition	Infotainment Bus Status	Result
OFF	Sleep	N/A	OFF	Infotainment System OFF
MM Inactive **Stop Mode**	Standby	HMIAudioMode = OFF Power_Up_Chime_Module = OFF	OFF	In Stop Mode as many current sources are tuned off as possible so in a low power state. This mode is used to improve start-up times
MM Inactive	Standby	HMIAudioMode = OFF	ON	Background tasks may be running. Infotainment audio sources inactive (ex. AM/FM, SDARS/DAB, CD, VR, Bluetooth Phone, APIM, BT Audio, Prompts, USB, iPod…) Non-Infotainment Standby Features can be supported (ex. Chimes – if enabled, Climate Control – if CC entry conditions met), OTA (over the air software updates), Phone as a key phone charging, ECG key off power moding Display Only mode allowed if supported
MM Inactive Display only (ex.active clock, welcome, farewell etc)	Standby / Sleep	HMIAudioMode = OFF	ON / OFF	Background tasks may be running. HMI Output display as defined by the HMI. Infotainment audio sources inactive (ex. AM/FM, SDARS/DAB, CD, VR, Bluetooth Phone, APIM, BT Audio, Prompts, USB, iPod…) Non-Infotainment Standby Features can be supported (ex. Chimes – if enabled, Climate Control – if CC entry conditions met)
MM Inactive Chime Only Mode – when infotainment system OFF	Standby	HMIAudioMode = OFF Power_Up_Chime_Modules = Active	ON	Infotainment audio active for Chimes through the infotainment system Infotainment audio sources inactive (ex. AM/FM, SDARS/DAB, CD, VR, Bluetooth Phone, APIM, BT Audio, Prompts, USB, iPod…)
MM Inactive Phone as a Key phone charging - when infotainment system OFF	Standby / Sleep	HMIAudioMode = OFF PrsnIDevChrgEnbl_B_Rq = Active	ON / OFF	Phone charging ports are active to charge a phone (ex USB port) Infotainment audio sources inactive (ex. AM/FM, SDARS/DAB, CD, VR, Bluetooth Phone, APIM, BT Audio, Prompts, USB, iPod…)
MM Inactive ECG Key Off Power Moding	Standby / Sleep	HMIAudioMode = OFF KeyOffPwMde_D_Stat = ON	ON / OFF	ECG has Infotainment System Master powered up for a key off function (ex OTA function) Infotainment audio sources inactive (ex. AM/FM, SDARS/DAB, CD, VR, Bluetooth Phone, APIM, BT Audio, Prompts, USB, iPod…)
MM Active	Functional	HMIAudioMode = ON	ON	HMI active, sound available (sound can be off when audio stack is empty), infotainment features normal operation (ex. AM/FM, SDARS/DAB, CD, VR, Bluetooth Phone, APIM, BT Audio, USB, iPod…)
Extended Play	Functional	HMIAudioMode = ON	ON	HMI active, sound available (sound can be off when audio stack is empty), infotainment features normal operation

				(ex. AM/FM, SDARS/DAB, CD, VR, Bluetooth Phone, APIM, BT Audio, Prompts, USB, iPod…) Enables user to listen to infotainment system when Ignition is OFF and Delay Acc is OFF
Phone Mode	Functional	HMIAudioMode = ON	ON	Phone call active through audio system. Note: independent of other System States while active

Note: MM Inactive the power mode states are not necessarily limited just to these.

3 Functional Definition

3.1 PWRMANv3-FUN-REQ-033880/B-System Master Power Moding (TcSE ROIN-289928-1)

This function is used for CGEA 1.3 programs

3.1.1 PWRMANv3-SR-REQ-033881/D-System Master Power Moding (TcSE ROIN-289984-3)

The System Master shall always remember the PowerMode state (ex MMActive, Phone) between PowerMode signal transitions (Ignition Status = Run/Acc/Off, Delay_Acc…).

If the Ignition_Status signal is missing for more than 5 seconds in Run (or last state received was Run) then the System Master shall default to Standby Power mode with the infotainment system OFF.

If the Ignition_Status signal is set to Unknown in Run (or last state received was Run) then the System Master shall default to Standby Power mode with the infotainment system OFF.

If the Delayed Accessory signal is missing for more than 5 seconds in Run then the System Master shall assume Delayed_Accessory = OFF.

If the Veh_Lock_Status signal is missing for more than 5 seconds in Run then the System Master shall assume the missing signal state is unknown.

When Ignition_Status does not equal Run (ex. Accessory, OFF) and the System Master is no longer receiving the Ignition_Status, Delayed_Accessory or Veh_Lock_Status signals then the System Master shall assume the last state received of the signals.

To enter Functional Power Mode states from Standby the voltage at the system master shall be 10v < B+ < 16v.

If during Functional Power Mode the voltage at the system master is (B+ < 10v) OR (B+ > 16v) for more then Thysterisis then the system shall turn the infotainment system OFF and enter Standby Power mode.
If entered standby because the System Master was outside the allowable voltage range (B+ < 10v) OR (B+ > 16v) for more than Thysterisis than the System Master shall perform some voltage hysteresis before re-entering Functional power mode if the voltage re-enters at the defined voltage range.
Ex. While in Run the voltage went below 10V for more than Thysterisis than the System Master enters Standby power mode. Than to re-enter functional power mode (ex crank the vehicle engine) the system master would add a voltage hysteresis such the system master goes to 10.5v for more than Thysterisis before re-entering functional power mode. If there is no voltage hysteresis then system could be continually be turned ON and OFF if on the voltage border.

When the power mode changes to Crank it will not cause a change in the current Power Mode System State (ex. won't exit phone mode, MMActive) unless specifically noted elsewhere. Refer to the Error Management section for details of operation during Crank and Station Management for definition of Crank.

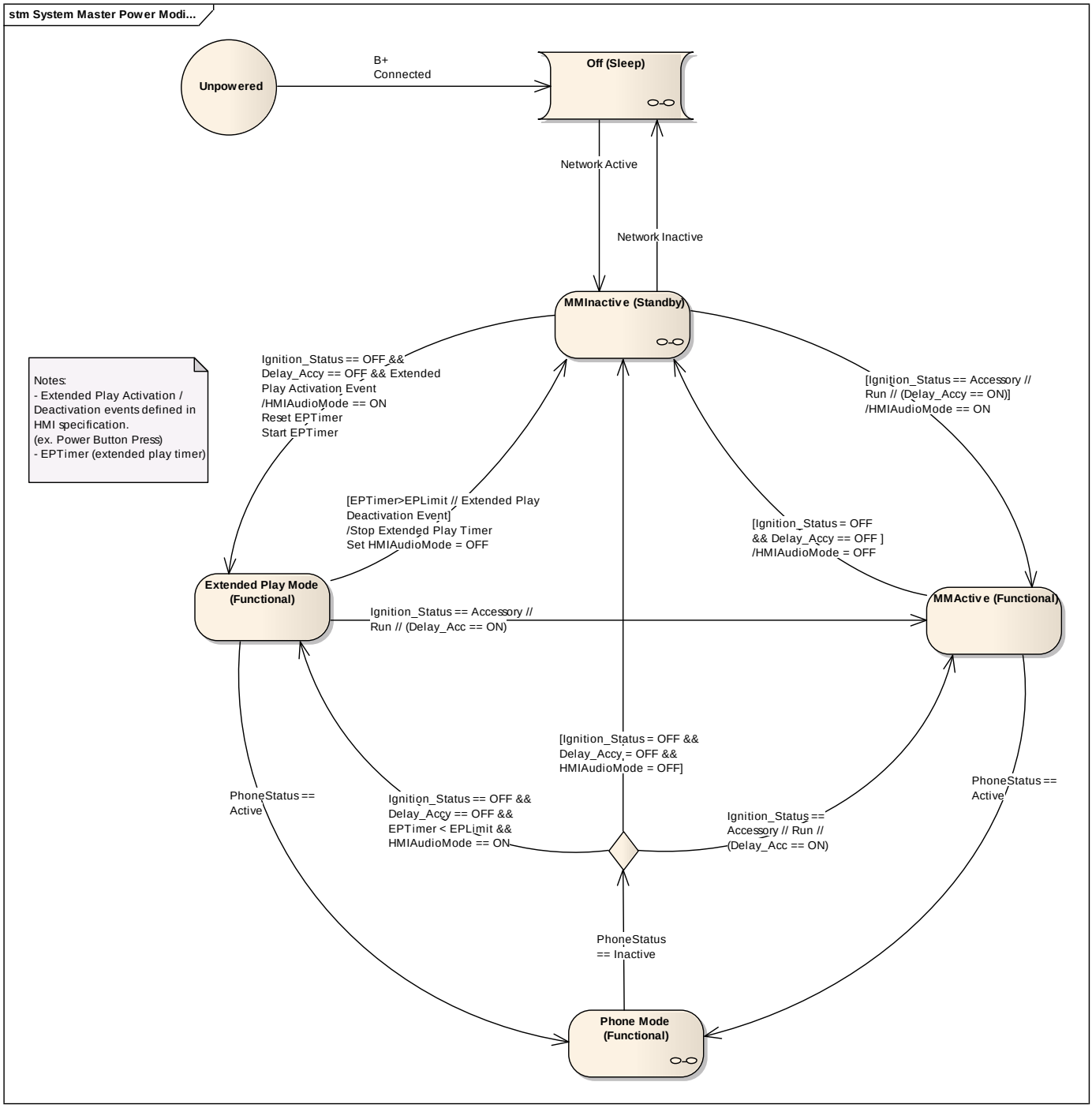
During a cold crank event if the power mode signal HMIAudioMode equals ON then the system master shall re-send HMIAudioMode = ON after the crank event ends but within 100 msec of the crank event ending (crank event ending as defined in “STMGNTv2-FUN-REQ-014669-Crank, Front System ON (CGEA 1.3)” / “STMGNT-FUN-REQ-014666-Crank, Front System ON (C1MCA)”).

Upon a PowerMode signal change used to trigger a transition from Functional to a Standby power mode state the PowerMode signals shall be true for 100 msec +/- 10 msec before the transition occurs.

For example, to transition out of Functional one of the triggers is Ignition_Status = OFF and Delay_Accy = OFF. If Ignition_Status = Accessory in functional and then for 10 msec equaled (Ignition_Status = OFF and Delay_Accy = OFF) and then goes back to and remains at (Ignition_Status = Accessory and Delay_Acc = OFF) then the System Master would remain in functional never transitioning to Standby (MMInactive, 10 Minute Clock mode).

	Pre-Condition: **Last State of Audio Stack in MMActive / Phone Mode when HMIAudioMode transitions from ON to OFF**	**Event:** **Last State of Audio Stack in Extended Play when Ignition_Status changes from OFF to Run/ACC**	**Post-Condition:** **Audio Stack at Ignition_Status = Run/ACC**
1	OFF	OFF (extended play never turned ON)	OFF
2	OFF	OFF (extended play was turned ON and then OFF by user or timer expired)	OFF
3	OFF	ON (extended play is currently ON at transition)	ON
4	ON	OFF (extended play never turned ON)	ON
5	ON	OFF (extended play was turned ON and then OFF by user or timer expired)	ON
6	ON	ON (extended play is currently ON at transition)	ON

OFF (empty audio stack, non-savable source or HMIAudioMode = OFF)
ON (saveable Active Audio Source - AM/FM, SDARS, USB…)

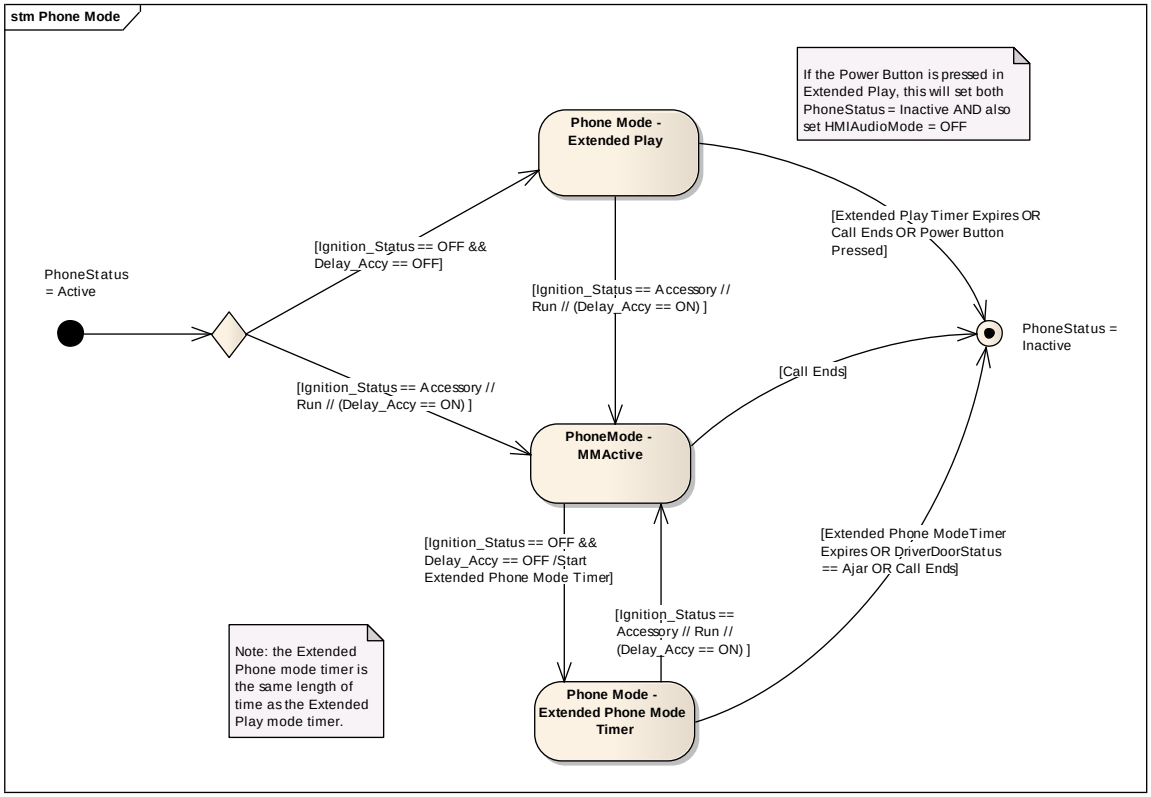


See Phone and MMInactive/Sleep diagrams for internal power moding in those states

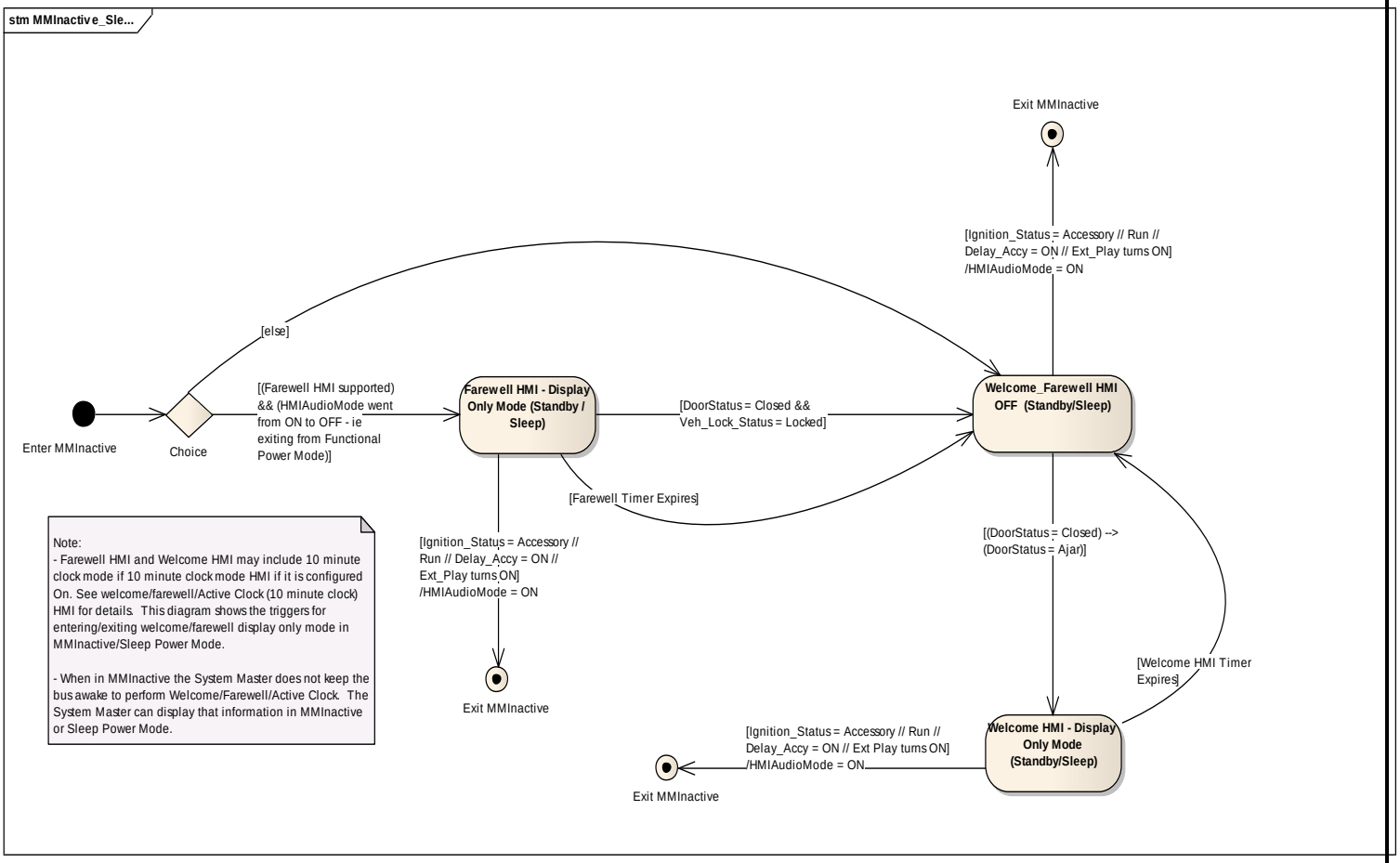
3.1.2 PWRMAN-TMR-REQ-030653/B-T_Hysterisis timer (TcSE ROIN-40635-1)

Name	Description	Units	Range	Resolution	Default
T_Hysterisis timer	Time that is required for the System Master to wait for the supply voltage to stabilize before transitioning to or from Functional Power Mode.	sec	0-20	1	10

3.1.3 PWRMANv2-SR-REQ-031239/C-Phone Mode Power Moding (TcSE ROIN-275203-1)



3.1.4 PWRMAN-REQ-033882/C-MMInactive_Sleep Power Mode Diagram - Welcome_Farewell (TcSE ROIN-289985-2)



Note:

- this may be legacy and not supported. If there is a welcome / farewell specification, then follow the welcome / farewell specification and this is obsolete.
- If this is supported, this is only supposed to identify times the System Master needs to be powered for welcome and farewell in Standby/Sleep and not if the HMI is shown or for how long the HMI is shown if it is shown. See HMI specs for details.

3.2 PWRMAN-FUN-REQ-031236/B-System Master Power Moding (TcSE ROIN-268082-1)

This function is only used for C1MCA and CGEA 1.2 programs. Those are the only architectures that should be using the PowerMode signal.

3.2.1 PWRMAN-SR-REQ-030652/B-System Master Power Moding (TcSE ROIN-40633-11)

The System Master shall always remember the last PowerMode state between PowerMode transitions

Question 1: What should the System Master do if PowerModeQF != OK?
Answer 1: Then the PowerMode signal should not trigger any power mode transition until PowerModeQF == OK

Question 2: What should the System Master do if PowerModeUB != Active?
Answer 2: Then the PowerMode signal should NOT trigger any power mode transition until PowerModeUB == Active

If the signal LockStatusValid == Invalid then the System Master shall treat the Lock_Status signal as the last signal state encoding it received (lock or unlock) before the signal LockStatusValid changed from Valid to Invalid. Once LockStatusValid == Valid again the System Master shall use the current value in the Lock_Status signal.

If the PowerMode signal is missing for 5 seconds then the System Master shall default to Standby Power mode with the infotainment system OFF.

To enter Functional Power Mode states from Standby the voltage at the system master shall be 10v < B+ < 16v.

If during Functional Power Mode the voltage at the system master is (B+ < 10v) OR (B+ > 16v) for more then Thysterisis then the system shall turn the infotainment system OFF and enter Standby Power mode.
If entered standby because the System Master was outside the allowable voltage range (B+ < 10v) OR (B+ > 16v) for more than Thysterisis than the System Master shall perform some voltage hysteresis before re-entering Functional power mode if the voltage re-enters at the defined voltage range.
Ex. While in Run the voltage went below 10V for more than Thysterisis than the System Master enters Standby power mode. Than to re-enter functional power mode (ex crank the vehicle engine) the system master would add a voltage hysteresis such the system master goes to 10.5v for more than Thysterisis before re-entering functional power mode. If there is no voltage hysteresis then system could be continually be turned ON and OFF if on the voltage border.

When the power mode changes to Crank (PowerMode == Crank_3) it will not cause a change in the current Power Mode System State (ex. won't exit phone mode, MMActive) unless specifically noted elsewhere. Refer to the Error Management section for details of operation during Crank.

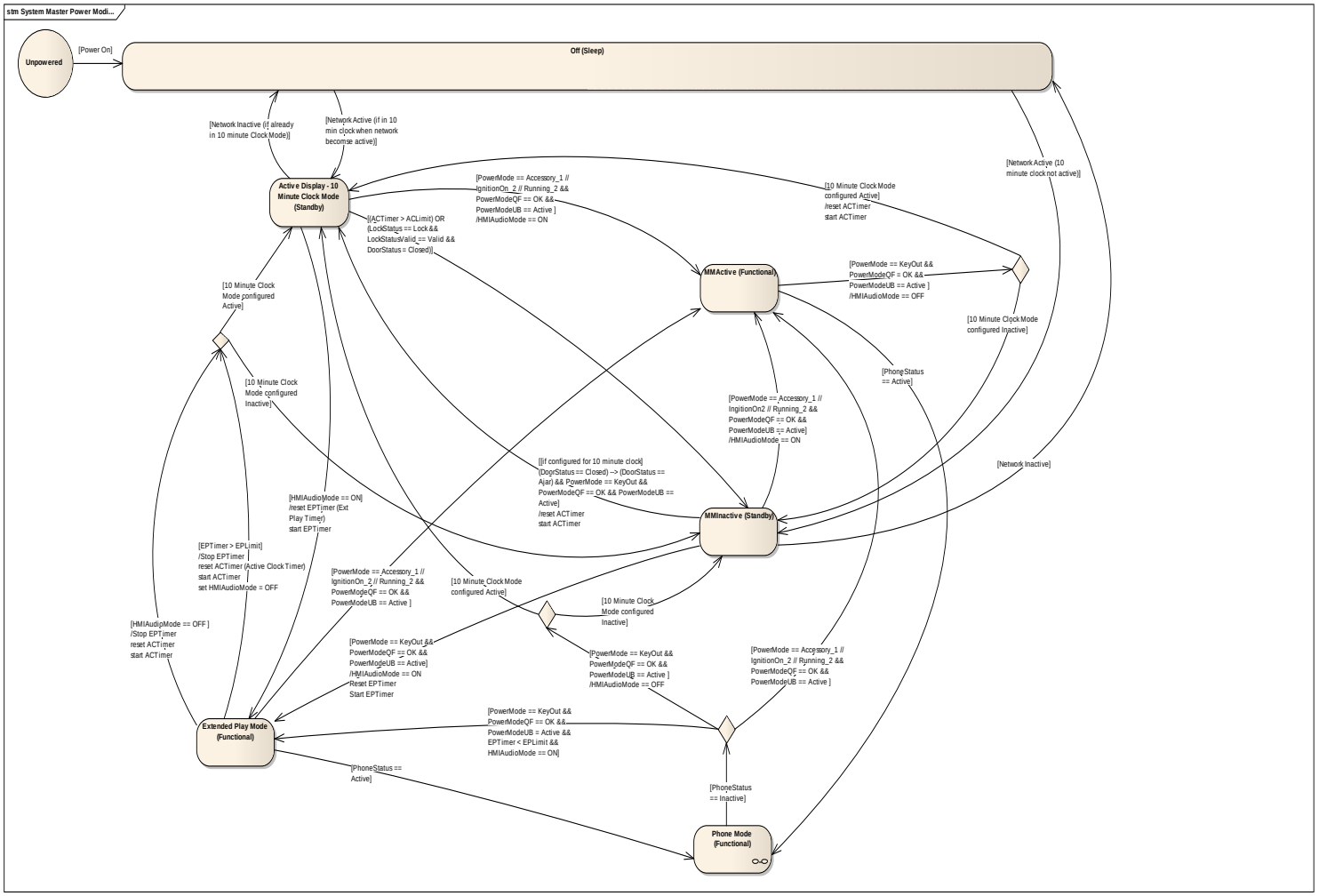
Upon a PowerMode signal change used to trigger a transition from Functional to a Standby power mode state the PowerMode signal shall be true for 100 msec +/- 10 msec before the transition occurs.

For example, to transition out of Functional one of the triggers is the PowerMode == KeyOut. If Power Mode == Running_2 in functional and then for 10 msec equaled KeyOut and then goes back to and remains at Running_2 then the System Master would remain in functional never transitioning to Standby (MMInactive, 10 Minute Clock mode).

	Pre-Condition: **Last State of Audio Stack when PowerMode transitions from PM >= Accessory_1 to PM < Accessory_1**	**Event:** **Last State of Audio Stack in Extended Play when PowerMode transitions from PM < Accessory_1 to PM >= Accessory_1**	**Post-Condition:** **Audio Stack at PM >= Accessory_1**
1	OFF	OFF (extended play never turned ON)	OFF
2	OFF	OFF (extended play was turned ON and then OFF by user or timer expired)	OFF
3	OFF	ON (extended play is currently ON at transition)	ON
4	ON	OFF (extended play never turned ON)	ON
5	ON	OFF (extended play was turned ON and then OFF by user or timer expired)	ON

6	ON	ON (extended play is currently ON at transition)	ON

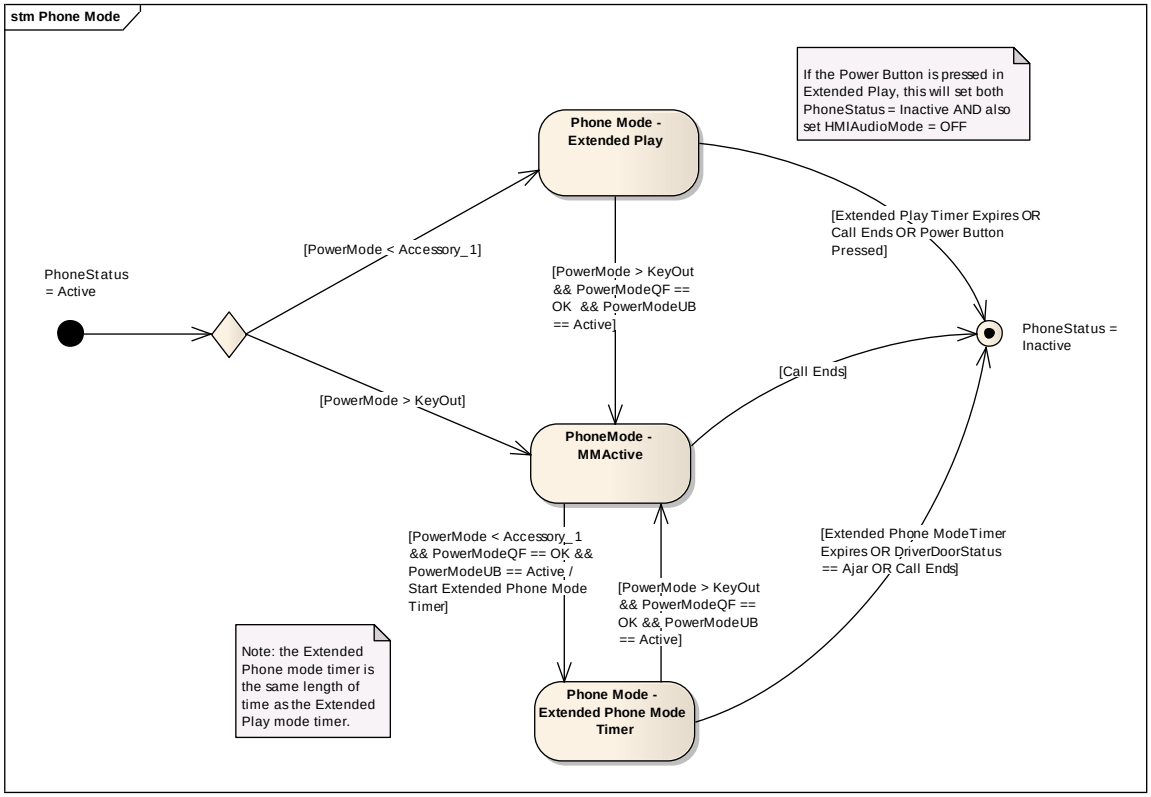
OFF (empty audio stack, non-savable source or HMIAudioMode = OFF)
ON (saveable Active Audio Source - AM/FM, SDARS, USB…)



3.2.2 PWRMAN-TMR-REQ-030653/B-T_Hysterisis timer (TcSE ROIN-40635-1)

Name	Description	Units	Range	Resolution	Default
T_Hysterisis timer	Time that is required for the System Master to wait for the supply voltage to stabilize before transitioning to or from Functional Power Mode.	sec	0-20	1	10

3.2.3 PWRMAN-SR-REQ-030654/C-Phone Mode Power Moding (TcSE ROIN-202251-1)



3.3 PWRMAN-FUN-REQ-033883/B-MMActive (TcSE ROIN-289933-1)

3.3.1 Use Cases

3.3.1.1 PWRMAN-UC-REQ-033884/A-Enter MMActive – Enter MMActive without going to Extended Play (TcSE ROIN-289140-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered OFF Ignition Status is OFF Delayed Accessory is OFF Load Shed is not active Transport Mode is not active
Scenario Description	The user changes ignition status to Run/Acc
Post-conditions	The infotainment system powers ON in MMActive
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.3.1.2 PWRMAN-UC-REQ-033885/A-Exit MMActive – key OFF and opening door (TcSE ROIN-289141-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered ON Load Shed is not active Transport Mode is not active
Scenario Description	1. The user changes ignition status to OFF if not OFF already and remains powered up in delayed accessory 2. The user opens the driver or passenger door which cancels delayed accessory
Post-conditions	The infotainment system powers OFF and MMActive is exited
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.3.1.3 PWRMAN-UC-REQ-033886/A-Exit MMActive – Delayed Accessory Expires (TcSE ROIN-289142-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered ON Ignition Status is OFF Delayed Accessory is Active Load Shed is not active Transport Mode is not active
Scenario Description	The Delayed Accessory timer expires
Post-conditions	The infotainment system powers OFF and MMActive is exited
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.4 PWRMAN-FUN-REQ-033887/B-Extended Play (TcSE ROIN-289937-1)

3.4.1 Use Cases

3.4.1.1 PWRMAN-UC-REQ-033888/A-Enter Extended Play Mode (TcSE ROIN-289135-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered OFF Ignition Status is OFF Delayed Accessory is OFF Load Shed is not active Transport Mode is not active
Scenario Description	The user selects <Infotainment ON> via HMI
Post-conditions	The infotainment system turns ON and enters Extended Play mode
List of Exception Use Cases	N/A
Interfaces	CBI

3.4.1.2 PWRMAN-UC-REQ-033889/A-Exit Extended Play Mode - User turns OFF Extended Play (TcSE ROIN-289136-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered ON Extended Play is active Ignition Status is OFF Delayed Accessory is OFF Load Shed is not active Transport Mode is not active
Scenario Description	The user selects <infotainment OFF> via HMI
Post-conditions	The Infotainment System Powers OFF and Extended Play is exited
List of Exception Use Cases	N/A
Interfaces	CBI

3.4.1.3 PWRMAN-UC-REQ-033890/A-Exit Extended Play Mode - Extended Play Mode timer expires (TcSE ROIN-289137-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered ON Extended Play is active Ignition Status is OFF Delayed Accessory is OFF Load Shed is not active Transport Mode is not active
Scenario Description	The Extended Play Mode timer expires
Post-conditions	The Infotainment System Powers OFF and Extended Play is exited

List of Exception Use Cases	N/A
Interfaces	CBI

3.4.1.4 PWRMAN-UC-REQ-033891/A-Exit Extended Play Mode – Ignition Status changes to Run/Acc (TcSE ROIN-289138-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered ON Extended Play is active Ignition Status is OFF Delayed Accessory is OFF Load Shed is not active Transport Mode is not active
Scenario Description	The ignition status changes to Run/ACC
Post-conditions	The Infotainment System Remains Powered ON in Run/ACC and Extended Play becomes inactive
List of Exception Use Cases	N/A
Interfaces	CBI

3.4.1.5 PWRMAN-UC-REQ-033892/A-Exit Extended Play Mode – Transport / Load Shed active (TcSE ROIN-289139-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered ON Extended Play is active Ignition Status is OFF Delayed Accessory is OFF Load Shed is not active Transport Mode is not active
Scenario Description	A Transport Mode or Load Shed event turns OFF the infotainment system
Post-conditions	The Infotainment System Powers OFF with {HMI Indication} for Load Shed or Transport Mode
List of Exception Use Cases	N/A
Interfaces	CBI

3.4.2 Requirements

3.4.2.1 PWRMAN-SR-REQ-014500/B-Extended Play Supported / Not Supported (TcSE ROIN-40652-1)

Extended Play mode shall be configurable Supported / Not Supported. Reference IDS specification for details.

3.4.2.2 PWRMAN-SR-REQ-014501/C-Extended Play Configuration Times (TcSE ROIN-40653-1)

Extended Play mode shall be configurable for various times ~~up to 1 hour~~. Reference IDS specification for details.

3.5 PWRMAN-FUN-REQ-033893/B-Phone Mode (TcSE ROIN-289941-1)

3.5.1 Use Cases

3.5.1.1 PWRMAN-UC-REQ-033894/A-Entering Phone Mode (TcSE ROIN-289143-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered ON in MMActive or Extended Play
Scenario Description	The user places or receives a Phone Call
Post-conditions	The infotainment system enters Phone Mode
List of Exception Use Cases	N/A
Interfaces	CBI (Center Stack Button Interface – Touch/Non Touch) G-HMI (Graphic HMI) SWC (Steering Wheel Control)

3.5.1.2 PWRMAN-UC-REQ-033895/A-Exit Phone Mode during MMActive Phone Mode (TcSE ROIN-289145-1)

Actors	Vehicle Occupant
Pre-conditions	Phone Call is active Infotainment System Powered ON Ignition Status is Run/ACC or Delayed Accessory is Active Load Shed is not active Transport Mode is not active
Scenario Description	Call is ended
Post-conditions	Phone mode is exited and the applicable power mode state is entered
List of Exception Use Cases	N/A
Interfaces	CBI (Center Stack Button Interface – Touch/Non Touch), G-HMI (Graphic HMI), SWC (Steering Wheel Control)

3.5.1.3 PWRMAN-UC-REQ-033896/A-Exit Phone Mode during Extended Play (ie Extended Play Phone Mode) (TcSE ROIN-289144-1)

Actors	Vehicle Occupant
Pre-conditions	Phone Call is active Infotainment System Powered ON Extended Play is active (ignition status is OFF and Delayed Acc is OFF) Load Shed is not active Transport Mode is not active
Scenario Description	Call is ended, or Extended Play timer expires, or Power Button is pressed
Post-conditions	Phone mode is exited: If the Extended Play timer expires or Power Button is pressed the infotainment system turns OFF.

	If the call is ended and extended play is still active then the infotainment system will remain in extended play
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.5.1.4 PWRMAN-UC-REQ-033897/A-Exit Phone Mode during Extended Phone Mode (TcSE ROIN-289146-1)

Actors	Vehicle Occupant
Pre-conditions	Phone Call is active Infotainment System Powered ON With Ignition Status at OFF the Delayed Accessory timer expired during Phone Call and went to Extended Phone Mode Load Shed is not active Transport Mode is not active
Scenario Description	Call is ended, or Extended Phone Mode timer expires, or the driver door becomes ajar
Post-conditions	Phone mode is exited and the infotainment system powers off
List of Exception Use Cases	N/A
Interfaces	CBI (Center Stack Button Interface – Touch/Non Touch), G-HMI (Graphic HMI), SWC (Steering Wheel Control)

3.6 PWRMAN-FUN-REQ-033898/B-MMInactive_Sleep (welcome, farewell, active clock) (TcSE ROIN-289945-1)

3.6.1 Use Cases

3.6.1.1 PWRMAN-UC-REQ-033899/A-Activating Welcome HMI - From entering vehicle (TcSE ROIN-289112-1)

Actors	Vehicle Occupant
Pre-conditions	Doors are closed Infotainment System Powered OFF Ignition Status is OFF Delayed Accessory is OFF Load Shed is not active Transport Mode is not active
Scenario Description	User opens the driver or passenger door to enter the vehicle
Post-conditions	The Welcome HMI is displayed
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.6.1.2 PWRMAN-UC-REQ-033900/A-Exiting Welcome HMI - Welcome Timer Expires (TcSE ROIN-289113-1)

Actors	Vehicle Occupant
Pre-conditions	Welcome HMI Active Infotainment System Powered OFF Ignition Status is OFF Delayed Accessory is OFF Load Shed is not active Transport Mode is not active
Scenario Description	The Welcome Timer expires
Post-conditions	The Welcome HMI is exited
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.6.1.3 PWRMAN-UC-REQ-033901/A-Exiting Welcome HMI - Turning ON the infotainment system (TcSE ROIN-289114-1)

Actors	Vehicle Occupant
Pre-conditions	Welcome HMI Active Infotainment System Powered OFF Ignition Status is OFF Delayed Accessory is OFF Load Shed is not active Transport Mode is not active
Scenario Description	The user turns ON the infotainment system. This could be enter conditions such as changing ignition status to Run/ACC or turning on Extended play.
Post-conditions	The Welcome HMI is exited

List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.6.1.4 PWRMAN-UC-REQ-033902/A-Activating Farewell HMI – from turning off infotainment system (TcSE ROIN-289115-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered ON
Scenario Description	The user powers OFF the infotainment system. This could be exit conditions such as opening the door to exit delayed accessory or pressing the power button to end extended play.
Post-conditions	The Farewell HMI is displayed
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.6.1.5 PWRMAN-UC-REQ-033903/A-Exiting Farewell HMI – Farewell Timer expires (TcSE ROIN-289116-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered OFF Farewell HMI is active
Scenario Description	Farewell Timer expires
Post-conditions	The Farewell HMI is exited
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.6.1.6 PWRMAN-UC-REQ-033904/A-Exiting Farewell HMI - Door Closed and Door Locked (TcSE ROIN-289133-1)

Actors	Vehicle Occupant
Pre-conditions	Farewell HMI Active Infotainment System Powered OFF Ignition Status is OFF Delayed Accessory is OFF Load Shed is not active Transport Mode is not active
Scenario Description	The user closes the door and then locks the door while exiting the vehicle
Post-conditions	The Farewell HMI is exited
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.6.1.7 PWRMAN-UC-REQ-033905/A-Exiting Farewell HMI - Turning ON the infotainment system (TcSE ROIN-289134-1)

Actors	Vehicle Occupant
Pre-conditions	Farewell HMI Active Infotainment System Powered OFF Ignition Status is OFF Delayed Accessory is OFF Load Shed is not active Transport Mode is not active
Scenario Description	The user turns ON the infotainment system. This could be enter conditions such as changing ignition status to Run/ACC or turning on Extended play
Post-conditions	The Farewell HMI is exited
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.6.2 Requirements

3.6.2.1 PWRMAN-SR-REQ-030662/B-10 Minute Clock Mode (Active Clock mode in Standby power mode) (TcSE ROIN-40693-2)

The user shall not be able to listen to the infotainment system while 10 Minute Clock mode (Active Clock Mode in Standby power mode) is active. 10 Minute Clock Mode display defined by the HMI.

3.6.2.2 PWRMAN-SR-REQ-030663/C-10 Minute Clock Mode Supported / Not Supported (TcSE ROIN-40694-1)

If support 10 minute clock mode for a particular market then 10 Minute Clock mode shall be configurable Supported / Not Supported. Reference IDS specification for details.

3.7 PWRMAN-FUN-REQ-033906/C-Load Shed Strategy (TcSE ROIN-289949-1)

3.7.1 Use Cases

3.7.1.1 PWRMAN-UC-REQ-033907/A-Entering Load Shed Low Power State (TcSE ROIN-289147-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered ON in MMActive or Extended Play Load Shed is not active The engine is OFF Transport Mode is not active eCall is not active
Scenario Description	A Load Shed event occurs while the engine is OFF
Post-conditions	The Infotainment System enters MMInactive state with an Engine OFF Load Shed {HMI indication} for an appropriate amount of time.
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.7.1.2 PWRMAN-UC-REQ-033908/A-Exiting Load Shed Low Power State (TcSE ROIN-289901-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered OFF in Load Shed The engine is OFF Transport Mode is not active eCall is not active
Scenario Description	The Load Shed event is ended
Post-conditions	The Infotainment System exits Load Shed mode and enters the applicable power mode state. If Ignition Status is Run/Acc or Delayed Accessory is active then MMActive would be entered. If Ignition Status is OFF and Delayed Accessory is OFF (even if previous power mode state was extended play) then MMInactive would be entered
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.7.2 Requirements

3.7.2.1 PWRMAN-SR-REQ-014507/B-Signals initiating an Engine OFF Infotainment Load Shed Event (TcSE ROIN-40679-2)

Unless noted otherwise the following load shed signals shall initiate an 'Engine OFF Infotainment Load Shed Event' for the System Master when:

-- '_Battery_Mgmt_2 : Batt_Lo_SoC_B = Active' AND
1. '_Battery_Mgmt_2 : Shed_Level_Req = SOON_ENG_OFF' OR
2. '_Battery_Mgmt_2 : Shed_Level_Req = SHED_ENG_OFF'

OR

-- '_Battery_Mgmt_2 : Batt_Crit_SoC_B = Active' AND
1. '_Battery_Mgmt_2 : Shed_Level_Req = SOON_ENG_OFF' OR
2. '_Battery_Mgmt_2 : Shed_Level_Req = SHED_ENG_OFF'

OR

-- '_Battery_Mgmt_2 : Shed_Drain_Eng_Off_B = Active' AND
1. '_Battery_Mgmt_2 : Shed_Level_Req = SOON_ENG_OFF' OR
2. '_Battery_Mgmt_2 : Shed_Level_Req = SHED_ENG_OFF'

OR

-- '_Battery_Mgmt_2 : Shed_T_Eng_Off_B = Active' AND
1. '_Battery_Mgmt_2 : Shed_Level_Req = SOON_ENG_OFF' OR
2. '_Battery_Mgmt_2 : Shed_Level_Req = SHED_ENG_OFF'

3.7.2.2 PWRMAN-SR-REQ-014508/B-System Master Load Shed Event Activation Process (TcSE ROIN-40680-3)

If an 'Engine OFF Infotainment Load Shed Event' is occurring then:

1. The System Master shall disconnect the audio source and then turn the infotainment system OFF by setting the HMIAudioMode = Load Shed
2. After the System Master turns OFF the infotainment system then a Load Shed message can be displayed as called out in by the HMI.
3. After displaying the HMI the System Master shall vote to go to sleep if no other non-infotainment features are required from the system master.

Note: when a Load Shed event and Transport Mode event are active at the same time the load shed event shall take priority. This includes any HMI displayed to the user.

3.7.2.3 PWRMAN-SR-REQ-014509/I-Infotainment Components Load Shed State requirements (TcSE ROIN-66172-3)

Unless otherwise noted the infotainment components shall transition to their Standby or Sleep Load Shed low power state when the signal HMIAudioMode == Load Shed.

In the Standby Load Shed low power state non-essential component functions shall be turned OFF (ex. active pre-fetch). Basic standby operations will still be followed such as supporting the Network bus and any regulatory requirements.

Note: There may also be applicable Climate Control load shed requirements for modules that support Climate Control functionality. See Climate specifications for details.

Chimes and Load Shed:

- The infotainment components that support chimes (ex. AHU, DSP AMP, AAM, ANC…) during a transition to load shed from state where chimes are through the infotainment system shall wait until the Cluster transfers control of the chimes back to the Cluster (as defined in ALERT-REQ-014761-Load Shed) before entering their low power states.
- Since the infotainment components that support chimes have to wait for Cluster to transfer chime control back to the Cluster (ie IPC_Infotainment : Chime_Source = Cluster) during a load shed event before they no longer support chimes the infotainment components would have Chime_Supported = Supported while supporting chimes.
- After chime control is transferred to the Cluster the infotainment components shall change Chime_Supported = Not_Supported while the load shed is active.

Chimes and Load shed – variant 3: (applies to Phoenix architecture)

- APIM PDC (Cluster and Chime Generator in one module): when HMIAudioMode = Load Shed the integrated Chime Client and Chime Generator shall use the VMCU back-up speaker and set Power_Up_Chime_Modules = Inactive and Chime_Source = Cluster.

- The PDC CCPU, AHUv2 and DSPv2 shall set their Chime_Supported signals equal to ~~Not_Supported~~ "Inactive" while a load shed event is active.
    - Note: Chime_Supported set to Inactive allow the chimes to go back to the infotainment system when the load shed event ends (ex engine is running). Chime_Supported = Not_Supported would lock out chimes for that whole ignition cycle.

~~Chimes and Load Shed – variant 2: (applies to SYNC 4.2)~~

- ~~SYNC 4.2 (AHU and Cluster in one module): when HMIAudioMode = Load Shed the integrated Chime Client and Chime Generator shall use the back-up speaker(s) and set Power_Up_Chime_Modules = Inactive and Chime_Source = Cluster (as defined in "Alertv2-REQ-372081-Load Shed – SYNC 4.2").~~

3.7.2.4 PWRMAN-SR-REQ-014510/B-Infotainment Components transition from Load Shed State to Normal Operation (TcSE ROIN-40682-2)

For the System Master if a Load Shed event is ended after previously being active in the same ignition cycle then the infotainment system can return to its previous audio source in functional power mode. This only applies if PowerMode > KeyOut (ie so audio doesn't come back up in Extended Play).

The infotainment components shall become operable again if the signal HMIAudioMode changes from 'Load Shed' to 'ON' (functional) or 'OFF' (standby functions).

3.7.2.5 PWRMANv2-SR-REQ-014511/B-Infotainment Components transition from Load Shed State to Normal Operation (TcSE ROIN-275491-1)

For the System Master if a Load Shed event is ended after previously being active in the same ignition cycle then the infotainment system can return to its previous audio source in functional power mode. This does not apply in Extended Play mode when Ignition_Status = OFF and Delay_Accy = OFF.

The infotainment components shall become operable again if the signal HMIAudioMode changes from 'Load Shed' to 'ON' (functional) or 'OFF' (standby functions).

3.7.2.6 PWRMAN-SR-REQ-014512/C-Load Shed and High Criticality features (TcSE ROIN-40683-3)

For a particular module the module team needs to determine what/if there are high criticality items that will not be shut down for load shed. The items below should not be prevented from operating during a load shed event (not limited to the items below):

eCall:
If a priority assist call is active then the call does not have to be ended for a load shed event (System Master can keep HMIAudioMode = "ON" instead of going to "Load Shed").

If there is a load shed event currently active (HMIAudioMode = Load Shed) and a priority assist call needs to take place then the load shed event can be ended by the System Master (HMIAudioMode = Load Shed to ON) so the call can be made.

Reference priority assist phone requirements / HMI for different ways to end/place a priority assist phone call during a load shed event.

Phone as a Key Phone Charging:
For Phone as a Key a load shed event shall not prevent the phone charging module charging ports (ex SYNC USB) from being able to charge a phone when PrsnlDevChrgEnbl_B_Rq = Active.

- Note: the phone charging needs to be supported in case the user's phone is dead and they need to be able to charge it enough to start the vehicle.

3.7.2.7 PWRMAN-SR-REQ-014513/C-Ending a Load Shed Event (TcSE ROIN-40684-4)

The System Master shall end the load shed event and no longer have 'HMIAudioMode = Load Shed Active' when the signal Shed_Level_Req = NO_SHED or when the conditions in "PWRMAN-GREQ-014507-Signals initiating an Engine OFF Infotainment Load Shed Event" are no longer met.

3.7.2.8 PWRMAN-SR-REQ-014514/B-EFP Load Shed (TcSE ROIN-40686-3)

~~If EFP supports load shed for infotainment it shall then shed loads as defined in the EFP component spec(s) when:~~
~~1. The signal "HMIAudioMode = Load Shed" (info-CAN bus) OR "Multimedia_System = OFF" (external from info-CAN bus), AND~~
~~2. The signal "PowerMode = Accessory_1 // KeyOut" on info-CAN bus, OR "Ignition_Status = OFF or Accessory" when EFP external from the info-CAN bus, AND~~
~~3. Doesn't violate any climate control, illumination or regulatory requirements~~

~~Note: Follow any Climate load shed requirements defined in applicable climate specifications.~~

Load Shed is not supported for Infotainment EFP functionality. When the EFP in a load shed state (could be in load shed for other EFP functionality such as climate control…) the EFP shall still support infotainment power moding and be able to send a infotainment button press whenever the CAN bus is active.

Note: When HMIAudioMode = Load_Shed then the EFP shall treat this the same as HMIAudioMode = OFF / Multimedia_System = OFF.

3.7.2.9 PWRMANv2-SR-REQ-014515/B-EFP Load Shed (TcSE ROIN-278270-2)

~~If EFP supports load shed for infotainment it shall then shed loads as defined in the EFP component spec(s) when:~~
~~1. The signal "HMIAudioMode = Load Shed", AND~~
~~2. The signal "Ignition_Status = OFF or Accessory", AND~~
~~3. Doesn't violate any climate control, illumination or regulatory requirements~~

~~Note: Follow any Climate load shed requirements defined in applicable climate specifications.~~

Load Shed is not supported for Infotainment EFP functionality. When the EFP in a load shed state (could be in load shed for other EFP functionality such as climate control…) the EFP shall still support infotainment power moding and be able to send a infotainment button press whenever the CAN bus is active.

Note: When HMIAudioMode = Load_Shed then the EFP shall treat this the same as HMIAudioMode = OFF / Multimedia_System = OFF.

3.7.2.10 PWRMAN-SR-REQ-014516/C-SWCM Load Shed (TcSE ROIN-66176-2)

If the Steering Wheel Control module supports load shedding from the vehicle then during a load shed event the SWCM module cannot power down the infotainment buttons functionality whenever the Multimedia_System = ON / HMIAudioMode = ON (note if HMIAudioMode = ON the infotainment system is not in a load shed state even if the vehicle is).

- Example: The SWCM infotainment buttons would be operational during a priority assist call when the infotainment system is on regardless if the vehicle itself is in a load shed state (ie vehicle load shed modules sending network signals in a load shed state but HMIAudioMode = ON meaning the infotainment system is ON).

If the Steering Wheel Control module supports load shedding from the vehicle then during a load shed event the SWCM can support load shed from the vehicle if Multimedia_System = OFF / HMIAudioMode = (OFF / Load Shed).

Note: if the SWCM receives the HMIAudioMode signal instead of the Multimedia_System signals for a program CAN dB then the signals can be used interchangeably.

- Multimedia_System = OFF is the same as HMIAudioMode = OFF or HMIAudioMode = Load Shed.
  - HMIAudioMode = Load Shed means the infotainment system is in a load shed state.
- Multimedia_System = ON is the same as HMIAudioMode = ON.

3.8 PWRMAN-FUN-REQ-033909/A-Transport Mode (TcSE ROIN-289955-1)

3.8.1 Use Cases

3.8.1.1 PWRMAN-UC-REQ-033910/D-Entering Transport Mode Low Power State (TcSE ROIN-289902-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered ON in MMActive or Extended Play CGEA 1.2 / C1MCA architecture (legacy architectures): Ignition Status is OFF or Accessory CGEA 1.3 / FNV2+ architecture: Ignition Status is OFF, Acc, or Run with engine off (but not engine off because of a start-stop engine off event) Transport Mode is not active Load Shed is not active eCall is not active
Scenario Description	Transport Mode becomes Active
Post-conditions	The Infotainment System enters Transport Mode low power state with an {HMI indication} (HMI indication if applicable).
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface
Notes	Use case applicable for the HMI post-condition only if the HMI specs support this use case. See HMI specs for details When say CGEA 1.3, FNV2+ architectures, the plus means that applies to all future architectures

3.8.1.2 PWRMAN-UC-REQ-033911/C-Exiting Transport Mode Low Power State by changing vehicle power mode state (TcSE ROIN-289903-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered OFF in Transport Mode CGEA 1.2 / C1MCA architecture (legacy architectures): Ignition Status is OFF or Accessory CGEA 1.3 / FNV2+ architecture: Ignition Status is OFF, Acc, or Run with engine off (but not engine off because of a start-stop engine off event) Load Shed is not active eCall is not active
Scenario Description	- For CGEA 1.2 / C1MCA architectures the user changes Ignition Status to Run - For CGEA 1.3 / FNV2+ architectures the user starts the engine.
Post-conditions	The Infotainment System exits Transport Mode and enters MMActive
Notes	When say CGEA 1.3, FNV2+ architectures, the plus means that applies to all future architectures
Interfaces	Vehicle System Interface

3.8.1.3 PWRMAN-UC-REQ-033912/C-Exiting Transport Mode Low Power State when vehicle is no longer in Transport Mode (TcSE ROIN-289906-1)

Actors	Vehicle Occupant
Pre-conditions	Infotainment System Powered OFF in Transport Mode Ignition Status is OFF or Accessory

	Load Shed is not active eCall is not active
Scenario Description	The Transport Mode event is ended
Post-conditions	The Infotainment System enters the applicable power mode state. If Ignition Status is Acc or Delayed Accessory is active then MMActive would be entered. If Ignition Status is OFF and Delayed Accessory is OFF then MMInactive would be entered
List of Exception Use Cases	N/A
Interfaces	Vehicle System Interface

3.8.2 Requirements

3.8.2.1 PWRMAN-SR-REQ-014518/E-Transport Mode (TcSE ROIN-40660-3)

When the infotainment components receive the signal 'CarMode = Transport' indicating Transport Mode is Active AND receive the 'HMIAudioMode = OFF' from the System Master then the infotainment system shall transition to Standby power mode in their transport mode low power state. The infotainment components shall exit Transport Mode when these conditions are no longer true.

The System Master shall enter Transport mode only when CarMode = Transport and PowerMode = KeyOut or PowerMode = Accessory_1. The System Master shall set HMIAudioMode = OFF while in Transport Mode. Unless noted otherwise the System Master shall exit Transport Mode when these conditions are no longer true.

10 minute clock mode is inactive during Transport mode.

During Transport mode Climate requirements, illumination requirements, and regulatory requirements shall be followed as defined for Transport mode. Refer to the applicable Climate and Illumination specifications for details.

Refer to Operational Mode Management Specification for details of when CarMode is set to Transport mode.

Note: this requirement is for CGEA 1.2 and C1MCA vehicles

3.8.2.2 PWRMANv2-SR-REQ-014519/J-Transport Mode (TcSE ROIN-278271-1)

When the infotainment components receive the signal LifeCycMde_D_Actl / CarMode = Transport' indicating Transport Mode is Active AND receive the 'HMIAudioMode = OFF' from the System Master then the infotainment system shall transition to Standby power mode in their transport mode low power state. The infotainment components shall exit Transport Mode low power state when either of these conditions are no longer true (ie: exit if HMIAudioMode = ON, OR LifeCycMde_D_Actl / CarMode != Transport).

The System Master shall enter Transport mode low power state only when:

- LifeCycMde_D_Actl / CarMode = Transport, and
- Ignition_Status = OFF, or Ignition_Status = Accessory, or Ignition_Status = Run and Eng_D_Stat does not equal EngON or EngAutoStopped (ie engine OFF – the driver hasn't started the engine).

The System Master shall set HMIAudioMode = OFF while in Transport Mode low power state. Unless noted otherwise the System Master shall exit Transport Mode low power state when these conditions are no longer true (ie LifeCycMde_D_Actl / CarMode != Transport or Ignition_Status = RUN and End_D_Stat = EngON or EngAutoStopped).

10 minute clock mode is inactive during Transport mode.

During Transport mode Climate requirements, illumination requirements, and regulatory requirements shall be followed as defined for Transport mode. Refer to the applicable Climate and Illumination specifications for details.

Refer to Operational Mode Management Specification for details of when LifeCycleMode is set to Transport mode.

Note: CarMode is generic for this requirement and is any signal that contains the Transport Mode signal for a given architecture (ex. CGEA 1.3 LifeCycleMode is the CAN signal with Transport Mode).

Note: this requirement is for CGEA 1.3+ vehicles

3.8.2.3 PWRMAN-SR-REQ-014520/H-Transport Mode and CGEA Chimes (TcSE ROIN-40663-3)

Audio Chimes shall NOT be enabled through the Infotainment System during Transport Mode. The Cluster shall support Chimes during Transport Mode.

During a transition to Transport Mode from another LifeCycMde_D_Actl/CarMode state where the chimes are through the infotainment system the Cluster shall set the 'Chime_Source' signal equal to 'Cluster' and Power_Up_Chime_Modules = Inactive.

- ~~The infotainment components that support chimes shall wait until the Cluster transfers control of the chimes back to the Cluster with the 'Chime_Source = Cluster' AND 'Power_Up_Chime_Module = Inactive' before entering their transport mode low power states.~~
  - ~~Since the infotainment components that support chimes have to wait for Cluster to transfer chime control back to the Cluster during a transport mode event before they no longer support chimes the infotainment components would have Chime_Supported = Supported while supporting chimes. After chime control is transferred to the Cluster the infotainment components can change Chime_Supported = Not_Supported while transport mode is active.~~
    - Legacy Infotainment components can continue follow the requirement above with strikethroughs (if already implemented) where they wait for the Cluster before setting Not_Supported. New modules (ex new AHU, DSP AMP) shall set Chime_Supported = Not_Supported when LifeCyclMde_D_Actl = Transport.
- For the Phoenix architecture the AHUv2 and DSP AMPv2 shall set their Chime_Supported signals to Not_Supported when LifeCycMde_D_Actl = Transport.

3.9 PWRMAN-FUN-REQ-031040/A-Button Activation in Sleep Power Mode (TcSE ROIN-268143-1)

3.9.1 Requirements

3.9.1.1 PWRMAN-SR-REQ-030665/E-Button Activation in Sleep Power Mode (TcSE ROIN-60372-4)

For button activation events while the Button Input Client module (ex EFP/ECP or Rear EFP if applicable) is asleep the Button Input Client shall be capable of waking up the bus to Standby Power Mode to Tx the button press. This is only for buttons allowed to wake-up the bus.

Unless noted otherwise by the Ford Button Input Client D&R engineer the Front Power button <Infotainment On>, Rear Power Button <Infotainment On> (if supported), and Eject button when pressed shall wake up the bus when the Button Input Client is asleep so that those button presses can be sent out.

The Receiving module (ex System Master/APIM/MFD/CHR…) shall be capable of receiving the button press within 100 msec of bus wake-up (ie T1 - Ready to Receive) and capable of processing the button press once it enters Standby power mode.

Entering Extended Play mode: The user selects <Infotainment ON> via the Button Input Client while the bus is asleep. The Button Input Client wakes up the bus, transmits the button for <Infotainment ON> to the System Master while in Standby Power mode. The System Master processes the button press and turns the infotainment system ON in Extended Play Mode.

3.10 PWRMAN-FUN-REQ-031041/A-Disc Load / Eject (TcSE ROIN-268144-1)

3.10.1 Requirements

3.10.1.1 PWRMAN-SR-REQ-030666/C-Load / Eject in any Power Mode state (TcSE ROIN-40673-2)

In a CAN or network based infotainment system
The power mode state shall not prevent the user from inserting/ejecting a disc into the CD/DVD mechanism. Exception Unpowered mode.

Reference requirement "SCD-UC-REQ-020450-Disc Eject, Audio Resource Server OFF, Vehicle OFF (TcSE ROIN-0912-1)" for additional details when infotainment system is off (ie HMIAudioMode = OFF) and ejecting disc.

In an infotainment system without CAN or a network base of communication
Prevent the user from inserting/ejecting a disc into the CD/DVD mechanism when it is in the SLEEP MODE or UNPOWERED MODE.
Allow the user to insert/eject disc into the CD/DVD mechanism when it is in the STANDBY MODE or FUNCTIONAL MODE.

3.11 PWRMAN-FUN-REQ-233261/B-Phone as a Key - Phone Charging Power Moding

3.11.1 Use Cases

3.11.1.1 PWRMAN-UC-REQ-233263/B-Phone as a Key - Charging a Phone when the infotainment system is OFF

Actors	Vehicle Occupant
Pre-conditions	The infotainment system is powered OFF so there no infotainment audio (ie HMIAudioMode = OFF). The Vehicle System is not requesting infotainment be capable of charging a phone (ie PrsnIDevcChrgEnbl_B_Rq = Inactive)
Scenario Description	The Vehicle System request the infotainment system to be capable of charging a phone (ie PrsnIDevcChrgEnbl_B_Rq = Active)
Post-conditions	The infotainment phone charging ports (ex USB) are able to charge a phone The infotainment system is powered OFF so no infotainment audio (ie HMIAudioMode = OFF)
Notes	An example of when this might happen would be if the user's phone battery is dead and they enter the vehicle through the keypad (or door left unlocked), but with a dead phone battery they cannot start the car. The vehicle may use a strategy to determine if a person needs to charge their phone in the vehicle and send this PrsnIDevcChrgEnbl_B_Rq power moding signal to the infotainment system so the phone can be charged enough to start the vehicle.
Interfaces	Vehicle System

3.11.1.2 PWRMAN-UC-REQ-236924/A-Phone as a Key - Vehicle System no longer requesting the infotainment system be able to charge a phone

Actors	Vehicle Occupant
Pre-conditions	The infotainment system is powered OFF so there no infotainment audio (ie HMIAudioMode = OFF). The Vehicle System requesting infotainment be capable of charging a phone (ie PrsnIDevcChrgEnbl_B_Rq = Active) The infotainment phone charging ports (ex USB) are able to charge a phone
Scenario Description	The Vehicle System no longer requires the infotainment system to be capable of charging a phone (ie PrsnIDevcChrgEnbl_B_Rq = Inactive)
Post-conditions	The infotainment phone charging ports (ex USB) are no longer required to be able to charge a phone to support Phone as a Key The infotainment system is powered OFF so no infotainment audio (ie HMIAudioMode = OFF)
Notes	
Interfaces	Vehicle System

3.11.2 Requirements

3.11.2.1 PWRMAN-SR-REQ-233262/E-Phone as a Key - Phone Charging power moding

Whenever the infotainment system is powered on (ie HMIAudioMode = ON) the Infotainment Phone Charging modules (ex USB ports or any other phone charging ports) shall be capable of charging a phone.

An infotainment module that supports charging a Phone (ex. USB ports, infotainment power points…) shall support charging a phone whenever "PrsnIDevChrgEnbl_B_Rq = Active". This is regardless of HMIAudioMode power mode status.

- Example: If HMIAudioMode = OFF and PrsnIDevChrgEnbl_B_Rq = Active the Infotainment Phone Charging Module shall be capable of charging a phone (ex with the USB ports) while the infotainment system remains off.

The Infotainment module that supports charging a Phone shall power down to its low power state if PrsnDevChrgEnbl_B_Rq = Inactive and no other signals or features are powering up the infotainment module (ex Ignition_Status).

When Ignition_Status = OFF/Accessory if the signal PrsnIDevChrgEnbl_B_Rq is no longer on the network bus (either signal missing or update bit showing the signal is not fresh data) then the last signal state shall be remembered.

The Infotainment Phone Charging module shall not keep the bus awake for PrsnIDevChrgEnbl_B_Rq = Active and will remain powered up locally if the network bus is in sleep mode.

If the Infotainment System Phone Charging module has not received PrsnIDevChrgEnbl_B_Rq = Inactive for more than an hour after first receiving PrsnIDevChrgEnbl_B_Rq = Active then the Infotainment System Phone Charging module shall treat PrsnIDevChrgEnbl_B_Rq as though it equals Inactive.

- Whenever the Infotainment System Phone Charging module receives PrsnIDevChrgEnbl_B_Rq = Active the 1 hour timer shall be reset

When the infotainment system is in a load shed state (ex HMIAudioMode = Load Shed), or KOL Mode (ie KeyOffMde_D_Actl) is at hibernate/critical batt, if PrsnIDevChrgEnbl_B_Rq = Active then the Infotainment Phone Charging module shall still be capable of charging a phone.

3.12 PWRMAN-FUN-REQ-235503/C-Key Off Load Mode signal Power Management

3.12.1 Use Case

3.12.1.1 PWRMAN-UC-REQ-235517/B-Critical Batt - KOL Mode (Infotainment)

Actors	System
Pre-conditions	Ignition_Status = OFF Low battery critical battery event occurs (ie KeyOffMde_D_Actl = Normal → Critical Battery) and bus goes back to sleep
Scenario Description	User opens the door and presses the power button to enter extended play
Post-conditions	1. The Welcome screen does not turn On 2. Extended Play is not entered
Notes	
Interfaces	Vehicle System Interface

3.12.1.2 PWRMAN-UC-REQ-235518/D-Hibernate - KOL Mode (Infotainment)

Actors	System
Pre-conditions	Ignition_Status = OFF for more than 5 days (ie KeyOffMde_D_Actl = Hibernate)
Scenario Description	User opens the door and presses the power button to enter extended play
Post-conditions	1. The Welcome screen does not turn On 2. Extended Play is not entered
Notes	Hibernate was 5 days when the use case was written
Interfaces	Vehicle System Interface

3.12.1.3 PWRMAN-UC-REQ-235608/A-Critical Batt - KOL Mode (Chimes)

Actors	System
Pre-conditions	Ignition_Status = OFF Low battery critical battery event occurs (ie KeyOffMde_D_Actl = Normal → Critical Battery) and bus goes back to sleep
Scenario Description	User opens the door and activates a chime
Post-conditions	Chimes are played through the Cluster
Notes	
Interfaces	Vehicle System Interface

3.12.2 Requirements

3.12.2.1 PWRMAN-SR-REQ-235509/K-KOL Mode Signal power management usage

The purpose of the key off load mode signal is to minimize key off load in the vehicle in order to preserve the life of the battery.

Infotainment modules shall support the table below for the KeyOffMde_D_Actl signal (ie KOL_Mode) for entering and exiting different KOL mode states:

KeyOffMde_D_Actl	Ignition_Status	KOL Mode Requirements
Don't care	**Not OFF (ie Crank / Accessory / Run)**	*Ignition_Status is prioritized over KeyOffMde_D_Actl* The Infotainment modules are not required to use any KOL Mode Reduced Current Drain Strategies when ignition status is not OFF.
TRANSPORT | NORMAL | FACTORY	**OFF**	These states are don't cares with the KeyOffMde_D_Actl signal. No new requirements. Follow existing strategies Follow current strategy for LifeCycleMode_D_Actl / CarMode signal (ex Transport Mode, Factory Mode)
HIBERNATE	**OFF**	The Infotainment System Master shall disable the Welcome / Farewell strategy The Infotainment System Master shall disable extended play For TCU see applicable TCU specifications for reduced current drain strategies Note: at the time this SPSS was written Hibernate mode is entered after 5 days of key off.
CRITICAL_BATT	**OFF**	The Infotainment System Master shall disable the Welcome/Farewell strategy and all non-critical infotainment features (treat critical features as features that load shed would not shut down). • The infotainment System Master shall shut down the infotainment system and set HMIAudioMode = Load Shed. The Infotainment System Master shall disable extended play. Note: for infotainment load shed shutdown process see load shed requirement "PWRMAN-REQ-014508-System Master Load Shed Event Activation Process". The Cluster shall play the chimes and shall not set the infotainment system as the Chime Audio Source (ie Power_Up_Chime_Modules = Inactive and Chime_Source = Cluster). • The AHU shall set AHU_Chime_Supported = Not Supported for non-Phoenix architectures • The PAC/AHU shall set AHU_Chime_Supported = Inactive for the Phoenix architecture For TCU see applicable TCU specifications for reduced current drain strategies

KeyOffMde_D_Actl (ie KOL Mode) does not replace the LifeCycle Mode_D_Actl (ie CarMode) signal for Transport Mode or Factory Mode.

- Transport and Factory Mode encodings in the KeyOffMde_D_Actl signal are considered don't cares. Follow any existing SPSS requirements for Transport and/or Factory Mode (ex using LifeCycleMode_D_Actl).

KeyOffMde_D_Actl signal is defined to be to the "NORMAL" encoding when Ignition_Status is not OFF (ex RUN/ACC).

When Ignition_Status = OFF if there is no KeyOffMde_D_Actl signal on the bus or an update bit indicates not fresh data for the signal then assume the last KOL state.

KeyOffMde_D_Actl subscriber ECU's shall retain the last received KOL_Mode value during ECU sleep (for use on wake-up).

It is understandable that there will be race-conditions when both KeyOffMde_D_Actl and Ignition_Status are received via CAN (especially when they are in different CAN messages). In this case, the Subscriber ECUs are directed to prioritize Ignition_Status above KeyOffMde_D_Actl.

If KeyOffMde_D_Actl is missing for 5 seconds in Run and still missing when key changes out of Run (ex to ACC/OFF) then KeyOff Mode shall be treated as though KeyOffMde_D_Actl = Normal until the signal is no longer missing.

- Note: subscribers of KeyOffMde_D_Actl shall not set a DTC when the signal is missing because there are no customer noticeable issues when KeyOffMde_D_Actl is missing.

For infotainment module resets while Ignition_Status = OFF assume the last KOL Mode state (ex Normal, Hibernate, Critical Batt) if the signal is not present on the bus.

For Phone as a Key the KeyOffMde_D_Actl signal state (ie Critical_Batt, Hibernate) shall not prevent the phone charging module charging ports (ex SYNC USB) from being able to charge a phone when PrsnIDevChrgEnbl_B_Rq = Active.

- Note: the phone charging needs to be supported in case the user's phone is dead and they need to be able to charge it enough to start the vehicle.

3.13 PWRMAN-FUN-REQ-235584/A-Factory Mode

3.13.1 Use Case

3.13.1.1 PWRMAN-UC-REQ-235519/B-Factory Mode - Infotainment System Chimes

Actors	System
Pre-conditions	Vehicle is in Factory mode Chimes are through the infotainment system Delayed Accessory is Active Ignition_Status = OFF
Scenario Description	The front door is opened and delayed accessory is ended
Post-conditions	Chimes cannot remain through the infotainment system for more than 30 seconds after delayed accessory ends
Notes	No longer than 30 seconds after delayed accessory ends if chimes are needed they would have to be through the Cluster
Interfaces	Vehicle System Interface

3.13.1.2 PWRMAN-UC-REQ-235603/A-Factory Mode - Extended Play

Actors	System
Pre-conditions	Factory Mode is active Infotainment System is OFF (ie HMIAudioMode = OFF) Ignition_Status = OFF
Scenario Description	User presses the power button to enter Extended Play Mode
Post-conditions	1. Extended Play Mode is entered 2. After 1 minute Extended Play mode times out and the infotainment system turns OFF.
Notes	
Interfaces	Vehicle System Interface

3.13.2 Requirements

3.13.2.1 PWRMAN-SR-REQ-235583/D-Factory Mode

Unless noted otherwise (if called out otherwise in other specifications) the infotainment system shall operate normally in Factory Mode with the exceptions listed below.

Features limited in Factory Mode when the signal LifeCycleMode_D_Actl signal equals Factory:

1. The infotainment System Master shall only support Extended Play for 1 minute.
    a. Note: this allows the extended play triggers to be tested in factory mode such as the power button press waking up and turning on the infotainment system but conserves vehicle battery by limiting the time allowed in extended play.
2. The Cluster shall not exceed 30 seconds in the time it keeps Power_Up_Chime_Module = Active after Delayed Accessory ends.

LifeCycleMode_D_Acl subscriber ECU's (ex Infotainment system master, Cluster) shall retain the last received LifeCycleMode_D_Actl value during ECU sleep (for use on wake-up).

3.14 PWRMAN-FUN-REQ-295539/A-OTA VehOnSrc_D_Stat Power Moding

3.14.1 Requirements

3.14.1.1 MD-REQ-295565/A-VehOnSrc_D_Stat

Message Type: Status

Signal used for OTA (over the air) events. Details of signal usages reference the OTA specifications

Logical Signal Name	Literals	Value	Description
VehOnSrc_D_Stat	OFF	0x0	
	Manual	0x1	
	RemoteStart	0x2	
	RemoteParkAssist	0x3	
	OverTheAir	0x4	

3.14.1.2 PWRMAN-SR-REQ-295540/A-VehOnSrc_D_Stat set to OTA Power Management

Power Supply requirement at time requirement cascaded to infotainment team:

- When Ignition = OFF and the signal VehOnSrc_D_Stat = OTA, to reduce energy consumption, modules must not activate any sensors, actuators, I/Os or customer facing interfaces due to OTA function.

This power supply requirement above includes (but not limited to):

1. The Infotainment System Master shall not turn HMIAudioMode to ON if it is already OFF.
    - This includes:
        i. Not activing Extended Play if it is currently off
            - Ex) pressing the power button when HMIAudioMode = OFF shall not turn on extended play
        ii. Not activating MMActive if currently off
            - Ex) ignition_status changing from OFF to Run/Acc shall not turn HMIAudioMode from OFF to ON.
2. The Infotainment System Master shall disable the Welcome / Farewell strategy
3. The Cluster shall play the chimes and shall not set the infotainment system as the Chime Audio Source (ie Power_Up_Chime_Modules = Inactive and Chime_Source = Cluster).

VehOnSrc_D_Stat signal when set to OTA while infotainment system already ON:
The VehOnSrc_D_Stat signal is not supposed to be set to OTA when Ignition_Status = Run/Acc, Delayed_Accessory = Active or Power_Up_Chime_Modules = Active. If it is set while the infotainment system is already ON (ex ignition_status = Run/Acc or Delay_Acc = ON) then the System Master shall determine if the infotainment system powers down or remains powered up in infotainment mode. See OTA specs if there is any additional details use cases/error handling if this happens.

OTA functions when VehOnSrc_D_Stat = OTA:
OTA functions (ie over the air software updates/programming) are not limited by VehOnSrc_D_Stat = OTA for the infotainment system.

- Example: an OTA related feature might require the infotainment display to show OTA HMI if needed for an OTA event or may require other OTA related functions to be performed (ex software programming). Reference the OTA specs for details.

3.15 PWRMAN-FUN-REQ-295414/A-Key OFF Power Moding - ECG and Infotainment System Master

3.15.1 PWRMAN-CLD-REQ-295454/A-ISM KeyOff Power Mode Server

The ISM (Infotainment System Master) controls the infotainment system (display(s), WiFi, USB…) and is the Power Mode Server to the ECG Power Mode Client/Master for certain key off features.

3.15.2 PWRMAN-CLD-REQ-295455/A-ECG KeyOff Power Mode Client/Master

The ECG (Enhanced Central Gateway) is the Key Off Power Mode Client/Master powering on the ISM Power Mode Server for particular Key Off features.

3.15.3 Interface Requirements

3.15.3.1 MD-REQ-295417/A-KeyOffPwMde_D_Stat

Message Type: Status

Signal sent from the ECG to the ISM (Infotainment System Master) indicating if the ECG requires the ISM to be powered on or not.

Logical Signal Name	Literals	Value	Description
KeyOffPwMde_D_Stat	Inactive	0x0	The ECG does not require that the ISM be powered up
	ON	0x1	Used to power up the ISM for ECG initiated key off features
	…	…	
	Reserved	0x7	

3.15.3.2 MD-REQ-295418/A-InfoSysMasterPw_D_Stat

Message Type: Status

Signal sent from the infotainment system master (ISM) indicating if the infotainment system master is powered up and ready to support network commands

Logical Signal Name	**Literals**	**Value**	**Description**
InfoSysMasterPw_D_Stat	Inactive	0x0	ISM application software is not fully powered up
	ISM Powered ON	0x1	ISM is application software is fully powered up
	…	…	
	Reserved	0x7	

3.15.4 Requirements

3.15.4.1 Overview

The requirements in this power management SPSS function are only for how the ECG can power up the ISM module when it is powered down in key off. This includes the ECG powering up the ISM so it can support Ethernet communication for key off features.

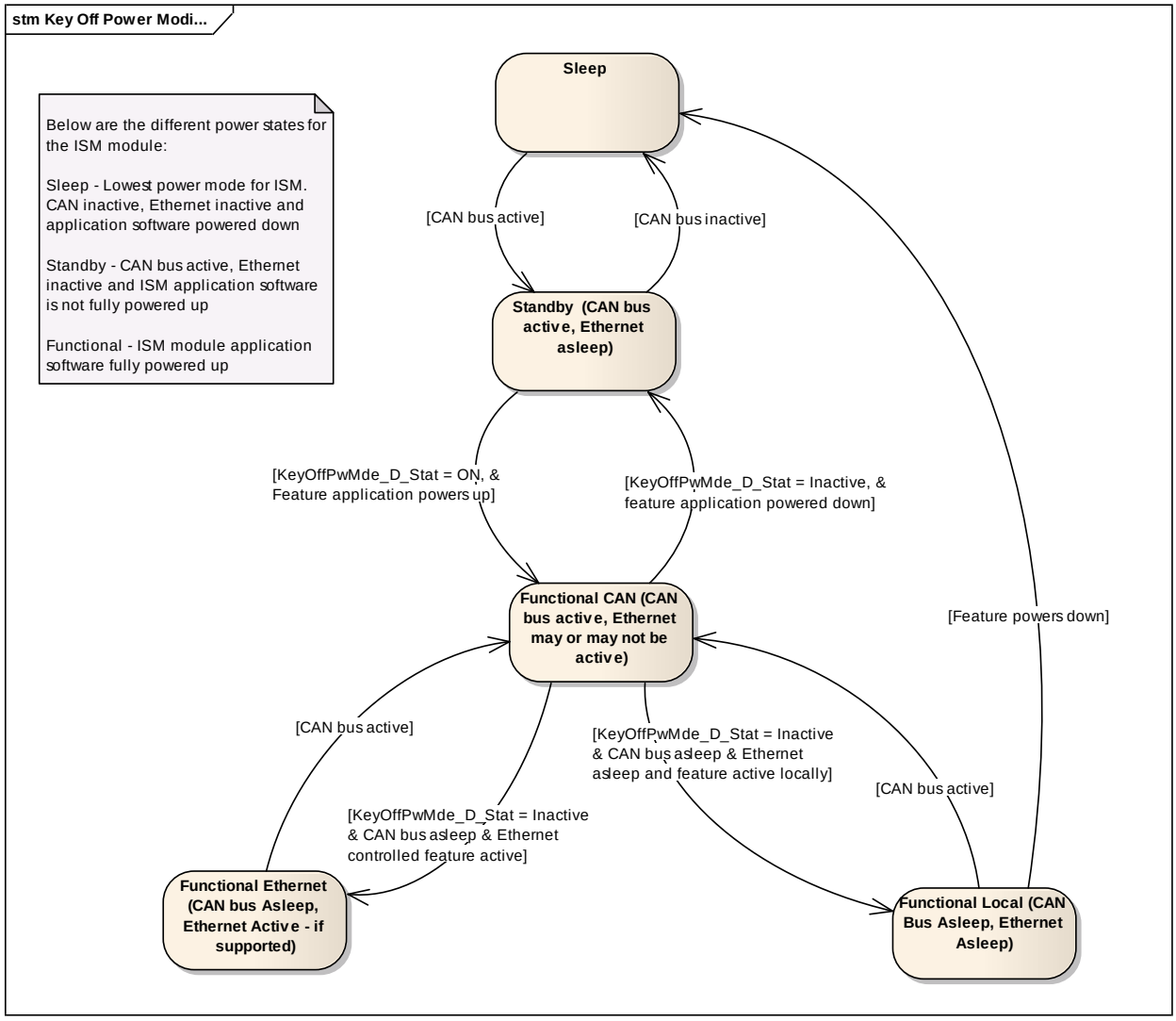
For details of implementing specific features and the associated CAN and/or Ethernet signals with those features reference the associated feature specs (ex OTA, WIR feature specifications).

3.15.4.2 PWRMAN-SR-REQ-298572/A-CAN bus while Ethernet Network is awake

During key off if the CAN network needs to be active for network management so Ethernet can remain up then the ECG shall be the module responsible for keeping the CAN bus active.

This requirement does not apply if the CAN bus can go to sleep while the Ethernet network remains active.

3.15.4.3 PWRMAN-STM-REQ-298575/A-ISM Power Moding State Diagram



3.15.4.4 PWRMAN-SR-REQ-298568/A-ECG usage of KeyOffPwMde_D_Stat signal

If Ignition_Status = OFF and a key off feature needs to be activated involving the Infotainment System Master then the ECG will need to power up the ISM module for the key off feature via the KeyOffPwMde_D_Stat power mode signal.

If the ECG needs the ISM powered up for a key off feature then the ECG shall:

1) Wake-up the CAN bus if it is not already awake
2) After 150 msec or more have elapsed since CAN bus wake-up then the ECG shall set KeyOffPwMde_D_Stat = ON.
    i) Note: if the ECG woke up the CAN bus and a few msec later set KeyOffPwMde = ON and then back to inactive then the ISM module by time it is in ready to receive (100 msec later) would only see “Inactive” and will not power up.
    ii) Since KeyOffPwMde_D_Stat is a periodic signal on CAN the ECG could always set KeyOffPwMde_D_Stat = ON at start-up and instead of putting back to inactive hold it state to ON as long as the ECG wants to ensure the ISM remains powered on.

The ECG shall set KeyOffPwMde_D_Stat = Inactive before letting the CAN bus go to sleep.

3.15.4.5 PWRMAN-SR-REQ-298258/A-ISM usage of KeyOffPwMde_D_Stat signal

When the ISM receives KeyOffPwMde_D_Stat = ON if the ISM application software is not powered up (ex HMIAudioMode = OFF) then the ISM shall power up its application software so that the ISM can receive and process network communication (ex CAN, Ethernet).

- Note: when ISM application software fully powered up then in Functional Power Mode state

The ISM module shall be able to receive KeyOffPwMde_D_Stat = ON within 100 msec of CAN bus wake-up (*T1).

The ISM module shall remain powered up in functional power mode state as long as KeyOffPwMde_D_Stat = ON.

When the ECG sets KeyOffPwMde_D_Stat = Inactive then the ISM will no longer rely on the ECG to remain powered up. The ISM shall remain powered up as specified by that feature and shall power down when no longer needed.

Note: For the ISM module if HMIAudioMode = OFF and KeyOffPwMde_D_Stat = ON then the ISM would be powered up within the current System Master Power Moding MMInactive Standby state.

*T1 definition for ISM see “PWRMAN-REQ-014468-Bus wake-up transition times from Sleep Power Mode”.

Error Handling:
If the CAN bus goes to sleep while the ISM is still receiving KeyOffPwMde_D_Stat = ON then the ISM shall consider the KeyOffPwMde_D_Stat as equal to Inactive.

- This means if there is a feature/function that still requires the ISM to stay powered up it will (ex could be downloading software locally to itself) but if no key off feature/function is active requiring the ISM to stay up and the last state of KeyOffPwMde_D_Stat was ON before the bus went to sleep the ISM shall power down after the CAN bus goes to sleep.
    - Note: a function that could keep the ISM powered up is if the Ethernet network is allowed to stay awake while the CAN bus is asleep.

3.15.4.6 PWRMAN-SR-REQ-295421/A-ISM usage of the InfoSysMasterPw_D_Stat signal

The infotainment System Master shall set InfoSysMasterPw_D_Stat = ON whenever the ISM module feature applications powered up and can support network communication for those features (ex CAN or Ethernet communication).

- Note: When InfoSysMasterPw_D_Stat = ON this doesn’t mean the infotainment system is ON regarding what the customer can see and hear (HMI_HMIMode_St could be OFF). This just means the ISM application software is fully powered up and can receive commands from the ECG or any other module.

The ISM keeping the CAN network awake is not tied to InfoSysMasterPw_D_Stat = ON. Unless called out specifically for the feature the ISM shall not keep the CAN bus awake when InfoSysMasterPw_D_Stat = ON.

- Note: when HMIAudioMode = ON it is called out that ISM keep the CAN network awake.

The infotainment System Master shall set InfoSysMasterPw_D_Stat = OFF/Inactive (default CAN setting) when the ISM feature applications are powered down and not able to interface for its features (ex commands via CAN, Ethernet for OTA…).

Some examples of when InfoSysMasterPw_D_Stat = ON (but not limited to these):

- Whenever HMIAudioMode = ON
- Whenever the ISM is powered up for a key off feature initiated by the ECG (ex OTA software update)

Error Handling key off features:

- When the ISM is powered up because KeyOffPrwMde_D_Stat = ON if it is then put back to KeyOffPrwMde_D_Stat = inactive, and after the ISM powers up and sets InfoSysMasterPw_D_Stat = ON if the ISM does not receive any commands/interface for a key off feature within 5 seconds of InfoSysMasterPw_D_Stat = ON then the ISM shall power back down.

Note:
If the ISM module was in a local power mode (ex SYNC VHM mode) initiated by the ECG with the network asleep (ex CAN, Ethernet) then if the ECG needs to know when the ISM powers down the ISM shall wake up the CAN bus and send InfoSysMasterPw_D_Stat = OFF to the ECG.

3.15.4.7 PWRMAN-SR-REQ-298569/A-ECG usage of the InfoSysMasterPw_D_Stat signal

The ECG shall monitor the InfoSysMasterPw_D_Stat signal waiting for it to equal ON to know that the ISM module can support network communications for feature (ex SOA/Ethernet, CAN).

Ethernet awake and CAN bus asleep:
If the vehicle allows the Ethernet network to be up while the CAN bus is sleep then the ECG shall not let the CAN bus the ISM is on go to sleep until after InfoSysMasterPw_D_Stat = ON.

3.15.4.8 PWRMAN-SR-REQ-295462/A-ISM Powered up locally to support an ECG controlled Key-Off feature

If the network doesn't need to be awake to perform a function then the ECG should command the ISM module what function to perform and let the bus go to sleep.

- An example of this is SYNC VHM Mode. If Ignition_Status = OFF (key off) and ISM/SYNC is downloading software to itself locally (ex SYNC WiFi, SYNC USB) then the CAN/Ethernet bus shall not be kept up the whole time during the download to preserve key off load off the battery. The exception to this is when the ECG is needed for command and control for ECG initiated VHM mode. See OTA specs for details.
- For features such as SYNC VHM mode there would need to be a strategy for how long the ISM could stay powered up locally. There could be a pre-determined amount of time, or the ECG could tell the ISM how long it is allowed to stay up or some other strategy.

3.15.4.9 PWRMAN-SR-REQ-295464/A-ISM internal hardware shutdown for hardware not needed for Key Off feature

When the ISM is powered off (ex HMI_HMIMode_St = OFF) and receives KeyOffPwMde_D_Stat = ON the ISM module shall power up to support Key Off features. Once powered up and the ISM receives the command and control from the ECG for the feature supported then the ISM could power down hardware (ex Display, WiFi, USB, Bluetooth, illumination for LIN ICP…) not needed for the key off feature to reduce the load on the vehicle battery.

ISM team to determine if can be supported

3.15.4.10 PWRMAN-SR-REQ-295465/B-Vehicle Low Power states and impact on ISM when KeyOffPwMde_D_Stat = ON

When the following low power states are already active the ISM shall not power up when KeyOffPwMde_D_Stat turns from OFF to ON for the following states:

- ~~LifeCycMde_D_Actl = Transport Mode~~
- ISM is in a Load Shed state (ie HMI_HMIMode_St = Load Shed)
- KeyOffMde_D_Actl = Critical Battery

Note: When KeyOffMde_D_Actl = Hibernate and KeyOffPwMde_D_Stat turns from OFF to ON then the ISM module shall power up.
Note2: When VehOnSrc_D_Stat = OTA and KeyOffPwMde_D_Stat turns from OFF to ON then the ISM module shall power up.

Example:

- Pre-Condition:

- KeyOffMde_D_Actl = Critical Battery
- ISM is powered down
- KeyOffPwMde_D_Stat = OFF

- Event:
  - KeyOffPwMde_D_Stat changes from OFF to ON
- Post-Condition:
  - ISM remains powered down

If KeyOffPwMde_D_Stat = ON and the ISM is already powered up then the ISM shall remain powered up as long as KeyOffPwMde_D_Stat = ON.

Example:

- Pre-Condition:
  - Ignition_Status = OFF
  - Delayed_Accessory = OFF
  - KeyOffPwMde_D_Stat = ON (ISM powered ON)
- Event:
  - A load shed event becomes active
- Post-Condition:
  - Load shed is ignored while KeyOffPwMde_D_Stat = ON and ISM remains powered up

3.15.4.11 OTA specific Key Off power moding requirements

3.15.4.11.1PWRMAN-SR-REQ-295419/A-OTA Network Management

For OTA key off events that require the CAN network to be active, the ECG shall be responsible for keeping the CAN network awake when communicating with the Infotainment System Master.

3.15.5 Sequence Diagram

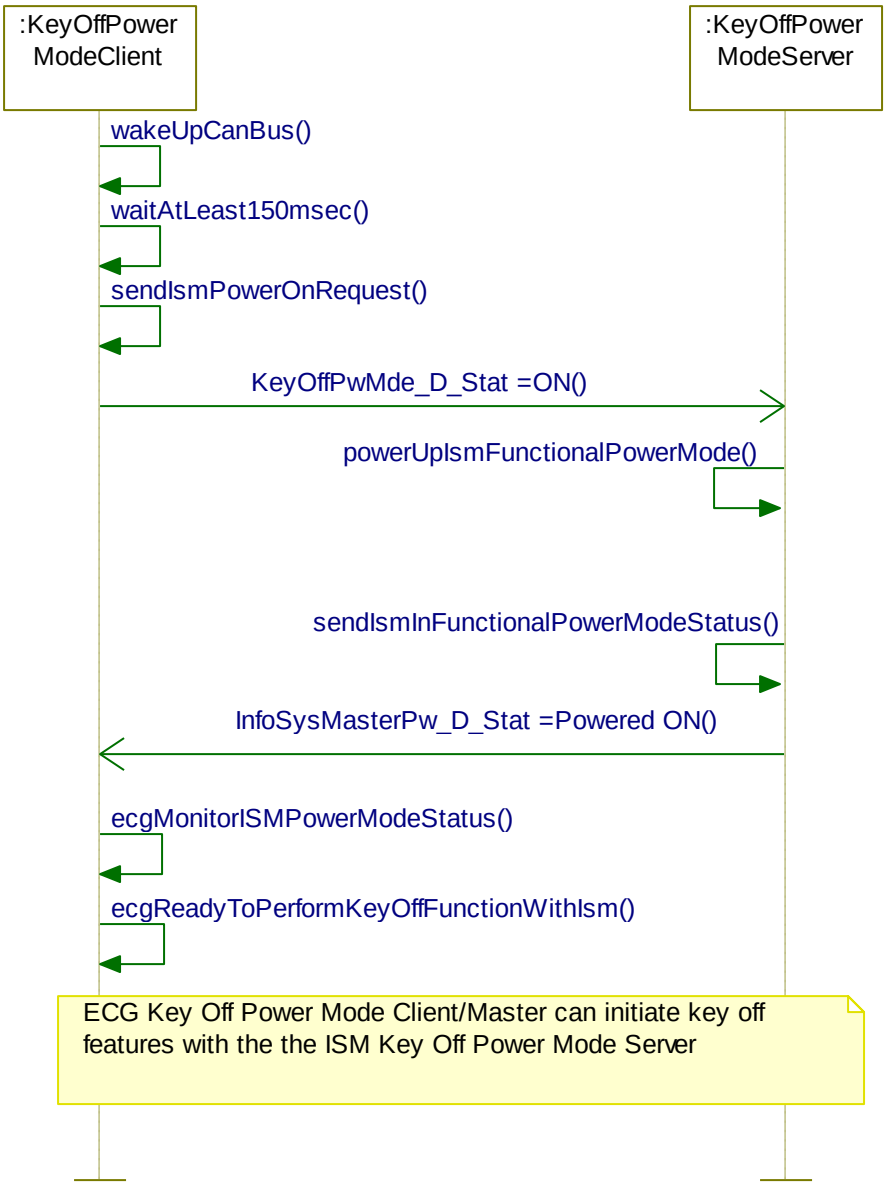
3.15.5.1 PWRMAN-SD-REQ-298341/A-System Start up for ECG initiated Key Off feature

Pre-condition:

- The ISM application software is powered down
- HMIAudioMode = OFF (last state before CAN bus sleep)
- CAN bus is asleep
- Ethernet is network is not active
- KeyOffPwMde_D_Stat = Inactive (last state before CAN bus sleep)
- InfoSysMasterPwr_D_Stat = Inactive (last state before CAN bus sleep)

Event:

- The ECG needs to perform a key off feature with the ISM module


:KeyOffPower ModeClient
:KeyOffPower ModeServer
wakeUpCanBus()
waitAtLeast150msec()
sendIsmPowerOnRequest()
KeyOffPwMde_D_Stat =ON()
powerUpIsmFunctionalPowerMode()
sendIsmInFunctionalPowerModeStatus()
InfoSysMasterPw_D_Stat =Powered ON()
ecgMonitorISMPowerModeStatus()
ecgReadyToPerformKeyOffFunctionWithIsm()
ECG Key Off Power Mode Client/Master can initiate key off features with the the ISM Key Off Power Mode Server

3.16 PWRMAN-FUN-REQ-350922/A-Existing Transport Mode to Normal Mode and restoring factory defaults

3.16.1 PWRMAN-SR-REQ-346790/B-Exiting Transport Mode to Normal Mode and restoring Factory Defaults

The System Master module (ex. APIM) shall perform a master reset *locally restoring factory defaults when:

- the vehicle speed is 0 km/h, and
- LifeCycMde_D_Actl = Transport Mode (**last state – could be from previous ignition) → Normal

If the vehicle speed was greater than 0 km/h when the conditions above are met, then the System Master module shall perform a master reset the next time when the ignition_status signal changes to OFF/ACC.

*Performing a master reset locally means the System Master module does not set any master reset network signals to restore factory defaults and only the System Master module performs the master reset. That means signals for FactoryReset.Rq shall not be set to ResetFactoryDefaults. When the conditions above are met

The System Master performing the Master Reset shall still send the language request message to the Cluster to make sure the Language matches the System Master as called out in requirement "VS-REQ-136296-Master Reset Language".

and the master reset is performed the FactoryReset.Rq signals shall remain set to inactive.

**The last LifeCycMde_D_Actl signal state shall be remembered between power mode and ignition cycles (ex between bus asleep and wake cycles)

Note: this requirement is not related to SPSS requirements "PWRMANv2-SR-REQ-014519-Transport Mode" which is the requirement for powering up and down the system master while transport mode is active on the vehicle (ie while LifeCycMde_D_Actl = Transport). That requirement is not related to the vehicle itself exiting transport mode (example gets to the dealership – LifeCycMde_D_Actl = Normal) and going to the default settings.

Reference "VS-FUN-REQ-025341-Master Reset to Factory Defaults – APIM" in the Vehicle Settings SPSS for Master Reset.

Reference "H22G_SYNC_Welcome_Power_Modes" HMI specification when exiting Transport Mode.

Reference "STMGNT-FUN-212052-Master Reset of Audio Settings" for APIM with integrated AHU. When AHU functionality is integrated use the entry conditions listed in this requirement.

Reference "P01a_MasterReset_vXXXX" for Sync Master Reset Behavior

3.17 PWRMAN-FUN-REQ-361257/A-Clear Exit Assist Power Moding

Note: See Vehicle Settings SPSS with details on implementing Clear Exit Assist feature. This function in the power management SPSS is only for the power moding portion.

3.17.1 VS-CLD-REQ-359585/A-Clear Exit Assist Warning Client

The Clear Exit Assist Warning Client interfaces with the user via the HMI and interfaces with the Clear Exit Assist Warning Server to determine if HMI updates are needed.

3.17.2 VS-CLD-REQ-359586/A-Clear Exit Assist Warning Server

The Clear Exit Assist Warning Server is responsible for the control to the Clear Exit Assist function and interfaces with the Clear Exit Assist Warning Client.

3.17.3 PWRMAN-CLD-REQ-359656/A-Infotainment System Master

3.17.4 Interface Requirements

3.17.4.1 MD-REQ-359588/A-ClrExitAsstActv_B_Rq

Message Type: Request

Request signal from the Clear Exit Assist Warning Server to the Clear Exit Assist Warning Client / Infotainment System Master to remain powered up to display the clear exit assist warning HMI

Logical Signal Name	Literals	Value	Description
ClrExitAsstActv_B_Rq	False	0x0	
	True	0x1	

3.17.5 Requirements

3.17.5.1 PWRMAN-SR-REQ-359648/A-Clear Exit Assist Power Moding

The Clear Exit Assist Warning Client shall update the HMI with the applicable HMI Warning when it receives the signal ClrExtAsstMsgTxt_D_Rq2 from the Clear Exit Assist Warning Server set to a particular warning encoding.

For the Clear Exit Assist feature the Clear Exit Assist Warnings can be displayed on the Clear Exit Assist Warning Client's HMI whenever the infotainment system is on (ie HMI_HMIMode_St = ON) or in MMInactive (Sleep/Standby) power mode as specified below.

The Infotainment System Master / Clear Exit Assist Warning Client shall support Clear Exit Assist Warning HMI in MMInactive (Sleep/Standby) power mode (ie HMI_HMIMode_St = OFF) when the following applies:

1. The Clear Exit Assist Warning Server power mode signal is set as ClrExitAsstActv_B_Rq = True, AND
2. 240 seconds has not elapsed since the signal Delay_Acc went from ON to OFF.

The Infotainment System Master / Clear Exit Assist Warning Client shall NOT remain powered up capable of displaying Clear Exit Assist HMI in MMInactive (Sleep/Standby) power mode because of the Clear Exit feature (might remain powered up because of other features) when the following applies:

1. The Clear Exit Assist Warning Server power mode signal ClrExitAsstActv_B_Rq = False, OR
2. 240 seconds has elapsed since the signal Delay_Acc went from ON to OFF

The Infotainment System Master / Clear Exit Assist Warning Client shall NOT keep the network awake for the Clear Exit Assist feature. This includes not keeping the network bus awake when ClrExitAsstActv_B_Rq = True and HMIAudioMode = OFF.

If the infotainment system master is in MMInactive (Sleep/Standby), with the network asleep but the conditions are true to be powered up for the Clear Exit Assist Warning feature then the Infotainment System Master shall power up locally (ie remain powered up waiting for warning signals even though the network bus is asleep).

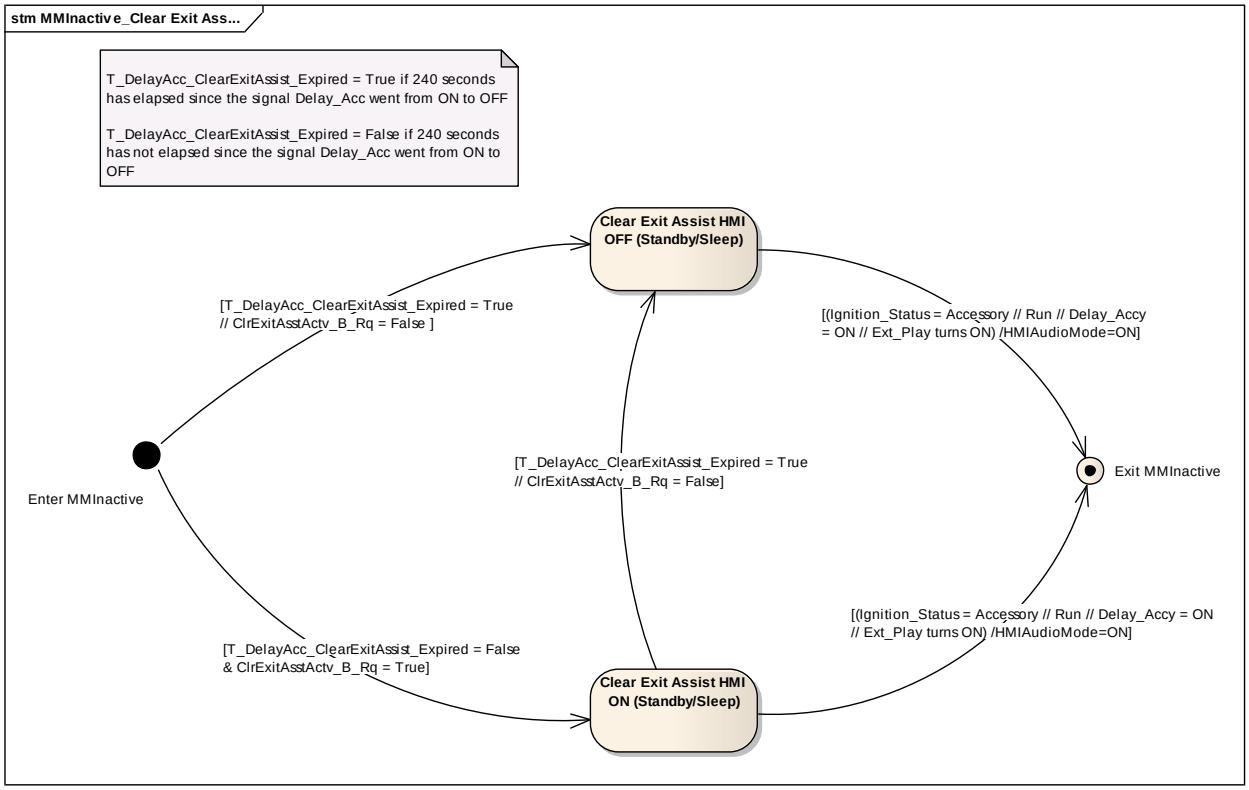
- Note: if the network bus is asleep then the Infotainment System Master / Clear Exit Assist Warning Client shall assume the last state of the ClrExitAsstActv_B_Rq signal.

If the ClrExitAsstActv_B_Rq is not on the network bus for 5 seconds or more while the signal Ignition_Status = RUN then the Infotainment System Master / Clear Exit Assist Warning Client shall consider the signal ClrExitAsstActv_B_Rq missing. When ClrExitAsstActv_B_Rq is missing the Infotainment System Master shall NOT remain powered up capable of displaying Clear Exit Assist HMI in MMInactive (Sleep/Standby) power mode because of the Clear Exit feature (might remain powered up because of other features).

Note:

- The Infotainment System Master and Clear Exit Assist Warning Client may be the same module. See implementation guide for details

3.17.5.2 PWRMAN-SR-REQ-359676/A-MMInactive Sleep_Standby Clear Exit Assist Power Mode Diagram



3.18 Stop Mode

3.18.1 PWRMAN-FUN-REQ-377259/B-Stop Mode - External module provides timer

3.18.1.1 Overview

Stop Mode is a low power sub-state of Standby Power Mode for the Infotainment System Master. Stop Mode is a state where the Infotainment System Master has as many infotainment features turned off as possible (both hardware and software) to allow for quick start-ups but at the same time to keep the current draw key off load (KOL) to the battery as low as possible. To the customer the infotainment system appears off, with the display and audio off, during Stop Mode.

3.18.1.2 Physical Mapping of Classes

The table below shows how the logical classes may be mapped to physical modules for the Stop Mode Power Mode. The table below covers the lead program.

At the time the specification was written the below table was the latest. If there are additional modules deployed to the class descriptions or the vehicle architecture changed since the spec was written and released, then the applicable implementation guide class description would cover those modules. If there is a conflict between the implementation guide and the table below the implementation guide takes precedent.

Logical Class	Physical Module (ECU)
Battery State of Charge Server	BCM
Infotainment System Master	APIM

3.18.1.3 Interface Requirements

3.18.1.3.1 MD-REQ-378492/A-PwLoApim_T_Actl

Message Type: Status

Signal informing the Infotainment System Master how long it can stay in Stop Mode

Logical Signal Name	Literals	Value	Description
PwLoApim_T_Actl	0 minute	0x0	Shutdown if in Stop Mode to Sleep Mode
	1 minute	0x1	
	2 minutes	0x2	
	3 minutes	0x3	
	4 minutes	0x4	
	…	…	
	2,047 minutes	0x7FF	34 hours, 7 minutes

3.18.1.4 Functional Requirements

3.18.1.4.1 PWRMAN-REQ-377764/A-Stop Mode - Powering down internal power sources

During Stop Mode the Infotainment System Master shall power down all unnecessary internal power sources that are not required to quickly boot up to MMActive in Functional Power Mode. During Stop Mode the lowest possible current draw for the Infotainment System Master shall be targeted.

The Infotainment System Master shall not keep the network bus awake during Stop Mode.

3.18.1.4.2 PWRMAN-SR-REQ-377933/A-Battery State of Charge Server usage of PwLoApim_T_Actl signal

The Battery State of Charge Server monitors the battery state of charge and will set an amount of time via the PwLoApim_T_Actl signal that the Infotainment System Master can remain in Stop Mode.

The Battery State of Charge Server shall wake-up the bus and update the PwLoApim_T_Actl signal with additional time if the Battery State of Charge Server determines the battery state of charge has improved enough to warrant additional time in the PwLoApim_T_Actl signal.

- Example: the user connects a charge cord and start charging the vehicle battery

3.18.1.4.3 PWRMAN-SR-REQ-379474/A-Infotainment System Master internal timer based on the PwLoApim_T_Actl signal

When Ignition_Status does not equal Run/Start, the Infotainment System Master shall start an internal running timer based on the PwLoApim_T_Actl signal to use for Stop Mode power moding.

The signal PwLoApim_T_Actl shall always overwrite the Infotainment System Master internal timer if the value in the signal is different then what is running in the Infotainment System Master.

Note: at the time this spec was written the Battery State of Charge Server was updating the PwLoApim_T_Actl signal, on event, once every 60 seconds when the bus was active.

3.18.1.4.4 PWRMAN-SR-REQ-377707/A-Entering Stop Mode via the PwLoApim_T_Actl signal

The Infotainment System Master shall enter Stop Mode whenever Sleep Power Mode would normally be entered and the PwLoApim_T_Acl Stop Mode timer has not expired.

- Exception: The Battery State of Charge Server is causing a power down event to Sleep Power mode. Stop Mode shall not be entered in this case. Triggers for this includes the Load Shed signals and KeyOffMde_D_Actl = Hibernate or Critical Battery.

3.18.1.4.5 PWRMAN-SR-REQ-377932/A-Exiting Stop Mode via the PwLoApim_T_Actl signal

The Infotainment System Master shall power down from Stop Mode to Sleep Mode after the Stop Mode internal timer started based on the PwLoApim_T_Actl expires.

- Some cases where the Infotainment System Master internal Stop Mode timer might be used without valid data from the PwLoApim_T_Actl signal would be when the Igntion_Status does not equal Run/Start for some of the scenarios below:
  - Bus is asleep, OR
  - the Infotainment System Master is not receiving PwLoApim_T_Acl on the bus, OR
  - There is an Update Bit indicating that the PwLoApim_T_Actl signal data is not fresh data

The Infotainment System Master shall treat PwLoApim_T_Acl = 0 minutes received from the Battery State of Charge Server as Shutdown from Stop Mode and shall enter Sleep Mode (lowest power mode).

Note: The Infotainment System Master can always exit Stop Mode to other power mode states (ex Infotainment Mode (ie HMI_HMIMode_St = ON), Welcome, Farewell…).

3.18.1.4.6 PWRMAN-SR-REQ-378156/A-Additional usage of PwLoApim_T_Actl signal by Infotainment System Master

PwLoApim_T_Acl = 0 minutes does not cause the Infotainment System Master to exit any other power mode except Stop Power Mode.

- Ex. If Infotainment System Master is in Infotainment Mode (ie HMI_HMIMode_St = ON) or Standby features are active (ex Welcome/Farewell/OTA…) then signal PwLoApim_T_Actl = 0 minutes will have no effect on power moding.

- Note: other signal from the Battery State of Charge Server would still cause the Infotainment System Master to exit other power modes such as Load Shed signals, KeyOffMde_D_Actl = Critical Battery or Hibernate, etc.

When ignition_status does not equal Run/Start, if the PwLoApim_T_Actl signal is missing then the Infotainment System Master shall assume the last timer value sent from the Battery State of Charge Server.

When ignition_Status equal Run, if PwLoApim_T_Actl is missing for more than 5 seconds then this signal would be considered missing and 0 minutes shall be assumed in the signal.

3.18.1.4.7 PWRMAN-SR-REQ-378158/A-Infotainment System Reset from Stop Mode

If the Infotainment System Master has not powered down to Sleep Power Mode for more than T_Reset hours, then after T_Reset hours has elapsed, the Infotainment System Master shall enter Sleep Mode when it would normally enter Stop Mode.

- This could mean going from Stop Mode, to Functional Mode, to Display Only mode back to Stop Mode but never entering Sleep for T_Reset hours.

After entering Sleep Mode because T_Reset hours expired, if the PwLoApim_T_Actl timer has not expired then after powering down to sleep mode the Infotainment System Master shall reboot and after the reboot is complete the Infotainment System Master shall enter Stop Mode.

T_Reset time is a configurable value. At the time the spec was written, the default T_Reset time to use was 36 hours but it may not be the latest value for T_Reset.

Note: The reboot that occurs after T_Reset has elapsed is performed to make sure the Infotainment System Master has no functional issues (ex memory leakage).

3.18.1.4.8 PWRMAN-SR-REQ-378157/A-Transport and Factory Mode - Stop Mode

Stop Mode is not supported in Transport or Factory mode.

Stop Mode shall only be supported when LifeCycMde_D_Actl = Normal.

3.18.2 PWRMANv2-FUN-REQ-383672/A-Stop Mode variant 2 - infotainment internal timer

3.18.2.1 Overview

Stop Mode is a low power sub-state of Standby Power Mode for the Infotainment System Master. Stop Mode is a state where the Infotainment System Master has as many infotainment features turned off as possible (both hardware and software) to allow for quick start-ups but at the same time to keep the current draw key off load (KOL) to the battery as low as possible. To the customer the infotainment system appears off, with the display and audio off, during Stop Mode.

3.18.2.2 Functional Requirements

3.18.2.2.1 PWRMAN-SR-REQ-383673/A-Applicable Stop Mode variant

Stop Mode Variant 2, Stop Mode Variant 2 or Stop Mode disabled can all be configured on the Infotainment System Master. Stop Mode variant 1 (PWRMAN-FUN-377259 - Stop Mode - External module provides timer) and Stop mode variant 2 (PWRMAN-FUN-383672-Stop Mode variant 2 – infotainment internal timer) are mutually exclusive. Only one Stop Mode variant can be configured enabled at one time on the Infotainment System Master.

3.18.2.2.2 PWRMAN-REQ-377764/A-Stop Mode - Powering down internal power sources

During Stop Mode the Infotainment System Master shall power down all unnecessary internal power sources that are not required to quickly boot up to MMActive in Functional Power Mode. During Stop Mode the lowest possible current draw for the Infotainment System Master shall be targeted.

The Infotainment System Master shall not keep the network bus awake during Stop Mode.

3.18.2.2.3 PWRMANv2-SR-REQ-383674/B-Internal Stop Mode timer

When the Ignition_Status changes from Run/Acc to OFF the Infotainment System Master shall start a Stop Mode timer. When that timer has elapsed the Infotainment System Master is no longer allowed to enter Stop Mode.

Ex. If the Stop Mode internal timer on a program is 2 hours, then the timer shall begin when Ignition_Status goes from Run/Acc to Off. After 2 hours has elapsed from when ignition_status first went to OFF the Infotainment System Master is no longer allowed to enter Stop Mode.

Note: Predictive Triggers (ex door open, door unlock) will not restart the Stop Mode timer. For details on Predictive Triggers see requirement "PWRMAN-REQ-324997-Predictive Triggers".

- Example: If the Stop Mode timer was 2 hours when ignition_status went to OFF, and 1 hour has elapsed when a predictive trigger event occurs, then after the predictive trigger one hour would still remain on the Stop Mode timer.

Once the Stop Mode timer has expired it (ex 2 hours expired) will be reset to the to the full time (ex 2 hours) once Ignition_Status = Run again.

The internal Stop Mode timer to the Infotainment System Master will vary between programs. Therefore, a range of values shall be protected for.

3.18.2.2.4 PWRMANv2-SR-REQ-383675/A-Entering Stop mode

The Infotainment System Master shall enter Stop Mode whenever Sleep Power Mode would normally be entered and the internal Stop Mode timer has not expired.

- Exception: The Battery State of Charge Server is causing a power down event to Sleep Power mode. Stop Mode shall not be entered in this case. Triggers for this includes the Load Shed signals and KeyOffMde_D_Actl = Hibernate or Critical Battery signal.

3.18.2.2.5 PWRMANv2-SR-REQ-383676/A-Exiting Stop mode

The Infotainment System Master shall power down from Stop Mode to Sleep Mode after the Stop Mode internal timer expires.

Signals from the Battery State of Charge Server would cause the Infotainment System Master to exit Stop Mode (ie cancel timer) to Sleep Mode such as Load Shed signals, KeyOffMde_D_Actl = Critical Battery or Hibernate

The Stop Mode timer expiring does not cause the Infotainment System Master to exit any other power mode except Stop Mode.

Note: The Infotainment System Master can always exit Stop Mode to other power mode states (ex Infotainment Mode (ie HMI_HMIMode_St = ON), Welcome, Farewell…).

3.19 RSOA-FUN-REQ-398359/A-Rear Seat Occupant Alert v2 Interface Client Power Management

3.19.1 Requirements

3.19.1.1 REQ-398360/A-Power Management Signaling of the Rear Seat Occupant Alert v2 Interface Client

In order to properly display the alert to the user upon being triggered in certain use cases, the Rear Seat Occupant Alert v2 Interface Client shall execute its internal power management strategy according to the following:

Once an alert has been triggered, the interface client's Application Layer (e.g. CCPU) shall send a Boolean signal to the interface client's Vehicle Interface Processor (e.g. VMCU) to indicate that the Rear Seat Occupant Alert notification is active and currently being displayed to the user. This signal state is then used to keep the interface client in a functional state to display the notification to the user for as long as the alert is active. Once the alert is no longer active, this signal is then used to allow the interface client to begin shutdown. If an alert is never triggered for a given key cycle, then the signal is sent such that the interface client can begin shutdown immediately once the ignition is set to Off and the Driver/Passenger door is opened as in any other scenario. Please refer to the P06 specification for further details.

Note: This strategy is unique to this variant of the feature, which is indicated via a configurable parameter in the Rear Seat Occupant Alert v2 Interface Client.

3.20 PWRMAN-FUN-REQ-443537/A-Rear Seat Occupant Alert - variant when RSOA Interface Client is not responsible for RSOA chime

3.20.1 Physical Mapping of Classes

The table below shows how the logical classes may be mapped to physical modules for the Rear Seat Occupant Alert feature (variant when RSOA Interface Client is not responsible for RSOA chime). The table below covers the lead program.

At the time the specification was written the below table was the latest. If there are additional modules deployed to the class descriptions or the vehicle architecture changed since the spec was written and released, then the applicable implementation guide class description would cover those modules. If there is a conflict between the implementation guide and the table below the implementation guide takes precedent.

Logical Class	Physical Module (ECU)
Rear Seat Occupant Alert Interface Client	APIM

3.20.2 Requirements

3.20.2.1 RSOA-REQ-443519/B-Display Only Power Mode Extension (for variant when RSOA Interface Client is not responsible for RSOA Chime)

To support the displaying the Rear Seat Occupant Alert pop-up after the a transition to Ignition OFF and Delayed Accessory OFF, the Rear Seat Occupant Alert Interface Client shall extend the duration of Display-Only mode for a period of T_NotificationDuration to allow for the displaying of the Rear Seat Occupant Alert pop-up for its full duration.

Likewise, to support the displaying the Rear Seat Occupant Alert pop-up after the termination of a Clear Exit Assist event, the Rear Seat Occupant Alert Interface Client shall extend the duration of Display-Only mode for a period of T_NotificationDuration after the termination of a Clear Exit Assist event to allow for the displaying of the Rear Seat Occupant Alert pop-up for its full duration.

3.20.2.2 RSOA-TMR-REQ-392735/A-T_NotificationDuration

Name	Description	Units	Range	Resolution	Default
T_NotificationDuration	The amount of time for the notification to be displayed. Note: Set by configurable parameter, refer to IDS	sec	See IDS		

3.21 PWRMAN-FUN-REQ-422137/A-Delivery Assist - Power Moding

3.21.1 Overview

For the delivery assist feature this allows the Infotainment System Master to go to Stop Mode when the user exits the vehicle and re-enters for quicker start-up times.

3.21.2 Interface Requirements

3.21.2.1 MD-REQ-422174/A-DelvrAsstExtndWak_D_Rq

Message Type: Request

The Delivery Assist power mode signal indicates if the Infotainment System Master should power down to Delivery Assist Stop Mode when the infotainment system powers down

Logical Signal Name	Literals	Value	Description
DelvrAsstExtndWak_D_Rq	Null	0x0	Assume the last state (Active / Inactive)
	Inactive	0x1	
	Active	0x2	
	Not used	0x3	

3.21.3 Use Cases

3.21.3.1 PWRMAN-UC-REQ-422231/A-Driver powers up the infotainment system while Delivery Assist Stop Mode is active

Actors	Vehicle Occupant, System
Pre-conditions	The driver exits the vehicle and the infotainment system powers down to Delivery Assist Stop Mode The Delivery Assist Stop Mode timer has not expired
Scenario Description	The driver enters the vehicle and starts the vehicle
Post-conditions	The infotainment system powers up from Stop Mode (quicker boot-up) instead of a full cold boot
Notes	
Interfaces	Vehicle System Interface

3.21.3.2 PWRMAN-UC-REQ-422232/A-Driver powers up the infotainment system after the Delivery Assist Stop Mode times out

Actors	Vehicle Occupant, System
Pre-conditions	The driver exits the vehicle and the infotainment system powers down to Delivery Assist Stop Mode The Delivery Assist Stop Mode timer times out and the Infotainment System powers down to sleep mode low power state

Scenario Description	The driver enters the vehicle and starts the vehicle
Post-conditions	The infotainment system powers up from a full cold boot (ie takes longer to boot-up then from Stop Mode).
Notes	With a predictive trigger the infotainment system may already be powering up or powered up when the user starts the vehicle.
Interfaces	Vehicle System Interface

3.21.4 Requirements

3.21.4.1 PWRMAN-SR-REQ-422176/A-Entering Delivery Assist Stop Mode

The Infotainment System Master shall only be able to enter Delivery Assist Stop Mode when the following entry conditions are met.

1. The Infotainment System Master is configured for a set amount of time to support the Stop Mode for Delivery Assist (ex 5, 10, 15 minutes…), AND
2. Load Shed is not active, Transport Mode is not active and KeyOffMde_D_Actl does not equal Critical_Batt.

When entry conditions are met if DelvrAsstExtndWak_D_Rq = Active when HMIAudioMode goes from ON to OFF then the Infotainment System Master shall enter Stop Mode power mode state instead of powering off completely to sleep low power mode.

If the CAN bus the Infotainment System Master is on goes to sleep, and if the last state of the signal DelvrAsstExtndWak_D_Rq was Active then the Infotainment System Master shall stay powered up locally in Stop Mode without keeping the CAN bus awake.

Note: If the vehicle is configured to support Stop Mode already (ex 2 hours), and if that Stop Mode time is greater than the Deliver Assist Stop Mode timer (ex 15 minutes) then the Delivery Assist Stop Mode timer would not be applicable

3.21.4.2 PWRMAN-SR-REQ-422175/A-Exiting Delivery Assist Stop Mode

The Infotainment System Master shall Exit Delivery Assist Stop Mode when:

1. There is a Load Shed event, OR
2. Transport Mode becomes enabled, OR
3. KeyOffMde_D_Actl = Critical_Batt, OR
4. DelvrAsstExtndWak_D_Rq = Inactive, OR
5. The Stop Mode for Delivery Assist configuration timer times out.

The Stop Mode delivery timer starts when HMIAudioMode changes from ON to OFF.

3.22 PWRMAN-FUN-REQ-486437/A-Sentinel / Integrated Security Cameras (ISC) Power Moding

3.22.1 Overview

This SPSS is for supporting Sentinel Power Mode for the Sentinel Power Mode Infotainment Server.

- Note: the Sentinel Power Mode Infotainment Server is the SentinelOnBoardClient in the Sentinel SPSS specification(s).

Sentinel is also called the Integrated Security Cameras (ISC feature). For this SPSS only Sentinel will be referred too but this is the same as Integrated Security Cameras (ISC).

During Sentinel Power Mode the Infotainment module will be recording and storing the video. See applicable specifications for details (Sentinel SPSS and Video Recording and Playback SPSS).

For the Sentinel subscription and if it is enabled please see the Sentinel SPSS and CCS Client SPSS for details (CCS - Customer Connectivity Settings).

Sentinel feature is a connected intelligent system offering security services to the users against theft and intrusion inside the truck bed, cargo area and surrounding the vehicle particularly for commercial vehicle customers.

Sentinel feature is an integrated security system that enables the user to:

- Detect intruders using AJAR sensors (or any sensor in the combined sensor module), Perimeter sensors, as well as accelerometer sensor
- Send a notification to the user about the detected intrusion,
- Start recording the video feed from the vehicle cameras locally on the vehicle and on the cloud,
- Enable streaming directly to a subscription app on the customer's mobile device.

3.22.2 Physical Mapping of Classes

The table below shows how the logical classes may be mapped to physical modules for the Sentinel Power Mode feature. The table below covers the lead program.

At the time the specification was written the below table was the latest. If there are additional modules deployed to the class descriptions or the vehicle architecture changed since the spec was written and released, then the applicable implementation guide class description would cover those modules. If there is a conflict between the implementation guide and the table below the implementation guide takes precedent.

Logical Class	Physical Module (ECU)
Perimeter Alarm Server	BCM
Sentinel Power Mode Infotainment Server / SentinelOnBoardClient	APIM

3.22.3 Interface Requirements

3.22.3.1 MD-REQ-486457/A-Perimeter_Alarm_Status

Message Type: Status

Signal from the Perimeter Alarm Server with the status of Perimeter Alarm

Logical Signal Name	Literals	Value	Description
Perimeter_Alarm_Status	Disarmed	0x0	
	Prearmed	0x1	
	Armed	0x2	
	Activated	0x3	

3.22.4 Use Cases

3.22.4.1 PWRMAN-UC-REQ-486459/A-Enter Sentinel Power Mode for possible intrusion event

Actors	Sentinel Video Recording and Storage component, Sentinel System
Pre-conditions	Ignition_Status = OFF Vehicle supports the Sentinel feature (ie feature enabled EOL) The Sentinel video and recording component is not powered up in Sentinel Power Mode
Scenario Description	A possible intrusion event is detected
Post-conditions	The Sentinel video recording and storage component powers up (if not already up for a non-Sentinel feature), enters Sentinel Power Mode and verifies the Sentinel CCS setting is enabled The Sentinel video recording and storage component starts a power down timer counter Then Sentinel video recording and storage component starts recording and stores the video when complete.
Notes	The Sentinel Video Recording and Storage component is powered up and down by the Sentinel Power Mode Infotainment Server logical object which is part of it. For video recording and storage refer to the Video Recording and Playback SPSS

3.22.4.2 PWRMAN-UC-REQ-486797/A-Exit Sentinel Power Mode - Sentinel Setting Disabled

Actors	Sentinel Video Recording and Storage component, Sentinel System
Pre-conditions	Ignition_Status = OFF A possible intrusion event occurred. The Sentinel video and recording component is powered up in Sentinel Power Mode
Scenario Description	The Sentinel video and recording and storage component checks the setting status and the CCS Sentinel setting is disabled.
Post-conditions	The Sentinel video recording and storage component exits Sentinel Power Mode
Notes	The Sentinel Video Recording and Storage component is powered up and down by the Sentinel Power Mode Infotainment Server logical object which is part of it. For video recording and storage refer to the Video Recording and Playback SPSS CCS – Customer Connectivity Setting

3.22.4.3 PWRMAN-UC-REQ-486798/A-Exit Sentinel Power Mode - Timer Expires

Actors	Sentinel Video Recording and Storage component, Sentinel System
Pre-conditions	Ignition_Status = OFF A possible intrusion event occurred. The Sentinel video and recording component is powered up in Sentinel Power Mode The Sentinel CCS Setting is enabled
Scenario Description	The Sentinel video and recording and storage component Sentinel Power Mode timer expires
Post-conditions	The Sentinel video recording and storage component exits Sentinel Power Mode
Notes	The Sentinel Video Recording and Storage component is powered up and down by the Sentinel Power Mode Infotainment Server logical object which is part of it. For video recording and storage refer to the Video Recording and Playback SPSS CCS – Customer Connectivity Setting

3.22.4.4 PWRMAN-UC-REQ-486817/A-Exit Sentinel Power Mode - No Recording Storage Device available

Actors	Sentinel Video Recording and Storage component, Sentinel System
Pre-conditions	Ignition_Status = OFF A possible intrusion event occurred. The Sentinel video and recording component is powered up in Sentinel Power Mode The Sentinel CCS Setting is enabled
Scenario Description	The Sentinel video and recording and storage component does not have a storage device available (ex USB removed)
Post-conditions	The Sentinel video recording and storage component exits Sentinel Power Mode
Notes	The Sentinel Video Recording and Storage component is powered up and down by the Sentinel Power Mode Infotainment Server logical object which is part of it. For video recording and storage refer to the Video Recording and Playback SPSS CCS – Customer Connectivity Setting

3.22.4.5 PWRMAN-UC-REQ-488157/A-Exit Sentinel Power Mode - Record to Storage Device Setting is Disabled

Actors	Sentinel Video Recording and Storage component, Sentinel System
Pre-conditions	Ignition_Status = OFF

	A possible intrusion event occurred. The Sentinel video and recording component is powered up in Sentinel Power Mode The Sentinel CCS Setting is enabled
Scenario Description	The Sentinel Storage Setting to store videos to a storage device (ex USB) is disabled
Post-conditions	The Sentinel video recording and storage component exits Sentinel Power Mode
Notes	The Sentinel CCS setting enables/disables the Sentinel feature while the Sentinel Storage setting (ex USB) enables/disables the storage device The Sentinel Video Recording and Storage component is powered up and down by the Sentinel Power Mode Infotainment Server logical object which is part of it. For video recording and storage refer to the Video Recording and Playback SPSS CCS – Customer Connectivity Setting

3.22.5 Requirements

3.22.5.1 PWRMAN-SR-REQ-486469/A-Power States when Sentinel Power Mode is Not Supported

Sentinel Power mode is NOT supported by the Sentinel Power Mode Infotainment Server when:

1. LifeCycMde_D_Actl = Transport
2. Load Shed is active
3. KeyOffMde_D_Actl = Critical Battery and Ignition_Status = OFF

Sentinel Power Mode shall NOT be exited if the Sentinel Power Mode Infotainment Server is already in Sentinel Power Mode and then a load shed or critical battery event occurs. After the Sentinel Power Mode event ends (ex T_SentinelPwrMode timer expires), then the Sentinel Power Mode Infotainment Server will power down for the Load Shed or Critical Battery event and Sentinel Power Mode cannot be re-entered while either load shed or critical battery remain active.

3.22.5.2 PWRMAN-SR-REQ-486497/A-Entering Sentinel Power Mode

In order for Sentinel Power Mode to be entered the Sentinel Power Mode Infotainment Server has to be EOL configured to supported Sentinel Power Mode.

If Sentinel Power Mode is EOL configured enabled then the following conditions shall cause the Sentinel Power Mode Infotainment Server to enter Sentinel Power Mode:

1. Ignition_Status = OFF, AND
2. The signal Perimeter_Alarm_Status changes from Not Activated (ie Disarmed, Pre-armed, Armed) to Activated.

Sentinel power mode might overlap with infotainment functional power mode (ie HMI_HMIMode_St = ON) but they are independent. If Infotainment functional power mode ends (ie HMI_HMIMode_St = ON → OFF) but Sentinel Power Mode is still active then the Sentinel Power Mode Infotainment Server shall remain powered up in Sentinel Power Mode.

3.22.5.3 PWRMAN-SR-REQ-486537/A-Exiting Sentinel Power Mode

Once Sentinel Power Mode is entered as described in "PWRMAN-REQ-486497-Entering Sentinel Power Mode" the Sentinel Power Mode Infotainment Server shall exit Sentinel Power Mode when one of the following occur:

- The Sentinel CCS settings is disabled, OR

- Once the Sentinel Power Mode Infotainment Server first enters Sentinel Power Mode it shall check if the CCS Sentinel setting is enabled or disabled by checking the CCS database (Customer Connectivity Setting) (ie Feature 112 = ON). If the Sentinel setting is disabled in the CCS database then the Sentinel Power Mode Infotainment Server shall exit Sentinel Power Mode. See the Sentinel SPSS and CCS Client SPSS for details.

- The T_SentinelPwrMde timer expires, OR
- There is no storage device or storing the video is not enabled. See the Sentinel SPSS and Video Recording and Playback SPSS for details.

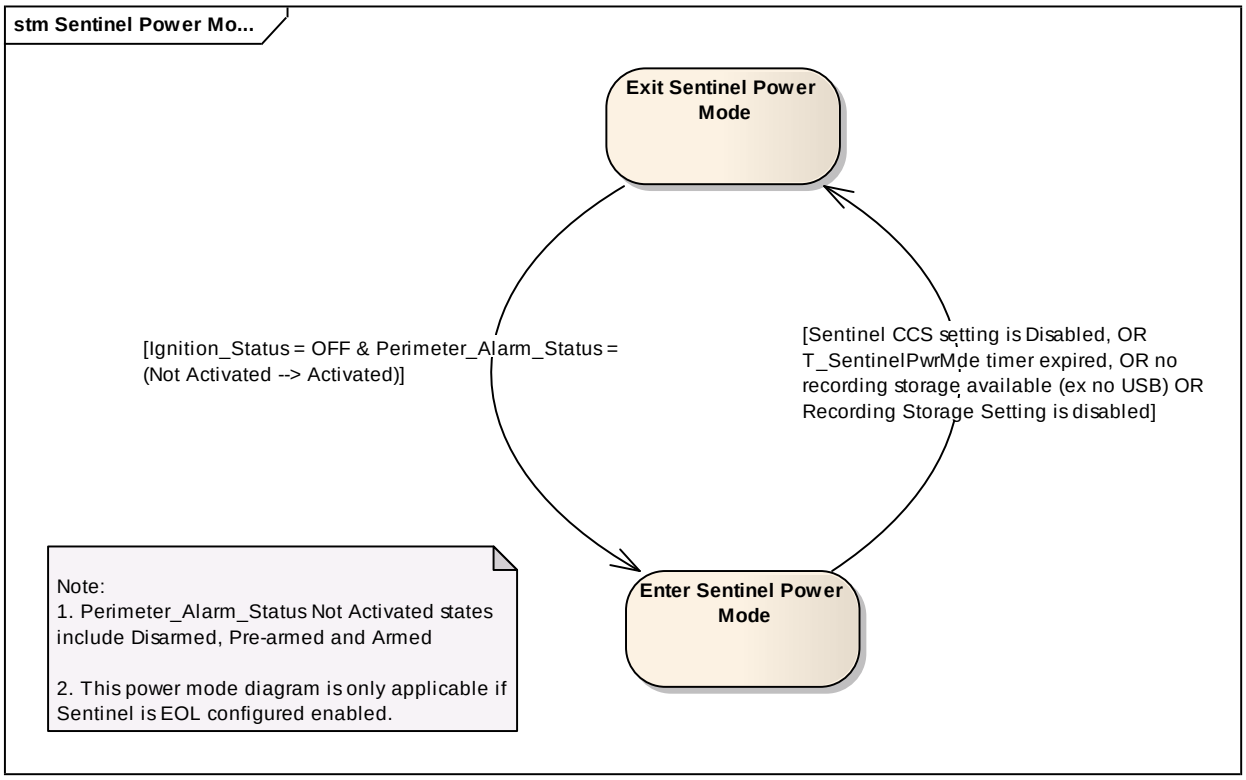
Note:

1. Sentinel power mode shall not be exited when Perimeter_Alarm_Status changes from Activated to another encoding (such as Disarmed).
2. If T_SentinelPwrMde timer expired and Perimeter_Alarm_Status still equals Activated the Sentinel Power Mode Infotainment Server shall still power down (ie need Perimeter_Alarm_Status to change from Activated to Not_Activated and then Activated again for Sentinel Power Mode to be re-activated).
3. If HMI_HMIMode_St = ON when Sentinel Power Mode is entered then HMI_HMIMode_St changing to OFF shall not cause Sentinel Power Mode to be exited.

3.22.5.4 PWRMAN-TMR-REQ-486516/A-T_SentinelPwrMde

Name	Description	Units	Range	Resolution	Default
T_SentinelPwrMde	This is the EOL configuration for the time that Sentinel Power Mode will remain powered up when Ignition_Status = OFF. The default is EOL configurable	sec	0-600	60	

3.22.5.5 PWRMAN-STM-REQ-487717/A-Sentinel Power Mode State Diagram



4 Appendix: Reference Documents

Reference #	Document Title
1	"APIM (SYNC) KOL Transport requirement" or SDS equvilant (for deep sleep mode in transport mode)
2	"Global Power Supply Start/Stop Voltage Curve Specification" and Power Supply SDS requirement "RQT-002600-000443". Those specs are for surviving wark cranks if a VQM module is not on a vehicle
3	IDS (infotainment Diagnostic Specification)
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