



Function Specification (FncS)

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## Function Specification (FncS)

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## Function Specification (FncS)

# 1 INTRODUCTION

## 1.1 Purpose

The purpose of this functional specification is to provide the requirements for in Vehicle Software Update for HMI and flows, during and after software update. This specific includes all HMIs requirements such as user consent, schedule update, HMI notification, and software update details for USB, OTA, and check for updates.

## 1.2 Scope

The following set of functions is describe in this specification.

Function ID	Function Name	Owner	Reference
	Vehicle HMI		
	Ford Pass HMI		
	Legal User Consent		
	Cloud Consent		
	Consumer Website HMI		
	FMEA		

Table 1: Functions described in this specification

## 1.3 Audience

The Function specification defines OTA software update related in Vehicle HMI.

### 1.3.1 Stakeholder List

For the latest list of the feature stakeholder and their roles & responsibilities refer to [<Put VSEM Link here>](#).

Function ID	Function Name	Owner
	Balwinder Gill	IVSU team
	Elizabeth Kanous/Robert Thomas	Legal
	Nicholas Davio	Vehicle HMI Supervisor
	Jason Mick	Vehicle HMI Designer
	Benjamin Hamacher	CCS Feature Owner
	Micha Kahlen	Vehicle Connectivity
	Brian Mason	Vehicle HMI Designer
	Hong Pan	Vehicle HMI Designer

Table 2: Stakeholder List

## 1.4 Document Organization



## Function Specification (FncS)

### 1.4.1 Document Context

List here all Ford internal documents, which are directly relate to the feature.

Reference	Title	Doc. ID	Revision
	OTA Manager		
	Install Manager		
	Manifest Manager		
	IVSU Trigger Manager		

Table 3: Document Context

## 1.5 References

### 1.5.1 Ford Documents

List here all Ford internal documents, which are directly related to the feature.

Definition	Description
H31L	SYNC4 Master Reset
H33	SYNC4 SHMI General Info and App Install
H31a	SYNC4 Wi-Fi Prompts
H31j	SYNC4 Customer Connectivity Settings
H22f	SYNC4 Transient Message Table
H31c	SYNC4 InfoBook Supplement
H22e	SYNC4 Status Bars ICONs
P31a	15P SYNC4 Settings
H31c	SYNC4 InfoBook Supplement
H29b	SYNC4 External Navigation
A73a	Services Market Behavior Table
L31a	Settings
H29b	External Navigation
H75	SYNC4 Web Browser
A73a	Service Market Behavior Table
P31a	SYNC4 Settings
HMI spec	Phoenix/Android
Other	Regional specific HMI spec
IPC	Cluster Interface

Table 4: Ford Documents

### 1.5.2 Abbreviations

Abbr.	Stands for	Description
FS	Function Requirements Specification / Function Group Specification	The document describing, collecting and developing the requirements of a function or a group of functions.
SDN	Service Delivery Network	Service Delivery Network the non-vehicle based infrastructure by which Connected Services and Solutions are transmit and receive from the Vehicle for processing.
ASU	Automatic System Update	User Consents for automatic software update by enable or disable (there are different levels of user consent depending on software update



Function Specification (FncS)

		type)
AU	Automatic Updates	User can opt-in/opt-out of the software updates
ASU/AU	System Updates	
HMI	Human Machine Interface/Interaction	
FordPass	The FordPass App provides takes what you used to do with multiple apps and does it in one. This one-stop mobility	
FCSD	Ford Customer Service Division	
FMC	Ford Motor Company	
MMOTA	Multi Module Over the Air update	
OTA	Over the Air	
IVSU	In vehicle software update	
CS	User Experience	
OTA Manager	Also refer to SWUM	

Table 5: Abbreviations used in this document



## 2 FUNCTION GROUP DESCRIPTION

### 2.1 Overview

The purpose of in vehicle HMI function specific is to provide details of the OTA and USB related HMIs with priorities and default values. This purpose of OTA in vehicle HMI specification is to provide corporate/legal requirements and default values for all region.

The OTA vehicle HMI specification will define safer and reliable user experience with IVSU

- Software types deliver via OTA
  - Recall, regulation, security update, improvements, etc.

This function specific must be followed by all the different HMI layouts.

### 2.2 Input Requirements

#### F-REQ-305324/D-###R\_FNC\_Veh\_HMI\_Input\_001### OTA Policy Table Check – Condition 1

The OTA Policy table defines default setting for the OTA software updates.

The OTA Manager shall define default setting for the IVSU. The IVSU default values are configuration at EOL and/or through OTA/USB.

If policy table is not available, then OTA Manager shall cover minimum logic to support OTA updates.

#### F-REQ-305325/F-###R\_FNC\_Veh\_HMI\_Input\_002### Vehicle Connectivity Settings – Condition 2

Vehicle Connectivity Setting shall be enabled for in the vehicle before vehicle can receive the OTA software updates.

If the Vehicle Connectivity Setting is disable, then in vehicle HMI shall indicate that vehicle will not receive software updates .

For Example:

- If Vehicle Connectivity = ON, then automatic software update is ON
- If Vehicle Connectivity = ON, then automatic software update is OFF
- If Vehicle Connectivity = OFF, then automatic software update is OFF

The HMI logic shall read policy table at EOL configuration, after a Master a Reset, and after a change in policy table.

Note: Vehicle Connectivity Settings are defined in CCS OTA Policy.

#### F-REQ-305319/D-###R\_FNC\_Veh\_HMI\_Input\_003### Software Update Details – Condition 3

The Ford Backend shall have a text file containing description of software changes. This text files shall go thru governance and approval process before the software can be deliver thru OTA.



## Function Specification (FncS)

Software updates with improvements and security update shall have detailed description; where as other updates can be brief.

The software update details shall contain all translations include consumer website, mobile app, and service/support websites.

### **F-REQ-305320/C-###R\_FNC\_Veh\_HMI\_Input\_004### Vehicle Connectivity – Condition 4**

1. Onboard Modem Data Accounts: there shall be two separate accounts as following: -
  - A. Consumer Owned Account – consumer pays for this account and if carriages allow consumer shall have access to vehicle hotspot for personal use.
  - B. FMC Account – consumer does not have access to FMCA; Ford Motor Company pays this account and does not allow the consumer to access hotspot. FMCA account data is restricted to communicate with Ford backend for data transfer and OTA Software updates.
2. Wi-Fi Capability: - the vehicle shall have Wi-Fi capability to download software updates. The User shall have the ability to connect the vehicle to any chosen Wi-Fi access point as specified by WIR functional requirements.

### **F-REQ-305321/D-###R\_FNC\_Veh\_HMI\_Input\_005### USB Parser Shall Notify HMI with Errors - Condition 5**

The USB parser shall detect if USB contains OTA Software update file(s) and folder. If any errors occurring during initial parsing of the OTA files, then USB parser shall set a flag for HMI to indicate error.

The USB Parser shall valid the software files and set an appropriate HMI flag.

### **F-REQ-305322/D-###R\_FNC\_Veh\_HMI\_Input\_006### Software Delivery Methods - Condition 6**

The OTA Software update shall have delivered thru various channels such as Wi-Fi, cellular connection, and USB. Vehicle shall follow the rules in the manifest for which connectivity to use for that download or upload thru embedded modem cellular; Wi-Fi AP

The in-vehicle HMI shall have connection settings where user can select connect to available connections.

Connection Setting: -

Wi-Fi Data: - Wi-Fi connection will be defaulted to ON, but user shall configure the Wi-Fi access point.

Cellular/Modem: - Allow the user to select Modem settings and connections

### **F-REQ-305323/C-###R\_FNC\_Veh\_HMI\_Input\_007### Software Update Prioritization - Condition 7**

The OTA Manager and USB Function specific has more details about software update priorities for USB and OTA Updates.

### **REQ-326585/B-###R\_FNC\_Veh\_HMI\_Input\_008### OTA Manager input to HMI - Condition 8**

The OTA manager shall set, and clear HMI flags related to IVSU, such as user consent, software update notification, reminders, and activation etc.





## Function Specification (FncS)

### **FUR-REQ-392408/A-###R\_FNC\_Veh\_HMI\_Input\_009### Software Update Details Description (Release Notes) File – Condition 9**

With each software update trigger OTA cloud shall include update details description (release notes) file URL.

The update details description (release notes) text file shall go thru approval process before the software can be deliver thru OTA and file shall include all translations to support infotainment systems, consumer website, mobile app, owner's fleet portal, and service/support websites.

When additional consent is required, OTA cloud shall have the same text for update details description (release notes) as additional/PII consent text.

### **REQ-394532/A-###R\_FNC\_Veh\_HMI\_Input\_010### Additional/PII Consent Text File - Condition 10**

If an update requires additional/PII consent, then OTA cloud shall include the additional/PII consent file URL with the update.

The text file shall go thru approval process before the software can be deliver thru OTA and file shall include all translations to support infotainment systems, consumer website, mobile app, owner's fleet portal, and service/support websites.

### **REQ-410159/A-###R\_FNC\_Veh\_HMI\_Input\_011### Driver Distraction Rules for OTA HMI Popups - Condition 11**

HMI shall follow the vehicle driver distraction rules when applicable.

## **2.3 Assumptions & Constraints**

This specification is not limited to SYNC but also include sub system other **Infotainment Systems** with WiFi capability.

- Users who have appropriate consent for MMOTA updates
- Embedded Modem will use FMS capability for OTA
- Cloud is the overall connectivity master
- USB Updates are included in this specification
- The vehicle has connectivity thru FMS paid cellular connection, Customer Home Wi-Fi or Customer Data Plan
- Assumes that all activations of updated software will only occur on the next ignition cycle



## Function Specification (FncS)

### 3 FUNCTIONAL ARCHITECTURE

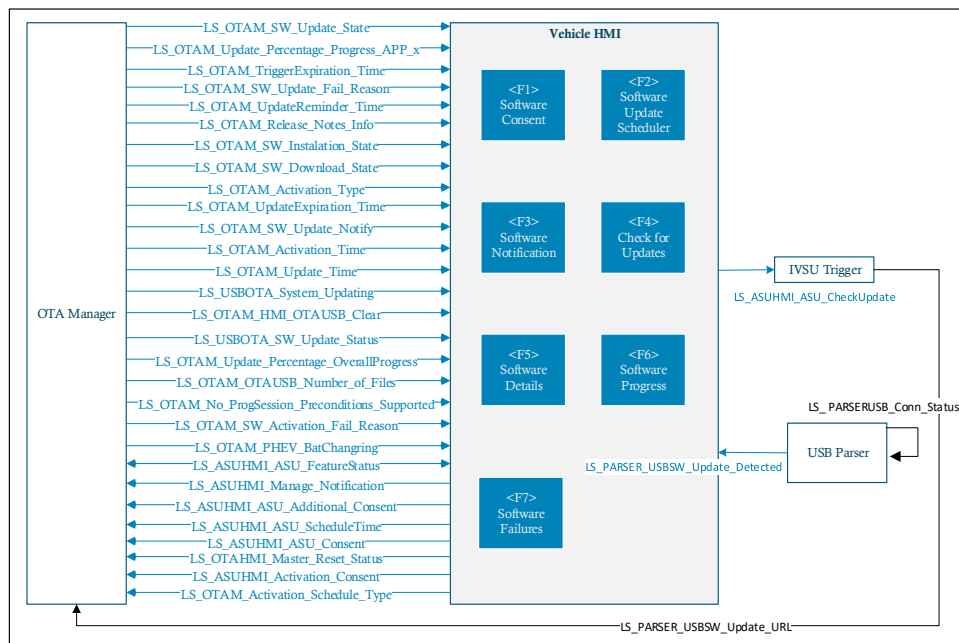


Figure 1: Function Group HMI Overall – Functional Architecture

#### 3.1 Function List

##### 3.1.1 List of Logical Functions

Function ID	Function Name	Function Description
<F1>	Software Consent	The authorization is required to update the software under the electronic & communication and privacy rules and product liability. The default setting for OTA Software updates are defined in the Policy table per region and/or country.
<F2>	Software Update Scheduler	The update scheduler function is required for all vehicle inhibits and once the schedule is set there is no action needed from the customer, vehicle automatically shall complete the software updates at schedule time. Once the



## Function Specification (FncS)

		update scheduler in process user cannot abort and shall wait until software update is complete.
<F3>	Software Notification	Software notification allows the user to get notification about updates, such as update is pending for activation, upcoming schedule reminder, successful update, and schedule is required etc.
<F4>	Check for Updates	HMI shall allow the customer to “Check for Updates” under Automatic software updates settings. Check for Updates button shall allow the customer to check for App updates and provide one time all level user consent to download the latest apps.
<F5>	Software Update Details	Software Update Details shall have description of contents of the updates and shall be deliver part of the OTA software update.
<F6>	Software Progress Bar	Software progress shall provide the customer the ability to monitor download, install, and activation certain types of software updates. Progress bar shall be capable to have single or multiple progress bars
<F7>	Software Failures	During OTA software updates if vehicle has reduced functionality or vehicle inhibit and USB update, the customer shall be notify in details for errors that occur with any action required from the customer.

Table 6: List of Logical Functions

### 3.1.1.1 Logical Inputs

Signal ID	Signal Name	Description
	LS_OTAM_Activation_Type	Software activation types: (1) No Ignition Cycle (2) Ignition Cycle (3) Inhibit
	LS_OTAM_SW_Update_State	The signal identify status of the software update as in progress, pending, successful, failed, up to date, none.
	LS_OTAM_SW_Activation_Fail_Reason	The signal identify types of failure and action for user such as permanent inhibit, USB failure, warning, partial, none.
	LS_OTAM_SW_Installation_State	The signal identify each state of the software install for USB or Check for updates as in progress, failed, paused, successful.
	LS_OTAM_SW_Update_Fail_Reason	The signal identify error codes for software failure reasons from OTA manager.
	LS_OTAM_SW_Download_State	The signal identify each state of the software download/transfer for USB or check for updates as in progress, failed, paused, successful.
	LS_OTAM_UpdateExpiration_Time	The signal identify time allowed to update the software.
	LS_OTAM_SW_Update_Notify	The signal can identify type of user consent required for software update.
	LS_OTAM_Release_Notes_Info	The signal identify release notes which will be displayed in vehicle HMI.
	LS_OTAM_Update_Percentage_OverallProgress	This signal identify overall progress of the software update in percentage.
	LS_OTAM_Activation_Schedule_Type	Identify the range of software update schedule as a week or a day, if automation software update default values is enable, then schedule default value = week. If automation software update default values is disable, then schedule default value is day.
	LS_OTAM_Activation_Time	Identify how long software activation time will take.
	LS_OTAM_OTASWB_Number_of_Files	HMI shall display number of files OTA system processing
	LS_OTAM_Update_Percentage_Progress_APP_x	HMI shall show progress of the each Application update when user request Check for Update.



## Function Specification (FncS)

	LS_OTAM_HMI_OTASWB_Clear	Reset all HMIs when software update is cleared
	LS_OTAM_No_ProgSession_Preconditions_Supported	If software activation is postponed due to vehicle precondition are not set then this flag is used to notify the customer with action item
	LS_USBOTA_SW_Update_Status	Details of USB software update during download, File Transfer, and installation
	LS_USBOTA_System_Updating	To determine if USB device contain valid software
	LS_OTAM_Update_Time	HMI shall display data and time after each software activation
	LS_ASUHMI_ASU_Consent	Vehicle Connectivity Settings

### 3.1.1.2 Logical Outputs

Signal ID	Signal Name	Description
HMI Only	LS_ASUHMI_ASU_Consent	Vehicle Connectivity setting for Automatic software update Feature consent = enabled or disabled. When Vehicle Connectivity has feature = disabled, this signal shall be use to hide all ASU related HMIs.
	LS_ASUHMI_Activation_Consent	Allow the customer chooses to activate time 1. NOW; 2. DATETIME; 3. UNDEFINED
	LS_ASUHMI_ASU_Additional_Consent	When ASU = OFF and Manage Notification = ON, then this signal can be used to require one-time consent
	LS_ASUHMI_ASU_ScheduleTime	Signal identify scheduled time/day for activation
	LS_ASUHMI_ASU_CheckUpdate	Customer checking for software updates and provided consent.
HMI Only	LS_ASUHMI_ASU_ReoccurringSchedule	HMI logic shall keep track of recurring schedule and display to customers as requested
	LS_ASUHMI_ASU_FeatureStatus	Feature enable or disable based on consumer desires or Vehicle Connectivity Settings. If software update is pending and trigger expires, then HMI shall disable the feature with how to enable prompt.
	LS_OTAM_TriggerExpiration_Time	Each software update is allowed for a period of time, HMI logic shall use to clear the all HMIs and if user input was needed, then educate the user.
	LS_OTAM_UpdateReminder_Time	OTAM sets this flag, then HMI shall reminder the user. Time could come from cloud or user.
	LS_ASUHMI_Manage_Notification	This signal determines if user will get notifications thru HMI when software update is available
	LS_OTAHMI_Master_Reset_Status	Notify OTA Manager that Master reset is in progress
	LS_PARSERUSB_Conn_Status	Status of the USB device connection
	LS_PARSER_USBSW_Update_Detected	To determine when to show Processing Update...transient message
	LS_PARSER_USBSW_Update_URL	Signal is used to set IVSU trigger with USB content details



## 4 LOGICAL FUNCTIONS

### 4.1 Logical Function Software Consent

#### 4.1.1 Function Description

Software Updates in the vehicle require user consent before updating the vehicle (authorization is required to update the software under the electronic & communication and privacy rules and product liability).

Depending on the software update types, it may require additional/PII agreement/consent. The default setting for OTA Software updates are define in the CCS and/or OTA Policy table per region and/or country.

In special cases when vehicles is owned by FMC, no user consent is required for a software updates and it can be overwritten by Ford backend. When vehicle connectivity is enabling, then customer shall also have the ability to turn ON and/or OFF IVSU feature. Depending on the region and/or country, HMI will have been configuring for both changeable and/or unchangeable; HMI shall hide all the unchangeable settings.

Software updates (non-vehicle inhibit) may be covered under the vehicle connectivity and does not require user inputs under Software updates, such update will complete silently in background and user will not be notified.

USB Software update does not require consent from vehicle connectivity and/or software updates.

#### 4.1.2 Function Scope



## Function Specification (FncS)

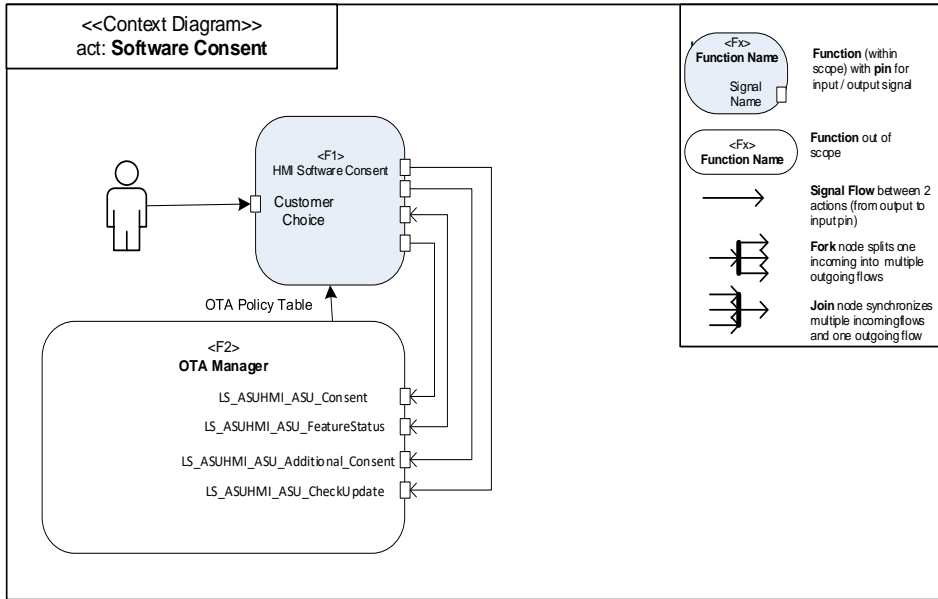


Figure 2: Context Diagram of Function Software Consent

### 4.1.3 Function Interfaces

#### 4.1.3.1 Logical Inputs

Signal ID	Signal Name	Description
	Customer Choice	This is the customer selection of the consent settings that will be shown in the screen
	LS_OTAM_SW_Update_Notify	Type of Consent needed

#### 4.1.3.2 Logical Outputs

Signal ID	Signal Name	Description
	LS_ASUHMI_ASU_Consent	Vehicle Connectivity setting True/False
	LS_ASUHMI_ASU_FeatureStatus	Automatic software update Feature enable or disable.
	LS_ASUHMI_ASU_Additional_Consent	Type of consent received from the user



Function Specification (FncS)

	Vehicle Connectivity Settings	Vehicle Connectivity Settings
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4.1.4 Function Modeling

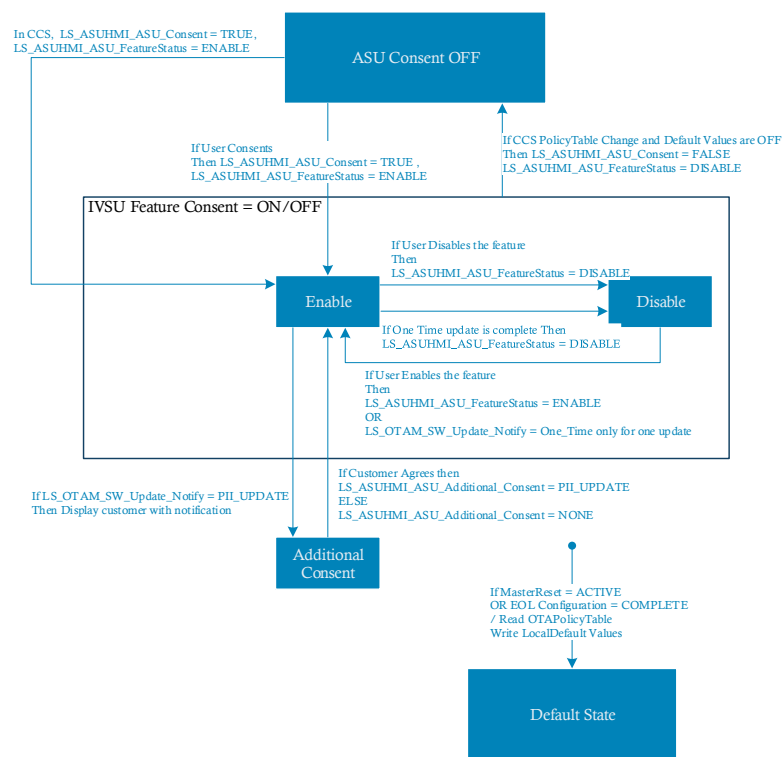


Figure 3: State Machine of Function Software Consent

4.1.5 Function Requirements



## Function Specification (FncS)

### 4.1.5.1 Functional Requirements

#### **F-REQ-305211/D-###R\_FNC\_Veh\_HMI\_Consent\_001### In Vehicle Software Update Requires Appropriate User Consent before updating the vehicle**

In Vehicle Software Updates requires a customer authorization before vehicle can receive latest software form the Ford Backend. The software update shall require appropriate consent from the user thru in vehicle HMI or Ford mobile app or consumer website.

For the regions and/or countries where Automatic Software updates is default to ON.

1. Vehicle is able to received software updates and if incremental consent is required, then user will be asked to provide additional consent thru in vehicle HMI or Ford mobile app

For some regions and/or countries where Automatic Software updates is default to OFF.

2. Vehicle is not able to receive software updates but vehicle's ability to communicate with the Ford Backend.
  1. Posting the current part numbers in order to get available software information
    1. Download of the ODL file
  2. Software Update Details
  3. Download cloud authorization commandsSoftware update setting shall allow the user to get notification of software update is available thru in vehicle HMI or Ford mobile app and given option to provide user consent before receiving the software updates.

During software activation vehicle will be inoperable for few minutes and customers shall set a one time or recurring schedule.

#### **F-REQ-305316/F-###R\_FNC\_Veh\_HMI\_Consent\_002### Software Update Settings Enable/Disable**

When vehicle connectivity is enabled, then HMI shall allow the ability to change automatic software updates enable/disable. [LS\\_ASUHMI\\_ASU\\_FeatureStatus = Enable/Disable](#).

#### **REQ-432319/A-###R\_FNC\_Veh\_HMI\_Consent\_003### Vehicle Lost Consent During Update (User Disable the Software Update Settings)**

#### **REQ-432320/A-###R\_FNC\_Veh\_HMI\_Consent\_004### Vehicle Lost Consent (Vehicle Connectivity is Disabled)**

If Vehicle Connectivity (VC) is already "ON" and software active trigger is in progress and user change the Vehicle Connectivity from ON to OFF, then Software Updates shall proceed according to the followings: -

- A. Update is in progress (interruptible):  
Downloading is blocked until VC is re-enabled
- B. Update is in progress (Non-interruptible): It is not possible to interrupt non-interruptible OTA activity.

#### **F-REQ-305287/D-###R\_FNC\_Veh\_HMI\_Consent\_005### OTA and Vehicle Connectivity Settings and Other Default Settings**

The OTA Manager shall store default values of vehicle authorization level. OTA default values are updateable through OTA. New default values shall be shared with HMI from OTA Manager.

HMI logic shall read the Vehicle Connectivity Settings (CCS policy table) for default settings per region and/or county.







## Function Specification (FncS)

- Prompt the customer for Wi-Fi connection set recurring schedule for faster updates
  - If User Consent changed from ON → OFF, then HMI shall display:
    - A. If update is not in progress, then HMI shall show disclaimer that if you turn off ASU, your vehicle won't receive new features or critical updates automatically.
    - B. If update is in progress, then HMI shall display update is in progress do you want to continue or wait until update is complete, if user choose to continue HMI shall display disclaimer 3.1.3A.
  - If download is NOT complete, then pause the software update and wait for user input before resume the current download or start new download.
  - If download is hundred percent complete, then vehicle shall continue processing the current software update until completion based on the previous user consent.
  - 3.2. Additional Consent or PII – Ford Motor Company may require additional Consent and/or PII for specification type(s) of software (**LS\_ASUHMI\_ASU\_Additional\_Consent = ONE\_TIME or PII\_UPDATE or Additional**).
    - The OTA Manager shall notify the HMI if additional and/or PII User Consent as needed and it shall store user selection and post it to Ford backend
  - 3.3. One-time Consent – Customer can use “**Check Updates**” **LS\_ASUHMI\_ASU\_CheckUpdate = True** and/or “**Update**” button as one-time consent **LS\_ASUHMI\_ASU\_Additional\_Consent = One-time**. In order to this option to work vehicle requires network connection.
  - 3.4. Direct Configuration may have special use case for user consent
    - 3.4.1. If the change occurs because customer subscribe an App through in vehicle settings, then direct configuration update does not require user consent.
    - 3.4.2. For all direct configuration change occur automatically shall have software update
  - 4. USB Update User Consent – User consent is provided when customer login into consumer website and downloads the software.
- Vehicle consent is stored in OTA Manager – HMI logic shall notify OTA manager with all consent related changes and OTA Manager shall notify user consent changes to Ford Backend.

### F-REQ-305317/B-###R\_FNC\_Veh\_HMI\_Consent\_007### User Consent Priority – Vehicle vs Ford Backend

For all non FMC owned vehicles, user consent stored in OTA Manager shall have higher priority, then what is stored in the Ford Backend.

For all FMC owned vehicles, user consent stored in Ford backend shall have higher priority, then what is stored in the OTA Manager.

### F-REQ-305266/F-###R\_FNC\_Veh\_HMI\_Consent\_008### Master Reset shall Restore Software Update Settings to Factory/Default

If customer initiate Master Reset , then HMI manager shall restore the Automatic Software Update settings to factory/default.

If Automatic Update settings default = OFF , then HMI shall prompt the customer to enable the Automatic Software Update after master reset is complete.

If Automatic Software Update settings default = ON, then No HMI

### F-REQ-305221/F-###R\_FNC\_Veh\_HMI\_Consent\_009### Vehicle Authorization State

The authorization is required to update the software under the electronic & communication and privacy rules and product liability. The default setting for OTA Software updates are define in the Policy table per region and/or country.

Automatic Software Updates settings in vehicle life cycle:



## Function Specification (FncS)

1. In some regions and/or countries, the software update **enabled** by default, customer has option to disable thru in vehicle HMI.
2. In some regions and/or countries, the software updates **disabled** by default, but customer has option to enable through in vehicle HMI or ASK ME LATER option.
  1. If user select 'Ask me Later', then HMI shall re-prompt (configured time)the customer to change the settings.
3. FMC Owned vehicles shall have an OVERRIDE Op-Out options to update vehicle while in factory, transport, Ford Fleet, and dealer, and other parking lots without in vehicle HMI inputs.



## Function Specification (FncS)

4. FORD BACKEND HAVE ABILITY TO SET DIFFERENT LEVELS OF SOFTWARE UPDATE CONSENT
  1. Base Consent
  2. Override consent for software update settings and user will see other notifications, such as update pending, update successful or unsuccessful.
  3. Completely silent update, where user will not see any notifications and update shall be non-vehicle inhibit.
  4. PII Consent: - Ford backend shall determine if software update requires PII consent from the user.
  5. Additional Consent: - Ford backend shall determine if software update requires additional consent from the user.
  6. USB Software update does not require vehicle authorization through in vehicle HMI.

### REQ-347787/A-###R\_FNC\_Veh\_HMI\_Consent\_010###Additional Consent and PII Consent

If software update requires PII data for the update, then OTA Manager shall set a flag LS\_OTAM\_SW\_Update\_Notify = PII\_UPDATE for HMI to prompt the user for PII Consent LS\_ASUHMI\_ASU\_Additional\_Consent = PII\_UPDATE.

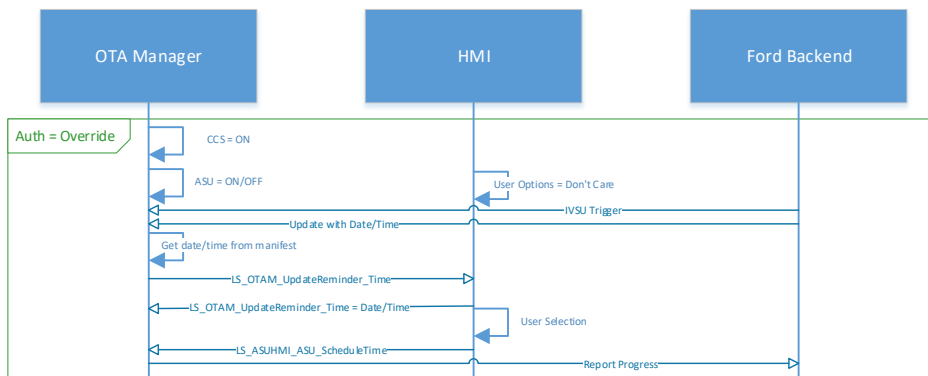
If the PII feature or (location sharing) is enabled, then HMI logic shall skip the popup and response OTA manager with consent is given by the user.

HMI shall have dynamic screen to display Additional/PII and other consents.

### F-REQ-305210/F-###R\_FNC\_Veh\_HMI\_Consent\_011### OVERRIDE – Vehicle Authorization State

For all FMC vehicle shall have capability to update software updates without user consent through in vehicle HMI.

Ford backend shall OVERRIDE in vehicle all level user consent and some HMI options. Software activation schedule timer come from the Ford backend and HMI shall reflect the choose time LS\_OTAM\_UpdateReminder\_Time = time.



Flow 5: Override Vehicle Authorization



## Function Specification (FncS)

### REQ-331790/D-###R\_FNC\_Veh\_HMI\_Consent\_012### One-Time Consent

If software update is pending and requires one-time consent, then HMI shall prompt the user for one-time user consent is needed in order to complete the software update.

If user input is required, then HMI shall continue to display notification until user input is received or software update is expired; once the user input is received or update expire HMI shall clear the notification.

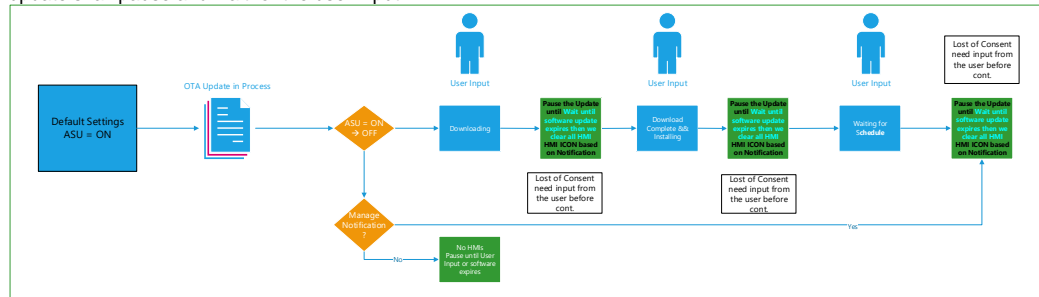
### REQ-347788/B-###R\_FNC\_Veh\_HMI\_Consent\_013### Automatic Software Updates Settings when Vehicle Connectivity is Off

If vehicle connectivity is off and customer try to access the "system update" then HMI shall prompt the user to enable vehicle connectivity (CCS Entity: MMOTA (ID 33, Type 1)) before continuing with "system update" tile.

- If MMOTA ID 33, Type 1 is off, then do not allow the user to access system updates tile, notify the user that vehicle connectivity is off and popup option shall allow the user to enable the vehicle connectivity.
- If MMOTA ID 33, Type 1 is on, then allow the user to access system updates tile

### REQ-369545/C-###R\_FNC\_Veh\_HMI\_Consent\_017### Software Update is in process and User Change the ASU to OFF

When ASU = ON and Software update is the progress, but customer change the ASU setting to OFF, then software update shall pause and wait for the user input.



Flow 6: User change the ASU setting when software update is in progress

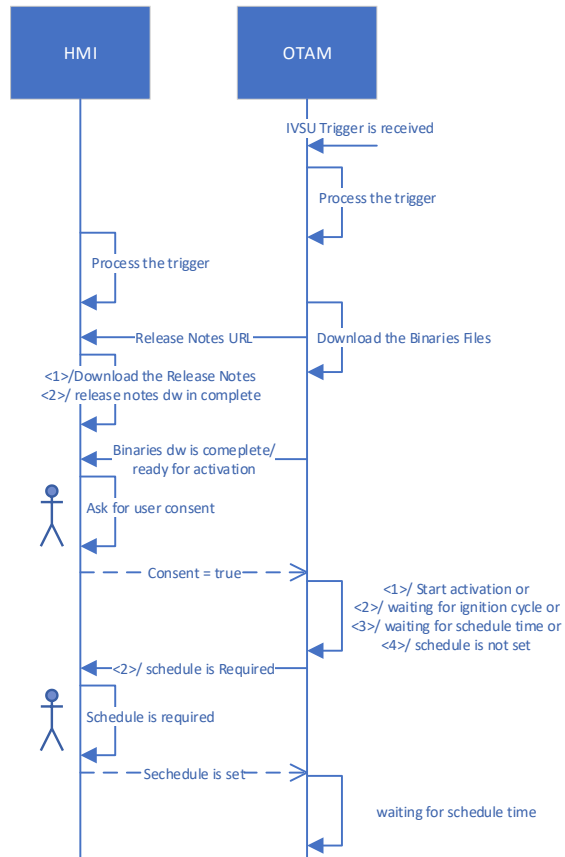
### REQ-380245/B-###R\_FNC\_Veh\_HMI\_Consent\_018### Prompt the User for Consent

When ASU = ON and additional consent is required && ASU = OFF, then OTAM shall download the software binaries in the background. HMI shall prompt the customer for required consent once all required files download is complete (including release notes).



## Function Specification (FncS)

Download the Binaries before asking Consent (all levels)



Flow 7: Download Binaries Before Asking for User Input (when possible)

### REQ-380372/A-###R\_FNC\_Veh\_HMI\_Consent\_019### Remote Consent Changes

When HMI receives remote consent update from the OTAM, then HMI shall update the current settings to reflect the new setting including all levels of consent.

LS\_OTAM\_HMI\_Remote\_Consent  
Value{  
00 - ASU Setting On/OFF



## Function Specification (FncS)

01 – One-time Consent  
02 – Additional Consent  
03 – PII Consent  
}

### **REQ-392413/A-###R\_FNC\_Veh\_HMI\_Consent\_020### When ASU = OFF and additional consent is required**

When ASU = off and update requires additional consent, the HMI shall notify the user for consent required.

HMI shall allow the user to accept the update when user click update button from popup or from update details screen (ref REQ-394234).

### **REQ-392414/A-###R\_FNC\_Veh\_HMI\_Consent\_021### ICON enter to System updates when vehicle Connectivity to enable**

When vehicle connectivity is disable user shall not be able to enter system update settings from ICON or from settings. System shall pause all OTA updates when vehicle connectivity is disabled.

### **REQ-406506/A-###R\_FNC\_Veh\_HMI\_Consent\_022### Update Expired and User Never Accepted the Update**

#### **4.1.5.1.1 Error Handling**

### **F-REQ-305202/C-###R\_FNC\_Veh\_HMI\_Consent\_014### Local Default Values**

The component that hosts the vehicle HMI logic shall have local default values.

#### **4.1.5.2 Non-Functional Requirements**

### **F-REQ-305212/C-###R\_FNC\_Veh\_HMI\_Consent\_015### Screen Refresh**

If default values in the Vehicle Connectivity and OTA changes, then an ignition cycle is requiring to reflect the changes and the customer shall not able to visually detect any changes in the vehicle HMI settings.

### **REQ-347385/A-###R\_FNC\_Veh\_HMI\_Consent\_016### Automatic System Updates Changes**

The HMI manager shall provide the OTAMC with the status of the automatic software updates anytime the status is changed.



## Function Specification (FncS)

### 4.2 Logical Function Software Update Scheduler

#### 4.2.1 Function Description

The update scheduler function shall allow the user to schedule a time when vehicle in inoperable to complete software update. This specific will cover both types OTA software updates erase and replace update and A/B memory swap. The update schedule function allows configurable day/time, which can be DAY (24hr) or WEEKLY (7days) depending on the default values. The update scheduler function is required for all vehicle inhibits and once the schedule is set there is no action needed from the customer, vehicle automatically shall complete the software updates at schedule time.

Once the software activation is in process user cannot abort but shall wait until software update is complete fail/pass. In vehicle system shall prompt the user that schedule is required with or without the vehicle inhibit.

#### 4.2.2 Function Scope

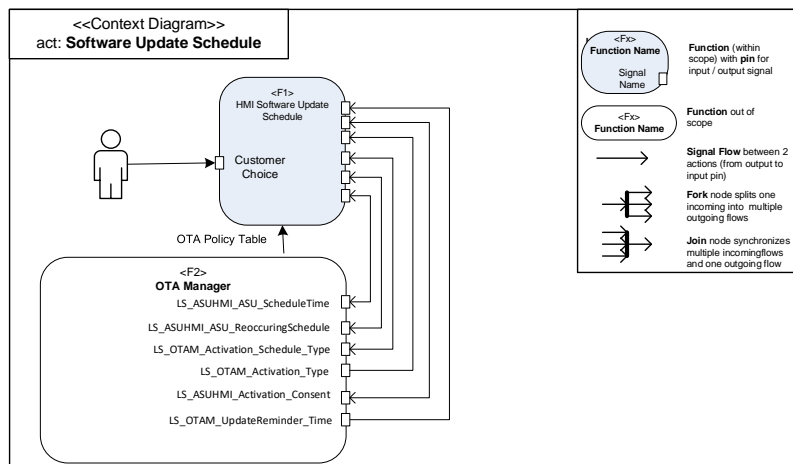


Figure 4: Context Diagram of Function Software Update Scheduler

#### 4.2.3 Function Interfaces

##### 4.2.3.1 Logical Inputs

Signal ID	Signal Name	Description
	CustomerChoice	This is the customer selection of the consent settings that will be shown in the screen





## Function Specification (FncS)

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### 4.2.3.2 Logical Outputs

Signal ID	Signal Name	Description
	LS_ASUHMI_Activation_Consent	Allow the customer chooses to activate time NOW; DATEIME; UNDEFINED
	LS_ASUHMI_ASU_ScheduleTime	Value in seconds for the scheduled time
	LS_ASUHMI_ASU_ReoccurringSchedule	Identify if it is a recurring schedule is True or False
	LS_OTAM_Activation_Schedule_Type	Based on software update priority HMI shall have options set recurring Weekly schedule or select onetime
	LS_OTAM_UpdateReminder_Time	Reminder Notification for upcoming software update (timer comes from the user or cloud)
	LS_OTAM_Activation_Schedule_Type	Schedule can be daily or weekly 01 - WEEKLY 02 – DAY
	LS_OTAM_Activation_TypeSW_AB_ER	Type of software update 01- AB 02- ER 03 - AB and ER
	LS_OTAM_TriggerExpiration_Time	Update expire, clear HMI notification
	LS_OTAM_UpdateReminder_Time	Upcoming schedule reminder date/time
	LS_OTAM_HMI_User_Press_Cancel	User press cancel update 00 - True 01 – False
	LS_OTAM_Vehicle_Inhibit_Type	Progress during activation 00 - NONE 01 - ProgrammingSession 02 – ActivatingNOW
	LS_OTAM_SW_Update_Postpone	Software activation postponed due to vehicle conditions 00 - True 01 – False
	LS_OTAM_PreconditionList	List of preconditions that are not met



## Function Specification (FncS)

### 4.2.4 Function Modeling

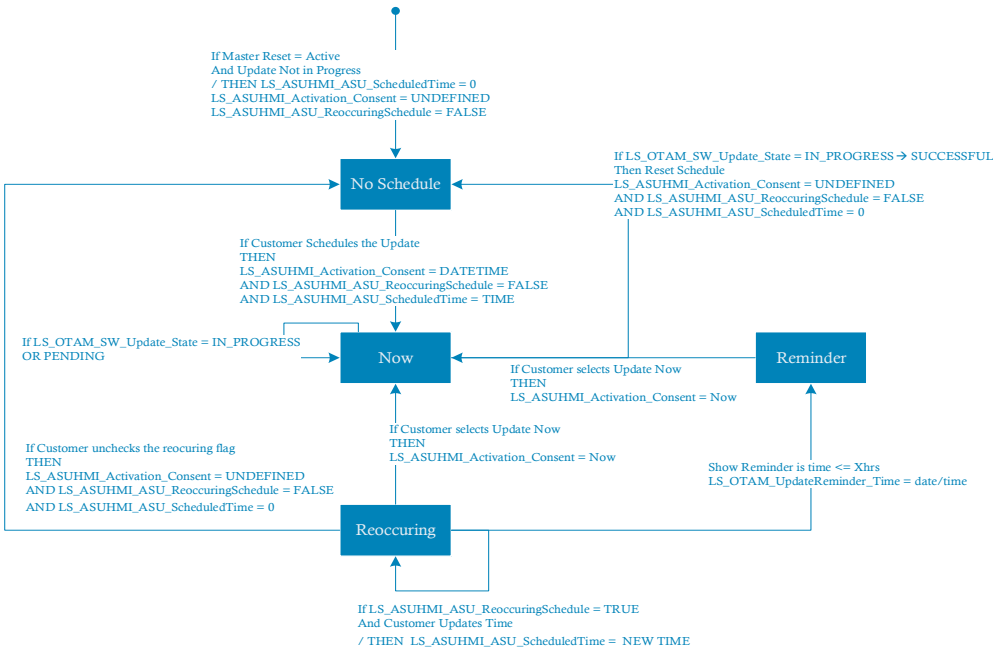


Figure 5: State Machine of Function Software Scheduling

### 4.2.5 Function Requirements

#### 4.2.5.1 Functional Requirements

##### F-REQ-305213/D-###R\_FNC\_Veh\_HMI\_Sch\_001### OTA Software Update Scheduler Range

The update schedule function is configurable day/time, which can be Now or Weekly depending on the region's default values.

HMI shall allow the user to set recurring or onetime schedule.

If **LS\_OTAM\_Activation\_Schedule\_Type = WEEKLY**, then HMI shall have recurring WEEKLY range to set day and time.

HMI shall allow the user to access the schedule options via System Update settings.



## Function Specification (FncS)

### F-REQ-305214/D-###R\_FNC\_Veh\_HMI\_Sch\_002### NOW Activation Options

Update Now is one-time schedule, which can be used for one attempt to activate the software.

If OTA software update is pending for activation and requires schedule, then OTA manager shall set a flag for HMI to allow the user to update the software NOW or schedule it for Later [LS\\_ASUHMI\\_Activation\\_Consent = NOW or Later](#).

If USB software update requires schedule to complete the software update, then OTA manager shall set a flag for HMI to allow the user to update the software NOW or schedule it for Later [LS\\_ASUHMI\\_Activation\\_Consent = NOW or Later](#).

HMI shall allow the user to access the update now options via System Update settings:

If software update is pending for activation and requires schedule, then HMI shall enable the update now button.

Otherwise disable/gray-out the update now button and if user try to click the button show warning that button is unavailable.

### F-REQ-305215/E-###R\_FNC\_Veh\_HMI\_Sch\_003### Set a Recurring Schedule to Complete New Software Update

HMI logic shall be allowing the user to set a recurring schedule to complete software updates. Whenever recurring schedule value change HMI logic shall notify the OTA Manager with change [LS\\_ASUHMI\\_ASU\\_ReoccurringSchedule = True/False](#).

Under settings, HMI shall allow the user to have access to recurring schedule with current value and allow the user to change the current values as many time as needed. If customer decides to unselect the recurring schedule, then HMI logic shall keep track of user selection and update the HMI screen and notify the OTA Manager.

If update is pending for activation and user setting a schedule within 10mins from Now, then HMI shall indicate that update maybe may delay to next recurring schedule time.

For most software updates vehicle preconditions can be met after 30min of cool down (such as PCM requires proper cool down before switching from memory A to B), so HMI logic shall allow the user to schedule activation 30mins from selection.

### F-REQ-305217/G-###R\_FNC\_Veh\_HMI\_Sch\_005### Master Reset Clears Schedule Selection

When customer initiate a Master reset, then HMI shall clear the update schedule preferences and notify to OTAM with default values of following signals.

The schedule time shall go to default values of:

[LS\\_ASUHMI\\_Activation\\_Consent = UNDEFINED](#)

[LS\\_ASUHMI\\_ASU\\_ScheduleTime = NULL](#)

[LS\\_ASUHMI\\_ASU\\_ReoccurringSchedule = FALSE](#)

### F-REQ-305218/D-###R\_FNC\_Veh\_HMI\_Sch\_006### Editing Schedule and Software Update expired

The customer shall have ability to change the day/time prior to activation starts. However, each software update shall have an expiration time [LS\\_OTAM\\_TriggerExpiration\\_Time = expire](#).

If customer input was not received within allowed time, then HMI shall prompt the user with "Software update was cancelled because a time was not scheduled. Do you want to set up a recurring schedule for future updates?"



## Function Specification (FncS)

### F-REQ-305220/D-###R\_FNC\_Veh\_HMI\_Sch\_007### Update Schedule Priority

Update will take place based on the schedule saved in the vehicle and it's based on the vehicle local time.

### F-REQ-305230/F-###R\_FNC\_Veh\_HMI\_Sch\_008### Software Update Schedule Time & Reminder

HMI shall prompt with pre-activation reminder that the software update scheduled when it receives from the OTAM [LS\\_OTAM\\_UpdateReminder\\_Time](#). HMI shall notify the user with schedule time and allow them to edit the schedule and select update now.

### F-REQ-305219/E-###R\_FNC\_Veh\_HMI\_Sch\_009### Schedule Time Reached While Ignition ACC/RUN/START and Vehicle is in Park

If the Ignition status is ACC/RUN/START and vehicle is Park when the schedule time reaches, then HMI shall notify the customer to activate turn the ignition off or cancel the update.

If user press cancel update, then HMI shall send [LS\\_OTAM\\_HMI\\_User\\_Press\\_Cancel = true](#) to OTAM.

If user takes no action within 70secs, then HMI prompt turn the ignition off shall time out.

### REQ-326160/B-###R\_FNC\_Veh\_HMI\_Sch\_010###HMI Display during Programming Session

In vehicle HMI shall have functional display during programming session and shall show progress of the software update with downtime of vehicle inhibit ([LS\\_OTAM\\_Activation\\_Time = Seconds](#)).

If OTA Manager set flag [LS\\_OTAM\\_Vehicle\\_Inhibit\\_Type = ProgrammingSession or ActivatingNow](#), then HMI shall show programming screen with software activation progress bar. Other HMI notifies and user selections shall wait until software update complete pass or fail.

### REQ-326157/G-###R\_FNC\_Veh\_HMI\_Sch\_011### Precondition are not Met and Requires User Action

If software activation was postponed due to vehicle conditions not met and at next ignition cycle HMI receives a flag from OTAM, then HMI shall notify the user with list the preconditions not met from below table based on the priority (0 is highest) and prompt the uses to take an action.

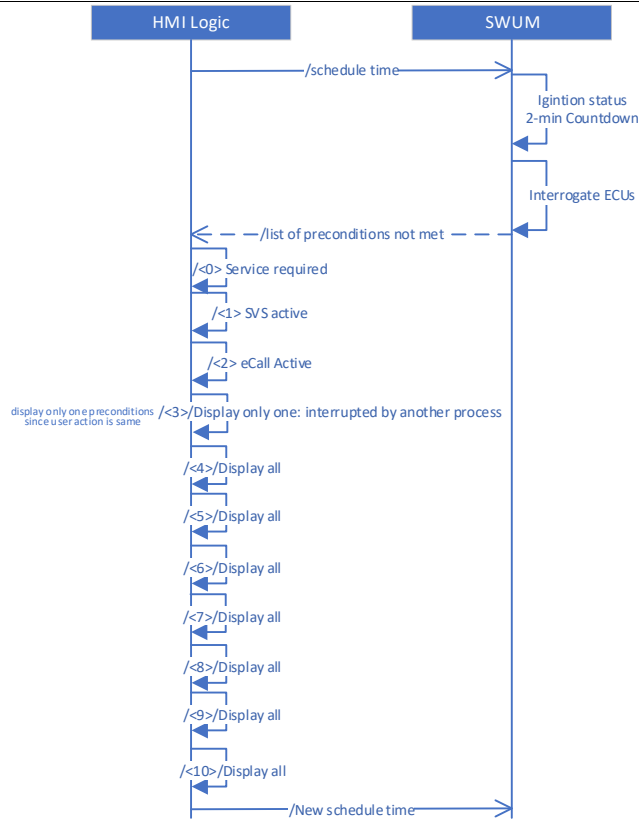
HMI Logic shall check to see if schedule is required and prompt the user appropriately.

1. If recurring schedule is set, then HMI shall show day/time when the system will retry, and HMI shall provide customer the option to reschedule the time of the retry.
2. If recurring schedule is not set, then HMI shall inform the customer to set a schedule to retry.
3. HMI also shall give user option to update now.

HMI shall display the preconditions based on the priority: -



## Function Specification (FncS)



**Flow 10: Priority to display the HMI messages**

If at schedule time following preconditions are not complete, then HMI shall receive a flag  
`LS_OTAM_SW_Update_Postpone = True` with list `LS_OTAM_PreconditionList = list` of the preconditions that are not met.

System Behavior	Popup Title	List Text	Priority	HMI Popup Text
User Action				
Vehicle Speed Too High/Speed	System Not Updated	Vehicle Speed	/<5>	The update was postponed because the vehicle was in motion. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
DC Charging (EV & Plug In PHEV)	System Not Updated		/<4>	The update was postponed because the vehicle was charging. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
PRNDL Out of Range/ PRNDL State	System Not Updated		/<8>	The update was postponed because the vehicle was not in park (P). {The vehicle will try again on {schedule date and time}.} /



## Function Specification (FncS)

System Behavior	Popup Title	List Text	Priority	HMI Popup Text
				{Schedule a time to retry the update.}
Hazards On	System Not Updated		/<4>	The update was postponed because the hazard lights were on. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Alarm Actively Sounding	System Not Updated		/<4>	The update was postponed because the alarm sounded. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Engine RPM Too High (or Torque Available)/Engine Status	System Not Updated		/<6>	The update was postponed because the engine was running. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Liftgate Ajar	System Not Updated		/<8>	The update was postponed because the liftgate was open. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Park Lamps On	System Not Updated		/<8>	The update was postponed because the parking lights were on. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Illuminated Exit Active	System Not Updated		/<6>	The update was postponed because the Illuminated Exit system was on. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Door Ajar	System Not Updated		/<8>	The update was postponed because a door was open. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Brake Pedal Pressed	System Not Updated		/<8>	The update was postponed because the brake pedal was pressed. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Remote Start	System Not Updated		/<5>	The update was postponed because the vehicle was started remotely. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Remote Park Assist	System Not Updated		/<9>	The update was postponed because the vehicle was being parked remotely. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Neutral Tow Active	System Not Updated		/<9>	The update was postponed because the vehicle was in neutral towing mode. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Windows Down	System Not Updated		/<8>	The update was postponed because a window was open. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}



## Function Specification (FncS)

System Behavior	Popup Title	List Text	Priority	HMI Popup Text
4X4 High/Low Active	System Not Updated		/<9>	The update was postponed because the vehicle was in 4x4 mode. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Service Required				
Limp Home Active	System Not Updated		/<0>	The update was postponed because the vehicle requires service. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Too Many Confirmed DTCs Active	System Not Updated		/<0>	The update was postponed because the vehicle requires service. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Automatic process: only display one of the following preconditions				
ESCL Lock Pending	System Not Updated		/<3>	The update was postponed because it was interrupted by another process. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
eCall Status (CAN Signal = value) add details...for example: progress, pending, etc.?	System Not Updated		/<3>	The update was postponed because it was interrupted by another process. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Motor Movement Active	System Not Updated		/<7>	The update was postponed because it was interrupted by another process. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Steering Pension Torque Out of Range	System Not Updated		/<3>	The update was postponed because it was interrupted by another process. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Diagnostic Self-Test Active	System Not Updated		/<3>	The update was postponed because it was interrupted by another process. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Charging Fault	System Not Updated		/<3>	The update was postponed because it was interrupted by another process. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Ignition Status Out of Range	System Not Updated		/<3>	The update was postponed because it was interrupted by another process. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Ignition Off / ACC Functionality Active	System Not Updated		/<3>	The update was postponed because it was interrupted by another process. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Voltage Out of Range (power manager or SOC/ Load Shed)	System Not Updated		/<3>	The update was postponed because it was interrupted by another process. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}



## Function Specification (FncS)

System Behavior	Popup Title	List Text	Priority	HMI Popup Text
Park Brake Out of Range or Activation in Progress	System Not Updated		/<3>	The update was postponed because it was interrupted by another process. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Unknown Precondition is not Met	System Not Updated		/<10>	The update was postponed because it was interrupted by another process. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}
Battery Disconnect	System Not Updated		/<2>	The update was postponed because Battery Disconnect, please confirm the Clock time. {The vehicle will try again on {schedule date and time}.} / {Schedule a time to retry the update.}

Table 7: List of Precondition with priority

### REQ-329373/B-###R\_FNC\_Veh\_HMI\_Sch\_012### Activation Postponed due to Vehicle Conditions not Met

If the update scheduler is, postpone due to vehicle conditions at time of schedule or vehicle is not ready to complete software activation and customer cannot fix the preconditions, then prompt the customer with a warning that vehicle update is not complete due to vehicle conditions [LS\\_OTAM\\_SW\\_Update\\_Postpone = True](#) and system shall automatically retry at next schedule time (show day/time).

If recurring schedule time = null, then prompt the user to set time.

### REQ-326161/B-###R\_FNC\_Veh\_HMI\_Sch\_013### User Consent Override and Requires Schedule from Cloud (Authorization Level 4)

If update is received with override user consent (authorization level 4), then schedule time shall come from the cloud. HMI shall continue to allow the user to edit the schedule via settings or from the reminder popup. HMI shall continue to display the 24hrs reminder.

### REQ-346981/C-###R\_FNC\_Veh\_HMI\_Sch\_014### When User Disable Recurring Schedule: clear the set date/time

If recurring schedule is set and user disables the recurring schedule option, then HMI shall clear the recurring set day/time and send notification to OTAM.

LS\_ASUHMI\_Activation\_Consent = UNDEFINED

LS\_ASUHMI\_ASU\_ScheduleTime = NULL

LS\_ASUHMI\_ASU\_ReoccurringSchedule = FALSE

### REQ-347386/B-###R\_FNC\_Veh\_HMI\_Sch\_015### HMI allow the user to select and save the time before setting it to OTAM

HMI shall have a "SAVE" button to save the schedule, if there is not selection then, HMO shall gray the clear button.

HMI shall have a "Clear" button to clear the current schedule, if there is not selection then, HMI shall gray the clear button. After customer make changes to the schedule, HMI shall show confirmation popup with Day and time.

HMI shall prompt the customer if customer schedule selection is not valid.





## Function Specification (FncS)

If customer try to exit the HMI schedule screen after making changes to the schedule, then HMI shall have prompt to ASK the customer to save the new schedule before exit.

HMI shall send the latest update schedule date/time to OTAM.

### REQ-347783/C-###R\_FNC\_Veh\_HMI\_Sch\_016### Stolen Vehicle Service is Active

If update is in progress and stolen vehicle service is active, then update will cancel, and HMI shall clear all the HMIs.

### REQ-352881/B-###R\_FNC\_Veh\_HMI\_Sch\_018### Update Expired and User Inputs Never Set Schedule

When software update requires a user input to apply the update [LS\\_OTAM\\_Activation\\_Type = INHIBIT && LS\\_USBOTA\\_SW\\_Update\\_Status = PENDING && LS\\_ASUHMI\\_ASU\\_ScheduleTime = Null](#) and user input was not provides and software update time expired [LS\\_OTAM\\_TriggerExpiration\\_Time = Expire](#), then HMI shall show a popup to allow the user to set a recurring schedule.

### REQ-369646/B-###R\_FNC\_Veh\_HMI\_Sch\_019### Allow the User to Clear then Schedule and Get Feedback

HMI shall allow the user to clear the schedule. When user click the clear schedule button, then HMI shall show a transient message with feedback of customer action.

### REQ-380373/A-###R\_FNC\_Veh\_HMI\_Sch\_020### Remote Schedule Changes

When HMI receives remote schedule updates from the OTAM, then HMI shall update the current settings to reflect the new setting.

```
LS_OTAM_HMI_Schedule_Changes
    Value{
        00 – Clear the schedule
        01 – Update day/time
    }
```

#### 4.2.5.1.1 Error Handling

### F-REQ-305203/E-###R\_FNC\_Veh\_HMI\_Sch\_021### Master Reset shall Reset Schedule Values

The schedule time shall go to default values of:

```
LS_ASUHMI_Activation_Consent = UNDEFINED
LS_ASUHMI_ASU_ScheduleTime = NULL
LS_ASUHMI_ASU_ReoccurringSchedule = FALSE
```



## Function Specification (FncS)

### 4.2.5.2 Non-Functional Requirements

#### REQ-346761/C-###R\_FNC\_Veh\_HMI\_Sch\_022### Count Down Timer when SYNC Display of Off

When HMI is displaying the two minutes of countdown timer and sync display turn off, then HMI logic shall continue to countdown with timer until it two minutes are expires.

## 4.3 Logical Function Software Notification

### 4.3.1 Function Description

Software updates have different types of notifications based on the user consent level.

- Update successful: -
  - When an OTA software updates is successful, in vehicle HMI shall show clickable ICON, user can click this icon for more details about the update.
- Customer initiate software Update – in vehicle HMI shall allow the customer to check for software updates
  - Customer shall be notified if the update is available thru in vehicle HMI and shall be able to see update progress (including initial communication, downloading details such number of files and percentage complete, installation progress, activation and update successful.
- Silent Update
  - If vehicle receives an update with overwrite, then HMI shall not prompt the user for consent, Wi-Fi, and/or schedule but notify the user when update completes.

Customer selection and Ford Backend (thru manifest) shall determine the HMI options for OTA software updates.

### 4.3.2 Function Scope



#### 4.3.3.1 Logical Inputs

#### 4.3.3.2 Logical Outputs

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## Function Specification (FncS)

	LS_OTAM_Activation_Type	Activation Type: - Non Ignition Cycle Ignition Cycle Inhibit
	LS_OTAM_Release_Notes_Info	Software
	LS_OTAM_UpdateExpiration_Time	Maximum expiration time that a software is allowed to stay in pending state
	LS_OTAM_TriggerExpiration_Time	Maximum expiration time that is used for one-time consent

### 4.3.4 Function Modeling

N/A

### 4.3.5 Function Requirements

#### 4.3.5.1 Functional Requirements

#### F-REQ-305222/E-###R\_FNC\_Veh\_HMI\_Notif\_001### Additional User Consent Notification

If software update requires an additional/PII consent, then OTA Manager shall set a flag LS\_OTAM\_SW\_Update\_Notify = Additional/PII for HMI to prompt the customer to provide additional consent.

If user input is received, then HMI shall notify the OTAM that user input is received

LS\_ASUHMI\_ASU\_Additional\_Consent = Additional/PII and HMI shall clear all notification (ICON/popup/button) that consent is needed.

If user input is not received, then HMI shall continue to display the notification (ICON/button/popup) until update is expired or canceled.

#### REQ-326784/C-###R\_FNC\_Veh\_HMI\_Notif\_002### Vehicle in Private Mode

If customer has elected to be in a private mode, then IVSU shall only update software files that doesn't require any PII data. HMI shall not prompt the user for software updates that are required PII consent.

#### REQ-331788/D-###R\_FNC\_Veh\_HMI\_Notif\_003### Wi-Fi Connection Reminder

HMI shall have standard notification to reminder the user to connect to Wi-Fi for faster software update.

HMI shall determine if Wi-Fi status to prompt the user:

If Wi-Fi = OFF, then HMI shall prompt the customer to enable Wi-Fi and connect to AP.

If Wi-Fi = ON and AP is connected, then notify the user to connect to Wi-Fi.

If Wi-Fi = ON and AP is preconfigured and it's out of range, then notify the user to connect to Wi-Fi.

If Wi-Fi = ON and access point in range, then HMI show the available AP connections and allow the user to connect to Wi-Fi.



## Function Specification (FncS)

### F-REQ-305223/E-###R\_FNC\_Veh\_HMI\_Notif\_004### When Vehicle Connectivity is Enabled, User shall see Software Update Notification

If vehicle connectivity is enabled user shall be allow the get the software notifications and user shall have not the ability to disable notification.

If user want to disable the notification user has to disable the vehicle connectivity.

### F-REQ-305225/E-###R\_FNC\_Veh\_HMI\_Notif\_005### Details Update Button

If OTA system is waiting for user consent, then OTA Manager shall set a flag [LS\\_OTAM\\_SW\\_Update\\_Notify = One\\_time](#) for HMI to display Update under setting → details and HMI ICON on main screen, HMI shall show Update button with software release notes (release notes shall be stored locally). If customer click Update button, then HMI shall notify the OTA Manager with flag [LS\\_ASUHMI\\_ASU\\_Additional\\_Consent = One\\_time](#).

HMI shall clear the HMI ICON when [LS\\_OTAM\\_TriggerExpiration\\_Time = Expire](#) and/or [LS\\_USBOTA\\_SW\\_Update\\_Status = Successful](#) or [LS\\_OTAM\\_SW\\_Update\\_State = FAILED](#) or [LS\\_OTAM\\_SW\\_Update\\_State = UP\\_TO\\_DATE](#).

### F-REQ-305226/B-###R\_FNC\_Veh\_HMI\_Notif\_006### Preferred Network

Preferred Network: - The customer shall have interface with the vehicle HMI to allow the user to select the preferred network for the software updates. This includes both hotspot and Wi-Fi (Consumer or public network).

### F-REQ-305227/B-###R\_FNC\_Veh\_HMI\_Notif\_007### OTA Software Notification Display Time

Vehicle HMI shall configure specification timers for OTA software popup notification so that the customer has the ability to read all the information displayed in it.

### F-REQ-305228/B-###R\_FNC\_Veh\_HMI\_Notif\_008### HMI ICON Action Notification

HMI logic shall keep displaying the ICON with notifications until the task has been complete or user action is done. HMI shall continue to show IVSU related ICONs even if vehicle is in motion. When user click on the ICON, then HMI shall show notify with detail of the user action.

All IVSU related information should be available for the customer to access under settings.

### F-REQ-305229/C-###R\_FNC\_Veh\_HMI\_Notif\_009### Activation Pending HMI Notification

OTA Manager shall set a flag for HMI to notify the user the software activation is pending [LS\\_OTAM\\_Activation\\_Status = pending](#)

If activation shall wait for the user action to complete the update.

1. If software activation requires schedule time [LS\\_OTAM\\_Activation\\_Type = INHIBIT](#), then it shall wait until user provide date and time.



## Function Specification (FncS)

2. If software activation requires an ignition cycle **LS\_OTAM\_Activation\_Type = IGNITIONCYCLE**, then is shall wait until user perform an ignition cycle.  
If user do not provide input and close the popup, then HMI shall continue to show an ICON until software update expires.

### F-REQ-305231/B-###R\_FNC\_Veh\_HMI\_Notif\_010### OTA Software Activate

All OTA software requires an ignition cycle to activate the software. The user shall have option to schedule a time for activation when vehicle is inhibited more than normal ignition cycle.

The OTA Manager shall have two flags for HMI (A/B swap readiness and E/R timer) before each OTA software activation takes place. **LS\_OTAM\_Activation\_Type = inhibit && LS\_OTAM\_Activation\_TypeSW\_AB\_ER = (AB or ER or AB\_and\_ER)**.

When vehicle is inhibited and customer decides to start the vehicle, then HMI shall warn the user and show software activation progress.

### F-REQ-305240/D-###R\_FNC\_Veh\_HMI\_Notif\_011### Master Reset During USB or OTA Software update is in Progress Warning Popup

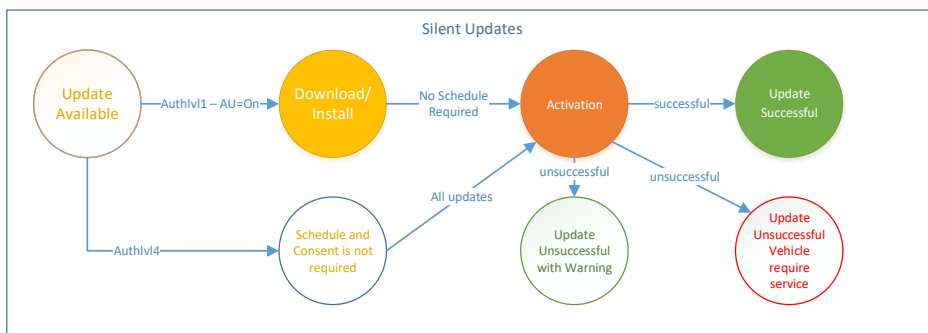
If the OTA software is in progress and customer trying to do master reset, then HMI shall display a warn that software update is in progress and doing master reset will cancel the update. You can continue with the master reset or wait for the software update to complete and then do a master reset with button to cancel or continue.

### REQ-329375/C-###R\_FNC\_Veh\_HMI\_Notif\_012### HMI Display during AL4 Software Updates

If vehicle receives a authorization level 4 update, then HMI shall not prompt the user for consent, Wi-Fi, and/or schedule. HMI shall not show any progress of the update during the update.

If schedule is required, then HMI shall notify the user for activation: schedule reminder, preconditions not met, update is successful, or update is not successful.

If schedule is not required, then HMI shall notify the user after update is complete: update is successful, or update is not successful only if vehicle requires service or user was notified for consent.





## Function Specification (FncS)

### REQ-326177/D-###R\_FNC\_Veh\_HMI\_Notif\_013### Software Update is in Process & Vehicle Lost Additional and/or PII User Consent

If vehicle is processing an active software trigger and consent is met (user click "accept") and vehicle lost consent (due to user change the consent ON→ OFF or something else) then, HMI shall prompt the user

"An update is in progress and will continue. The change to the Automatic Updates setting will apply to future updates. If you turn off Automatic Updates, your vehicle won't receive new features or critical updates automatically."

### REQ-326178/D-###R\_FNC\_Veh\_HMI\_Notif\_014### Software Update is in Process & Vehicle Lost Base User Consent

If vehicle is processing an active software trigger and consent is met (ASU=ON and/or user click "accept") and vehicle lost consent (due to user change the consent ON→ OFF) then, HMI shall prompt the user

"An update is in progress and will continue. The change to the Automatic Updates setting will apply to future updates. If you turn off Automatic Updates, your vehicle won't receive new features or critical updates automatically."

### F-REQ-305242/C-###R\_FNC\_Veh\_HMI\_Notif\_015### Software Updates and Activation Types

All types of software updates require vehicle to be in park and some software updates requires an ignition ON/OFF or vehicle inhibit to successfully complete.

OTA software updates types: -

- Vehicle is fully functional – OTA Manager shall set flag [LS\\_OTAM\\_Activation\\_Type = NOIGNITIONCYCLE](#), then HMI shall show [ICON](#) that software update is complete.
- Vehicle is fully functional – OTA Manager shall set flag [LS\\_OTAM\\_Activation\\_Type = IGNITIONCYCLE](#), then software update is waiting for auto ignition cycle HMI shall NOT prompt the user.
- Vehicle inhibit is required for few minutes – to complete the software updates it requires to set a schedule when HMI receives flag [LS\\_OTAM\\_Activation\\_Type = INHIBIT](#), then HMI shall prompt the customer with option to set a schedule time when vehicle will not be used, also with warning that vehicle shall not be able start the engine during this time.

### REQ-326180/E-###R\_FNC\_Veh\_HMI\_Notif\_016### In Vehicle Clock Time Format

HMI logic shall display the software update date and time [LS\\_OTAM\\_Update\\_Time = date/time](#) in bytes. Date and time display to the customer shall be depended on the region and/or user selected format, such as if clock format is 24hrs (army clock), then software update time and date shall be 24hrs.

### F-REQ-305246/C-###R\_FNC\_Veh\_HMI\_Notif\_017### HMI Temporary Vehicle Inhibit during Software Activation (Max time)

During OTA software activation, vehicle inhibits crank to prevent the customer from starting the engine.

During A/B swap and erase/replace software updates, the OTA Manager shall set a flag with inoperable max time to HMI [LS\\_OTAM\\_Activation\\_Time = time](#), then HMI shall have a process bar display to show the software activation progress.

When [LS\\_OTAM\\_Activation\\_Type = inhibit](#), then HMI shall display warning of vehicle inhibit and that key fobs will not work until software update is complete; follow by process bar in center stack display.



## Function Specification (FncS)

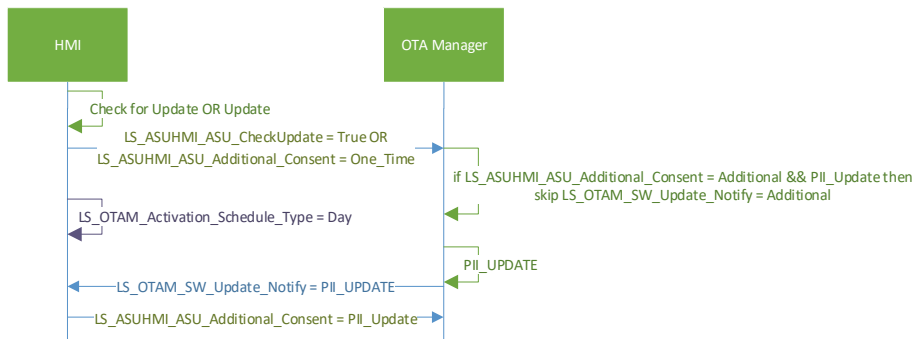
### F-REQ-305248/E-###R\_FNC\_Veh\_HMI\_Notif\_018### Clear Notification When Software Update Expires

When software update requires a user input to apply the update and user input was not provided and software update time expired, then OTA Manager shall send a flag **LS\_OTAM\_TriggerExpiration\_Time = Expire**, then HMI shall clear all IVSU related HMIs/ICONS.

### F-REQ-305250/D-###R\_FNC\_Veh\_HMI\_Notif\_019### ONE TIME Consent

The customer shall have the option to provide a ONE-TIME Consent thru “**Check Updates**” **LS\_ASUHMI\_ASU\_CheckUpdate = True** and/or “**Update**” button **LS\_ASUHMI\_ASU\_Additional\_Consent = ONE\_TIME**.

If customer selects one-time consent ICON, then HMI shall show popup that software update is available, and it may take few days to complete the update depending on the vehicle connection speed.



Flow 15: One Time User Consent

### F-REQ-305252/D-###R\_FNC\_Veh\_HMI\_Notif\_020### Software Update Activation is Successful with latest Software

OTA software update: once the activation is successful **LS\_USBOTA\_SW\_Update\_Status = Successful** and vehicle is update successfully, HMI shall show a clickable icon where user can see the details of the update. This ICON shall stay on the HMI for configurable ignition cycles or until the user clicks the ICON.

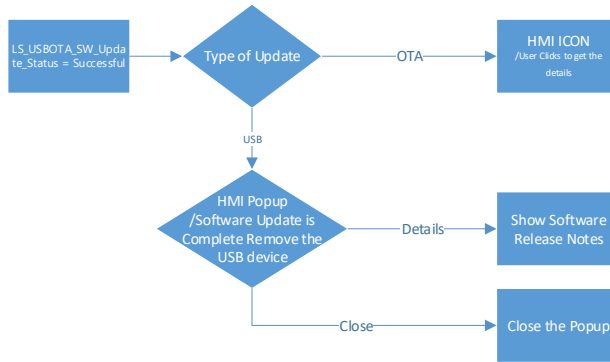
For USB software update is successful **LS\_USBOTA\_SW\_Update\_Status = Successful**, then

1. Popup Software update is complete remove the USB device with two options Close and Show Details, show details shall now release notes
2. Prompt the customer to remove the USB device when **LS\_USBOTA\_SW\_Update\_Status = Successful**





## Function Specification (FncS)



**Flow 16: Software Update is Successful**

### **F-REQ-305224/F-###R\_FNC\_Veh\_HMI\_Notif\_021### Details Software Release Notes**

After software update is successful **LS\_OTAM\_SW\_Update\_State = SUCCESSFUL OR LS\_USBOTA\_SW\_Update\_Status = SUCCESSFUL** and HMI shall notify the customer that update is successfully.

### **F-REQ-305254/C-###R\_FNC\_Veh\_HMI\_Notif\_022### Key forbs and Lock/Unlock Warning**

HMI shall notify the customer that the vehicle inhibited due to software update, and display a warning message that during software update vehicle will not response to key forbs and lock/unlock commands.

### **F-REQ-305256/F-###R\_FNC\_Veh\_HMI\_Notif\_023### Dynamic HMIs**

In vehicle HMI shall have OTA software update related dynamic screens and OTA Manager shall trigger the HMI dynamic popups by setting a flag.  
For additional consent, SYNC shall download and store HMI text locally.

### **F-REQ-305258/C-###R\_FNC\_Veh\_HMI\_Notif\_024### Set DATA Usage Limited**

The vehicle HMI shall allow the user to Set Data Usage Limit and Usage cycle reset data to be use for OTA software updates per month.

Set Data Usage Limit: - allow the user to set MB/GB data can be use per usage cycle.

Usage cycle reset data: - allow the user to set cycle.



## Function Specification (FncS)

### REQ-326785/C-###R\_FNC\_Veh\_HMI\_Notif\_025### Vehicle Inhibit for Software Activation vs. Vehicle Programming Session

Determine vehicle inhibit type if it's A/B swap software activation and/or Erase and replace programming session.

Vehicle Inhibit for Programming Session: If [LS\\_OTAM\\_Activation\\_TypeSW\\_AB\\_ER = \(ER or AB\\_and\\_ER\)](#), then show [LS\\_OTAM\\_Vehicle\\_Inhibit\\_Type = ProgrammingSession](#). Vehicle is in programming sessions HMI shall display Software Update in Progress as a progress bar.

Vehicle Inhibit for Software Activation: If [LS\\_OTAM\\_Activation\\_TypeSW\\_AB\\_ER = AB](#), then show [LS\\_OTAM\\_Vehicle\\_Inhibit\\_Type = ActivatingNow](#), Vehicle is activating the software.

### F-REQ-305244/E-###R\_FNC\_Veh\_HMI\_Notif\_026### Software Activation Failed and HMI Notification

If software update is failed, then check section Logical Function software failure REQ-527207 for more details on HMI notification.

### REQ-326179/D-###R\_FNC\_Veh\_HMI\_Notif\_027### Software Activation Failed and ASU = OFF or Vehicle Connectivity Settings = OFF

If software activation is failed when ASU = OFF and/or VC = OFF, then HMI Logic shall continue to notify the user about activation failure.

### REQ-326171/D-###R\_FNC\_Veh\_HMI\_Notif\_028### Software Activation During AC Charging

If software activation requires a vehicle inhibit [LS\\_OTAM\\_Activation\\_Type = INHIBIT](#), then OTA Manager requests charging system to disable PHEV battery charging to activate the software. HMI logic shall keep track of charging system and software update notifications and priorities to notify the customer when battery charging time and software update schedule time overlays.

### F-REQ-305262/F-###R\_FNC\_Veh\_HMI\_Notif\_029### Critical Errors during Software Update & Service

Service: -

For Wi-Fi updates updates are silent, therefore poses some difficulties for technicians to troubleshoot these errors. The software logic for the updates shall capture each exception and assign an error code to it. This code will be populated into a DID that technicians can look it up. [LS\\_OTAM\\_SW\\_Update\\_Fail\\_Reason = error code](#)

### F-REQ-305264/E-###R\_FNC\_Veh\_HMI\_Notif\_030### Reset of Wi-Fi Settings

The Reset options shall allow the user to have an ability to reset system settings selectively e.g. Wi-Fi without de-authorizing the Automatic Software updates etc.

Add capability for user to perform reset without going through de-authorization, and also to select and reset the settings.

- Decouples the settings reset and de-authorization process
- Enhances the user's ability to select and reset settings
- User doesn't have to go through authorization process again in case of settings reset e.g. Wi-Fi, Vehicle Connectivity
- Improve user experience

If software update is in progress and downloading software files at a time of customer initiates Reset, then HMI shall notify the customer that continue with reset will impact software update.



## Function Specification (FncS)

### REQ-347583/B-###R\_FNC\_Veh\_HMI\_Notif\_031### Crash during software update in progress (OTA/USB)

If vehicle is in crash and CAN signal is present, then USB parser/SFTP Transfer shall clear the software update [LS\\_OTAM\\_HMI\\_OTAUSB\\_Clear = ClearHMI](#)s. USB update shall restart from beginning once the CAN signal clears the crash alert.

### REQ-347584/B-###R\_FNC\_Veh\_HMI\_Notif\_032### eCall during software update in progress (OTA/USB)

If eCall occurs when software is in progress, then system shall pause and resume the software update.

[LS\\_OTAM\\_SW\\_Installation\\_State = Pause](#)  
[LS\\_OTAM\\_SW\\_Download\\_State = Pause](#)  
[LS\\_OTAM\\_SW\\_Update\\_State = Pause](#)  
[LS\\_USBOTA\\_SW\\_Update\\_Status = Pause](#)

### REQ-348141/D-###R\_FNC\_Veh\_HMI\_Notif\_033### Double Lock During Software Activation

As a safety precaution, double-locked doors will revert to central lock when the software update starts. Digital Owner's Manual shall cover this info.

### REQ-347585/B-###R\_FNC\_Veh\_HMI\_Notif\_034### Software File Size and Channel for Update in Release Notes

Release notes shall include file size (some kind of feedback to the customer how long it will take to download the file) and Channel that update is coming thru

### REQ-347586/B-###R\_FNC\_Veh\_HMI\_Notif\_035### Maximum Time Allow for Software Activation

If software will be going to expire less than 7days, then HMI shall only show days left before the software update will expire ([LS\\_OTAM\\_UpdateExpiration\\_Time = date/time](#)).

### REQ-369536/C-###R\_FNC\_Veh\_HMI\_Notif\_036### Wi-Fi Connection is Required for OTA Updates

If software update requires Wi-Fi connection [LS\\_OTAM\\_ConenctionType\\_WiFi = True](#), then HMI shall notify the user to connect to Wi-Fi (ref REQ-394235 & REQ-331788).

If vehicle lost Wi-Fi network during download, then HMI shall prompt the user to re-connect to Wi-Fi and HMI shall allow the user to see the download progress.

HMI shall clear the notification once the software download is complete and Wi-Fi is no longer needed.

### REQ-387745/B-###R\_FNC\_Veh\_HMI\_Notif\_037### Update is Canceled

If update was in progress silently and canceled/aborted, then HMI shall clear all HMI notifications.

If update was in progress and user was notified about the update (consent/Wi-Fi/schedule etc.) and update was canceled/aborted, then HMI shall notify the user that update is not successful and vehicle will automatically retry, no user action is required.



## Function Specification (FncS)

All reason of cancel update:

NotCanceled - 0,  
AirbagDeployed - 1,  
MasterReset - 2,  
CanceledByCloud -3,  
HighPriorityJob -4,  
VehicleModeChanged -5,  
RestraintImpactThresholdExceeded -6,  
Expired -7,  
CanceledByUser -8  
CrashedYetToBeServiced – 9  
VehicleTheftModeActivated -10  
CanceledByService – 11

### REQ-392412/B-###R\_FNC\_Veh\_HMI\_Notif\_039### HMI ICON Priority

Rules when ICON Notifications overlap, and software update is pending for activation: -

- A. Preconditions not met and reminder ICON
  - 1. If update was postponed due to (requires user action and/or service required) and next schedule time is with 24hrs, then at first ignition cycle HMI shall display preconditions not met popup once and same time display 24hrs reminder ICON. Preconditions popup shall clear at second ignition cycle but continue to display 24hrs reminder until activation time is met.
  - 2. If update was postponed due automatic process and next schedule time is with 24hrs, then at first ignition cycle HMI shall skip the preconditions notification and display the 24hrs reminder ICON until activation time is met.
- B. Preconditions not met, and schedule is not set
  - 1. If update was postponed due to (requires user action and/or service required), then at first ignition cycle HMI shall display preconditions not met popup once for 3 ignition cycles before switching the schedule required ICON.
  - 2. If update was postponed due automatic process, then at first ignition cycle HMI shall display preconditions not met popup once and next ignition cycle show schedule required ICON.
- C. Preconditions not met, and next schedule time is greater than 24hrs
  - 1. If update was postponed due to (requires user action and/or service required), then at first ignition cycle HMI shall display preconditions not met popup once for 3 ignition cycles before clearing the ICON on 4<sup>th</sup> ignition cycle.
  - 2. If update was postponed due to requires service required, then at first ignition cycle HMI shall display preconditions not met popup once and ICON for next 2 ignition cycles before clearing the ICON on 4<sup>th</sup> ignition cycle.

Note: If system notification center and possible, show two or more notifications at same time.

### REQ-395173/B-###R\_FNC\_Veh\_HMI\_Notif\_041### HMI shall clear the notification after user input is received

HMI manger shall clear notification after user input is received, such as, consent/schedule is required, reminders, and/or update is canceled.



## Function Specification (FncS)

### **FUR-REQ-438530/A-###R\_FNC\_Veh\_HMI\_Notif\_048### Mini Browser to accept Wi-Fi term and conditions**

HMI manager shall allow the user to connect public Wi-Fi connection.

### **FUR-REQ-438531/A-###R\_FNC\_Veh\_HMI\_Notif\_049### Time Based Prompt Asking Customer to Connect to Wi-Fi**

HMI Manager shall prompt the customer to connect to Wi-Fi:

1. After vehicle is purchased within 30 days and 90 days (limit prompts to once or twice)
2. If vehicle doesn't reconnect after 90 days (limit prompts to once or twice)

### **FUR-REQ-438532/A-###R\_FNC\_Veh\_HMI\_Notif\_050### Power/Battery Reset During Activation**

If Power Reset/battery disconnect during activation, HMI shall display the correct status of the update:

- If update failed then failure message and other way around.

#### **4.3.5.1.1 Error Handling**

### **F-REQ-305204/D-###R\_FNC\_Veh\_HMI\_Notif\_040### Power Reset During Download and Install**

Power reset shall not affect any OTA software settings and values. After a power reset, all the settings shall be re-stored to the values that they were prior to the power reset.

#### **4.3.5.2 Non-Functional Requirements**

### **F-REQ-305267/D-###R\_FNC\_Veh\_HMI\_Notif\_043### Icon Design**

The status bar icon shall design to be intuitive to the customer so they can understand the difference between a pending activation, reminders, update successful or unsuccessful, and a one-time consent etc.

### **REQ-344157/B-###R\_FNC\_Veh\_HMI\_Notif\_044### Display Release Notes**

In vehicle HMI shall display the release notes with in 500ms of the software activation complete. Or allow the user to see the release notes when use is required.

### **REQ-347388/B-###R\_FNC\_Veh\_HMI\_Notif\_046### Reference to Owner's Manual**

Some of the popups DO NOT cover the details of the software update behavior when asking for user input, for more information HMI shall have link to Owner's Manual.



## Function Specification (FncS)

### REQ-347839/B-###R\_FNC\_Veh\_HMI\_Notif\_047### Do Not Show this Popup Again

For all non-critical notification popup is displayed instead of notification ICON, then HMI shall allow the user to disable the popup by selecting "Do not show this message again".

### REQ-406535/A-###R\_FNC\_Veh\_HMI\_Notif\_042### Display shall not be black screen during OTA update

Display shall not be black screen SYNC is powering up or down during OTA update. \*

### REQ-433568/A-###R\_FNC\_Veh\_HMI\_Notif\_045### Active Notifications

HMI manger shall have active notifications when user action and notifications are required. Active notifications are not limited to ICONs.

## 4.4 Logical Function Software Update Details

### 4.4.1 Function Description

Each software update shall have the update details (release notes) file with description of the software changes; it shall be approved by legal and translated to all the required languages.

The update details file shall be release in the Ford Backend.

Update details file shall be able to include the detail description with images and URLs.

The software release description shall be delivering with the software update. The only exception to this rule is if an update is completely silent to the customer. The owner website shall have more details and history of the software updates that were push to the vehicle.

HMI shall allow the user to see software update status under Update Details settings.

### 4.4.2 Function Scope



## Function Specification (FncS)

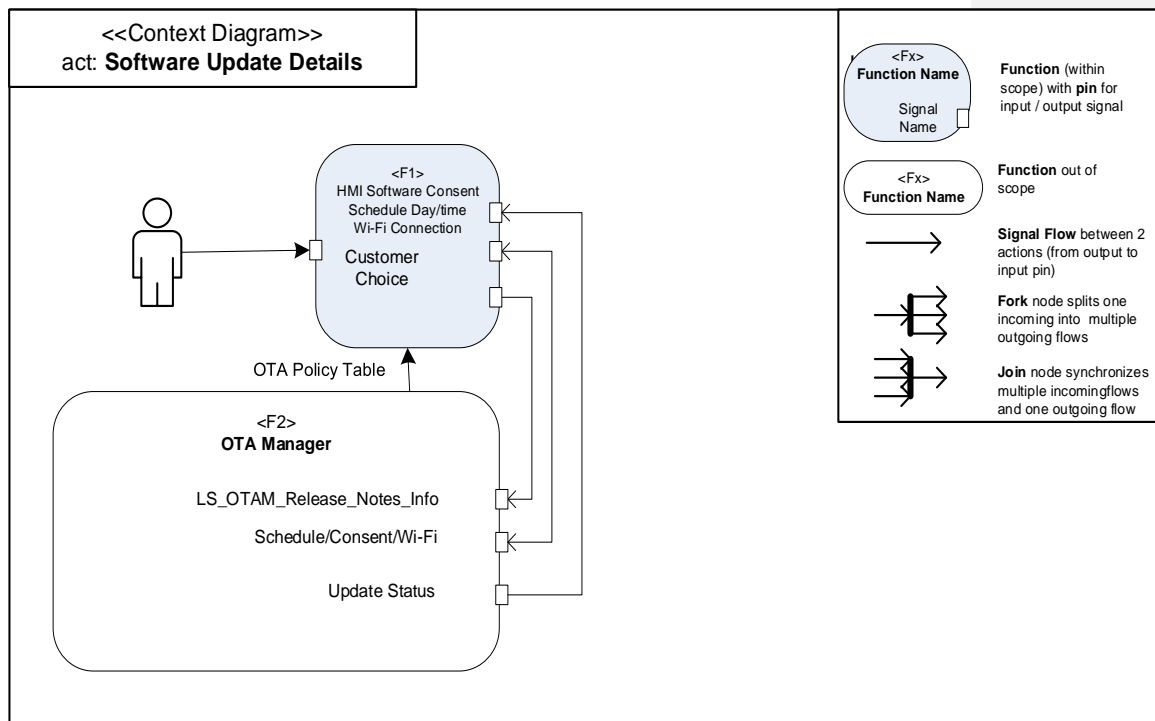


Figure 7: Context Diagram of Function Software Update Details

### 4.4.3 Function Interfaces

#### 4.4.3.1 Logical Inputs

Signal ID	Signal Name	Description
	CustomerChoice	This is the customer selection of the consent settings that will be shown in the screen

#### 4.4.3.2 Logical Outputs

Signal ID	Signal Name	Description
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## Function Specification (FncS)

	LS_OTAM_Release_Notes_Info	Software update release notes text
	LS_OTAM_ConenctionType_WiFi	Software update requires Wi-Fi connection
	LS_OTAM_Activation_Status	Software activation schedule day/time
	LS_OTAM_SW_Update_State	Software update status
	LS_OTAM_SW_Download_Pause_Reason	Reason why software download pause
	LS_OTAM_SW_Download_State	Software download status
	LS_OTAM_SW_Installation_State	Software installation status
	LS_OTAM_HMI_OTASWB_Clear	Clear all HMIs
	LS_OTAM_Activation_Time	Identify how long software activation time will take
	LS_ASUHMI_Activation_Consent	Software update requires schedule

### 4.4.4 Function Modeling

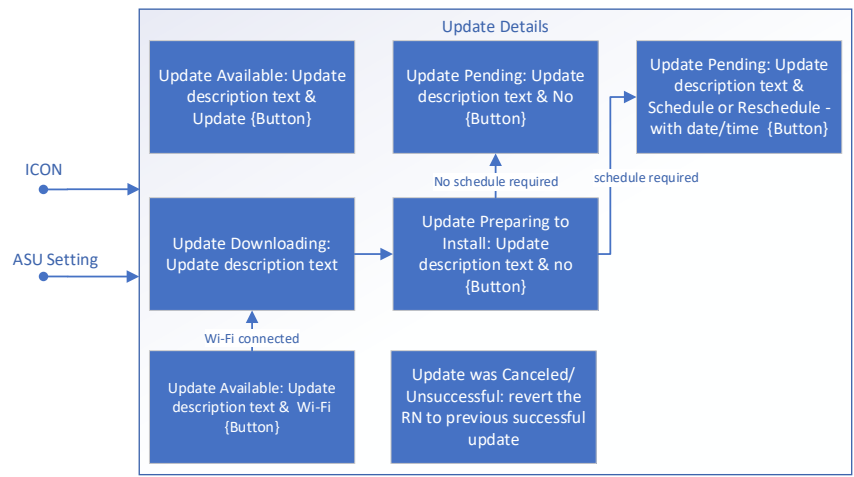


Figure 8: State Machine of Function Software Update Details





## Function Specification (FncS)

### 4.4.5 Function Requirements

#### 4.4.5.1 Functional Requirements

##### **F-REQ-305283/E-###R\_FNC\_Veh\_HMI\_SW\_Details\_001### Software Update Details Settings**

HMI shall allow to customer to access the update details from system update settings and from HMI ICONs to check the software update status, such as: -

1. Software Update is available or software update in pending for user action
2. Update is downloading
3. Update is preparing in install
4. Update is installing
5. Update is pending
6. Update is canceled
7. Update is successful
8. Vehicle is up to date

##### **FUR-REQ-392409/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_002### Download the Update Details Text before Notify the User for Action**

HMI manger shall download the release notes file before notifying the user that update is available, such as consent required, Wi-Fi is required, schedule is required, and update is successful etc.

##### **REQ-394121/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_003### System is Unsuccessful to Download the Additional/PII Consent File**

If additional/PII consent is required and system failed to download the additional/PII consent text file, then system shall have x retries.

##### **F-REQ-305285/D-###R\_FNC\_Veh\_HMI\_SW\_Details\_004### Software Update Pending and Schedule is Not Set**

If software update is pending for activation and it requires a schedule but schedule is not set, then update details shall display that new release notes and status that Software Update is pending and requires a schedule with option to access schedule screen (such as schedule button).

After user input is received or update canceled or expired, then HMI shall transition the update details screen to next state.

##### **REQ-348831/E-###R\_FNC\_Veh\_HMI\_SW\_Details\_010### Software Update is Pending but Waiting for Schedule Time Shall Show on Update Details Display**

When software update is pending and requires a schedule, then HMI shall display the set schedule date and time and show a button to reschedule, which shall allow the user to access schedule input screen.



## Function Specification (FncS)

### REQ-393740/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_005### System is Unsuccessful to Download the Release Notes file after Max Reties

When vehicle receive an update, HMI logic shall download the update details description file as soon as URL becomes available and if it fails to download the file, then after x reties HMI shall notify the user that update is available with standard text and HMI shall continue to retry to download file until campaign is complete.

After maximum retries HMI shall display standard text when notifying the user that update is available and redirect the customer to mobile app and/or consumer website for release notes.

Update is Available but requires Wi-Fi connection	A system update is available. To download the update, connect to a Wi-Fi network. For more info access mobile app or consumer website.
Update is available	A system update is available For more info access mobile app or consumer website.
Update Requires Schedule	A system update is pending For more info access mobile app or consumer website.
Update activation is pending for schedule time	A system update is pending. The update is scheduled for: {date} at {time}. For more info access mobile app or consumer website.
No Update is in progress	Continue to show previous state
If no release notes file available (current or previous)	Your system is up-to-date

### REQ-394235/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_007### Software Update is available and requires Wi-Fi Connection

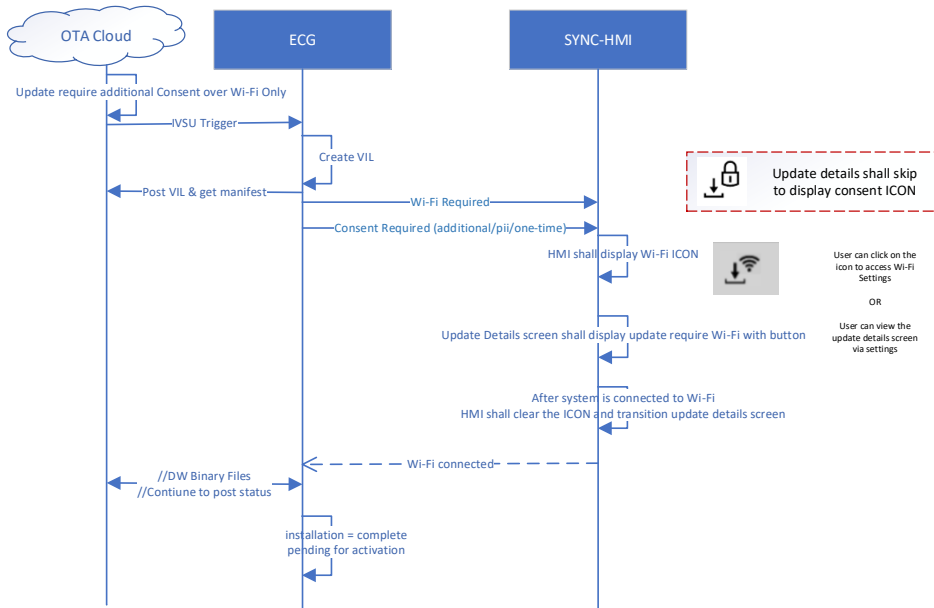
If software update is available and requires Wi-Fi network connection, then HMI shall notify the user to connect to Wi-Fi and after vehicle is connected to Wi-Fi HMI shall clear the notification.

1. HMI shall prompt the user to connect to Wi-Fi via ICON, by clicking the ICON user shall be able to access the Wi-Fi settings.
2. Under update detail, HMI shall display that an update is available with new release notes with Connect button, if user clicks on the connect button it shall allow the user to view Wi-Fi settings.
3. User shall be able to connect to Wi-Fi via Wi-Fi settings

If Wi-Fi is disable, then ICON/Connect button shall allow the user to turn the Wi-Fi to ON before connected to access point. Once the system is connected to Wi-Fi, then HMI shall display transient message that Wi-Fi successfully connected, and update details shall transition to next state and clear the ICON notification.



## Function Specification (FncS)



### Flow 17: Software Update is available and requires Wi-Fi

Note: HMI shall have a standard text that depending on connection, multiple connections may be needed to complete the download. Once you set up your Wi-Fi, your vehicle will automatically connect and resume the download when in range of that Wi-Fi.

### REQ-394243/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_006### Software Update Expired Because it Required Wi-Fi Connection and Connection was not Made

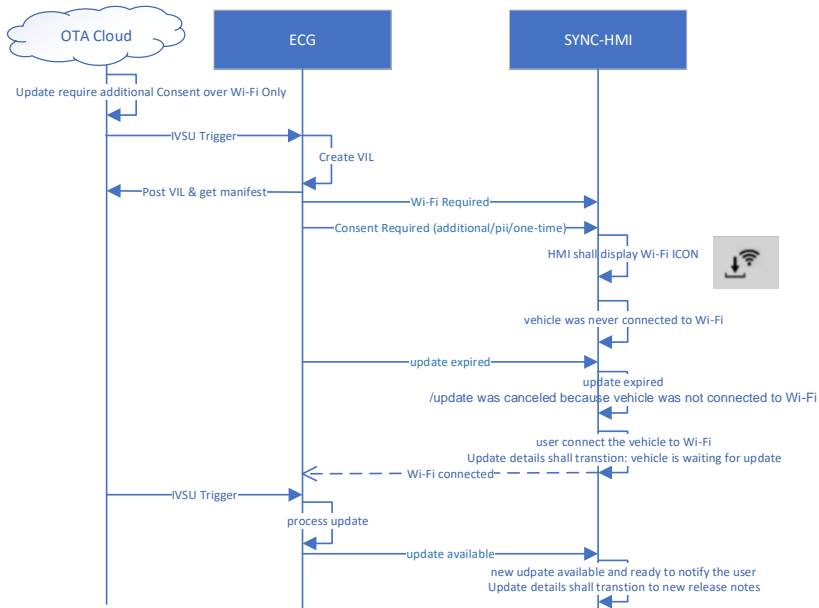
Software update was available and required Wi-Fi and vehicle was not connected to Wi-Fi access point and update expires, then update details shall display that update was canceled because vehicle was not connected to Wi-Fi.

After user connect to Wi-Fi and no new update is pending, update details shall when available, a new update will be pushed to the vehicle and/or if new state becomes available.

If new update available, then update details shall transition to new state.



## Function Specification (FncS)



**Flow 27: Software update expired while waiting for Wi-Fi connection**

### REQ-394961/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_015### Software Update is available and requires Wi-Fi Connection, Vehicle is Connected to Wi-Fi

If software update is available over Wi-Fi and vehicle is connected to Wi-Fi, then update details shall display download progress of the update with release notes.

After the download is complete update details shall transition the update details screen to next state.

### REQ-394825/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_008### Software Update is Available and Required Wi-Fi And User Consent (one-time/Additional/PII)

When automatic system update is disable and software update is available and requires Wi-Fi connection, user the required to provide consent(one-time/additional/PII) and connect to Wi-Fi. HMI shall prompt the user that by clicking Connect you are accepting the update (providing consent)

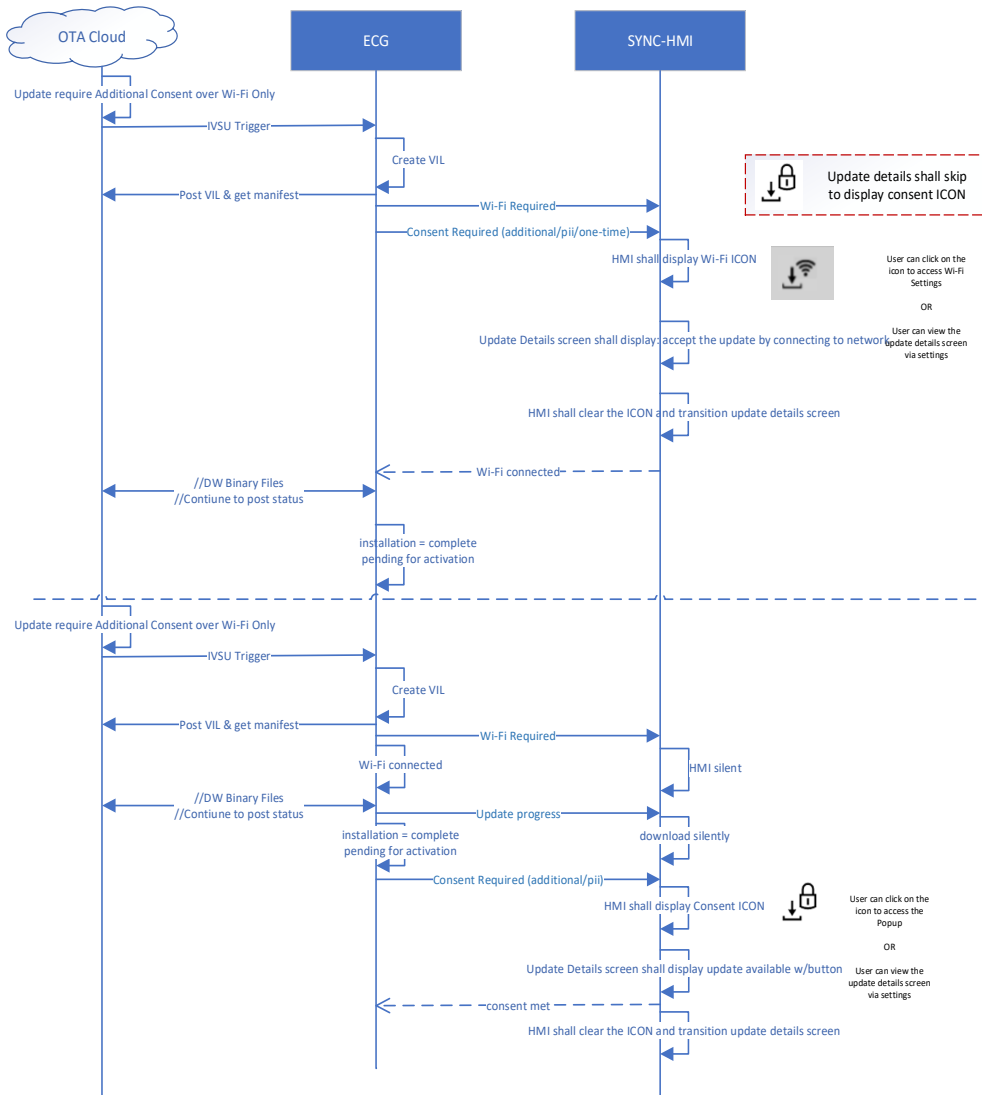
A system update is available. To accept the update, connect the vehicle to a Wi-Fi network.

OR

A system update is available. If you agree to accept the update, connect the vehicle to a Wi-Fi network.



## Function Specification (FncS)



Flow: 19 Wi-Fi and Consent Required and Wi-Fi is not Connected



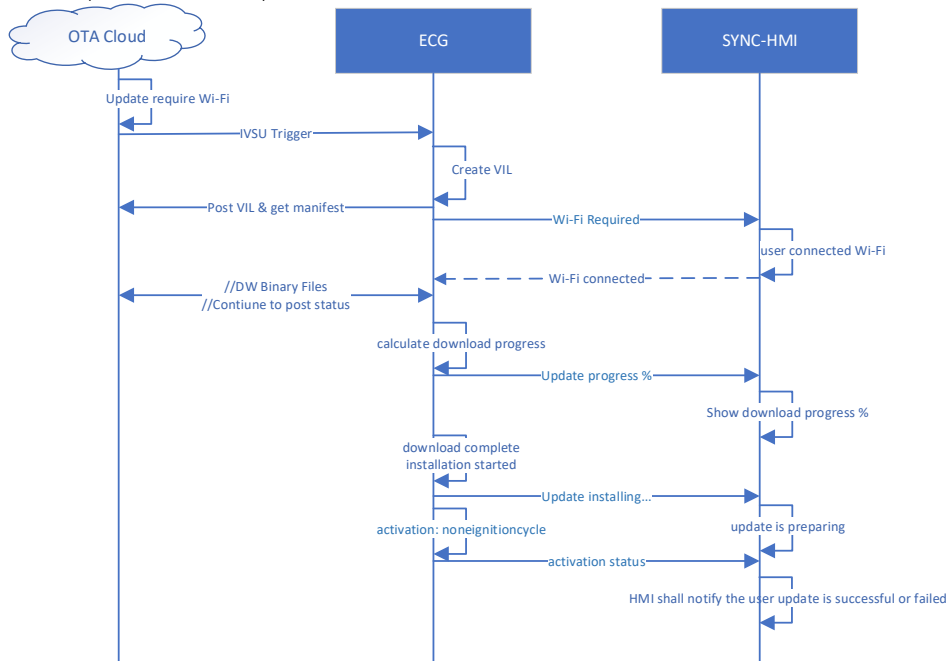
## Function Specification (FncS)

### REQ-394329/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_009### Software Update is Downloading

If user was notified that software update is available and user provided Wi-Fi connection and/or Consent and download started, then HMI shall display transient message download started and update details shall display that update is downloading with release notes. If update fails than update details shall revert the release back to last successful release notes.

When software is downloading over Wi-Fi **LS\_OTAM\_ConenctionType\_WiFi = True**, update details shall display download progress and notify for customer that download may continue after ignition off and depending on the connection it may require multiple ignition cycles to complete the download.

During download HMI shall display the download progress (%). Once download is complete update details shall transition the state (reference 395035/A).



Flow 28: Software Downloading Over Wi-Fi

### REQ-394963/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_027### Software Download Pause Due to System Condition is not Met

If software download was in progress and vehicle lost Wi-Fi connection, then HMI shall notify the user that update is pause and required Wi-Fi connection to resume the download, HMI shall only prompt the user, if user action will result in resuming the download.

If user was notified about the update and update pause **LS\_OTAM\_SW\_Download\_State = pause** and pause reason is other than connectivity, then HMI shall display the update is taking longer than expected.

**LS\_OTAM\_SW\_Download\_Pause\_Reason**

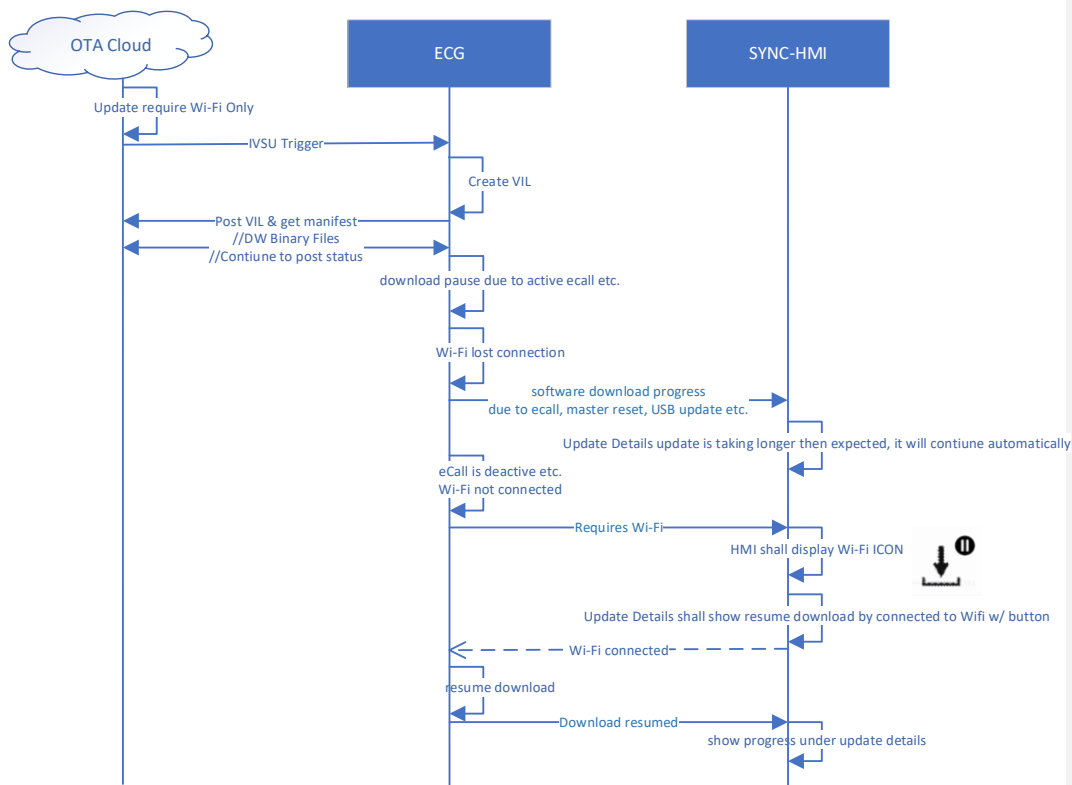


## Function Specification (FncS)

```
Values{
01 – USB Update,

02 - eCall,
03 – Loadshed,
04 – no connectivity
05 – unknown,

}
```



Flow 20: Update required Wi-Fi and Update is Pause

### REQ-394330/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_011### Software Update is Preparing to Install

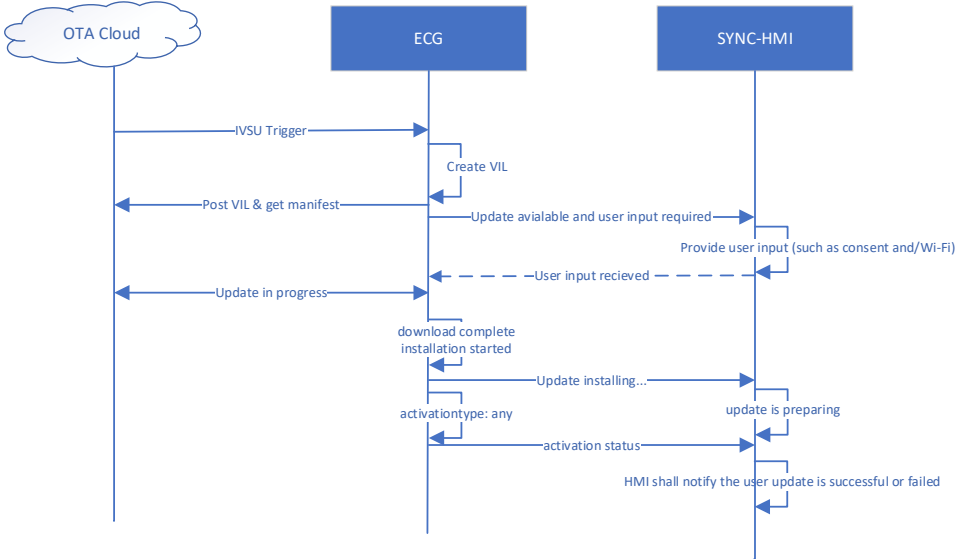
User was notifying that update is available and software update is completely in background and no user input requires at this time, then update details shall display that update is preparing to install.



## Function Specification (FncS)

Note: After download is complete some updates can take long time to install and no user input is required at this time, so HMI shall show update is preparing to install.

Once install in complete update details shall transition to next state.



### REQ-394242/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_012### Update Expired Because Consent Was not Provided

If software update was pending for consent (One-time), then update details shall display that update was cancel because update consent wasn't provided, if ASU is disable then guide the customer how to enable ASU.

If user enables ASU, then update details shall transition to your vehicle is waiting for its next update.

If software update was pending for consent (additional/PII), then update details shall display that update was cancel because update consent wasn't provided.

If new update becomes available, then update details shall transition to new state.

### REQ-394234/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_013### Software Update is Available but Requires Consent

If software update is available and requires user consent, then HMI shall notify the user:





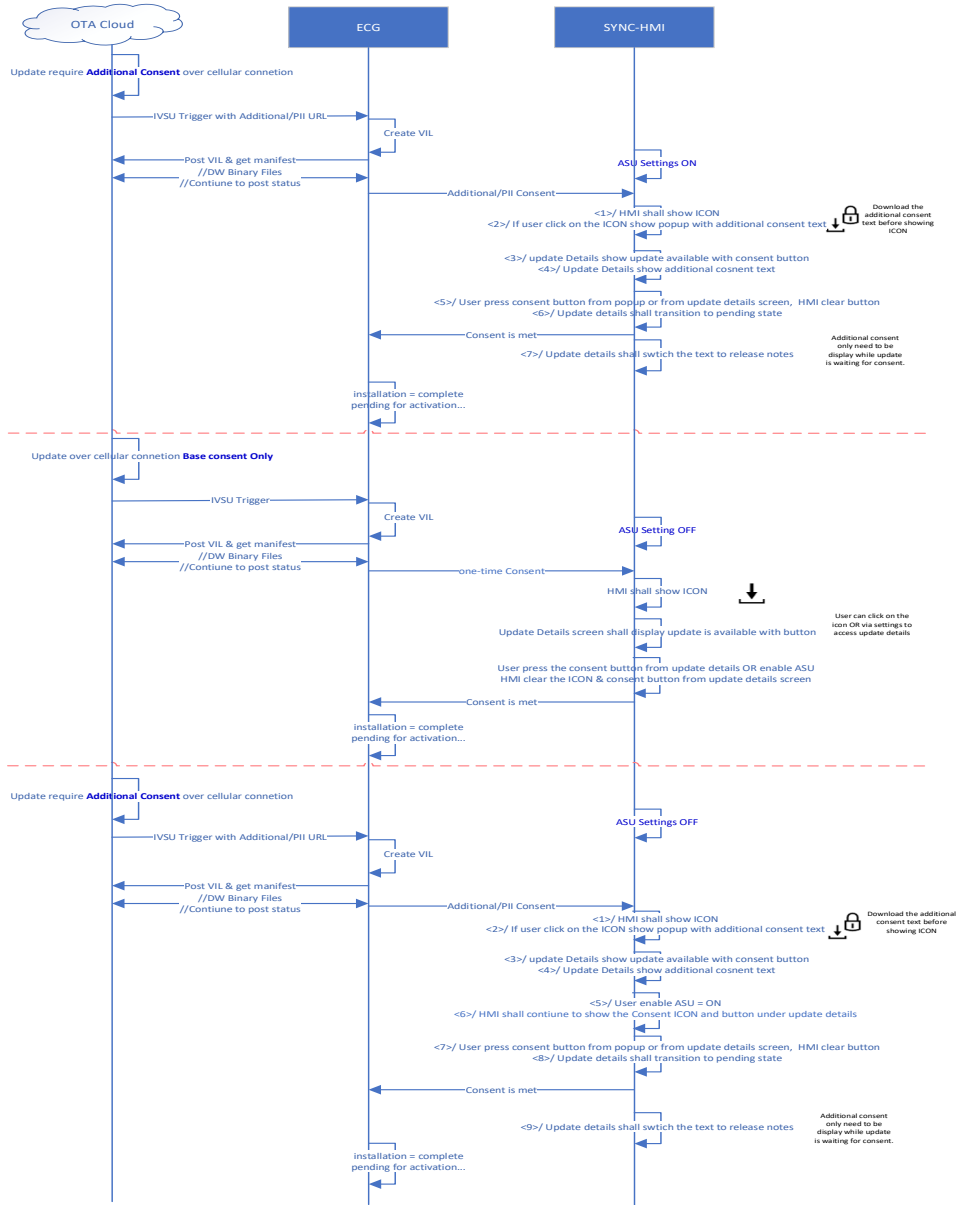
## Function Specification (FncS)

1. Additional or PII consent is required and ASU is enabled, then update details shall display update is available with additional consent text with update button, allow the user to accept the update by clicking the update button.
2. If base consent is required and ASU is disabled, then update details shall display that update is available with release notes text and update button, allow the user to accept the update by clicking the update button or changing the ASU settings.
3. Additional or PII consent is required and ASU is disabled, then update details shall display update is available with additional consent text with update button, allow the user to accept the update by clicking the update button, however if customer enable the ASU, HMI shall continue to display consent required notification.

Once the required consent is provided by the user, HMI shall also transition the update details screen.



## Function Specification (FncS)





## Function Specification (FncS)

### Flow 21: Update Requires User Consent over cellular Connection

#### REQ-394814/A-###R\_FNC\_Veh\_HMI\_SW\_Details\_014### Software Update is Pending and Does not requires schedule

If user was notified that update was available and update is non-schedule update, then update details shall show that update is pending with no button and waiting for an ignition cycle.

#### REQ-394238/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_016### Restore Update Details to Last Successful Release Notes after Software Update Fails

If software update failed while in progress ~~and user was not notified about update~~, then ~~update shall fail silently without notifying the user~~

Update details shall continue to display the previous release notes and last successful update.

#### F-REQ-305284/F-###R\_FNC\_Veh\_HMI\_SW\_Details\_017### Software Update is Successful Update

After software update successful, update details HMI shall display the new release notes text and notify the user that update was successful.

- 1- User shall be able to access the update details by clicking the update successful ICON
- 1- If customer does not click the ICON then, HMI shall clear the ICON after x ignition cycles or system restart.
- 2- If customer clicks on the ICON, HMI shall show update details or popup that update was successful and clear the ICON.
- User can access the update details screen via automatic system update settings

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#### REQ-395060/B-###R\_FNC\_Veh\_HMI\_SW\_Details\_029### Vehicle is Up-to-Date

If HMI receives [LS\\_OTAM\\_HMI\\_OTASUB\\_Clear = ClearHMIs](#) OR at EOL OR no release notes available after successful update, then update details shall display vehicle is up-to-date.

#### REQ-326576/D-###R\_FNC\_Veh\_HMI\_SW\_Details\_024### Software Update Date and Time

After each software activation HMI shall display date and time flag [LS\\_OTAM\\_Update\\_Time = date/time](#) received from OTA Manager. Master Reset shall not affect date and time.

Date and time display to the customer shall be depended on the region and/or user selected format, such as if clock format is 24hrs, then software update time and date shall be 24hrs.

#### 4.4.5.1.1 Error Handling



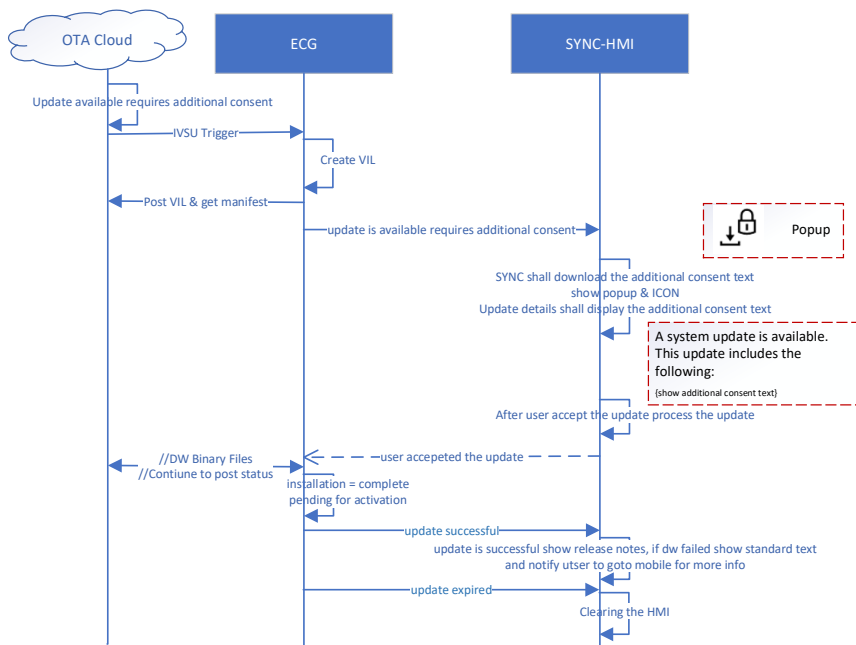
## Function Specification (FncS)

### F-REQ-305205/E-###R\_FNC\_Veh\_HMI\_SW\_Details\_025### No Blank Display for Software Details

There shall never be a blank display for release notes, when release notes are not available then HMI manager shall display a default text such as “Your vehicle is up to date”.

### REQ-396768/A-###R\_FNC\_Veh\_HMI\_SW\_Details\_027### Software Update Available and Requires Additional Consent

If software update is available and requires additional consent, then HMI shall display the additional consent text under update details.



#### 4.4.5.2 Non-Functional Requirements

### F-REQ-305288/D-###R\_FNC\_Veh\_HMI\_SW\_Details\_026### Software Update Details Display Time Out

Display screen of release notes should not timeout but have an option to close or go back. Customers can read at different speeds and depending on the length of the release notes, we might have undesired timeouts.



Function Specification (FncS)

REQ-433199/A-###R\_FNC\_Veh\_HMI\_SW\_Details\_025### Display the Release Notes  
HMI Manger shall continue to display the release notes after reset and master reset.

4.5 Logical Function Software Update Progress Bar

4.5.1 Function Description

Software updates thru a USB and/or in vehicle HMI “Check for Updates” option in setting shall provide the customer the ability to monitor the progress of the download, install and activation.  
When user initiates OTA software updates thru USB or by in vehicle HMI then the progress bar shall show the software update details.  
  
An OTA update is a silent update; meaning that there shall be no display to the customer in regards to the progress of the download or install.

4.5.2 Function Scope

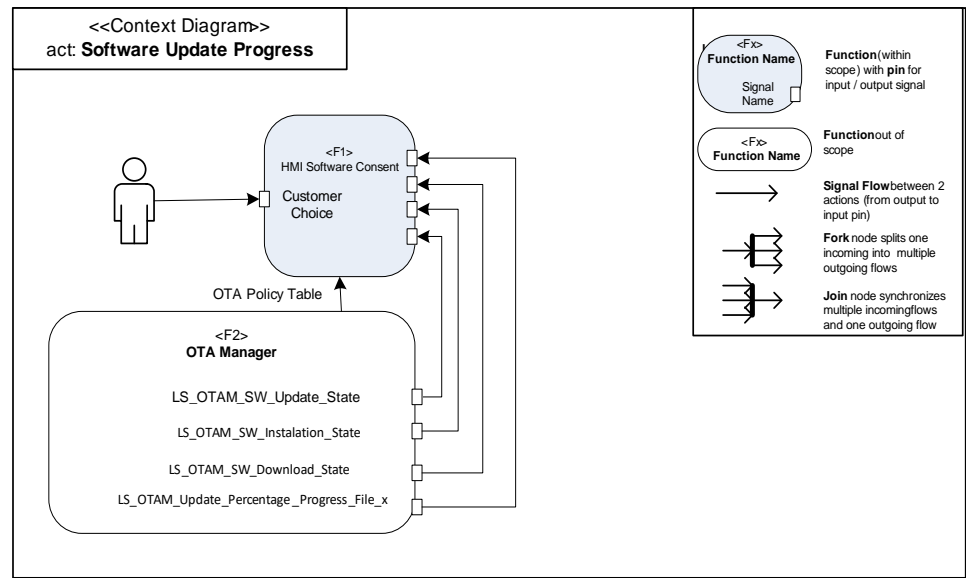


Figure 9: Context Diagram of Function Software Update Progress



## Function Specification (FncS)

### 4.5.3 Function Interfaces

#### 4.5.3.1 Logical Inputs

Signal ID	Signal Name	Description
	CustomerChoice	This is the customer selection of the consent settings that will be shown in the screen

#### 4.5.3.2 Logical Outputs

Signal ID	Signal Name	Description
	LS_OTAM_SW_Update_State	The activation status of the software update
	LS_OTAM_SW_Instalation_State	The installation status of the software update. During a USB update, the OTA Manager shall provide installation status per each parallel software file that is occurring.
	LS_OTAM_SW_Download_State	The download status of the software update. During a USB update, the OTA Manager shall provide download status per each parallel software file that is occurring.
	LS_OTAM_Update_Percentage_OverallProgress	This signal shall show overall progress of the software update.
	LS_OTAM_OTASUSB_Number_of_Files	This signal shall show total and remaining number of files

### 4.5.4 Function Modeling

N/A

### 4.5.5 Function Requirements

#### 4.5.5.1 Functional Requirements

##### F-REQ-305289/B-###R\_FNC\_Veh\_HMI\_Prog\_Bar\_001### Progress Bar for USB and Application Updates

When user initiates OTA software updates thru USB or by in vehicle HMI, then the progress bar shall show the software update details.

HMI shall display the number of total files with details of downloading and programming, paused, and pending for activation.

During USB update, system is updating do not unplug the USB until update is complete.

Progress bar shall be capable to have multiple progress as following: -



## Function Specification (FncS)

1. Target ECUs (connected thru Ethernet port): - OTA Manager shall provide the feedback to the HMI with progress of the download and file transfer to target ECUs
2. Client ECU (that has direct connection with USB port): - Client ECU shall provide the feedback to HMI with progress of the OTA software update.
3. OTA Manager shall provide over all progress time estimation of the software update.

### F-REQ-305290/B-###R\_FNC\_Veh\_HMI\_Prog\_Bar\_002### Progress Bar Accuracy

The progress bar accuracy shall be very detailed so that the customer can understand how much data has been downloaded, the status of the installation and how much time is left until the completion of the update.

### F-REQ-305292/B-###R\_FNC\_Veh\_HMI\_Prog\_Bar\_004### Reset Progress Bar

If the USB update is incomplete due to customer unplugged the USB, then prompt the customer to insert USB; the system shall allow 24hrs for the customer to re-plug the same USB but after 7day OTA manager shall clear the software and HMI shall reset the progress bar to default.

When an error occurs during USB update, the progress bar shall reset to default.

If a USB software update interpret current OTA software update, then the HMI progress bar shall reset to reflect the new software update process.

Example: - if OTA update is downloading, Apps for SYNC and user plugged in USB device with SYNC update, then OTA Manager shall clear the OTA update and continue with USB update and reflect the changes in progress bar.

When in progress software is erase by service and/or engineering tools, then the progress bar shall reset.

### F-REQ-305293/B-###R\_FNC\_Veh\_HMI\_Prog\_Bar\_005### Progress Bar for Check for Update is in Process

Under setting, if system is processing previous Check for Updates request and customer again pressed check for updates, then customer shall see the progress bar.

If software update is in process and customer clicks Check for Updates, then it shall take the customer to progress bar.

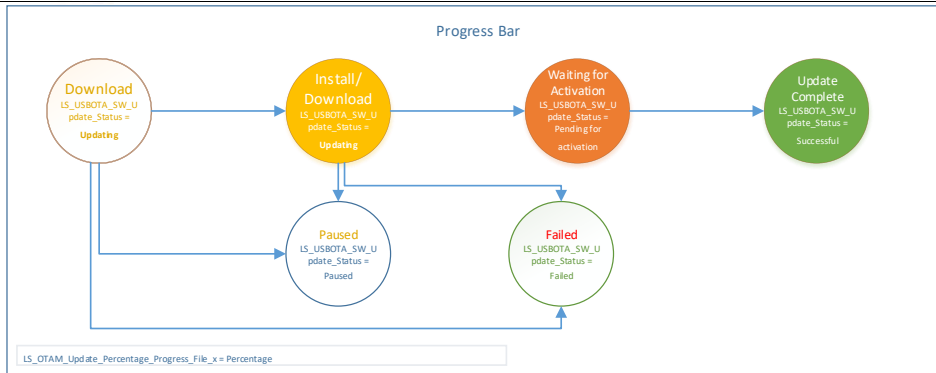
### F-REQ-305294/C-###R\_FNC\_Veh\_HMI\_Prog\_Bar\_006### Progress Bar during USB update

During USB update progress, HMI shall show a allow the user to review the progress bar by clicking the transient message system updating... and allow the user to click the transient message to access the progress bar.

HMI shall continue to display the progress bar until USB update is complete (successful/failed).



## Function Specification (FncS)



Flow 22: Progress Bar for USB Software update

### F-REQ-305295/B-###R\_FNC\_Veh\_HMI\_Prog\_Bar\_007### Progress Bar when System is Checking for Updates

When customer click for Check for Updates then OTA Manager shall provide a feedback within 60 seconds, with details of system is updating, up to date or start downloading.

Updating: 60 seconds in percentage

Up to date: [LS\\_OTAM\\_SW\\_Update\\_State = UP\\_TO\\_DATE](#)

Progress of the download

[LS\\_OTAM\\_Update\\_Percentage\\_Progress\\_APP\\_x](#), HMI shall show progress bar of each APP

[LS\\_OTAM\\_OTAUSB\\_Number\\_of\\_Files = number of file\(s\)](#), for example 1 of 5

[LS\\_OTAM\\_Update\\_Percentage\\_OverallProgress = Over all percentage](#)

### REQ-326187/A-###R\_FNC\_Veh\_HMI\_Prog\_Bar\_008### Reset Progress Bar when software update Failed

If software update is incomplete or failed and system clear the software update, then system shall reset the HMI progress bar. When Check for updates or USB software update [LS\\_USBOTA\\_SW\\_Update\\_Status = Failed](#), then HMI shall show failed on progress bar for configurable value = three ignition cycles.

### REQ-368885/B-###R\_FNC\_Veh\_HMI\_Prog\_Bar\_010### Progress Bar During OTA Updates

HMI shall show software update is in progress with progress bar and percentage complete when software is activating; on same display HMI also shall display vehicle in installing the update with show maximum inhibit time.

For OTA, 100% = Max Time ([LS\\_OTAM\\_Activation\\_Time = Domain: 2 bytes \(In seconds\)](#)).

Customer shall NOT be able to access any other screen from the software activation progress bar and after the update is complete, SYNC shall go back to default state.

### REQ-368889/A-###R\_FNC\_Veh\_HMI\_Prog\_Bar\_011### Download and File Transfer Progress Bar

During USB update, in vehicle HMI shall show a progress bar that system to transferring the files from USB to sync/ECG and another progress bar to shoe ECG to target ECU.





## Function Specification (FncS)

### REQ-395035/B-###R\_FNC\_Veh\_HMI\_Prog\_Bar\_014### Is User was Notify for Software Download over Wi-Fi HMI shall show Progress Bar with Percentage

If software update requires Wi-Fi and user was notified, then HMI shall display download progress status during the software download from cloud to ECG (reference REQ-392409/A).

LS\_OTAM\_download\_progress\_percentage  
Value {percentage}

#### 4.5.5.1.1 Error Handling

### F-REQ-305206/D-###R\_FNC\_Veh\_HMI\_Prog\_Bar\_012### Reset while in update in progress is displayed

The HMI screen shall synchronize with the progress of the update from the OTA Manager within 500 ms of the screen powering up. The progress display shall pick up on that state that it was prior to a reset, ~~(either power or master reset)~~

#### 4.5.5.2 Non-Functional Requirements

### F-REQ-305297/C-###R\_FNC\_Veh\_HMI\_Prog\_Bar\_013### Progress Bar Details

The HMI team shall design a progress bar that is always able to display some progress. Even though, it might be difficult to calculate the exact percentage of completion some progress on estimation. The customer should not feel like the progress bar is stuck in a particular task.

## 4.6 Logical Function Software Failures

### 4.6.1 Function Description

HMI shall notify the user if software update was unsuccessful for both USB and OTA.

OTA Software update has two types of failures: -

1. Software Update failed while update was taking place in the background and user is not aware of the update.
2. Software Updates failed after user was notified, such as update is available provide consent and/or update pending for schedule. During software updates via USB the customer shall be notified in details for errors that occur. For software updates via OTA, the customer shall be notified only for failures that occurred after a scheduled activation.

For USB notification refer to section (REQ-527237 USB Software Updates)



Function Specification (FncS)

4.6.2 Function Scope

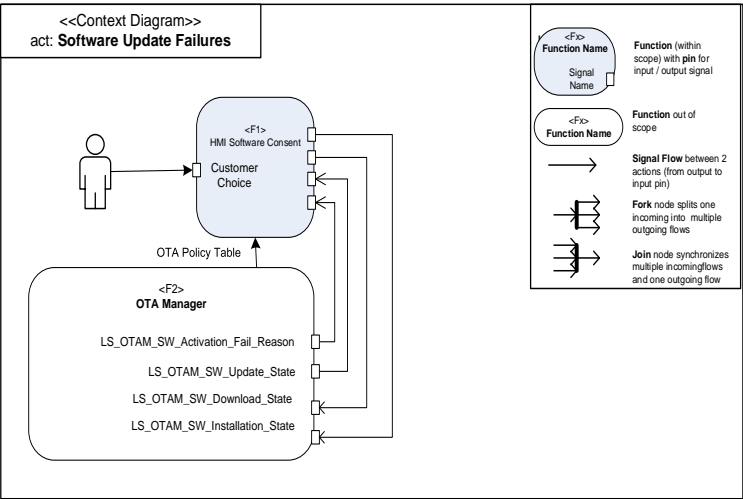


Figure 10: Context Diagram of Function Software Update Failures

4.6.3 Function Interfaces

4.6.3.1 Logical Inputs

Signal ID	Signal Name	Description
	CustomerChoice	

4.6.3.2 Logical Outputs

Signal ID	Signal Name	Description
	LS_OTAM_SW_Activation_Fail_Reason	WARNING PARTIAL PERMANENT_INHIBIT
	LS_OTAM_SW_Update_State	Failed
	LS_OTAM_SW_Download_State	Failed



## Function Specification (FncS)

	LS_OTAM_SW_Installation_State	Failed
--	-------------------------------	--------

### 4.6.4 Function Modeling

N/A

### 4.6.5 Function Requirements

#### 4.6.5.1 Functional Requirements

##### **F-REQ-305298/E-###R\_FNC\_Veh\_HMI\_SW\_Failure\_001### Software Update Failed with Warning and FMC will repush the update no user action required**

If software update failed during activation [LS\\_OTAM\\_SW\\_Activation\\_Fail\\_Reason = WARNING](#); then HMI shall notify the user that update is not successful and vehicle will automatically retry, no user action is required .

If software update failed during activation [LS\\_OTAM\\_SW\\_Activation\\_Fail\\_Reason = WARNING](#) and user was not notified about the update, then HMI shall skip the unsuccessful notification.

##### **F-REQ-305299/E-###R\_FNC\_Veh\_HMI\_SW\_Failure\_002### Software Update Failed and Vehicle is Reduced Functionality and Requires Service**

If software update failed during activation [LS\\_OTAM\\_SW\\_Activation\\_Fail\\_Reason = PARTIAL](#); then HMI shall notify the user that update is not successful, and vehicle has limited functionality and requires service and display phone number.

##### **REQ-330195/C-###R\_FNC\_Veh\_HMI\_SW\_Failure\_003### Software Update Failed Prior to Activation and Customer was Notified about the update**

If user was notified that update is available and/or pending and update failed while downloading or pending

[LS\\_OTAM\\_SW\\_Update\\_State = Failed](#) &&/OR [LS\\_OTAM\\_SW\\_Download\\_State = Failed](#) &&/OR

[LS\\_OTAM\\_SW\\_Installation\\_State = Failed](#), then HMI shall notify the user that update is not successful and vehicle will automatically retry, no user action is required and HMI shall not display phone number.

##### **REQ-393676/B-###R\_FNC\_Veh\_HMI\_SW\_Failure\_007### Software Update Failed and Vehicle is Permanently Inhibited**

If software update failed during activation [LS\\_OTAM\\_SW\\_Activation\\_Fail\\_Reason = PERMANENT\\_INHIBIT](#); then HMI shall notify the user that update is unsuccessful, and vehicle is not drivable and requires service (permanent inhibited). HMI shall continue to display this message until service is complete. HMI shall make sure the message is displayed at every ignition cycle until vehicle is de-inhibited.

If software activation failed due to critical failures [LS\\_OTAM\\_SW\\_Activation\\_Fail\\_Reason = PERMANENT\\_INHIBIT](#), then HMI shall notify the user that update has failed and required service and display phone number (reference A73a).



## Function Specification (FncS)

**REQ-432291/A-###R\_FNC\_Veh\_HMI\_SW\_Failure\_005### Software Update Failed while Updating in Background and User is not Aware of the update**

**REQ-433996/A-###R\_FNC\_Veh\_HMI\_SW\_Failure\_009### Software Update is Successful or Unsuccessful Notification if SYNC display is On after the Up**

### 4.6.5.1.1 Error Handling

**REQ-432290/A-###R\_FNC\_Veh\_HMI\_SW\_Failure\_008### Software Update is Successful or Unsuccessful Notification if SYNC display is On after the Up**

If update fail during activation, then HMI shall immediately display update failed before the system shutdown for x seconds.

### 4.6.5.2 Non-Functional Requirements

**F-REQ-305300/D-###R\_FNC\_Veh\_HMI\_SW\_Failure\_004### HMI Failure**

If the vehicle HMI fails to display any of the required messages/pop ups/settings, then the errors should be logged in the status logger and send to the cloud for evaluation.

**REQ-380375/B-###R\_FNC\_Veh\_HMI\_SW\_Failure\_006### Clear Failure Notification**

HMI shall display the failure notification for configured time before clearing it (exception permanent inhibits)

## 4.7 Logical Function USB Software Updates

### 4.7.1 Function Description

For USB software update progress, in vehicle HMI shall provide detailed step by step feedback to the customer, unless the manifest file explicitly disables notifications. HMI shall provide status update with percentage of the download, install, activation, and errors occur during the USB update.

When the vehicle detects an USB with OTA software, then HMI shall provide feedback that OTA USB is detect with valid OTA software packages. If USB is disconnecting during software copying (transfer the software file from USB or writing to USB), then HMI shall prompt the customer to reconnect the USB to proceed with the software update.



## Function Specification (FncS)

USB Function spec have more details about USB Update.

### 4.7.2 Function Scope

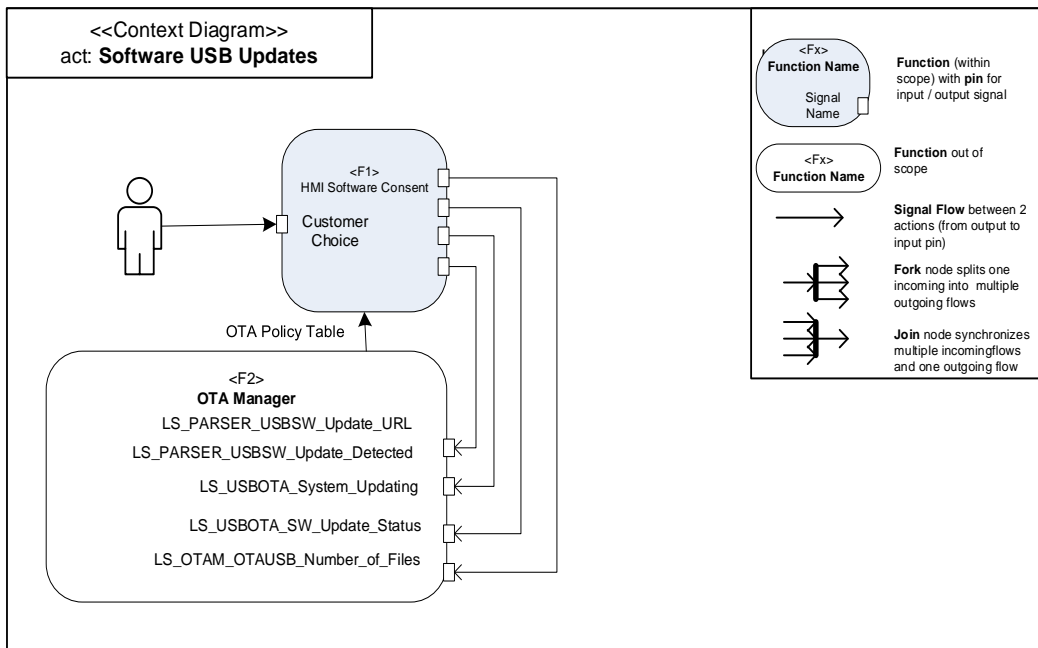


Figure 11: Context Diagram of Function USB Software Update

### 4.7.3 Function Interfaces

#### 4.7.3.1 Logical Inputs

Signal ID	Signal Name	Description
	<a href="#">LS_USBOTA_System_Updating</a>	Valid Manifest– Invalid Manifest Files Re-Download Files – same manifest file which was updated late time System update to date – Valid manifest
	<a href="#">LS_USBOTA_SW_Update_Status</a>	USB software update status



## Function Specification (FncS)

	LS_OTAM_Activation_Type	Activation Type: - No Ignition Cycle Ignition Cycle Inhibit
	LS_OTAM_Release_Notes_InfoValue	Software Release Notes
	LS_ASUHMI_Activation_Consent	NOW DATE TIME
	LS_OTAM_SW_Update_Fail_Reason	Error Code
	LS_OTAM_SW_Activation_Fail_Reason	Software activation failed reasons
	LS_OTAM_Update_Percentage_OverallProgress	Overall software update progress
	LS_OTAM_OTASWB_Number_of_Files	This signal shall show total and remaining number of files.
	LS_OTAM_Activation_Schedule_Type	Day or Week
	LS_OTAM_Activation_Time	Progress of activation
	LS_OTAM_HMI_OTASWB_Clear	USB update is paused and USB configuration time expire or OTA Manager abort the update, then set this signal to clear progress bar and other USB related HMIs.

### 4.7.3.2 Logical Outputs

Signal ID	Signal Name	Description
	LS_PARSERUSB_Conn_Status	Maintain USB connection status (plugged, unplugged, and re-plugged (same or different) USB device).
	LS_PARSER_USBSWB_Update_Detected	The USB Parser shall notify the Event trigger with files types and location of software files and VIL folder. USB parser shall provide an initial flag to HMI when validating the USB for OTA software updates. True/URLs/VIL upload location (VIL Folder creation or default location)
	LS_OTAHMI_Master_Reset_Status	Master Reset or No Master Reset

### 4.7.4 Function Modeling

N/A

### 4.7.5 Function Requirements

#### 4.7.5.1 Functional Requirements

#### REQ-326788/B-###R\_FNC\_Veh\_HMI\_USB\_SW\_002### USB Parser Detects Software Files On the USB Device

If software update is invalid and HMI received a set flag, then HMI shall prompt the user shall try again after re-downloading the latest software files from consumer website.

USB parser shall detect USB software update:



## Function Specification (FncS)

- If system detects valid manifest file, then HMI shall show transient message that system is updating.
- If system detects manifest file is with correct VIN but invalid, then HMI shall notify the user to redownload the files before trying for update.
- If system detects invalid manifest file (such as older and/or non-Ford or corrupted) software files on USB device, then HMI shall prompt the user shall download the latest files from consumer website before continuing.
- If system detects manifest file but device does not contain a manifest file for this vehicle, then HMI shall notify the user to redownload the files before trying the update.
- If system detects no manifest file but *FordSoftwareUpdates* folder, then HMI shall notify the user to redownload the files before trying for update.
- If software update is same as previously update, then HMI shall prompt the user "System is up to date and try later with latest files from consumer website"

### LS\_USBOTA\_System\_Updating

```
Values{
01 - Older_Software
02 - Valid Manifest
03 - Redownload Files
04 - Sys_to_update_date
}
```

### REQ-326789/B-###R\_FNC\_Veh\_HMI\_USB\_SW\_003### Software Update is in Progress and Lost USB Connection

During USB software update if update status **LS\_USBOTA\_SW\_Update\_Status = Paused** and USB device status is **PARSERUSB\_Conn\_Status = USB\_Unplug**, then HMI shall pause the update progress and prompt the user that to re-insert USB device to continue with software update.

### REQ-329660/A-###R\_FNC\_Veh\_HMI\_USB\_SW\_004### Download Software Files Keep USB Plugged in until Update is Complete

When OTA Manager finds **LS\_USBOTA\_System\_Updating = Valid Manifest && LS\_USBOTA\_SW\_Update\_Status = Updating**, then HMI shall display "keep USB plugged in until software update is complete".

### REQ-329661/C-###R\_FNC\_Veh\_HMI\_USB\_SW\_005### Clear HMIs when Update When USB lost Connection during Download/ File Transfer

\*

### F-REQ-305314/D-###R\_FNC\_Veh\_HMI\_USB\_SW\_006### Master Reset During USB Update

Master reset will cancel the update for HMI shall prompt the user {reference to REQ-305240}.

### F-REQ-305306/C-###R\_FNC\_Veh\_HMI\_USB\_SW\_007### Errors during USB Software Update

If any errors occur during USB software update **LS\_USBOTA\_SW\_Update\_Status** (updating, pending\_activation, and/or pause), then HMI shall display the failure reason with error code **LS\_OTAM\_SW\_Update\_Fail\_Reason = Error Code**.

### LS\_USBOTA\_SW\_Update\_Status

```
Values{
01 - Updating (Downloading/Installing/Resumed)
02 - Failed
}
```



## Function Specification (FncS)

```
03 - PENDING_Activation,  
04 - SUCCESSFUL,  
05 - Paused  
}
```

### FUR-REQ-326791/A-###R\_FNC\_Veh\_HMI\_USB\_SW\_008### USB Software Files Are Corrupted

If any of the software file(s) are corrupted, then OTA Manager shall set flag **LS\_OTAM\_SW\_Activation\_Fail\_Reason = SW CORRUPTED**; and HMI shall prompt the customer to re-download the software files and retry.

### REQ-326192/B-###R\_FNC\_Veh\_HMI\_USB\_SW\_009### USB Software Activation Requires Schedule

If HMI update is required schedule, then HMI shall notify the user that USB update requires user input. If schedule is already set, then HMI shall the current schedule and allow the user to edit it.

- If customer choose schedule for later, then HMI shall show schedule options.
- If reoccurring schedule is set, then show the date/time and allow the user to change it.
- If one-time schedule is required then prompt the user to set one-time schedule.

If **LS\_OTAM\_Activation\_TypeSW\_AB\_ER = AB**, then software is A/B swap

If **LS\_OTAM\_Activation\_TypeSW\_AB\_ER = ER**, then software is erase and replace

If **LS\_OTAM\_Activation\_TypeSW\_AB\_ER = AB and ER**, then software update is coordinated with A/B swap and erase and replace.

### F-REQ-305307/D-###R\_FNC\_Veh\_HMI\_USB\_SW\_010### Software Activation requires an Ignition Cycle

If USB software update is ready for activation and requires ignition cycle **LS\_OTAM\_Activation\_Type = IGNITIONCYCLE**, then HMI shall prompt the user "to complete the update turn the vehicle off and open and close the driver door and wait for x minutes before turn the vehicle on."

HMI manager shall use the dynamic time that comes from the cloud, however if dynamic time is not available, then HMI manager shall use "10" minutes as hardcoded value.

### F-REQ-305309/C-###R\_FNC\_Veh\_HMI\_USB\_SW\_017### USB Software Activation with Vehicle Inhibit

Self-install ECU shall report the progress to OTA Manager and HMI shall receive software update progress from the OTA Manager **LS\_OTAM\_Update\_Percentage\_OverallProgress = Overall**  
**LS\_OTAM\_OTASWB\_Number\_of\_Files = remaining out of total.**

### F-REQ-305310/C-###R\_FNC\_Veh\_HMI\_USB\_SW\_012### USB Update for same ECU that is currently being updating through OTA and files are 100% DW

If USB update is for the same ECU that is currently being updated through OTA and software package is 100% downloaded and installation started, then HMI shall prompt the user that OTA update is in progress with following option:

- (1) Wait until OTA update is complete OR
- (2) Cancel the OTA update before continuing with USB update.

Note: If USB update is for different ECU then system shall pause the OTA update and complete the USB update.





## Function Specification (FncS)

### F-REQ-305311/C-###R\_FNC\_Veh\_HMI\_USB\_SW\_013### USB Update Detected During Pending for Software Activation

If USB update is detected when previous software update is pending for activation, then HMI shall prompt the user that OTA update is pending for activation with following option:

- (1) waiting for ignition cycle and allow the user to do ignition cycle OR
- (2) waiting for schedule day and time and allow the user to change the schedule OR
- (3) waiting for schedule and allow the user to set schedule OR
- (4) Cancel the OTA update before continuing with USB update.

### REQ-368887/B-###R\_FNC\_Veh\_HMI\_USB\_SW\_014### Update is Not Successful Notification

If USB update activation is not successful, then HMI shall display USB update failed, please confirm the failure using the diagnostic tool.

### FUR-REQ-324904/C-###R\_FNC\_Veh\_HMI\_USB\_SW\_015### Software Download Failure

If software download failed [LS\\_OTAM\\_SW\\_Activation\\_Fail\\_Reason = USB\\_FAILURE](#), then HMI shall display message with details of the failure codes and next steps for the customer.

### F-REQ-305309/C-###R\_FNC\_Veh\_HMI\_USB\_SW\_017### USB Software Activation with Vehicle Inhibit

Self-install ECU shall report the progress to OTA Manager and HMI shall receive software update progress from the OTA Manager [LS\\_OTAM\\_Update\\_Percentage\\_OverallProgress = Overall](#)

[LS\\_OTAM\\_OTASWB\\_Number\\_of\\_Files = remaining out of total.](#)

### REQ-408304/A-###R\_FNC\_Veh\_HMI\_USB\_SW\_019### USB Update Failure due to Errors

Status Message		HMI Text	Error Code	
OTAM_S1011	Master Reset	The update was canceled because a master reset occurred.	1	Uses OTAM_S1011, cancelReason 2
	Crash	The update was canceled because a collision was detected.	2	Are "RestraintImpactThresholdExceeded" or "AirBag" suitable extra data values? Updatecancel - RstrnImpactEvtntStatussignal (Msg ID - 0x4C).
DCM_E1001		The direct configuration update cannot continue because an error occurred.	3	Depends on ECG-56733
SIM_E1001		The update cannot continue because an error occurred during	4	



## Function Specification (FncS)

		installation.		
OTAM_E1003		The update was canceled because it contained an invalid file.	5	
OTAM_E1005		The update cannot continue because the authorization file cannot be parsed.	6	The user text does not match the status message.
OTAM_E1008		The update cannot continue because an error occurred during activation.	7	To be triggered by an existing status should a last-minute addition be required.
Generic Failure	all other failures	The update cannot continue because an error occurred.	0	Updatecancel show popup 53 and reset the progress bar
				Status exists for OTA downloads in J1. You need to check if this is emitted in USB case, as there have never been any specific reqs to emit statuses for USB. (in fact USB statuses are disabled)
				Other generic failures

### 4.7.5.1.1 Error Handling

### 4.7.5.2 Non-Functional Requirements

## 4.8 Logical Function Fleet Software Updates

### 4.8.1 Function Description

HMI Manager shall have support Retail and Fleet specific HMIs. HMI manager shall identify is vehicle is configured as fleet either via DID or subscriptioned as fleet telematic. For all vehicles that are configured as Fleet vehicles, all user inputs shall be provided by the fleet admin and in vehicle HMI interface shall provide limited notification, In-vehicle HMI shall be read-only. Fleet manager has the full access to set schedule remotely.



## Function Specification (FncS)

### 4.8.2 Function Scope

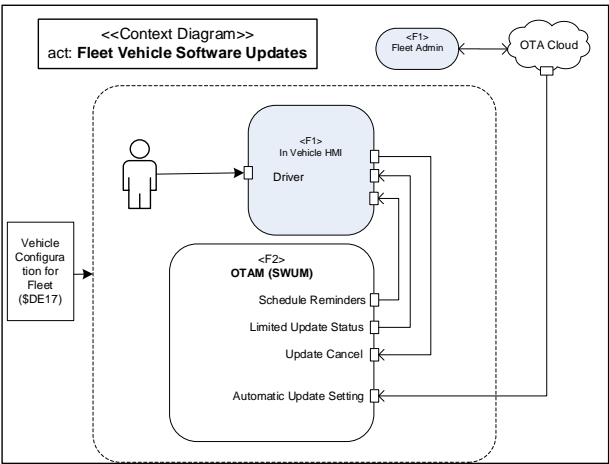


Figure 13: Context Diagram of Fleet Software Updates

### 4.8.3 Function Interfaces

Signal ID	Signal Name	Description
	CustomerChoice	Vehicle is configured or subscribe as fleet

### 4.8.4 Function Modeling

N/A

### 4.8.5 Function Requirements

#### 4.8.5.1 Functional Requirements

#### REQ-406509/A-###R\_FNC\_Veh\_Fleet\_SoftwareUpdates\_001### Software Update Settings

If vehicle is configured or subscribe as fleet, then HMI Manager shall have a Fleet HMI interface for Software Update Settings, where update details status is shown without other options.



## Function Specification (FncS)

1. Software Update settings shall directly show Update Details with status without any other options. HMI manager shall not allow the user to edit schedule via Software Update settings

Setting →
Software Updates
{Status}
{Release Notes}

### REQ-406510/A-###R\_FNC\_Veh\_Fleet\_SoftwareUpdates\_002### If Schedule is Set, Display Day and Time

HMI manager shall notify the user that Fleet manager has set a schedule with day and time.

If update is pending and schedule is set, then HMI Manager shall display upcoming schedule day and time without edit options.

If update is not pending and recurring schedule is set, then HMI Manager shall display the schedule day(s) and time.

### REQ-406512/A-###R\_FNC\_Veh\_Fleet\_SoftwareUpdates\_004### Display Schedule Reminders Popup

HMI manager shall display upcoming schedule reminder as popup at every ignition cycle within configured time (x = hours).

Reminder popup shall not allow the user to edit the schedule.

Reminder popup shall notify the user that schedule is set by the fleet manager.

### REQ-406513/A-###R\_FNC\_Veh\_Fleet\_SoftwareUpdates\_005### HMI during At schedule time

At schedule time if ignition is On, then HMI manager shall not prompt the user to turn off the ignition to continue with updates.

At schedule time if ignition is Off,

then HMI shall use same screens as retail users, such as

1. Two-minute Count down screen Ref. REQ-346761 and REQ-305230
2. Preparing for Updates Precondition check Ref. REQ-326157
3. System update progress bar Ref. REQ-326160

### REQ-406514/A-###R\_FNC\_Veh\_Fleet\_SoftwareUpdates\_006### Software Update is Successful and Release Notes

Software update is successful notification is same as retail users Ref. REQ-305252 and REQ-305224.

### REQ-406515/A-###R\_FNC\_Veh\_Fleet\_SoftwareUpdates\_002### Software Update is Unsuccessful

If vehicle is configured or subscribe as fleet and update is unsuccessful and

1. Failure type is **LS\_OTAM\_SW\_Activation\_Fail\_Reason = warning**, then HMI shall not display the failure.
2. Failure type is **LS\_OTAM\_SW\_Activation\_Fail\_Reason = PARTIAL**, then HMI shall notify the user that update has failed, and vehicle requires service as soon as possible, please contact your admin for further assistance. HMI notification shall persist the failure message until vehicle is serviced. (Ref. REQ-392410 and REQ-305244)
3. Failure type is **LS\_OTAM\_SW\_Activation\_Fail\_Reason = PERMANENT\_INHIBIT**, then HMI shall notify the user that update has failed and vehicle requires service immediately, please contact your admin for further assistance. (Ref. REQ-305244 and REQ-393676)



## Function Specification (FncS)

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### **REQ-406516/A-###R\_FNC\_Veh\_Fleet\_SoftwareUpdates\_008### Admin Shall Provide all User inputs Remotely**

If vehicle is configured or subscribe as fleet and update requires user input such as schedule day/time and/or consent, then HMI shall not notify the user for any inputs.

### **REQ-406517/A-###R\_FNC\_Veh\_Fleet\_SoftwareUpdates\_009### Update Details Shall show Upcoming Schedule day/time with Release notes**

If vehicle is configured or subscribe as fleet and update is pending and schedule is set, then HMI shall display the release notes and upcoming schedule day/time.

### **REQ-406518/A-###R\_FNC\_Veh\_Fleet\_SoftwareUpdates\_002### Update Postponed due to vehicle conditions are not met**

If vehicle is configured or subscribe as fleet and update is postponed due to vehicle conditions, then HMI shall not notify the user about reason why update was postponed and update details shall reflect the new schedule (null, or next schedule time).

#### **4.8.5.2 Non-Functional Requirements**



## 5 HMI FUNCTIONS

### 5.1 HMI Function in Vehicle HMI

#### 5.1.1 Function Description

The function specification will cover in OTA related Vehicle HMI flows, default values.

#### 5.1.2 Function Requirements

##### 5.1.2.1 Functional Requirements on HMI

##### REQ-326786/A-###R\_FNC\_Vehicle\_HMI\_001### Type of messaging ICON vs. Transient Message

HMI shall notify the customer with user required action for software update and these messages can be done thru ICON and/or transient messages.

This documents reference as an ICON but HMI shall make sure software update has highest priority in messaging other can use transient message instead.

##### REQ-326787/A-###R\_FNC\_Vehicle\_HMI\_002### Hide unchangeable HMI options

In Vehicle HMI shall hide all the OTA related HMIs that are unchangeable.

##### F-REQ-305315/B-###R\_FNC\_Vehicle\_HMI\_003### Setting Layer Depth

The ASU Setting should be on the first layer of settings for easy access to the consumer.

##### REQ-329380/A-###R\_FNC\_Vehicle\_HMI\_004### Extend Display

Software activation shall override the extended display when customer selects NOW options

##### F-REQ-305207/B-###R\_FNC\_Vehicle\_HMI\_006### Automatic Software Updates Setting

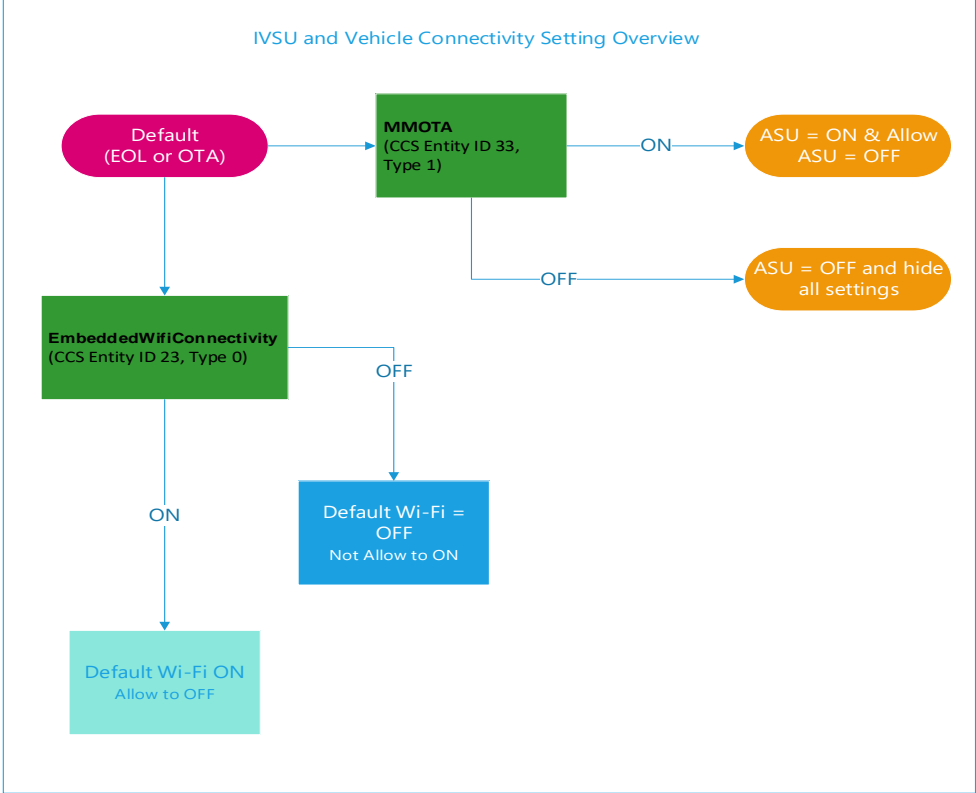
The automatic software update setting should be on the first layer of settings for easy access to the consumer.



## Function Specification (FncS)

### F-REQ-305208/D-###R\_FNC\_Vehicle\_HMI\_007### Legal Consent

HMI shall have a cohesive flow with Vehicle Connectivity Setting and ASU so that the consumer does not get confused on what is providing consent for per region/country.



Flow 24: Vehicle Connectivity and ASU Settings

### 5.1.2.2 Other Requirements

### F-REQ-305318/C-###R\_FNC\_Vehicle\_HMI\_008### Privacy Mode

Privacy Mode shall disconnect all connection types (Wi-Fi, Modem etc.). If vehicle losses connection due to privacy mode and required software files are 100% downloaded, the software update shall continue until complete.



## Function Specification (FncS)

### 5.1.3 Function Scope

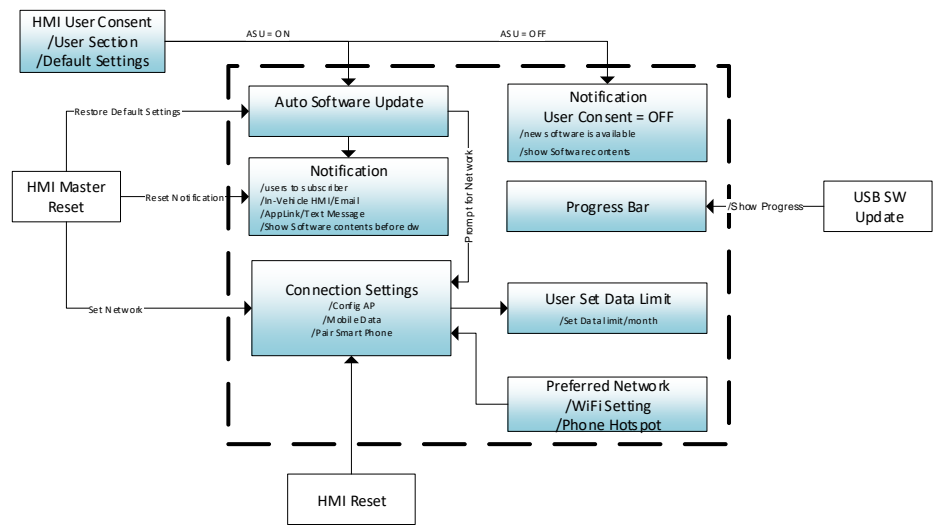


Figure 14: Overall In vehicle HMI

### 5.1.4 Function Modeling

### 5.1.5 OTA Software Update Requirements





Function Specification (FncS)

5.1.6 Function Requirements

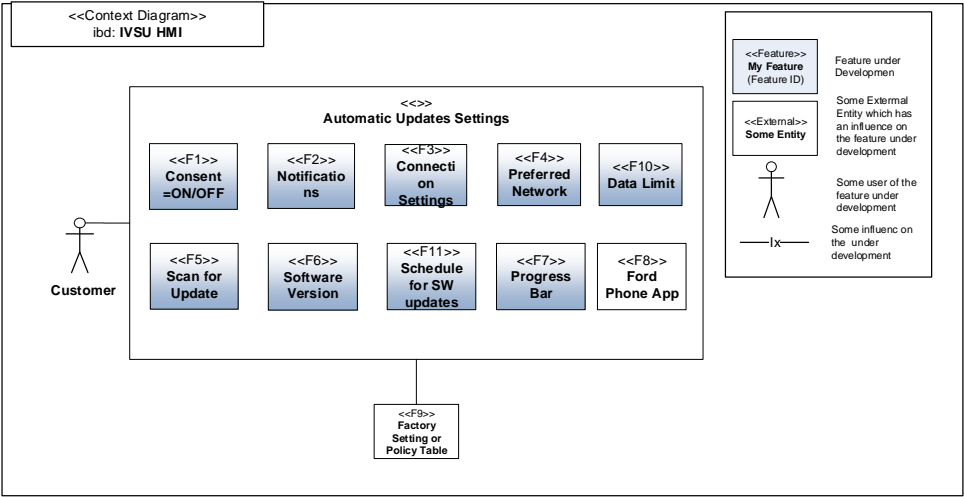


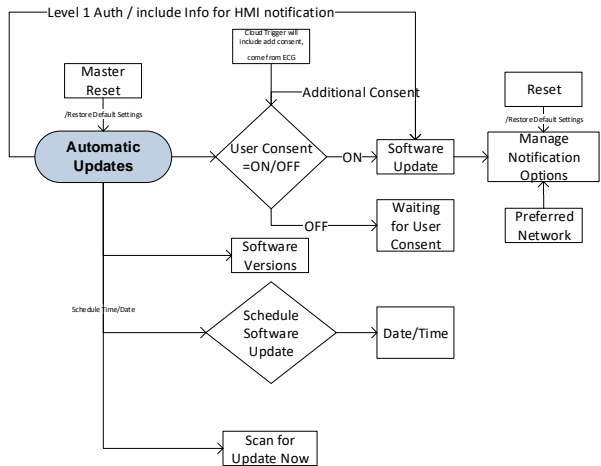
Figure 15: IVSU HMI

5.1.6.1 Requirements on HMI Views



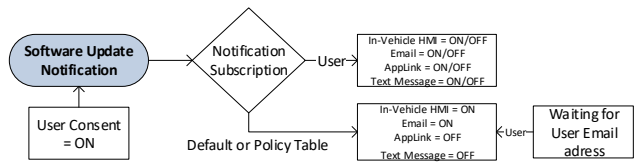
## Function Specification (FncS)

### 5.1.6.1.1 Automatic Updates for Software



Flow 25: IVSU Prompts

### 5.1.6.1.2 Notifications Subscription when User Consent = ON

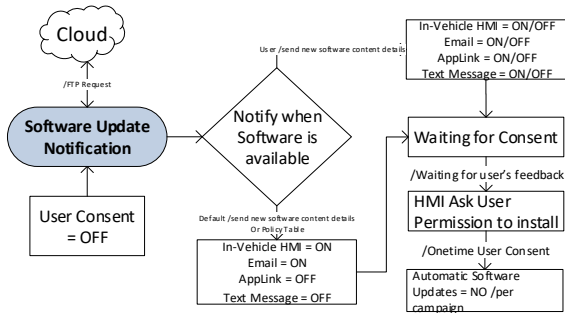


Flow 26: User Consent = ON



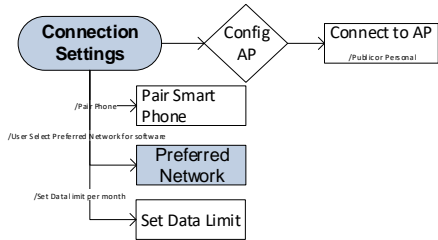
## Function Specification (FncS)

### 5.1.6.1.3 Notifications Subscription when User Consent = OFF



Flow: 27: User Consent = OFF

### 5.1.6.1.4 Connection Preferred Network Settings

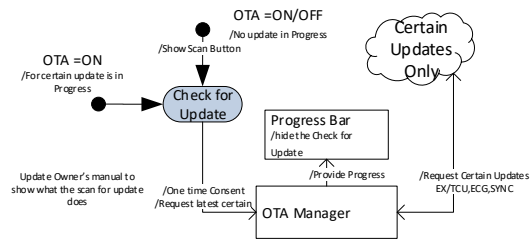


Flow 28: Connection Settings



## Function Specification (FncS)

### 5.1.6.1.5 Check Updates



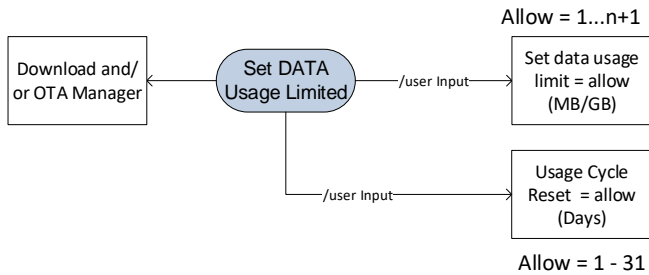
Flow 29: Check for Updates

### 5.1.6.1.6 Software Version



Flow 30: Software Version

### 5.1.6.1.7 Set DATA Usage Limited



Flow 31: Set Data Limit



## Function Specification (FncS)

### 5.1.7 Non-Functional Requirements

**REQ-352126/A-####R\_FNC\_Vehicle\_HMI\_009### User Input Shall be Captured by Designed Buttons**

HMI shall not dismiss the popup while user is touching the screen anywhere outside the borders of the popup. Popup shall capture the desired input from the user before dismissing the popup or allow the user to back out of the display.



## Function Specification (FncS)

### 6 OPEN CONCERNS

ID	Concern Description	Requirement	Status
	Preferred network	F-REQ-305226/B	Post Job1
	Set Data limit	F-REQ-305258/C	Post Job1
	Schedule Require for non-inhibit type of updates	?	Post Job1
	USB Release Notes		
	USB Progress Bar		
	USB unplugged		
	USB Errors		
	Update expire due to consent or Wi-Fi		
	What to do if system fails to download release notes? If moved to swum than follow the same retry logic as software files. What happens if URL is wrong?		
	Download the Binaries before consent		
	Update Now		G21B
	Wi-Fi		G21C
	Add AL5		
	Multiday schedule		G21B

Requirement ID	CR	Requires Confirmation a
F-REQ-305219/E- ###R_FNC_Veh_HMI_Sch_009### Schedule Time Reached While Ignition ACC/RUN/START and Vehicle is in Park	-	If user press cancel update, then HMI shall send <a href="#">LS_OTAM_HMI_User_Press_Cancel = true</a> to OTAM.  If user takes no action within 70secs, then HMI prompt turn the ignition off shall time out.
F-REQ-305254/C- ###R_FNC_Veh_HMI_Notif_022### Erase and Replace Software Installation		If the OTA software type is erasing and replace, then HMI shall prompt the customer to turn the key on to continue with software update.
###R_FNC_Veh_HMI_Notif_048###		
###R_FNC_Veh_HMI_Notif_049###		
		Schedule Require for non-inhibit type of updates



## Function Specification (FncS)

### 7 REVISION HISTORY

Rev. (revision)	Date	Description	Responsible
1.0	3/15/18	Initial version	BGill51
1.9.9	8/31/18	Erase and Replace	BGill51
		PHEV Battery charging during software activation	
		Added logical signals inputs and outputs from HMI	
		Type of messaging ICON vs. Transient Message	
		Extend Display	
		Software Activation Failed and HMI Notification	
		Master Reset – if type of consent is lost then HMI shall ask for same type of consent again	
		Added details how HMI logic shall make decisions	
		Clarification for eCall and Crash	
		HMI shall display date and time after activation is complete	
		Separate some of the requirements to clarify the signals	
		Add warning of key fobs and door unlock/lock won't work during E/R	
		Reschedule prompt shall be clear when to display 24hrs or 7days	
		ASU can be enable/disable thru HMI	
		Vehicle connectivity settings are tied with ASU – OTA Manager, HMI, and CCS shall have interface	
		Inhibit types Programming Session vs software activation	
		Added flows to clarify	
		Triggers during update in progress	
		FMC owned vehicle – no HMIs needed schedule comes from the cloud	
		OTA manager can share with HMI and allow to change it	
2.0	10/12/18	Updated section 8.1.1	BGILL51
		LS_ASUHMI_ASU_ScheduleTime LS_OTAM_Update_Time LS_OTAM_HMI_Master_Reset LS_OTAM_Activation_Status LS_OTAM_SW_Exceeded_Limit LS_OTAM_SW_Update_Notify	
		Added Popup for Consent and Schedule reminder, additional to ICON  REQ-331790 One-Time Consent Reminder	
2.1	12/03/18	Updated based on HMI team feedback: F-REQ-331790/B, F-REQ-305214/C, F-REQ-305216/C, REQ-326157/B, REQ-326784/B, REQ-331788/B, F-REQ-305225/C, REQ-329658/B, REQ-326171/B, F-REQ-305262/C, F-REQ-305264/B, REQ-326180/B, REQ-326576/B Removed F-REQ-305260/B, Added New Requirements FUR-REQ-336400/A & FUR-REQ-336401/A	
3.0	3/12/19	Updated the education display REQ-305248	
	3/19/19	Updated REQ-527060, REQ-305221, REQ-305217, REQ-305218, REQ-305230, REQ-326157, REQ-346981, REQ-305222, REQ-305225, REQ-305224, REQ-347587, REQ-347387, REQ-347388, and	



## Function Specification (FncS)

		527295 Added three new signals LS_OTAM_APP_Update_DOWN LS_OTAM_APP_UPDATE_Timer LS_ASUHMI_APP_DOWN Added SVS REQ-347783	
3.1	4/9/2019	Added a signal for unknown preconditions	
3.7	5/6/2019	Show reminder button on Release notes display Disable Recurring Schedule: clear the set date/time Stolen Vehicle Service is Active Stolen Vehicle Service is De-Active APP Updates that Requires User Consent	
3.8	10/21/2019	Added clarification Manage notifications, HMI shall not show any HMI when manage notification is disabled. Added clarification if software update is in progress and customer disable ASU than software update behavior. Removed the yellow highlights Added clarification about system update progress bar	
3.9	03/26/2020	Remove all requirement and signals for Nav app updates. OTA Nav updates do not require to Nav to be offline, USB updates will require Nav to be offline Req-347587/B && Req-368888 LS_ASUHMI_APP_DOWN LS_OTAM_APP_UPDATE_Timer LS_OTAM_APP_Update_DOWN	
4.0	7/20/20	527043/D-Ford Documents 527044/C-Abbreviations 527046/C-Overview 527047/C-Input Requirements F-REQ-305324/D-####R_FNC_Veh_HMI_Input_001### OTA Policy Table Check – Condition 1 F-REQ-305325/E-####R_FNC_Veh_HMI_Input_002### Vehicle Connectivity Settings – Condition 2 F-REQ-305319/D-####R_FNC_Veh_HMI_Input_003### Software Update Details – Condition 3 F-REQ-305320/C-####R_FNC_Veh_HMI_Input_004### Vehicle Connectivity – Condition 4 F-REQ-305321/D-####R_FNC_Veh_HMI_Input_005### USB Parser Shall Notify HMI with Errors - Condition 5 F-REQ-305322/D-####R_FNC_Veh_HMI_Input_006### Software Delivery Methods - Condition 6 F-REQ-305323/C-####R_FNC_Veh_HMI_Input_007### Software Update Prioritization - Condition 7 REQ-326585/B-####R_FNC_Veh_HMI_Input_008### OTA Manager input to HMI - Condition 8 FUR-REQ-392408/A-####R_FNC_Veh_HMI_Input_009### Software Update Details Description (Release Notes) File – Condition 9 REQ-394532/A-####R_FNC_Veh_HMI_Input_010### Additional/PII Consent Text File - Condition 10 527056/C-Functional Architecture 527059/E-Logical Inputs 527060/F-Logical Outputs 701911/B-Logical Functions 527063/D-Function Description 527064/C-Function Scope	Bgill51





## Function Specification (FncS)

	<p>527068/C-Function Modeling 701914/D-Functional Requirements F-REQ-305221/E-###R_FNC_Veh_HMI_Consent_003### Vehicle Authorization State REQ-326624/E-###R_FNC_Veh_HMI_Consent_004### Interface Between HMI, OTA, and Vehicle Connectivity Settings F-REQ-305287/D-###R_FNC_Veh_HMI_Consent_005### OTA and Vehicle Connectivity Settings and Other Default Settings F-REQ-305296/F-###R_FNC_Veh_HMI_Consent_006### Automatic Software Update Regional or/and Countries User Consent – Vehicle Authorization State F-REQ-305266/E-###R_FNC_Veh_HMI_Consent_008### Master Reset when Software Update is NOT in Progress REQ-347785/B-###R_FNC_Veh_HMI_Consent_009### Master Reset when Software Update is in Progress and Default ASU Setting is disabled F-REQ-305210/F-###R_FNC_Veh_HMI_Consent_011### OVERRIDE – Vehicle Authorization State REQ-331790/D-###R_FNC_Veh_HMI_Consent_012### One-Time Consent REQ-369545/B-###R_FNC_Veh_HMI_Consent_017### Software Update is in process and User Change the ASU to OFF REQ-380245/A-###R_FNC_Veh_HMI_Consent_018### Prompt the User for Consent REQ-380372/A-###R_FNC_Veh_HMI_Consent_019### Remote Consent Changes REQ-387747/A-###R_FNC_Veh_HMI_Consent_020### Fleet Vehicles User Consent REQ-392413/A-###R_FNC_Veh_HMI_Consent_020### When ASU = OFF and additional consent is required REQ-392414/A-###R_FNC_Veh_HMI_Consent_021### ICON enter to System updates when vehicle Connectivity to enable 527085/D-Function Description 527086/C-Function Scope 527090/B-Function Modeling 527092/F-Functional Requirements F-REQ-305215/D-###R_FNC_Veh_HMI_Sch_003### Set a Recurring Schedule to Complete New Software Update F-REQ-305217/F-###R_FNC_Veh_HMI_Sch_005### Master Reset Clears Schedule Selection F-REQ-305230/E-###R_FNC_Veh_HMI_Sch_008### Software Update Schedule Time &amp; Reminder F-REQ-305219/D-###R_FNC_Veh_HMI_Sch_009### Schedule Time Reached While Ignition RUN/START and Vehicle is in Park REQ-326157/F-###R_FNC_Veh_HMI_Sch_011###Precondition are not Met and Requires User Action REQ-347386/B-###R_FNC_Veh_HMI_Sch_015### HMI allow the user to select and save the time before setting it to OTAM REQ-369646/B-###R_FNC_Veh_HMI_Sch_019### Allow the User to Clear then Schedule and Get Feedback REQ-380373/A-###R_FNC_Veh_HMI_Sch_020### Remote Schedule Changes REQ-387746/A-###R_FNC_Veh_HMI_Sch_021### Schedule and Update Reminders for Fleet Vehicles F-REQ-305203/D-###R_FNC_Veh_HMI_Sch_025### Master</p>	
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## Function Specification (FncS)

	<p>Reset shall Reset Schedule Values REQ-346761/B-###R_FNC_Veh_HMI_Sch_024### Count Down Timer when SYNC Display of Off 527105/B-Function Description 527106/B-Function Scope 527110/B-Function Modeling 527112/H-Functional Requirements F-REQ-305222/E-###R_FNC_Veh_HMI_Notif_001### Additional User Consent Notification REQ-326784/C-###R_FNC_Veh_HMI_Notif_002### Vehicle in Private Mode REQ-331788/D-###R_FNC_Veh_HMI_Notif_003### Wi-Fi Connection Reminder F-REQ-305232/D-###R_FNC_Veh_HMI_Notif_011### Master Reset when Software is in Progress with Base level or One-time Consent &amp; Default Consent ON F-REQ-305234/E-###R_FNC_Veh_HMI_Notif_012### Master Reset &amp; SW is in Progress with Additional and/or PII Consent and Default Consent ON F-REQ-305240/C-###R_FNC_Veh_HMI_Notif_013### Master Reset when SW update is pending for activation with Additional and/or PII Consent F-REQ-305236/E-###R_FNC_Veh_HMI_Notif_014### Master Reset when SW update is in process &amp; ASU default OFF without Additional/PII Consent REQ-329375/B-###R_FNC_Veh_HMI_Notif_016### HMI Display during Silent OTA Software Updates REQ-326180/D-###R_FNC_Veh_HMI_Notif_020### In Vehicle Clock Time Format F-REQ-305250/C-###R_FNC_Veh_HMI_Notif_023### ONE TIME Consent F-REQ-305252/C-###R_FNC_Veh_HMI_Notif_024### Software Update Activation is Successful with latest Software F-REQ-305264/D-###R_FNC_Veh_HMI_Notif_034### Reset of Wi-Fi Settings REQ-348141/C-###R_FNC_Veh_HMI_Notif_037### Double Lock During Software Activation REQ-380376/A-###R_FNC_Veh_HMI_Notif_041### Master Reset During Software Update REQ-369536/B-###R_FNC_Veh_HMI_Notif_048### Wi-Fi Connection is Required for OTA Updates REQ-387745/A-###R_FNC_Veh_HMI_Notif_050### Update is Canceled REQ-392411/A-###R_FNC_Veh_HMI_Notif_051### HMI ICON and Behavior REQ-392412/A-###R_FNC_Veh_HMI_Notif_052### HMI ICON Priority REQ-395173/A-###R_FNC_Veh_HMI_Notif_35### HMI shall clear the notification after user input is received 527142/D-Non-Functional Requirements 527171/B-Function Description 527172/C-Function Scope 527175/C-Logical Outputs 527176/C-Function Modeling 527178/G-Functional Requirements</p>	
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## Function Specification (FncS)

	<p>F-REQ-305283/D-####R_FNC_Veh_HMI_SW_Details_001### Software Update Details Settings FUR-REQ-392409/A-####R_FNC_Veh_HMI_SW_Details_002### Download the Update Details Text before Notify the User for Action REQ-394121/A-####R_FNC_Veh_HMI_SW_Details_003### System is Unsuccessful to Download the Additional/PII Consent File F-REQ-305285/C-####R_FNC_Veh_HMI_SW_Details_004### Software Update Pending and Schedule is Not Set REQ-393740/A-####R_FNC_Veh_HMI_SW_Details_005### System is Unsuccessful to Download the Release Notes file after Max Reties REQ-394235/A-####R_FNC_Veh_HMI_SW_Details_007### Software Update is available and requires Wi-Fi Connection REQ-394243/A-####R_FNC_Veh_HMI_SW_Details_006### Software Update Expired Because it Required Wi-Fi Connection and Connection was not Made REQ-394961/A-####R_FNC_Veh_HMI_SW_Details_028### Software Update is available and requires Wi-Fi Connection, Vehicle is Connected to Wi-Fi REQ-394825/A-####R_FNC_Veh_HMI_SW_Details_008### Software Update is Available and Required Wi-Fi And User Consent (one-time/Additional/PII) REQ-394329/A-####R_FNC_Veh_HMI_SW_Details_009### Software Update is Downloading REQ-394963/A-####R_FNC_Veh_HMI_SW_Details_027### Software Download Pause Due to System Condition is not Met REQ-348831/D-####R_FNC_Veh_HMI_SW_Details_010### Software Update is Pending but Waiting for Schedule Time Shall Show on Update Details Display REQ-394330/A-####R_FNC_Veh_HMI_SW_Details_011### Software Update is Preparing to Install REQ-394242/A-####R_FNC_Veh_HMI_SW_Details_012### Update Expired Because Consent Was not Provided REQ-394234/A-####R_FNC_Veh_HMI_SW_Details_013### Software Update is Available but Requires Consent REQ-394814/A-####R_FNC_Veh_HMI_SW_Details_014### Software Update is Pending and Does not requires schedule REQ-394237/A-####R_FNC_Veh_HMI_SW_Details_015### Update is Not Successful because Software Download Failed REQ-394239/A-####R_FNC_Veh_HMI_SW_Details_016### Update is Not Successful because update was canceled due to collision REQ-394240/A-####R_FNC_Veh_HMI_SW_Details_017### Software Update is Not Successful because software update was canceled by Ford Motor Company REQ-394241/A-####R_FNC_Veh_HMI_SW_Details_018### Update Expired Because Schedule was Required and Not Set REQ-394238/A-####R_FNC_Veh_HMI_SW_Details_019### Update Failed while is Progress and User was Not notified F-REQ-305284/E-####R_FNC_Veh_HMI_SW_Details_021### Software Update is Successful Update REQ-394336/A-####R_FNC_Veh_HMI_SW_Details_022### Software Update Details After Update is Unsuccessful Ford will Re-Push the Update</p>	
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## Function Specification (FncS)

	<p>FUR-REQ-392410/A-###R_FNC_Veh_HMI_SW_Details_023### Software Update Details after Update is Unsuccessful and Vehicle Requires Service REQ-395060/A-###R_FNC_Veh_HMI_SW_Details_029### Vehicle is Up-to-Date REQ-326576/C-###R_FNC_Veh_HMI_SW_Details_024### Software Update Date and Time F-REQ-305205/D-###R_FNC_Veh_HMI_SW_Details_025### No Blank Display for Software Details F-REQ-305288/D-###R_FNC_Veh_HMI_SW_Details_026### Software Update Details Display Time Out 527189/B-Function Scope 527195/D-Functional Requirements F-REQ-305294/C-###R_FNC_Veh_HMI_Prog_Bar_006### Progress Bar during USB update REQ-368885/B-###R_FNC_Veh_HMI_Prog_Bar_010### Progress Bar During OTA Updates REQ-395035/A-###R_FNC_Veh_HMI_Prog_Bar_014### Is User was Notify for Software Download over Wi-Fi HMI shall show Progress Bar with Percentage F-REQ-305206/C-###R_FNC_Veh_HMI_Prog_Bar_012### Reset while in update in progress is displayed F-REQ-305297/C-###R_FNC_Veh_HMI_Prog_Bar_013### Progress Bar Details 527209/B-Function Scope 527212/C-Logical Outputs 527215/C-Functional Requirements F-REQ-305298/C-###R_FNC_Veh_HMI_SW_Failure_001### Software Activation is Not Successful and FMC will re-push the Update as it becomes available F-REQ-305299/D-###R_FNC_Veh_HMI_SW_Failure_002### Software Activation is Not Successful and Vehicle Requires Service REQ-330195/B-###R_FNC_Veh_HMI_SW_Failure_003### Update is Not Successful after it Notify the Customer that New Update is Available REQ-393676/A-###R_FNC_Veh_HMI_SW_Failure_007### Software Activation is Not Successful and Vehicle in not Drivable 527219/B-Non-Functional Requirements REQ-380375/A-###R_FNC_Veh_HMI_SW_Failure_006### Clear the Failure ICON 527239/C-Function Scope 527245/E-Functional Requirements REQ-395061/A-###R_FNC_Veh_HMI_USB_SW_001### System Detected USB with SYNC Utilities REQ-326788/B-###R_FNC_Veh_HMI_USB_SW_002### USB Parser Detects Software Files On the USB Device REQ-326789/B-###R_FNC_Veh_HMI_USB_SW_003### Software Update is in Progress and Lost USB Connection REQ-329661/B-###R_FNC_Veh_HMI_USB_SW_005### Clear HMIs when Update When USB lost Connection during Download/ File Transfer F-REQ-305314/C-###R_FNC_Veh_HMI_USB_SW_006### Master Reset During USB Update F-REQ-305306/C-###R_FNC_Veh_HMI_USB_SW_007### Errors</p>	
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## Function Specification (FncS)

		during USB Software Update REQ-326192/B-####R_FNC_Veh_HMI_USB_SW_009### USB Software Activation Requires Schedule F-REQ-305307/C-####R_FNC_Veh_HMI_USB_SW_010### Software Activation requires an Ignition Cycle F-REQ-305309/C-####R_FNC_Veh_HMI_USB_SW_017### USB Software Activation with Vehicle Inhibit F-REQ-305310/C-####R_FNC_Veh_HMI_USB_SW_012### USB Update for same ECU that is currently being updating through OTA and files are 100% DW F-REQ-305311/C-####R_FNC_Veh_HMI_USB_SW_013### USB Update Detected During Pending for Software Activation REQ-368887/B-####R_FNC_Veh_HMI_USB_SW_014### Update is Not Successful Notification FUR-REQ-324904/B-####R_FNC_Veh_HMI_USB_SW_015### Software Download Failure F-REQ-304779/C-####R_FNC_Veh_HMI_USB_SW_016### Master Reset when USB update is in Process F-REQ-305309/C-####R_FNC_Veh_HMI_USB_SW_017### USB Software Activation with Vehicle Inhibit 527146/B-Function Scope 527261/C-Functional Requirements on HMI F-REQ-305208/D-####R_FNC_Vehicle_HMI_007### Legal Consent 527268/B-Function Scope 527271/C-Function Requirements 527273/C-Automatic Updates for Software 527274/C-Notifications Subscription when User Consent = ON 527275/C-Notifications Subscription when User Consent = OFF 527276/C-Connection Preferred Network Settings 527277/C-Check Updates 527278/C-Software Version 527281/C-Set DATA Usage Limited 527282/C-Update Schedule 527288/C- Manage Software Update Notification Options 527289/E-Open Concerns 527291/H-Revision History 527295/H-Logical Signals	
4.6	1/14/2021	Added section 4.9 for Logical Function Fleet Software Updates	
		Update Now	
5.0	9/28/2021	Multiple days schedule options	
		clarification to existing requirements	



## Function Specification (FncS)

## 8 APPENDIX

### 8.1 Data Dictionary

#### 8.1.1 Logical Signals

Logical Signal Name	Value	OUTPUT	Description
LS_OTAM_Update_Percentage_Progress_APP_x	Value {percentage}	OTA	Check for Update progress
LS_ASUHMI_ASU_ReoccurringSchedule	Value{ 01 - FALSE; 02 - TRUE}	HMI	Input to OTA Manager
LS_ASUHMI_ASU_CheckUpdate	Value{ 01 - True 02 - False }	HMI	One time consent
LS_OTAM_TriggerExpiration_Time	Values{ 01 - Not_expired 02 - Expire }	OTA	Software update expired clear all HMIs
LS_OTAM_UpdateReminder_Time	Values{ date/time }	OTA	SW Activation Reminder and timer from the manifest Input from user or cloud
LS_OTAM_UpdateExpiration_Time	Value { date/time }	OTA	Max time shown in the schedule screen, if expire time is 3days from now then HMI shall only show 3days to activation the software because 4th day SW is not available.
LS_ASUHMI_Manage_Notification	Value(TRUE, FALSE)	HMI	
LS_ASUHMI_ASU_FeatureStatus	Values{ 01 - Enable 02 - Disable }	HMI/OTA	HMI Automatic software updates enable or disable OTA After Master reset or OTA default values change
LS_ASUHMI_ASU_Consent	Value(TRUE, FALSE)	HMI	Vehicle Connectivity settings True or False
LS_OTAM_SW_Update_Postpone	Value(TRUE, FALSE)	OTA	
LS_OTAM_SW_Update_Notify	Value { 01 - PII_UPDATE; 02 – Additional 03 – One-Time }	OTA	HMI to display for consent
LS_OTAM_ECU_App_reside	Value { 01 - APP_ECU_Updating }	OTA	Customer check for update when App ECU is updating then HMI shall prompt the customer try later
LS_ASUHMI_ASU_Additional_Consent	Value{	HMI	OTA: One time skip



## Function Specification (FncS)

Logical Signal Name	Value	OUTPUT	Description
	00 - Additional; 01 - ONE_TIME; 02 - PII_UPDATE; }		additional but may need PII
LS_ASUHMI_ASU_ScheduleTime	Values{ 00 - Null 01 - Bytes - date/time }	HMI	Signal identify scheduled time/day for activation. Comes from the user
LS_OTAM_Update_Time	Values{ 00 - None 01 - Bytes - date/time }	OTA	OTA manager Last SW update time and date. Update HMI after every activation
LS_OTAHMI_Master_Reset_Status	Value{ 00 - NONE 01 - MasterReset 02 - NoMasterReset }	HMI	HMI shall notify OTA Manager for Master Reset
LS_PARSERUSB_Conn_Status	Values{ 01 - USB_Plug 02 - USB_unPlug (download) }	HMI	USB device status
LS_PARSER_USBSW_Update_Detected	Values{ 01 - False 02 - True }	HMI	True: Processing Update...transient message
LS_PARSER_USBSW_Update_URL	Values { URLs/VIL Folder Location }	HMI	if LS_PARSER_USBSW_Update_Detected = true, then Set IVSU trigger with content
LS_USBOTA_System_Updating	Values{ 01 - Older_Software 02 - Valid Manifest 03 - Redownload Files 04 - Sys_to_update_date }	OTA	Determine if USB device is with valid software
LS_USBOTA_SW_Update_Status	Values{ 01 - Updating (Downloading/Installing/Resumed) 02 - Failed 03 - PENDING_Activation, 04 - SUCCESSFUL, 05 - Paused }	OTA	If updating (download/install) failed then use "Failed" for USB Software update Status
LS_ASUHMI_Activation_Consent	Value{ 00 - UNDEFINED 01 - NOW; 02 - DATETIME; }	HMI	One time schedule and NOW
LS_OTAM_Update_Percentage_Overall Progress	Value {percentage}	OTA	OTA/USB overall progress bar



## Function Specification (FncS)

Logical Signal Name	Value	OUTPUT	Description
LS_OTAM_OTASWB_Number_of_Files	Value { 01 - file remaining 02 - total files }	OTA	Total number of files in the manifest
LS_OTAM_Activation_Schedule_Type	Value { 01 - WEEKLY; 02 - DAY; }	HMI	Schedule weekly or daily share with OTA Manager
LS_OTAM_SW_Activation_Fail_Reason	Values{ 00_ NONE 01 - SW CORRUPTED; 02 - PERMANENT_INHIBIT; 03 - USB_FAILURE; 04 - WARNING; 05 - PARTIAL }	OTA	IF USB software activation failed then Use "USB_Failure"
LS_OTAM_SW_Update_Fail_Reason	{ErrorCode; }	OTA	USB Software update failed reason
LS_OTAM_Release_Notes_Info	Value {text}	OTA	Release Notes
LS_OTAM_Activation_TypeSW_AB_ER	Value{ 01- AB 02- ER 03 - AB and ER }	OTA	OTA Manage sharing type of software update
LS_OTAM_Activation_Type	Value{ 01- NOIGNITIONCYCLE 02- IGNITIONCYCLE 03- INHIBIT }	OTA	Activation Type
LS_OTAM_Vehicle_Inhibit_Type	Value{ 00 - NONE 01 - ProgrammingSession 02 - ActivatingNOW }	OTA	Vehicle in Programming Mode or activating the software HMI Logic shall make decision if LS_OTAM_Activation_TypeSW_AB_ER = AB-ER then show LS_OTAM_Vehicle_Inhibit_Type = ProgrammingSession  if LS_OTAM_Activation_TypeSW_AB_ER = AB then show LS_OTAM_Vehicle_Inhibit_Type = ActivatingNow  if LS_OTAM_Activation_TypeSW_AB_ER = ER then show





## Function Specification (FncS)

Logical Signal Name	Value	OUTPUT	Description
			LS_OTAM_Vehicle_Inhibit_Type = ProgrammingSession
LS_OTAM_Activation_Time	Domain: 2 bytes (In seconds).	OTA	Activation for both E/R and/or AB Time range (2min to Xmins)
LS_OTAM_HMI_OTAUSB_Clear	Values{ 01 - Pending 02 - ConfigtimeExpire 03 - ClearHMI }	OTA	USB update is paused and OTA Manager shall clear cache after 7days
LS_OTAM_SW_Installation_State	Values{ 01 - IN_PROGRESS 02 - PENDING, 03 - FAILED, 04 - PAUSED, 05 - SUCCESSFUL }	OTA	Software installation in progress
LS_OTAM_SW_Download_State	Values{ 01 - IN_PROGRESS, 02 - PENDING, 03 - PAUSED, 04 - FAILED, 05 - SUCCESSFUL }	OTA	Software download in progress
LS_OTAM_SW_Update_State	Values{ 00 - Clear_HMI 01 - IN_PROGRESS 02 - Pending, 03 - FAILED, 04 - SUCCESSFUL; 05 - UP_TO_DATE; }	OTA	OTA Software update Status
LS_OTAM_No_ProgSession_Preconditions_Supported	\$D04F (Ref GMRDB for DID bit mapping)	OTA	If software activation is postponed then set a flag for HMI and next action
LS_OTAM_HMI_Master_Reset	Values{ 01 - Cancel 02 - Pending, 03 - Pause, }		1. ASU = OFF Cancel the pre-download for only one-time 2. ASU = ON Pending for consent, with additional consent 3. ASU = ON Pause during master reset and resume after it's complete without additional consent
LS_OTAM_Activation_Status	Values{ 01 - Expired 02 - Pending, 03 - Pause, }	OTA	Software Activation status
LS_SVS_OTAM_Active	Value{ 00 - True 01 - False}	OTA	Stolen vehicle service
LS_OTAM_ConenctionType_WiFi	Value{	OTA	



## Function Specification (FncS)

Logical Signal Name	Value	OUTPUT	Description
	00 - True 01 - False}		
LS_OTAM_HMI_User_Press_Cancel	Value{ 00 - True 01 - False}	HMI	User pressed cancel update
LS_OTA_Fleet_Status	Value { 00- None 01- Ford Fleet 02- Commercial Fleet 03- Not Fleet}	OTA	Fleet owned vehicle, HMI shall not allow the user to edit the ASU and schedule settings.
LS_OTAM_HMI_Remote_Consent	Value{ 00 - ASU Setting On/OFF 01 – One-time Consent 02 – Additional Consent 03 – PII Consent }	OTA	OTAM shall set this flag when it receives remote consent changes and notify HMI.
LS_OTAM_HMI_Remote_Notification	Value{ 00 – Default 01 – Notification On/Off}	OTA	OTAM shall set this flag when it receives remote notification settings change and notify HMI.
LS_OTAM_HMI_Schedule_Changes	Value{ 00 – Clear the schedule 01 – Update day/time }	OTA	OTAM shall set this flag when it receives remote schedule and notify HMI.
LS_OTAM_HMI_ClearHMIsprompts	Value { 00 – Service tool 01 – OTA cancel trigger 02 – Clear failures ICONS by service tool }	OTA	Update is cancelled
LS_OTAM_ConenctionType_WiFi	Value{ 00 - True 01 - False}	OTA	
LS_OTAM_SW_Download_Pause_Reason	Values{ 01 – USB Update, 02 – Master Reset, 03 - eCall, 04 – Loadshed, 05 – no connectivity 06 – unknown, 07 – none }	OTA	If LS_OTAM_SW_Download_State = pause, OTAM shall send pause reason
LS_OTAM_download_progress_percentage	Value {percentage}	OTA	Software is downloading over Wi-Fi

### 8.1.2 Vehicle Connectivity Settings Data Reference

CCS Entity MMOTA – Entity ID 33, Type 1

CCS Entity VehicleConnectivity – Entity ID 1, Type 0

CCS Entity LocationSharing – Entity ID 4, Type 0

CCS Entity EmbeddedWifiConnectivity – Entity ID 23, Type 0

CCS Entity CellularConnectivity – Entity ID 24, Type 0

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


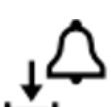
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## Function Specification (FncS)




### REQ-392411/B-###R\_FNC\_Veh\_HMI\_Notif\_038### HMI ICON and Behavior

Description for SYNC4 ICONs, other HMI interfaces shall use similar notifications

ID	Symbol/ICON	OTAM Logic
P.199		OTAM shall set a flag when update is successful
P.200		OTAM shall set a flag when update is unsuccessful
P.200		OTAM shall set a flag when update is postponed due to preconditions
P.201		When ASU = OFF and Update is available, then OTAM shall set a flag to notify HMI that update is available. If user accept the update, then OTAM shall resume the update and post the user input to OTA cloud. Update is expired, OTAM shall notify the HMI.
P.206		When schedule time is reached, OTAM shall set a flag to notify HMI for upcoming schedule update with 24hrs (configurable time).  If OTAM receives schedule time change then OTAM shall post the it to OTA Cloud.



## Function Specification (FncS)

P.207		<p>When OTA update is pending and requires a schedule, then OTAM shall set a flag to notify the HMI</p> <p>Once the user input is received OTAM shall resume the update and post the user input to OTA cloud.</p> <p>If OTAM receives schedule time change then OTAM shall post the it to OTA Cloud.</p>
P.208		<p>OTAM shall pause the update and set a flag for HMI to notify the user when update requires additional consent.</p> <p>Once the user input is received OTAM shall resume the update and post the user input to OTA cloud.</p>
P.198		<p>OATM shall set a flag that update is available, requires Wi-Fi, and update pause</p>

### 8.1.3 HMI Notification When update Failure/Expire/Cancel

**Disclaimer:** This table is subject to change and added for basic understanding. Logic lives on the swum side.

Authorization Levels	ASU	Inhibit	Update Failed/Expired/Canceled	HMI Popup #	SWUM-HMI Interface Signal
AL1	On	No	Failed/expires/cancels (Pre-download, download, install, and pending)	Silent Failure (no popup or ICON)	
AL1	On	No	Activation Failure	Popup 628/69	ENUM_GenericUpdateFailure



## Function Specification (FncS)

				619/94	
AL2/3	On/Off	No	Failed before user provides consent	Silent failure	
			Failed after user provided consent: Pre-download	SU3: show popup 619/94 Currently: silent QT: ?	
			Failed after user provided consent: download, install, waiting(pending) for activation	Popup 619/94	
			Failure during activation	Popup 628/69	
AL2/3	On/Off	No	Expire before user provides consent	Silent	
			Expire after user provided consent: Pre-download	Silent	
			Expire after user provided consent: download, install, waiting for activation	Silent/ Popup 619	
			Expire during activation	Once activation starts update will continue until pass/fail. If update is aborted, then it will apply expiration rules	
AL4	On/Off	No	Consent prompted is skipped Download/install is silent, but activation is not silent	Popup 628/69	
AL1/AL4	On	Yes	Failed/expires/cancels (prior to schedule prompt)	Silent Failure (no popup or ICON)	
			Failed while pending for schedule (schedule Not_Set)	Popup 619/94	
			Failed during pending for schedule (schedule Set)	Popup 619/94	
			Expire after user prompted for schedule (schedule Not_Set)	Popup 610/77	
			Expire after user prompted for schedule (schedule Set)	Popup 619/94	



## Function Specification (FncS)

			Cancel during pending for schedule (schedule Set or Not_Set)	Popup 619/94	
AL2/AL3	On	Yes	Failed/expires/cancels (prior to schedule prompt)	Popup 619/94	
			Failed while pending for schedule (schedule Not_Set)	Popup 619/94	
			Failed during pending for schedule (schedule Set)	Popup 619/94	
			Expire after user prompted for schedule (schedule Not_Set)	Popup 610/77	
			Expire after user prompted for schedule (schedule Set)	Popup 619/94	
			Cancel during pending for schedule (schedule Set or Not_Set)	Popup 619/94	
AL5	On/Off	No	HMI will be completely overwritten	Silent during the whole update	

## 8.2 Additional Information

### REQ-406508/A-###R\_FNC\_Veh\_Fleet\_SoftwareUpdates\_001### Vehicle Configured as Fleet

In vehicle HMI shall identify that vehicle is configured as fleet vehicle: Ford must have the ability to identify the different type of fleet vehicles build.

#### Type1 – Ford Fleet

When a vehicle is build with a FLEET MFAL and FIN Code for Ford, then these Vehicle shall be identified as Ford\_Fleet. These would be Ford management fleet vehicle or engineering vehicles.

#### Type2 – Commercial Fleet

When a vehicle is build a Fleet MFAL and FIN Code. Then these vehicles shall be identified as CommercialFleet. These vehicle are not subscribing to FCS.

#### Type 3 – Customer Retail Fleet

When a vehicle is build as a Retail vehicle and configured for Fleet after signing for FCS services and FIN Code is matching business partners for long term rent (eg: AVIS), then these vehicles shall be identified as CustomerRetail\_Fleet

#### Type 4 – Business Retail Fleet

When a vehicle is build as a Retail vehicle and configured for Fleet after signing for FCS services and FIN Code is matching business partners for short term rent (eg: HomeDepot), then these vehicles shall be identified as BusinessRetail\_Fleet

#### Type 5 – Emergency Fleet

When a vehicle is build as a police vehicle with a unique MFAL and configured for Fleet and FIN code is matching the business partners for police, hospitals etc, then these vehicles shall be identified as EmergencyFleet



## Function Specification (FncS)

### 8.2.1 List of all USB Failure Errors

Text Customer will see	Parameter Name	Description
The update was canceled because the vehicle memory is full.	Cache Full	Module doesn't have enough memory to process the update
The update was canceled because it contained an invalid file.	Manifest invalid	Manifest file is corrupted, older manifest file, and missing required files.
The update failed because an error has occurred.	Installation package returned error	Fail the installation and reset installation mode.
The USB drive was removed during the update	USB Removed	USB Removed during manifest download and/or software download
The update failed because an error has occurred.	Install Signature	Fail the installation
A reset occurred. The update will continue after the reset.	Reboot/Reset	Continue installation session from last saved point. A checkpoint should be saved for download progress and after each installation file processed
Information about the update cannot be saved on the USB drive.	Cannot read from USB	If USB device is unreadable then system shall skip uploading the VIL
Information about the update cannot be saved on the USB drive.	Cannot write to USB	If USB device does not allow to write, then skip uploading VIL
The update will continue when more battery power is available.	Battery Voltage Low	Save offset and wait for full power mode to continue download/installation session from last saved point.
The update will continue even though a USB drive was inserted in another port.	USB with Media Files or software files	Download in progress and second USB port user inserted Media USB device, files download shall continue.
The update will continue as long as the vehicle has enough battery power.	Vehicle Modes	As long as vehicle has power USB update shall continue to download and install.
The update is paused because an emergency call is in progress.	eCall/Phone	eCall in progress, Download/installation shall pause During phone call download/installation shall continue
A crash occurred. When possible, the update will continue.	Crash	If vehicle is in crash, then clear the software update and resume after crash signal is cleared. HMI shall reflect the change
The vehicle was tuned off. The update will continue.	Ignition Cycle	Download and install shall continue after ignition off
A master reset occurred. The update will continue.	Master Reset	Master reset shall not effect USB download/installation of the software files.
The update was canceled because the USB drive was removed and wasn't reinserted in time.	Update Canceled	Update was canceled due USB was unplugged and never re-plugged and config time expired.

REQ-432321/A-###R\_FNC\_Veh\_HMI\_SW\_Failure### Clear Permanent Inhibit Screen

### 8.2.2 HMI Display Time

When user is prompted about software update schedule, then HMI display shall display the max time which is dynamic comes from the cloud with following formula.

UpdateDisplayTime => total inhibit time (including rollback) + x minutes.