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# Document Overview

## Purpose & Scope

Platform Vehicle Control Services are software modules designed according Service Oriented Architecture (SOA) design principles. They provide consumer focused features with highly re-usable interfaces which allow the feature to interact with common vehicle resources such as doors, windows, lights, or cameras.

These interfaces abstract the feature from underlying technological implementations and changes over time, allowing the feature to work across vehicle programs and model years.

The purpose of this document is to define a specific Platform Vehicle Control Service, including its intent, context, high level architecture, and requirements, such that the document can be provided to a software development team who will then design and code the software service.

## Requirement Types

Several types of requirements are defined within this document, as described below.

|  |  |
| --- | --- |
| Requirement Type | Description |
| Functional Requirements | Requirements that directly impact consumer expectations of successful delivery. They provide the functionality that is expected by various consumers. |
| Non-Functional Requirements | Requirements that indirectly impact consumer expectations of successful delivery. They are items like performance, availability, and security that are not directly requested by the consumer yet will contribute to their perceived satisfaction with the product. |
| Interface Requirements | Requirements that help define interfaces between software modules and ECUs, including definitions for the constructs below. |
| Data Enumerations | Lists of values for interface parameters that are limited to a predetermined set of values, or enumerated list. |
| Data Structures | Definitions of data structures that are used within interfaces. |
| Provided Contracts | Interfaces that the Service will provide to consuming feature software. |
| Required Contracts | Interfaces that the Service will need, or use, in order to deliver desired functionality. |

## Document Conventions

This document is generated out of the Vehicle Software and Electrical Management System (VSEM).

The document sub-sections which define requirements will have a heading that contains the following information;

* + VSEM Object Type
  + Unique Object ID
  + Revision Level of the object

This heading will look something like;

FUR-REQ-403606/A

Which breaks down in the following Manner:

* ***FUR-REQ:*** Is the VSEM Object Type and identifies it as a Requirement (REQ) and may further describe the requirement sub-type where FUR is a Functional Requirement Object, and NFN is a non-functional requirement.
* ***404053:***is the Unique Object ID
* ***/A:***is the Revision Level of the object*.*

## Related Documents

Below is a list of documents that should be consulted in addition to this functional specification.

**Sources**

|  |  |  |  |
| --- | --- | --- | --- |
| **Item Name** | **Number** | **Document Location** | **Owner** |
| Sentinel | F003417 | VSEM | Gupta, Ishan (igupta1) |
| Integrated Dash Camera (IDC) | F003751 | VSEM | Eteer, Malik (meteer) |

**Other References**

|  |  |  |  |
| --- | --- | --- | --- |
| **Item Name** | **Number** | **Document Location** | **Owner** |
| CameraManagerService | 754753 | VSEM | Morris, Melissa (mmorr183) |
| FAS Video Recording and Playback | 848777 | VSEM | Emani, Savitha (semani4) |
| VRP\_Function Group Specification | 767683 | VSEM | Benhamouche, Fatima (fbenhamo) |

# Revision History

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| --- | --- | --- | --- | --- | --- |
| **Object** | **Rev** | **Rev Description** | **Release Status** | **Date Modified** | **Modified By** |
| ENG-768637/A-VideoRecorderService+ | A |  | Released | 18-Dec-2020 15:06 | Morris, Melissa (mmorr183) |
| ENG-768637/B-VideoRecorderService+ | B | - Metadata for Sentinel, EDC  - Align to latest Camera Manager APIs  - Updates per SYNC Dev Team Reviews  - File list Structure  - Update all diagrams  - Errors, Retires, config  - Doc Formatting | Released | 27-Aug-2021 13:31 | Morris, Melissa (mmorr183) |
| ENG-768637/C-VideoRecorderService+ | C | - Limiting feature to % of total space  - Do not ask user if USB can be used for recording  - Rename parameters for consistency  - Added format type  - Stop Response not by view  - Clarified metadata frequency  - Removed Feature from file name | Released | 18-Oct-2021 10:43 | Morris, Melissa (mmorr183) |
| ENG-768637/D-VideoRecorderService+ | D | - Add Storage Label to Storage ststues  - Add Storage Id to StartRecordingRsp  - Update test result value to better match error detail. | Released | 25-Oct-2021 13:43 | Morris, Melissa (mmorr183) |
| ENG-768637/E-VideoRecorderService | E | - Update Broadcast Topics to separate the 2 broadcasts at the topic level | Released | 25-Mar-2022 13:26 | Morris, Melissa (mmorr183) |

# Service Overview

The Video Recorder Service is a portion of an in-vehicle camera and video solution that enables many user experience Features to access in-vehicle cameras and stream video over Ethernet for a variety of purposes.

The Video Recorder Service will provide common interfaces for features needing to record video streams from vehicle cameras to some form of in vehicle persistent storage. It will also provide interfaces for discovering available storage devices and space on them as well as verifying that a specific storage device is suitable for storing video recordings.

Initially, the storage is assumed to be a USB Mass Storage Device (like a USB Stick) that is provided by the vehicle owner or operator. Storage options could be extended in the future to include some form of internal ECU storage, or other options.

**Not in Scope:**

* Requirements for playing back video and managing existing video files are discussed in a separate specification for a Video Playback Service.
* Cloud storage is not in scope for this service. An AWS Kinesis Video Service is being planned as part of the Mobile Device Viewer and Sentinel feature that may become the common way to send this type of video up to the cloud.

## Intended Audience

This document is intended for individuals with the following roles:

* Developers who will implement the service
* Feature owners and teams that wish to utilize the service to deliver their feature.
* Developers of feature level software who intend to utilize the interfaces provided by this service.

## Stakeholders

Below is a list of individuals who are either impacted by or have influence over the content within this specification.

|  |  |  |
| --- | --- | --- |
| **Name** | **CDS ID** | **Role / Responsibility** |
| Gupta, Ishan (I.) | [igupta1](mailto:igupta1@ford.com) | Feature Owner – Sentinel / Integrated Security Cameras |
| Zuraw, Timothy (T.) | tzuraw | Feature Team – Sentinel / Integrated Security Cameras |
| Luken, Richard (R.) | rluken2 | Feature Team – Sentinel / Integrated Security Cameras |
| Nunzio DeCia | ndecia | ECG – SPSS Owner Sentinel / Integrated Security Cameras |
| Emani, Savitha (S.) | semani4 | IVI-C – SPSS Writer VRP |
| Wohlfahrter, Michael (M.) | mwohlfah | Feature Team – Sentinel / Integrated Security Cameras |
| Eteer, Malik (M.) | meteer | Feature Owner – Enhanced Dash Cam |
| Benhamouche, Fatima (F.) | fbenhamo | Function Owner - Video Record and Playback (VRP)  ADAS Feature Owner - Mobile Device Viewer for Vehicle Cameras (MDVVC) |
| Raparthi, Satya (S.) | srapart1 | Cyber Security – Sentinel Rep. |
| Pohl, Sascha (S.) | spohl6 | Product Owner - Sentinel |
| Shokry Soliman, Ahmed (A.) | ashokrys | SYNC – Concept of Operations Creator |
| Mueller, Holger (H.) | hmuell62 | SYNC – Dev Team Supervisor |
| Shala, Kujtim (K.) | kshala | SYNC – Dev Team |
| Martinius, Moritz (M.) | mmart591 | SYNC – Dev Team |
| van Laak, Martin (M.) | mvanlaa1 | IVI-C - Software |
| Mahmood, Hamid (H.) | [hmahmoo3](mailto:hmahmoo3@ford.com) | SYNC Team - Infotainment and telematics |
| Ho, Colin (S.) | [cho19](mailto:cho19@ford.com) | SYNC Processing |
| Neubecker, Cynthia (C.M.) | [cneubeck](mailto:cneubeck@ford.com) | R&A Feature Owner - Enhanced Dash Camera |

## Potential Use Cases

Below is a list of potential ways that the Video Recorder Service may be utilized.

|  |  |
| --- | --- |
| **Use Case ID** | **Use Case Description** |
| UC\_FN\_VRS\_00001 | When a perimeter alarm is triggered for the vehicle, camera views from around the vehicle are recorded for a short period of time. These recordings can be viewed later while investigating the event (Sentinel / Integrated Security Camera Feature). |
| UC\_FN\_VRS\_00002 | Record video camera streams while the car is in motion in order to capture any mishaps. Integrated or Enhanced Dash Cam and Unstructured Data Features |
| UC\_FN\_VRS\_00003 | Protect certain video recording or segments of recordings from being overwritten if an event has occurred. Enhanced Dash Cam or Unstructured Data Features. |
| UC\_FN\_VRS\_00004 | Record camera stream onto a user’s device, such as a USB storage device. |
| UC\_FN\_VRS\_00005 | Start, stop, pause, resume recording of the camera stream as consumer wishes. |
| UC\_FN\_VRS\_00006 | Entertainment Feature, end-user would like to record camera stream while on leisure trip to capture a scenic route. |
| UC\_FN\_VRS\_00007 | Feature end-user checks the recorded streams and deletes unwanted recordings to clear storage. |
| UC\_FN\_VSRS\_00008 | Feature end-user checks the recorded streams and protects particular recordings or segments by flagging them as protected (Read Only). |
| UC\_FN\_VSRS\_00009 | Feature end-user reviews recorded streams and un-protects particular recording files that are no longer of use, by removing the protection (Read Only flag). |

## Abbreviations and Definitions

Below is a list of meanings for abbreviations and phrases used within this document.

|  |  |
| --- | --- |
| **Abbreviation / Phrase** | **Description** |
| ECU | Electronic Control Unit |
| EDC | Enhanced Dash CAM  A Feature that allows the vehicle operator to request certain camera views be recorded while driving and preserves certain video clips based on pre-determined triggers, or user request. |
| ISC | Integrated Security Cameras  A Feature that automatically records video from around and in the vehicle for approximately 5 minutes, after a perimeter alarm is triggered. |
| MDVVC | Mobile Device Viewer for Vehicle Cameras  A Feature that allows the vehicle Owner to view video from vehicle cameras on their phone. |
| PTDR | Police Track Data Recorder  A Feature that captured video and driving data while an officer is driving on a test track. |
| RTP | Real-time Transport Protocol  A network protocol at the application layer for delivering video and audio over IP Networks. |
| SOA | Service Oriented Architecture  A Software architecture and set of software design principles focused on delivering cohesive and highly reusable software components or “Services”. |
| UDP | User Datagram Protocol  A connectionless network protocol at the transport layer of the internet protocol suite. Frequently used for transporting time-sensitive data where package loss is preferred over delays due to retry attempts like for video or audio transmissions. |
| VRP | Video Record and Playback Function  A Function Specification derived from the Sentinel feature initially, but ideally serving the needs of several functions over time. |

# Architecture/Context Diagram

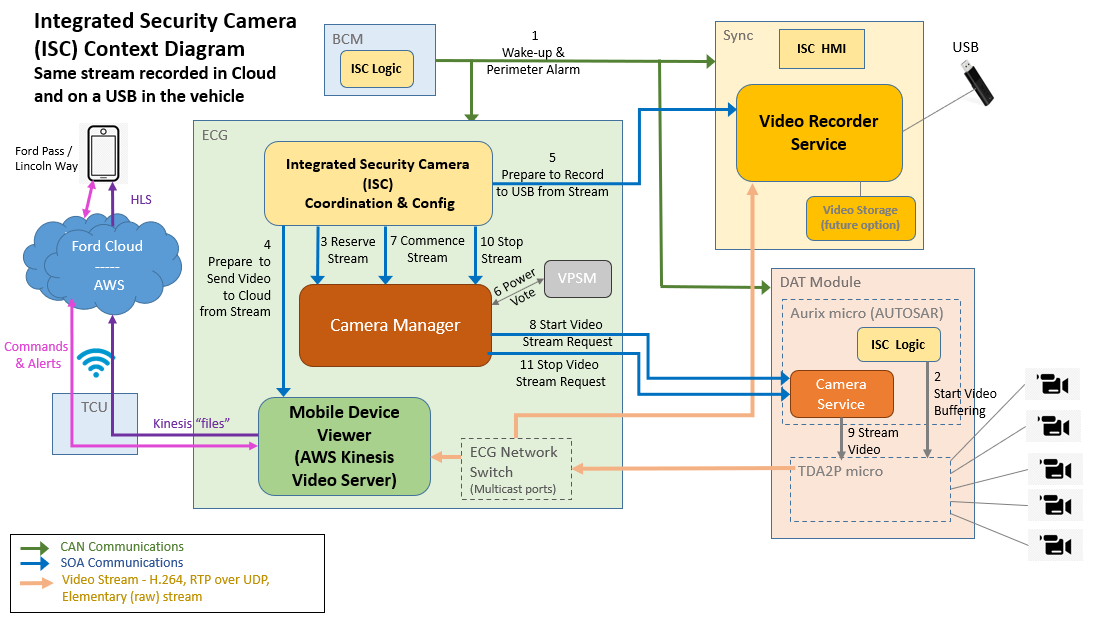
The architecture or context diagrams below are intended as visual aides to help understand the Video Recorder Service and its interactions with other software and devices.

## Context Diagram - Integrated Security Camera Example

Below is a context diagram showing possible interactions between the Video Recorder Service, and other software components in order to achieve the Sentinel or Integrated Security Cameras (ISC) Feature.

For this use case the flow is generally;

1. BCM Activates Perimeter Alarm and
   1. broadcasts a CAN message for the perimeter alarm
   2. ISC feature logic on BCM wakes the DAT, SYNC, and ECG modules
2. ISC logic on DAT detects the active perimeter alarm and begins buffering video for the predetermined camera views, while the other ECUs power up.
3. (3 thru 11) ISC Feature on ECG coordinates the streaming of the 3 views, recording them to a USB within the vehicle and sending them to the Cloud for storage there. The streams sent to the cloud may also be viewed on the vehicle owners mobile phone through Ford Pass.



# Requirements

The sections below provide the list of requirements for the Video Recording Service.

## Functional Requirements

The functional requirements below are those that directly impact consumer expectations of successful delivery. They provide the functionality expected by various consumers.

### Recording Requirements

The functional requirements below are directly related to recording video and logging metadata.

#### F-REQ-406621/A-Record Camera View to USB Device

The Video Recording Service shall allow consumers to request the recording of a specific in-vehicle camera view to a specified USB device.

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Removed references to live or buffered, not relevant to VR service. |

#### F-REQ-418724/A-Record Multiple Views at the Same Time

The Video Recorder Service shall allow a consumer to request multiple camera views to be recorded at the same time as part of the same recording session, providing it does not exceed bandwidth or CPU Load thresholds.

Notes:

* The initial release of video streaming over ethernet will not support multiplexing, so each Camera View will be on a separate “stream,” at a separate network address, and become a separate recording file.
* The ISC feature requirement is to record 3 views at one time. As of DAT 221, the ADAS Module can only provide 3 streams, and the AR Module plans to provide 2 streams. In the future there may be cameras available from other modules, and modules may expand the number of streams they can support.

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
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| **Revision Status** | Released |
| **Revision Comments** | Added Requirement |

#### F-REQ-418387/A-Video Source (Consumer Determined or VRS Initiated)

The Video Recorder Service shall facilitate two mechanisms for identifying the video source:

1. Initiated by Video Recorder: The Consumer provides a view name to the Video Recorder Service and it initiates the video stream using the Camera Manager Service.
2. Consumer Determined: The Consumer reserves or initiates the video stream in advance, then provides the multicast address for the stream as part of the start recording request.

**Initiated by Video Recorder Service:**

If the consumer provides a view name but does not provide a pre-determined multicast address for the video stream, then the Video Recorder Service shall be responsible for starting the video stream.

This is done via the Camera Manager Service, using the start stream interface. The Video Recorder Service must translate the View Name supplied as a string by the consumer into the appropriate enumerate value, then use that along with other view configuration information as provided by the consumer to start the video stream. For information on the Camera Manager Interfaces and specification see the required interfaces and related documents sections within this specification.

**Determined by Consumer:**

The Video Recorder Service shall allow the consumer to provide a pre-determined multicast address and port, as the source for the video to be recorded. This is done to support features like Integrated Security Cameras, which needs to coordinate the beginning of the video recording and stream between multiple recipients.

Upon receiving a request that contains the multicast address information, the Video Recorder Service shall prepare for recording and join the multicast group. When it is ready to record, it will provide a ready indication back to the requester (a success response to the request as well as broadcasting a recording status of “Ready” for the recording session. The requester will wait until all recipient indicate they are ready, and then it will request Camera Manager to commence the stream.

Note: The Integrated Security Cameras feature must coordinate the beginning of the video stream to ensure that all recipients capture the full video stream that was buffered by the ADAS module. If one recipient were to start the video stream before the second is ready, the second recipient would miss part of that buffered video.

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Added Requirement |

#### F-REQ-406306/A-Recording Duration

The Video Recording Service shall allow the consumer to specify the amount of time (duration) of the video recording.

If the consumer does not specify a recording duration, then the Video Recorder Service will continue recording until either the consumer requests it to stop, or an error occurs.

Note: Please see the requirement in this document on File Creation Modes for a special use of the duration when recording in a “loop mode”.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Changed from paragraph to requirement object. Updated properties. Combined specified and unspecified into one requirement. |

#### F-REQ-428388/A-Segment Duration

The Video Recorder Service shall allow the consumer to specify a recording segment size. The video recording will be broken up into files of that segment duration.

Example: If the consumer requests a recording with a total duration of 5 minutes and a segment duration of 1 minute, then 5 files will be created for the view, each of 1-minute duration.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

#### F-REQ-406312/A-Record Mode - File Creation Strategy

The Video Recorder Service shall allow the consumer to specify one of two possible recording modes when starting a recording. The two available modes are;

1. Continuous Mode
2. Loop Mode

For details on the behavior of each mode, see the requirements bearing the above mode names.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Changed from paragraph to requirement object. Updated properties. Combined details for continuous and loop into one requirement. |

#### REQ-435541/A-Continuous Mode Recording

When recording in this mode, the Video Recorder shall attempt to create a single video file per camera view, and a single associated metadata file. The recording of video and metadata will continue to the single files until any of the following occurs:

1. The total recording duration is reached, then the recording process is stopped, and all files are completed.
2. The consumer stops the recording, then the recording process is stopped, and all files are completed.
3. The storage device is out of available space, then the recording process is stopped, and all files are completed.
4. The consumer specified segment size is reached. This will force the Video Recorder to start new video and metadata files as new segments of the same recording session.
5. Maximum file size limit for the storage device is reached. This will force the Video Recorder to start new video and metadata files as new segments of the same recording session.
6. The video configuration is changed (resolution, framerate, or bitrate). This will force the Video Recorder to start new video and metadata files as new segments of the same recording session.

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| **Requirement Information** | |
| **Requirement Type** |  |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

#### REQ-435542/A-Loop Mode Recording

Loop Mode is used by consumers that wish to collect data in a recording loop or rolling storage method. The Video Recorder will create multiple video and associated metadata files, each of a specified segment duration. When the overall recording duration is reached, it will “loop back” and overwrite the earliest file segments with newer files. This way the total video duration will always be the duration specified but will represent only the most recent events for that duration.

It will continue this looping process until one of the following occurs;

1. The consumer stops the recording
2. The storage device is out of space

**Loop Example:**

If a consumer requests a Loop Mode recording with a total duration of 5 minutes and a segment duration of 1 minute, then the Video Recorder Service will:

1. Create segment files of 1-minute duration each
2. At the end of Minute 5, it will overwrite the files corresponding to minute 1, replacing them with files for the 6th minute. Thus, when played back the total length of the recording will always 5 minutes, representing the last 5 minutes before the recording was stopped. The table below demonstrates the recording segments that will be available during each minute of recording in this example.

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| **Minute of Recording** | **Segments on storage device** |
| First | 1 |
| Second | 1, 2 |
| Third | 1, 2, 3 |
| Fourth | 1, 2, 3, 4 |
| Fifth | 1, 2, 3, 4, 5 |
| Sixth | 2, 3, 4, 5, 6 |
| Seventh | 3, 4, 5, 6, 7 |
| Eighth | 4, 5, 6, 7, 8 |

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| **Requirement Information** | |
| **Requirement Type** |  |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

#### F-REQ-410435/B-Metadata / Data Logging

The Video Recorder Service shall allow consumers to select from a list of supported vehicle metadata to be recorded (logged) and synchronized with the video recording. The consumer may request that the metadata file be encrypted so that it can only be played back in the vehicle where it was recorded

The Video Recorder Service shall obtain the vehicle data from either CAN Signals or VIM Services. The data logged will be either the actual CAN Signal Value, or the CAN Interpretation. The logged metadata will include units as defined by the CAN source.

The metadata will be gathered and written to file at a configurable frequency, with a default value of every 200 milliseconds.

Transforming the CAN data or CAN interpretation Values into something more human readable or into a different language will be the responsibility of the playback HMI.

If one of the requested metadata fields is classified by the Ford Privacy Team or DPIA process as Personally Identifiable Information (PII) or as sensitive data, meaning data that could reveal a person’s behavior, then the Video Recorder will automatically encrypt the metadata file.

Below is a list of metadata requested to date.

For more information on the source, translation, and classification of metadata please see the data enumeration and configuration section of this document.

**MVP Data** – Requested by existing Features:

* Date
* Time
* Vehicle Speed
* GPS Location
* Vehicle Identification Number (VIN)
* Gas Pedal Position
* Braking Torque
* Perimeter Alarm Triggers

**Future Data** – The data below was originally requested by the Police Track Data Recorder feature (which decided to use a different approach than the Vehicle Camera Solution) but this information may be requested by it or other features in the future.

* Steering Wheel Angle
* G-Force
* Engine RPM
* Outside Temperature

Note:

* Feature teams can contact the individuals below for more info on data privacy classification and the DPIA process.
  + Kanous, Elizabeth (E.K.) [EKANOUS@ford.com](mailto:EKANOUS@ford.com)
  + Gallagher, Brian (B. P.) [BGALLA15@ford.com](mailto:BGALLA15@ford.com)

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Clarified frequency to gather and write |

#### F-REQ-420183/A-List Supported Metadata and Classification

The Video Recorder Service shall allow the consumer to request a list of the supported metadata and a flag indicating if it is classified as Personally Identifiable Information (PII) or sensitive data that could reveal information about a person’s behavior.

Note:

* For the list of supported metadata and its classification please see the data enumeration defined in the interface section as well as the configuration section of this document.
* For information on how the Video Recorder Service will obtain the metadata values during recording, please see the Configuration Section in this document.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

#### F-REQ-420904/A-Video Recording File Format

The Video Recording Service shall record video into an MP4 standard format.

Metadata shall be stored in a text (.txt) format.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

#### F-REQ-420939/B-File Directory Structure and Names

When recording video and metadata files, at the start of each recording session, the Video Recorder Service shall:

1. Find or create a directory called “Ford Videos”
2. Find or create a folder beneath that for the feature name as provided in the start recording request
3. Create a new folder beneath the feature directory for the recording session, with a name that consists of:
   1. date and time the start recording request was received in a format like 2021-05-25\_09-30 using 24-hour format
   2. An optional recording session name, if provided by the consumer as part of the start recording request. The optional Session Name should be proceeded by an underscore to separate it from the date and time.
4. Create files beneath the above sub-folder using the following naming pattern:

Date\_Time\_Segment#\_CameraView

Note: Metadata files will not include the camera\_view name as there could be several camera views but only one metadata file.

1. If the file is encrypted, append “\_enc” to the file name
2. Add an appropriate file extension based on the file type, either MP4 for a video file, or TXT for a metadata file.

Note:

* There will be a signature file for every video or metadata segment file.
* For continuous mode recordings with no segment duration, the segment # will normally be 0001. However, the Video Recorder Service may add additional segments as required by file system limitations and recording configuration changes (like a maximum file size limit, or changing the bitrate, or framerate of the video stream)

**Sample directory structure and file names:**



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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Remove feature name from file names |

#### F-REQ-420184/B-Out of Space Strategy

The Video Recorder Service shall allow the consumer to specify an out of space strategy to enact when there is insufficient space on the storage device to continue recording. This shall be provided as a parameter in the start recording request.

The out of space strategies are:

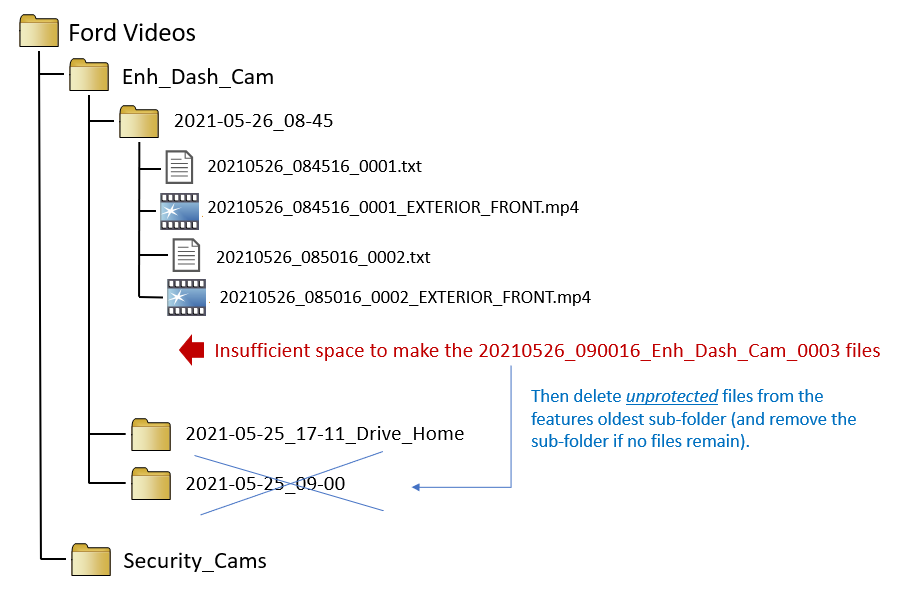
1. **Terminate:** When there is not sufficient space to continue recording, the Video Recorder Service will stop the recording session, and update the recording status for the session to “Out\_Of\_Space”.
2. **Delete From Older Sessions**: The oldest unprotected (read/write) files within the features oldest recording session will be deleted, and the sub-folder for the session will be deleted if no files remain. As recording continues, if more space is required, unprotected files will be deleted from the next oldest sub-folder for the same feature.
3. **Delete From Any Session:** The Video Recorder Service will start by deleting files from the oldest recording sessions for the feature. If that does not provide sufficient space, or if there are no other sub-folders, it will begin deleting the oldest segment files from the current recording session.

Example for Strategy 2, Delete Older Sessions:

The picture below shows the deletion of the oldest recording of the feature during a recording session for the Enhanced Dash Cam, with the following parameters:

* + Record Mode = Continuous
  + Segment Size = 5 minutes
  + Out of Space Strategy = Delete From Older Sessions

In the file structure image below, the Video Recorder Service determines there is insufficient space while creating files for segment 3 of the session, it deletes unprotected files from the oldest sub-folder for the Enhanced Dash Cam feature, and if no files remain it deletes the sub-folder as well.



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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Remove feature names from file names example |

#### F-REQ-406317/A-Protect Recording or Segment

The Video Recorder Service shall allow the consumer to identify the current recording session as protected (read only) at the start of recording.

The Video Recorder shall also allow the Consumer to send a request to flag the current recording session or current segment as protected during the recording process.

This will result in the file or files being marked as read only, and they will NOT be subject to deletion as part of the out of space strategy. This includes the files for all views being recorded as well as the file for any metadata being logged.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Changed from paragraph to requirement object. Updated properties. |

#### F-REQ-406320/A-Unprotect Recording or Segment

The Video Recorder Service shall allow the consumer to unprotect an in-progress recording session or a recording segment (make all associated files read / write). This means the recording files will be subject to deletion as part of the out of space strategy.

This includes the files for all views being recorded as well as the file for any metadata being logged.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Changed from paragraph to requirement object. Updated properties. |

#### F-REQ-428389/B-Specify Device Selection Strategy for Recording Storage

The Video Recorder Service shall allow the consumer to specify what sort of devices to consider as the storage location when starting a new recording. The list of Device Selection Strategies shall consist of:

1. Specified Only: The Video Recorder Service shall only use the storage device that matches the device ID sent as part of the start recording request. If that device ID is not found, or if it does not have sufficient space, then the recording will not start, and an appropriate error will be returned to the requesting consumer.
2. Include Pre-Tested: The Video Recorder Service shall favor the specified device, but if not provided, not available, or if it is out of space, then it will attempt to record to an available device that has been pre-tested and verified as good to use.
3. Include Any: The Video Recorder Service shall favor the specified device, if provided, then any pre-tested devices, but if none of those are available or have sufficient space, then it will attempt to record to an un-tested device, if available. Note: It is possible that a recording to an un-tested device will start, but later fail if the write speed of the device is not sufficient to keep up with the video stream.

For more information on the behavior of each option please see the requirements named “Select a Recording Device” for each of the above options.

For information on pre-testing a device, see the Pre-Test a Storage Device requirement under the Storage Device Management section.

Note: These options are necessary since some recording events are intended to happen both automatically and quickly, without an end-user present to respond to an out of space or device unavailable error. Rather than having each feature take on the logic of selecting the next device to try, it is being handled centrally by the Video Recorder Service.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Rename to Device Selection Strategy |

#### F-REQ-456737/A-LimitFeatureStorageUsed

The Video Recorder Service shall allow the consuming feature to specify a percentage of the total storage space to be used by the feature when making a start recording request. The amount of space occupied by recordings for that feature shall not exceed that percent of the total storage space on the storage device.

If a percent of total storage space is not provided, the video recorder shall default to 100%, meaning the feature is allowed to use all of the space on the storage device.

The goal is to prevent one feature from occupying all of the free space on the device, and preventing other features from being able to start recordings.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Added |

#### F-REQ-435544/A-Determine Expected\_Recording\_Space

When receiving a start recording request the Video Recorder Service shall calculate the Expected\_Recording\_Space as follows;

1. If Duration is provided, then Expected\_Recording\_Space is calculated by multiplying Duration \* Number\_of\_Views\_Requested \* Bitrate.
2. If Duration is not provided, then scan connected devices for past recording sessions for the feature and set Expected\_Recording\_Space equal to the average space used by those past recording sessions.
3. If there are no existing feature recording sessions available, and Segment\_Duration is provided in the request, then Expected\_Recording\_Space is calculated by multiplying Segment\_Duration \* Number\_of\_Views\_Requested \* Bitrate, then multiplying that by a factor of 2 or 3. This is done to ensure that at least 2 segments can be recorded, and then overwritten if dictated by the Out\_Of\_Space\_Strategy.
4. If no Segment\_Duration is provided, then Expected\_Recording\_Space = Available\_Space\_Min

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
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| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

#### F-REQ-457017/A-Determine Feature Free Space

When processing a start recording request, the Video Recorder shall utilize the Percent of Total Space provided in the request, or a default of 100%, in order to determine how much free space remains available to the requesting feature.

The goal is to prevent the feature from using all the free space on a storage device, thereby leaving none left for other features. This would be achieved be triggering the Out Of Space Strategy (and potentially deleting unprotected files) before all free space is gone.

Recommended Calculation:

1. Determine total space of the storage device
2. Use the percent to determine how much space the feature is allowed.
3. Determine how much space the feature has already used (both protected and unprotected recording segments).
4. If the amount used is less than the amount allowed, then;
   1. Subtract the amount used from the amount allowed to determine remaining space allowed by the feature
   2. Determine how much free space remains on the device
   3. If Free Space is greater than the amount remaining to the feature, then set Feature\_Free\_Space to the amount remaining to the feature.
   4. If Free Space is less than the amount remaining, and the Out\_Of\_Space\_Strategy is Terminate then deny the recording request
   5. If Free Space is less than the amount remaining, and the Out\_Of\_Space\_Strategy is NOT Terminate then set Feature Free Space to zero.
5. If the amount used is greater than the amount allowed, and the Out\_Of\_Space\_Strategy is Terminate then deny the recording request.
6. If the amount used is greater than the amount allowed, and the Out\_Of\_Space\_Strategy is NOT Terminate then delete unprotected feature recording segments in order to reduce the amount used by the feature to below that allowed plus the Out\_Of\_Space\_Min in order to allow recording to start and trigger the Out\_Of\_Space\_Strategy and set Feature Free Space to zero.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Added |

#### F-REQ-435545/B-Determine Available\_Space on a Storage Device

When processing a Start Recording request, the Video Recorder Service shall determine the Available Space on connected devices based on the Out\_Of\_Space\_Strategy, in the following manner:

1. If Out\_Of\_Space\_Strategy = “Terminate” then Available Space = Feature Free Space
2. If Out\_Of\_Space\_Strategy = “Delete from older” or “Delete from any” then Available\_Space = Feature Free Space PLUS Unprotected file space for the requesting Feature.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Altered to use Feature Free Space instead of just Free Space. |

#### F-REQ-435546/B-Select Recording Device - Specified Only

When receiving a start recording request with the “Device Selection Strategy” parameter set “Specified Only”, the Video Recorder Service shall:

1. Determine if the request includes a Device ID, if it does not, then recording cannot begin, set Error\_Reason to “Device ID not Specified” and send an error response to the requester.
2. Determine if the specified device ID is available (connected) in the vehicle, if not then recording cannot begin, set Error\_Reason to “Device Not Available” and send an error response to the requester.
3. Determine if the specified device ID has sufficient space for the recording by:
   1. Determine the Available\_Space on the device, as specified in the “Determine Available Space on Storage Device” requirement.
   2. Determine if the Available\_Space on the device is Greater than the Expected\_Recording\_Space, if not then recording cannot begin, set Error\_Reason to “Insufficient Space” and send an error response to the requester.
4. If no “Error\_Reason” is sent for any of the above, then use the specified device Id as the target for recording.

Please see the Behavioral Diagram section of this document for a recommended flow for “System Selects a Storage Device”.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | renaming to device selection strategy |

#### F-REQ-435547/B-Select Recording Device -Include Pre-Tested

When receiving a start recording request with the “Device Selection Strategy” parameter set to “Include Pre-Tested”, the Video Recorder Service shall determine the target device for the recording in the following order of preference;

1. The specified device ID, if that device is connected and has Available\_Space greater than the Expected\_Recording\_Space.
2. The pre-tested device that has the most recent files for this feature, and where Available\_Space is greater than Expected\_Recording\_Space.
3. The pre-tested device that has Available\_Space greater than Expected\_Recording\_Space. If there is more than one, choose the one with the most Available\_Space.
4. The pre-tested device that has Available\_Space greater than “Available\_Space\_Min”. If there is more than one, choose the one with the most Available\_Space.
5. If None of the above are found, then set Error\_Reason to “No Pre-Tested Storage Device with Sufficient Space” and send an error response to the requester.

Please see the Behavioral Diagram section of this document for a recommended flow for “System Selects a Storage Device”.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Rename to Device Selection Strategy |

#### F-REQ-435548/B-Select Recording Device - Include Any

When receiving a start recording request with the “Device Selection Strategy” parameter set to “Include Any”, the Video Recorder Service shall determine the target device for the recording in the following order of preference;

1. The Specified Device ID, if that device is connected and has Available\_Space greater than Expected\_Recording\_Space.
2. The pre-tested device that has the most recent files for this feature, and where Available\_Space is greater than Expected\_Recording\_Space.
3. The pre-tested device that has Available\_Space greater than Expected\_Recording\_Space. If there is more than one, choose the one with the most Available\_Space.
4. The pre-tested device that has Available\_Space greater than “Available\_Space\_Min”. If there is more than one, choose the one with the most Available\_Space.
5. The un-tested device that can be written to and has Available\_Space greater than “Available\_Space\_Min”.
6. If None of the above are found, then set Error\_Reason to “No Suitable Storage Device with Sufficient Space” and send an error response to the requester.

Please see the Behavioral Diagram section of this document for a recommended flow for “System Selects a Storage Device”.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Renaming to Device Selection Strategy |

#### F-REQ-406632/A-Recording Status

The Video Recording Service shall provide a status for all in progress video recording sessions. The statuses reported should represent both normal processing and expected error conditions like;

* Ready: Video Recorder Service is prepared to start recording on a pre-reserved Video Stream.
* Recording: Video Recorder Service is actively recording
* Recording Space Warning: Still recording, but the device will run out of space soon.
* Completed: Requested recording session has completed (for duration-based requests)
* Paused: Recording has paused
* Out of Space: Recording terminated due to storage space limit.
* Failed: Recording has terminated due to an unanticipated error

The status reported should be updated as it changes during the recording process (an on-change broadcast).

A recording status shall be provided for each camera view as well as for the recording of any metadata. In theory one camera view could fail, while others continue for the same session. The consumer could choose to try and restart the failed view.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
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| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Changed from paragraph to requirement object. Updated properties. |

#### F-REQ-433236/A-Recording Heart Beat

While any recording session is in progress, the Video Recorder Service will publish a recording heartbeat. This signal would be used by a consumer to drive a flashing LED, or other type of indication that recording is active.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
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| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

#### F-REQ-406776/A-Encryption

The Video Recorder Service shall allow the consumer to specify if the video and/or metadata should be encrypted while recording.

As stated earlier, if the consumer selects metadata that is classified as PII or Sensitive, then the Video Recorder Service shall force the metadata to be encrypted, regardless of the consumer’s request.

As of the initial release of the Video Recorder Service, playback of any encrypted video or metadata files will only be available within the vehicle. Currently there is no plan or requirement to share the encryption key outside of the vehicle.

In the future this may be changed to allow encrypted files to be used outside the vehicle, but the mechanism for this will have to be determined.

For details on how the files will be encrypted please see the document from Cyber Security entitled, “Video\_Recording\_and\_Playback\_ CyberSecurity\_Spec”.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Changed from paragraph to requirement object. Updated properties. |

#### F-REQ-421214/A-Digital Signatures

The Video Recorder Service shall apply a digital signature to all files (video and metadata) such that the signature can be verified during playback within the vehicle, to ensure the files were not altered. The digital signature shall not interfere with playback outside of the vehicle.

For details on the creation of the digital signature please see the document from Cyber Security entitled, “Video\_Recording\_and\_Playback\_ CyberSecurity\_Spec”.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

### Storage Device Management

The functional requirements below are related to managing storage devices for video recordings. This includes listing available storage devices and pretesting them.

#### F-REQ-406307/B-List Storage Devices & Information

The Video Recorder Service shall allow the consumer to request a list of devices and storage details for each. This list will include any storage device currently available in the vehicle, whether pre-tested or not.

The storage information provided shall include, but is not limited to, the following;

* Device ID
* Testing Results of any Pretesting:
  + Status: Suitable, Not Suitable, or Not Tested
  + Write Speed
* Total amount of space
* Free Space (unused)
* Feature protected space (occupied by feature specific protected files)
* Feature unprotected space (occupied by feature specific unprotected files)

If no devices are found it should still return success but will return an empty set. It is up to the HMI to translate the empty set into an error like "No Storage Devices found"

Note: Ideally the device ID should be either the Hardware Device ID of the USB stick, but may need to be that of the storage partition on it. This could change if reformatted, or re-partitioned.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | - Add handling when no devices found |

#### F-REQ-433370/B-Pre-Test a USB Mass Storage Device

The Video Service shall provide a common function that will allow any Feature to pre-test or verify that a specific USB storage device is suitable for recording in-vehicle video. This will ensure that the device can be written at a sufficient speed for the recording of video files. The pre-test can take from 5 to 10 seconds and is best done prior to attempting to record video.

When performing the test, The Video Recorder Service shall:

1. If successful, place a hidden file on the device indicating it has been tested and is “Good to Use”
2. If the device is writable, but fails for other reasons, place a hidden file on the device marking it as “Unsuitable”, or “Failed”.
3. Send a response back to the consumer indicating the result of the test.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Remove writting unsuitable on the device and storing unwritable device ID. If device is re-formatted (perhaps on users computer) that will change. |

#### F-REQ-433373/B-Detect New USB Device

Upon connection of a USB Device (or when a new device is detected on start-up) the Video Recorder Service, in conjunction with existing IVI Media detection and indexing software, shall attempt to verify if the new device can be used for recording videos by determining:

1. Is it a Mass Storage USB?
2. Has it already been tested?
3. Can it be written to?
4. Perform a Pre-Test to verify if the device suitable for video recording (sufficient write speed, etc.) according to the Pre-Test requirement.

The above must be executed in a manner that ensures a minimum amount of disruption to the end user and should align with the existing IVI Media Indexing process.

For a recommended logic flow, please see the Behavior Diagrams section of this document.

Rationale:

This will allow the customer to quickly swap out or add storage devices, without having to go into the menu system to pretest and select the device for all features that may be recording videos.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Remove asking user if it is OK to record to new device, per meeting on 10/06/2021. Desire is to keep this as plug and play as possible. |

#### F-REQ-437500/B-Format USB Mass Storage Device

The Video Recorder Service shall allow the consumer to request it to format a specified storage device in order to prepare it for video recordings. The Format should be exfat, but Fat32 would be acceptable. Fat32 is less desirable because it has a smaller max file size.

After the device is formatted the Video Recorder Service shall also pre-test the device to verify that it is suitable according to the Pre-Test a USB Mass Storage Device requirement.

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| **Requirement Information** | |
| **Requirement Type** | F - Functional |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Added desired and acceptable formats |

## Non-Functional Requirements

The non-functional requirements below are those that indirectly impact consumer expectations of successful delivery. They are items like performance and security that are not directly requested by the consumer yet will contribute to their perceived satisfaction with the product.

### NFN-REQ-406779/A-Availability - Life Cycle

The Video Recorder Service shall be available in the normal vehicle life cycle mode.

Any in progress or automated recording of videos shall be allowed in valet mode.

The Video Recorder Service may be available, but is not currently required, in other modes like factory or transport.

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| **Requirement Information** | |
| **Requirement Type** | NFN - Non-Functional-N/A |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

### NFN-REQ-406781/A-Availability - Ignition State

The Video Recorder Service Shall be available in ***all ignition states***, including off, accessory, or remote start.

The Video Recorder Service may be requested to record video by an off-board or automated feature, while ignition is off.

The Consuming feature is responsible for ensuring that the module hosting the Video Recorder Service is powered (SYNC / PDC).

Note: The Sentinel Feature requires video recording in an ignition off state, while features like Enhanced Dash Cam will require recording while ignition is on and vehicle is moving.

|  |  |
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| **Requirement Information** | |
| **Requirement Type** | NFN - Non-Functional-N/A |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

### NFP-REQ-406782/A-Response Time

Below are estimated response time expectations from feature teams.

|  |  |
| --- | --- |
| **Feature** | **Response time Expectation** |
| Enhanced Dash Cam | < 2 Seconds |
| Sentinel | TBD |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | NFP - Non-Functional-Performance |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

### NFP-REQ-406783/A-BootUp Time

The Sentinel feature requires video recording to start in under 2 seconds from the perimeter alarm being triggered. It is recognized that ECG and SYNC cannot boot up in the required amount of time.

Therefore, the ADAS Module will implement video buffering in order to capture the initial few seconds, while other ECUs are powered up and initialized. The fact that these video streams are buffered by ADAS should not impact the design for streaming or recording the video.

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | NFP - Non-Functional-Performance |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

### NFP-REQ-408161/A-Bandwidth

The Video Recorder Service shall support a bandwidth of at least a 1 to 4 Mbps.

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| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | NFP - Non-Functional-Performance |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

### NFN-REQ-408163/A-Buffering

The Video Recorder Service may have to establish buffers for video streams in order to support recording multiple camera views, or to handle the varying write speeds of storage devices.

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| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | NFN - Non-Functional-N/A |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

### NFN-REQ-410437/A-Retry and Timeout

When initiating a video stream, the Video Recorder Service shall wait a configurable amount of time (see configuration section) for the Camera Manager to respond to the start stream request.

If the Camera Manager fails to respond in that time, the Video Recorder Service shall retry the request a configurable number of times (see configuration section).

If there still is no acknowledgement after the last retry, then it shall send a failure response to the consumer with a reason of CAMERA\_VIEW\_NOT\_RESPONDING.

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| **Requirement Information** | |
| **Requirement Type** | NFN - Non-Functional-N/A |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Added requirement, based on ECG dev team request |

### NFN-REQ-410438/A-Multiple Requests - Queuing

The Video Recorder Service shall queue incoming requests and process them in the order received.

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | NFN - Non-Functional-N/A |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Added requirement, based on ECG dev team request |

### NFN-REQ-410439/A-Multiple Requests - Max Concurrent Requests

The Video Recorder Service shall queue up to 5 incoming requests, after which incoming requests will be denied. When the Queue is full, the Video Recorder Service will respond to the consumer with a failure status and an error description of "QUEUE\_FULL".

Rationale: Unlimited requests cannot be supported. The expectation from near term features are that Sentinel / ISC will operate in an ignition off state and record 3 camera views, while Enhanced Dash Cam will operate in an ignition on state and record one camera view. Therefore, the number of simultaneous requests should not be very great.

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| **Requirement Information** | |
| **Requirement Type** | NFN - Non-Functional-N/A |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Added requirement, based on ECG dev team request |

### NFN-REQ-406764/A-Multiple Recording Sessions

The Video Recorder Service *should* support multiple consumers creating recording sessions at the same time. The number of simultaneous recording sessions would be limited based on processing, bandwidth, or buffering limitations.

If these limitations are exceeded, and additional recording sessions cannot be accommodated, then an appropriate error message must be returned.

Hardware limitations may force the number of concurrent recording sessions to be limited to one initially, but ideally expanded over time.

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| **Requirement Information** | |
| **Requirement Type** | NFN - Non-Functional-N/A |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Clarified wording. Changed from paragraph to requirement object. Updated properties. |

### NFN-REQ-437038/B-Crash Recovery

The Video Recorder Service shall implement the following actions to provide a clean recovery in the even the Video Recorder Service or the module it is hosted on crashes.

1. Store information about active recording sessions in persistent memory, particularly the Camera Views that were initiated by the Video Recorder Service.
2. Upon reboot/recovery (perhaps as part of initialization) determine if that persisted data indicates that an incomplete recording session was in progress and not completed prior to a shutdown / crash.
3. For any camera views initiated by the Video Recorder Service, send a StopStreamRequest to Camera Manager.

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| **Requirement Information** | |
| **Requirement Type** | NFN - Non-Functional-N/A |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | remove question on broadcasting status |

## Future Possible Requirements

The requirements below are anticipated needs of upcoming features. They are provided as information only; in the event they may impact design and implementation considerations.

### Allow Cross Feature Deletion

The Video Recorder Service Shall enable a mechanism to identify that Feature 1 is able to delete unprotected recording files from a different feature, Feature 2.

For example, the DashCam feature has agreed to allow the Sentinel (or Integrated Security Cameras) feature to delete its unprotected recording segments.

Note: We would have to know the agreed Feature short names for each in advance to put into some form of configuration or persisted data.

### Pause and Resume Recording

In the future, the Video Recording Service may allow a consumer to pause and then resume the video recording. When paused the service would:

* Suspend recording of video stream
* Suspend recording of metadata
* Suspend duration timers (total duration and segment duration if applicable)
* The video stream should stay active

When the consumer later sends a resume request the service would:

* Resume recording the video stream
* Resume recording metadata
* Resume and duration timers (total duration and segment duration if applicable)

Notes:

* This would result in a “gap” in the recording, where events are not recorded for a period of time.
* This functionality is not part of the Minimum Viable Product (MVP) it is not requested for the Integrated Security Cameras nor the Enhanced Dash Cam features.

### Name Value Pair Metadata (free text)

The future consumer may wish to record name-value pairs of information along with the videos. These pairs of a field name and value may be provided with the start and/or stop recording requests.

Example: A consumer recording a test track experience may wish to record the track start and end points and times in order to calculate overall track time and distance.

### Save photos - single frame images

A future consumer (Aspire Photos) may wish to record photos or snapshots (single frame images) as pictures in persistent storage. The photo may be associated to a date timestamp, camera view name, and other information.

### Log metadata from any available CAN Signal

A future consumer may wish to log data from any available CAN Signal, by providing the name of that CAN Signal. The video Recorder service would need to create a dynamic VIM Service that included that signal as a primitive. Only the actual CAN data values would be logged, with no interpretations.

### Reserve Storage Space

A future consumer may wish to reserve or allocate storage space, if a recording is scheduled (example is Adventure Camera feature).

# Interface Contracts

This section provides information on the interface requirements for this service.

## Data Enumerations

Below are definitions for the data enumerations used within the Video Recorder Service interfaces, to provide known lists of values.

### IR-REQ-408225/A-RecordingMode

**Description:** This data enumeration is used to indicate the Mode of file creation used during recording.

|  |  |
| --- | --- |
| **Value** | **Description** |
| CONTINUOUS | Recording is performed continuously without any sort of loop back to overwrite earlier segment of the recording. |
| LOOP | Recording is performed in a loop mode. File segments are created of the specified segment duration, until the recording duration is reached. Then the system will “loop back” and overwrite the files for the first segment, then the second segment. This creates a recording of a set duration, consisting only of events that far back in time. |

|  |  |
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| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Changed to VSEM Requirement Object |

### IR-REQ-408226/B-DeviceSelectionStrategy

**Description:** This data enumeration is used to identify what sort of storage device the Video Recorder should attempt to use when making a recording.

|  |  |
| --- | --- |
| **Value** | **Description** |
| SPECIFIED\_ONLY | Record only to the storage device ID specified in the start recording request. If the specified device ID is not available, or full, then recording will fail. |
| INCLUDE\_PRETESTED | Record to a specified device ID, but if not available or full, then attempt to record to any pre-tested devices.  Note: the device with the most recent files for this feature will be favored, followed by the one with the most space. |
| INCLUDE\_ANY | Record to the specified device ID, but if not available or full, the look for pre-tested devices, and if none of those are available, then attempt to record to any USB Mass Storage device detected. |

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| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Rename to Device Selection Strategy |

### IR-REQ-421357/B-OutOfSpaceStrategy

**Description:** This data enumeration is used to indicate the desired behavior when there is insufficient free space on the storage device to continue recording.

|  |  |
| --- | --- |
| **Value** | **Description** |
| TERMINATE | The recording will terminate and an out of space error will be provided. |
| DELETE\_FROM\_OLDER\_SESSIONS\_ONLY | Unprotected files from older recording sessions for this feature will be deleted, in order to continue the current recording. |
| DELETE\_OLDEST\_FROM\_ANY\_SESSION | Unprotected files from older recording sessions for this feature will be deleted, if those do not provide sufficient space, then earlier segments from the current session will also be deleted, so that the current recording session can continue. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | - Rename Values as requested by Dev Team |

### IR-REQ-420931/B-SupportedMetadata

**Description:** This data enumeration is used to indicate what vehicle data will be logged alongside the video recording.

|  |  |
| --- | --- |
| Value | Description |
| Date | Date in mm-dd-yyyy format. |
| Time | Time of day in 24 hour format, like 21:15:12 |
| Vehicle Speed | Vehicle Speed as displayed in the Instrument Panel, either in Miles per hour (mph) or kilometers per hour (km/h) |
| Vehicle Location | GNSS information on the Vehicle’s location, including the information below |
| Latitude | In degree format, DDD° MM' SS.S" [N / S]. Sample - 32° 18' 23.1" N |
| Longitude | In degree format, DDD° MM' SS.S" [W / E]. Sample - 122° 36' 52.5" W |
| Altitude | Feet or meters above Mean Sea Level (MSL) |
| Heading | Compass direction |
| VIN | The Vehicle Identification Number of the vehicle where the recording was made. |
| Accelerator Pedal Position | A percentage interpretation of the Accelerator pedal position:  0% = released pedal.  100% = maximum pedal. |
| Braking Torque | Indication of braking force in newton\*meters (nm).  Includes braking applied by:  - Driver request (brake pedal)  - Adaptive Cruise Control system  - Collision Mitigation by Braking (CMbB) system |
| Driver Braking Indication | Indicates if the driver is braking by pushing on the brake pedal (Yes or No). |
| Perimeter Alarm Triggers | The current trigger for a perimeter alarm event. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | change value from gas pedal to accelerator pedal |

### IR-REQ-436532/A-PiiClassification

**Description:** This data enumeration is used to indicate the classification of metadata as Personally Identifiable Information or Sensitive.

|  |  |
| --- | --- |
| **Value** | **Description** |
| PII | This data is considered Personal Identifiable Information. It requires encryption |
| SENSITIVE | This data is considered sensitive as it may indicate driver behavior. It requires encryption. |
| NOT\_PII | This data is neither PII nor Sensitive. It does not require encryption. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

### IR-REQ-408733/A-Resolution

**Description:** This enumeration provides the list of available resolutions for the camera views. The desired resolution should be specified when starting a recording, else the current camera setting will be used.

Video Recorder Service will pass the desired resolution to Camera Manager when initiating the video stream.

|  |  |
| --- | --- |
| **Value** | **Description** |
| RES\_1280\_BY\_800 | This is a high-resolution setting |
| RES\_640\_BY\_480 | This is a medium resolution setting |
| RES\_480\_BY\_360 | This is a low-resolution setting |
| RES\_1920\_BY\_1080 | 1080p Only supported by the AR Module RGB View |
| RES\_1280\_BY\_720 | 720p – Only supported by the AR Module Views |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Added since config must be sent to Camera Manager when initiating the video stream. |

### IR-REQ-408734/A-FrameRate

**Description:** This enumeration provides the list of supported framerates for camera configurations. The desired framerate should be specified when starting a recording, else the current camera setting will be used.

|  |  |
| --- | --- |
| **Value** | **Description** |
| FPS\_30 | 30 Frames per second |
| FPS\_15 | 15 Frames per second |
| FPS\_10 | 10 Frames per second |
| FPS\_60 | 60 Frames per second, only supported by AR Views |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Added since config must be sent to Camera Manager when initiating the video stream. |

### IR-REQ-408735/A-Bitrate

**Description:** This enumeration provides the list of supported Bitrates for camera configurations. The desired Bitrate should be provided when starting a recording, else the camera’s current setting will be used.

|  |  |
| --- | --- |
| **Value** | **Description** |
| KBPS\_10000 | 10,000 kilobits per second |
| KBPS\_5000 | 5,000 kilobits per second |
| KBPS\_1000 | 1,000 kilobits per second |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Added since config must be sent to Camera Manager when initiating the video stream. |

### IR-REQ-408227/B-RecordingStatus

**Description:** This data enumeration is used to provide the consumer with the status for recording a view or logging metadata while the recording session is in progress.

|  |  |
| --- | --- |
| **Value** | **Description** |
| READY | Video Recorder Service is Ready to record a pre-reserved video stream. |
| RECORDING | Recording is in progress |
| RECORDING\_SPACE\_WARNING | Recording is still in progress, but device is running out of space. |
| COMPLETE | Recording has completed through the specified duration |
| OUT\_OF\_SPACE | Recording terminated due to insufficient storage Space |
| STOPPED | Recording was Stopped by Request. |
| FAILED | Recording terminated for an unanticipated reason |
| PAUSED | Recording is paused  Note: This value may not be implemented in Release 1 |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Added Stopped as separate from complete. |

### IR-REQ-435983/C-TestResult

**Description:** This enumeration is used to communicate any pre-test results for a storage device.

|  |  |
| --- | --- |
| **Value** | **Description** |
| NOT\_TESTED | Storage device has not been tested by the Video Recorder Service to determine if it is suitable for video recordings. |
| SUITABLE | Storage device has been tested and determined suitable for storing video recordings. |
| NOT\_SUITABLE | Storage device was tested and found unsuitable or the end consumer indicated it should not be used. |
| INVALID\_DEVICE\_FORMAT | Storage device has an incompatible file system / format |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | C |
| **Revision Date** | 25-Oct-2021 13:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Add INVALID\_DEVICE\_FORMAT |

### IR-REQ-408228/A-RequestStatus

**Description:** This enumeration is used to inform the consumer of the status of their request, when the Video Recorder Service is replying to requests like start recording, stop recording, or list video recording files.

|  |  |
| --- | --- |
| **Value** | **Description** |
| SUCCESS | Request execution was successful, there are no errors. |
| FAIL | Provider failed to fulfill request. Error details should be checked to get more information about the failure. |

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| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Changed to VSEM Requirement Object |

### IR-REQ-408229/B-ErrorDetail

**Description:** This enumeration is used to indicate the type of error that occurred when attempting to process a request.

|  |  |
| --- | --- |
| **Value** | **Description** |
| NONE | No error occurred |
| COMMAND\_NOT\_RECOGNIZED | Unknown command in SOA request |
| UNKNOWN\_ERROR | Failed due to an unanticipated error |
| INVALID\_REQUEST | Invalid request structure or parameters |
| DEVICE\_ID\_NOT\_SPECIFIED | Start Recording request was received with “Device Selection Strategy” set to specified only, but no device Id was provided. |
| DEVICE\_NOT\_AVAILABLE | The device ID specified in the start recording request was not found in the vehicle, and “Device Selectin Strategy” was set to specified only. |
| CAMERA\_VIEW\_NOT\_AVAILABLE | Requested Camera View is not available for streaming. |
| CAMERA\_VIEW\_NOT\_RESPONDING | Camera controller is not responding. |
| INSUFFICIENT\_SPACE | Specified storage device does not have sufficient space for the recording or to begin a recording session. |
| NO\_PRETESTED\_DEVICE\_WITH\_SPACE | This error occurs when the consumer requested a recording using the “Include\_Pretested” option but no pre-tested devices were found, or none had sufficient space. |
| NO\_SUITABLE\_DEVICE\_WITH\_SPACE | This error occurs when the consumer requested a recording using the “Include\_Any” option but no suitable devices were found, or none had sufficient space. |
| QUEUE\_FULL | Request queue is full, try request again later. |
| SPECIFIED\_DEVICE\_IS\_INVALID\_FORMAT | Unable to write to specified device, because it has an incompatible file system / format. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | updating descriptions for device selection strategy name change |

## Data Structures

The section below provides definitions for any data structures (or nested message) used to create arrays within the Video Recorder Service Interfaces.

### IR-REQ-435978/B-ViewsToRecord

**Description:** The following data structure, or nested message, is used when submitting a start recording request to inform the Video Recorder Service of the Camera Views that are to be recorded.

The consumer must provide the camera view name exactly as it occurs in the camera Manager list of camera views.

The consumer may optionally provide an IP address and port where the video can be found if the video stream was arranged by the coordinating consumer. Otherwise the Video Recorder Service will initiate the video stream with Camera Manager.

|  |  |  |
| --- | --- | --- |
| **Name** | **Data Type** | **Description** |
| view\_name | String | Name of camera view being recorded.  Note: The string must exactly match the view name as provided by the Camera Manager in its ViewStatus Broadcast. |
| ip\_address | string | Optional IP address where the view will stream |
| port | uint32 | Optional Port where the view will stream. |
| resolution | Enum  Resolution | Resolution to use when starting the video stream, if an address for an existing stream was not provided. If blank the camera view’s default will be used. |
| framerate | Enum  Framerate | Framerate to use when starting the video stream, if an address for an existing stream was not provided. If blank the camera view’s default will be used. |
| bitrate | Enum  Bitrate | Bitrate to use when starting the video stream, if an address for an existing stream was not provided. If blank the camera view’s default will be used. |
| power\_severity\_level | uint32 | Power Severity of requesting feature, needed to keep video source powered |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Add power severity level parameter |

### IR-REQ-456717/A-FeatureStorage

**Description:** This structure, or nested message, is used by the Video Recorder Service to provide a list of protected and unprotected storage space used by feature.

|  |  |  |
| --- | --- | --- |
| **Name** | **Data Type** | **Description** |
| feature\_name | string | Unique identifier of the storage device |
| feature\_unprotected\_space | uint32 | Amount of space used by unprotected recording files for the feature, available for deletion as part of out of space strategy |
| feature\_protected\_space | uint32 | Amount of space used by protected recording files for the feature, not available for deletion |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | A |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

### IR-REQ-408704/C-StorageStatus

**Description:** This structure, or nested message, is used by the Video Recorder Service to provide a list of available (connected) storage devices, and information regarding the storage space for each.

|  |  |  |
| --- | --- | --- |
| **Name** | **Data Type** | **Description** |
| storage\_device\_id | string | Unique identifier of the storage device |
| test\_result | Enum  TestResult | Indicates if the device was pre-tested for video recording and if so, the result of the test. |
| total\_space | uint32 | Total space of the storage device, in Mega Bytes (MB). |
| free\_space | uint32 | Amount of unused space on the device. |
| Feature\_storage\_space | Repeated  FeatureStorage | Amount of space used by unprotected files for the feature (available to be deleted during a recording session) |
| Other\_used\_space | uint32 | Amount of space used by non-feature recording files (Also NOT available for deletion while recording) |
| write\_speed | uint32 | Is this needed / available |
| label | string | Optional label of the storage device |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | C |
| **Revision Date** | 25-Oct-2021 13:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Rev B  - Rename to singular  - Change parameter name to "storage\_device\_id" for consistency.  Rev C  - add Storage Label per dev team |

### REQ-437797/A-ResponseByView

**Description:** The following data structure, or nested message, is used by the Video Recorder Service to respond to Start and stop recording requests with a status and error by the Views requested or for the metadata. It is possible for one view to fail, and others to succeed, or for views to succeed but not metadata.

|  |  |  |
| --- | --- | --- |
| **Name** | **Data Type** | **Description** |
| view\_name | String | Name of camera view being recorded or the word “metadata” to indicate the status of the data logging. |
| request\_status | Enumeration | The status of the request for this particular view, or metadata logging |
| error\_detail | Enumeration  ErrorDetail | Detailed error message providing more information about any failure that occured. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** |  |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

### IR-REQ-408699/B-RecordingSessionStatus

**Description:** The following data structure, or nested message, is used by the Video Recorder Service to communicate the status of active recording sessions for every view being recorded and the logging of metadata.

|  |  |  |
| --- | --- | --- |
| **Name** | **Data Type** | **Description** |
| recording\_id | string | Unique identifier of the recording session. |
| view\_name | String | Name of camera view being recorded or the word “metadata” to indicate the status of the data logging. |
| segment\_number | uint32 | Number for the segment currently being recorded. |
| recording\_status | Enumeration RecordingStatus | Status of the video recording, or logging of metadata. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | update parameter name to recording\_id |

### IR-REQ-436533/A-MetadataInformation

**Description:** The following data structure, or nested message, is used by the Video Recorder Service to communicate the list of supported metadata and information about it.

|  |  |  |
| --- | --- | --- |
| **Name** | **Data Type** | **Description** |
| metadata\_name | Enum  SupportedMetadata | Name of the supported metadata field, like accelerator pedal position. |
| metadata\_classification | Enum  PiiClassification | Identifies the privacy and security classification the metadata element was given by the Privacy Team. |
| Description | String | Description of the metadata. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

## Provided Interface Contracts

Below are the interfaces that the Video Recorder Service will provide to its consumers (other feature software or software modules) on the same or other ECUs.

### IR-REQ-408710/C-StartRecording

***Purpose***: This interface is used by the consumer to request the Video Recording Service to record a video stream for one or more Camera Views.

***Pre-Condition***: A persistent storage device is available that matches the request and has sufficient space to start a recording.

***Message Pattern:***  Request/Response

***Request Topic:*** SERVICES/REQUEST/VIDEO\_RECORDER

***Response Topic:***  Consumer Provided

**Note:** If the consumer does not provide an IP Address for the video stream then the Video Recorder Servicewill initiate the video stream with the Camera Manager and will receive the video source address from it.

|  |  |  |  |
| --- | --- | --- | --- |
| **Message Name** | **Message Element Name** | **Data Type** | **Description** |
| StartRecordingReq | feature\_short\_name | string | Name of the feature requesting the recording. This will be used for folder naming so should be abbreviated to prevent folder/file names from growing too large. |
|  | views\_to\_record | Repeated Structure  ViewsToRecord | List of Camera Views to be recorded, may include an address for an existing stream, or a view name and config values necessary to start a new stream. |
|  | recording\_mode | Enumeration RecordingMode | Mode to use for recording file creation, continuous or loop. |
|  | recording\_duration | Integer  *Minutes* | Amount of time in seconds to record the camera view(s) and any associated metadata.  If not provided (null or zero) then the Video Recorder Service will record until it receives a stop recording request. |
|  | segment\_duration | Integer  *Minutes* | Optional duration for each video segment, in seconds. Used to divide recording files into smaller segments and for loop mode. If not provided, the video file will not be broken into segments unless underlying system constraints force segmentation. |
|  | recording\_session\_name | String | Optional name to be appended to the folder name for the recording session |
|  | encrypt\_video\_file | boolean | Should the video recording files be encrypted? |
|  | encrypt\_metadata\_file | boolean | Should the metadata files be encrypted? |
|  | Device\_selection\_strategy | Enumeration  DeviceSelectionStrategy | Type of storage devices to be considered for storing the recording files. |
|  | storage\_device\_id | string | Id of a specific storage device where recording files should be placed. This is required if device selection strategy is specified only, but optional for other strategies. |
|  | metadata\_to\_record | Repeating  Enum SupportedMetadata | List of supported metadata fields to be captured along with the video recording. |
|  | out\_of\_space\_strategy | Enum  OutOfSpaceStrategy | Describes the desired action to take if the storage device runs out of space while recording. |
|  | protect\_flag | Boolean | Should the recording session be protected from deletion?  If true, all files for the session will be marked as read only.  If False, the files will be read/write and subject to deletion as part of the out of space strategy. |
|  | storage\_limit\_percent | Uint32 | Optional percentage of the total storage space that the feature should be limited to, for instance limit the feature to use only 80% of the total storage space. |
| StartRecordingRsp | recording\_id | String | Unique ID for this recording session, used to link to recording status, and for a stop recording requests, if recording duration was not specified. |
|  | response\_by\_view | Repeated Structure  ResponeByView | Status of the request for each view requested and for metadata logging. This is repeated for each view requested, and provided once for any metadata requested. |
|  | storage\_device\_id | string | ID of the Storage device that was chosen for the recording. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | C |
| **Revision Date** | 25-Oct-2021 13:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | - add parameter for % of total storage space the feature can use.  - changed durations from minutes to seconds  - changed session\_id to recording\_id and device\_id to storage\_device\_id for consistency  REv C  - Add Storage Device ID to response |

### IR-REQ-408866/B-StopRecording

***Purpose***: Used by the consumer to stop an in-progress video recording.

The consumer MUST send a stop request when:

* The recording was requested as continuous mode, with no duration specified
* The recording was requested as loop mode

The consumer can also send a stop request to stop ANY recording that is in progress.

***Message Pattern***: Request / Response

***Request Topic***: SERVICES/REQUEST/VIDEO\_RECORDER

***Response Topic***: Consumer provided

|  |  |  |  |
| --- | --- | --- | --- |
| **Message Name** | **Message Element Name** | **Data Type** | **Description** |
| StopRecordingReq | recording\_id | string | Unique Identifier of the recording session to be stopped. This was provided by the Video Recorder Service in the response to the start recording request. |
| StopRecordingRsp | recording\_id | string | Unique Identifier of the recording session |
|  | recording\_status | Enum  RecordingStatus | Status of the recording session. |
|  | req\_stat | Enum RequestStatus | Status of the request |
|  | error\_detail | Enum  ErrorDetail | Error detail if any. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | update parameter name from session\_id to recording\_id |

### IR-REQ-408871/B-ProtectRecording

***Purpose***: Used by the consumer to protect or unprotect video recording sessions or segment files. When “protected” all files related to that session or segment will be flagged as read only. This will prevent them from being overwritten by Video Recorder Service, when enacting an “Out of Space Strategy” that includes deleting older files.

***Message Pattern***: Request / Response

***Request Topic***: SERVICES/REQUEST/VIDEO\_RECORDER

***Response Topic***: Consumer provided

|  |  |  |  |
| --- | --- | --- | --- |
| **Message Name** | **Message Element Name** | **Data Type** | **Description** |
| ProtectRecordingReq | recording\_id | string | Id of the Recording Session to be protected or unprotected |
|  | segment\_number | uint32 | Segment number to be protected or unprotected, if not provided (null or zero) the entire session will be protected or unprotected. |
|  | protect\_flag | Boolean | True = Protect the files (read only)  False = Unprotect the files |
| ProtectRecordingRsp | req\_stat | Enumeration RequestStatus |  |
|  | error\_detail | Enumeration ErrorDetail |  |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Updated parameter name to protect\_flag and recording\_id |

### IR-REQ-408894/B-ListStorageDeviceInfo

***Purpose***: Used by the consumer to request a list of available (connected) storage devices and space information about each. It can also be used to get space information about a specific storage device, by provided a device ID.

***Message Pattern***: Request / Response

***Request Topic***: SERVICES/REQUEST/VIDEO\_RECORDER

***Response Topic***: Consumer provided

|  |  |  |  |
| --- | --- | --- | --- |
| **Message Name** | **Message Element Name** | **DataType** | **Description** |
| ListStorageDeviceInfoReq | feature\_short\_name | string | Short name of the Feature requesting the data. Must match feature name used when making recording requests. |
|  | storage\_device\_id | string | Optional Id of a specific device. If not provided, information on all connected devices will be returned. |
| ListStorageDeviceInfoRsp | req\_stat | Enum RequestStatus | Status of the request |
|  | error\_detail | Enum ErrorDetail | Any error that may have occurred. |
|  | storage\_device\_status | Structure  StorageStatuses | Storage space information, repeating for each connected device unless a specific device was requested. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Update parameter names to feature\_short\_name and storage\_device\_id for consistency |

### IR-REQ-436534/A-ListSupportedMetadata

***Purpose***: Used by the consumer to request a list of supported vehicle metadata that can be logged along with the video recording. This will include a description of the data provided and it’s privacy classification. Data that is classified as PII or Sensitive is required to be encrypted by the privacy / security teams.

***Message Pattern***: Request / Response

***Request Topic***: SERVICES/REQUEST/VIDEO\_RECORDER

***Response Topic***: Consumer provided

|  |  |  |  |
| --- | --- | --- | --- |
| **Message Name** | **Message Element Name** | **DataType** | **Description** |
| ListSupportedMetadataReq |  |  |  |
| ListSupportedMetadataRsp | req\_stat | Enum RequestStatus | Status of the request |
|  | error\_detail | Enum ErrorDetail | Any error that occurred. |
|  | supported\_metadata | Repeated Structure  MetadataInformation | Repeated list of metadata field names, PII classifications, and descriptions. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

### IR-REQ-408895/B-PublishRecordingHeartBeat

***Purpose***: This message is broadcast every 500 ms, while any recording is in progress. Any consumer may monitor this broadcast in order to activate a recording indicator (like an LED) to inform vehicle occupants, or those surrounding the vehicle that recording is in progress.

MVP requirement is only to indicate if any recording is in progress (ON/OFF). There is no need to identify which camera view is getting recorded.

***Message Pattern:*** Broadcast – Periodic every 500 ms

***Data Topic:*** SERVICES/DATA/VIDEO\_RECORDER/HEARTBEAT

|  |  |  |  |
| --- | --- | --- | --- |
| **Message Name** | **Message Element Name** | **Data Type** | **Description** |
| PublishRecordingHeartBeat | recording\_state | Boolean | True when recording is active |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 25-Mar-2022 13:26 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Provide additional granularity of topic name |

### IR-REQ-408941/B-PublishRecordingStatus

***Purpose:*** Broadcast message with the status of any in-progress recording requests as the status changes over time. Statuses may go from recording, to paused, then back to recording, and later change to completed, or it may go into one of several failed states.

***Message Pattern:*** Broadcast On Change

***Data Topic:*** SERVICES/DATA/VIDEO\_RECORDER/RECORDING\_STATUS

|  |  |  |  |
| --- | --- | --- | --- |
| **Message Name** | **Message Element Name** | **Data Type** | **Description** |
| PublishRecordingStatus | recording\_status | Repeating Structure  RecordingSessionStatus | Status of every active recording session, every view within a session, and metadata if requested for that session. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 25-Mar-2022 13:26 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Provide additional granularity of topic name |

### IR-REQ-437501/B-FormatStorageDevice

***Purpose***: Used by the consumer to request the Video Recorder Service to format a specific USB Mass Storage Device.

***Message Pattern***: Request / Response

***Request Topic***: SERVICES/REQUEST/VIDEO\_RECORDER

***Response Topic***: Consumer provided

|  |  |  |  |
| --- | --- | --- | --- |
| **Message Name** | **Message Element Name** | **DataType** | **Description** |
| FormatStorageDeviceReq | storage\_device\_id | string | Device Id of the Mass Storage device to be formatted, which is connected via USB. |
| FormatStorageDeviceRsp | req\_stat | Enum RequestStatus | Status of the request |
|  | error\_detail | Enum ErrorDetail | Any error that occurred. |
|  | storage\_device\_status | Structure  StorageStatuses | Storage space information for the formatted device. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | - rename device\_id to storage\_device\_id for consistency. |

### IR-REQ-437502/B-TestStorageDevice

***Purpose***: Used by the consumer to request the Video Recorder Service to test a specific mass storage device, that is connect via a USB slot in the vehicle.

***Message Pattern***: Request / Response

***Request Topic***: SERVICES/REQUEST/VIDEO\_RECORDER

***Response Topic***: Consumer provided

|  |  |  |  |
| --- | --- | --- | --- |
| **Message Name** | **Message Element Name** | **DataType** | **Description** |
| TestStorageDeviceReq | storage\_device\_id | string | Device Id of a Mass Storage device connect via USB. |
| TestStorageDeviceRsp | req\_stat | Enum RequestStatus | Status of request execution |
|  | error\_detail | Enum ErrorDetail | Error if any |
|  | device\_test\_result | Enum  TestResult | Result of the test, indicates if device is suitable or not suitable for recording video. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | - Rename parameter for device\_id to storage\_device\_id for consistency |

## Future Possible Contracts

Listed below are Interface requirements that may be added to the Video Recorder Service in the future, to fulfill nice to have requirements, or requirements of Features coming in later vehicle programs.

These are provided as information only; in case they might impact some current design or implementation considerations.

### IR-REQ-408868/B-PauseRecording

***Purpose***: Used by the consumer to pause an in-progress video recording. Note this will create a gap in both the video and the metadata being recorded.

***Message Pattern***: Request / Response

***Request Topic***: SERVICES/REQUEST/VIDEO\_RECORDER

***Response Topic***: Consumer provided

|  |  |  |
| --- | --- | --- |
| **Message Name** | **Message Element Data Type** | **Message Element Name** |
| PauseRecordingReq | string | recording\_id |
| PauseRecordingRsp | string | recording\_id |
|  | Enumeration  RequestStatus | req\_stat |
|  | Enumeration  ErrorDetail | error\_detail |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Update to recording\_id |

### IR-REQ-408869/B-ResumeRecording

***Purpose***: Used by consumer to Resume an in-progress video recording, that was previously paused.

***Message Pattern***: Request / Response

***Request Topic***: SERVICES/REQUEST/VIDEO\_RECORDER

***Response Topic***: Consumer provided

|  |  |  |
| --- | --- | --- |
| **Message Name** | **Message Element Data Type** | **Message Element Name** |
| ResumeRecordingReq | string | recording\_id |
| ResumeRecordingRsp | string | recording\_id |
|  | Enumeration  RequestStatus | req\_stat |
|  | Enumeration  ErrorDetail | error\_detail |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | update to recording\_id |

## Required Interface Contracts

The Video Recorder Service will need to utilize the following interfaces that are provided by other Software or ECUs.

### Video Stream Control Interfaces

The Video Recorder Service will utilize the following interfaces which are provided by the Camera Manager on ECG in order to start and stop the video stream of the desired Camera View or Views.

#### IR-REQ-404260/F-StartStream

***Purpose:*** This API will allow the consumer to start a video stream of a single camera view.

It can also be used to “reserve” a stream for a coordinated start by setting the “reserve\_for\_coordinated\_start” parameter to True. The consumer will receive the intended multicast IP address and port, allowing all recipients to connect to the address and join the multicast group prior to the stream starting.

If a stream is reserved, then the consumer that reserved it must send a Commence Reserved Stream request in order to start the video streaming. If a commence or cancelation request is not received in a reasonable amount of time, the reservation will be automatically canceled or started depending on the presence of other consumers for that stream.

***Message Pattern:*** Request / Response

***Request Topic:*** SERVICES/REQUEST/CAMERA\_MANAGER/STREAM\_CONTROL

***Response Topic:*** < Consumer Provided >

Notes:

* If the requested resolution, framerate, and bitrate are not supported by the requested view, it will still stream but at the default settings for that view.
* Subsequent requests for an already streaming view will be directed to the in-progress stream, with the existing configuration (resolution, framerate, and bitrate). The consumer must still send a stop request when no longer interested in the view.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Message Name** | | **Data Type** | **Message Element Name** | **Description** | |
| StartStreamReq | | enum | \_api\_version | Version of the software interface. see \_ApiVersion Enumeration in the info.proto file. | |
|  | | Enum  CameraView | camera\_view | The view requested. | |
|  | | Enum  Resolution | resolution | Desired resolution for the stream | |
|  | | Enum  FrameRate | frame\_rate | Desired frame rate for the stream | |
|  | | Enum  BitRate | bit\_rate | Desired bitrate for the stream | |
|  | | uint32 | power\_severity\_level | Power severity of the feature or function for use when voting to power the camera controllers with VPSM.  NOTE: all key off activities need to be evaluated by power supply team, Hussein Berry or Z Deljevic, in order to get severity assigned. | |
|  | | string | client\_id | Client Id of the consumer, for use in power requests to VPSM in order to power the camera controller. | |
|  | | bool | reserve\_for\_coordinated\_start | When set to true Camera Manager will reserve a multicast port for the stream request, but not initiate the stream until it receives a commence reserved stream request.  Default will be False | |
| StartStreamRsp | | Enum  RespStatus | response\_status | Status of request. | |
|  | | uint32 | stream\_id | Stream\_id is an auto generated uid by Camera Manager for each video stream. This is used later to change or stop the stream. | |
|  | | string | ip\_address | Multicast IP Address where the stream can be received (recipient must bind and join the multicast group). | |
|  | | uint32 | port | Multicast port where the stream can be received. | |
|  | | Enum  StreamType | stream\_type | Type of stream the consumer will be joining.  This can help the consumer determine if the stream is already in progress or a reserved stream that will not start until the reserving client sends a commence request. | |
|  | Enum  CameraView | | camera\_view | The view requested. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | F |
| **Revision Date** | 24-Jan-2022 14:25 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Add Camera View to response  Add "S" to "SERVICE" in topic name |

#### IR-REQ-404261/F-StopStream

***Purpose:*** This API will allow the consumer to stop a particular video stream. If there is more than one recipient of the stream, then Camera Manager will only stop the video stream when the last recipient sends a stop request.

***Message Pattern:*** Request / Response

***Request Topic:*** SERVICES/REQUEST/CAMERA\_MANAGER/STREAM\_CONTROL

***Response Topic:*** < Consumer Provided >

Note: It is the consumers responsibility to make sure stop requests are successful. This may mean retrying until a successful response is received, particularly in the event of a communication disruption or system crash. The consumer should persist knowledge about active video streams, and upon restart, ensure that it sends stop requests for any streams that were in process prior to the failure.

|  |  |  |  |
| --- | --- | --- | --- |
| **Message Name** | **Data Type** | **Message Element Name** | **Description** |
| StopStreamReq | enum | \_api\_version | Version of the software interface. see \_ApiVersion Enumeration in the info.proto file. |
|  | uint32 | stream\_id | Stream Id that is to be stopped. |
|  | Enum  CameraView | camera\_view | The view to be stopped. |
|  | string | client\_id | Client Id of the consumer, for use in power requests to VPSM in order to appropriately remove vote to power the camera controller. |
| StopStreamRsp | enum | response\_status | Status of request, see RespStatus enum. |
|  | uint32 | stream\_id | Stream\_id is an auto generated uid by Camera Manager for each video stream. This is sent in the response for consistency and to help consumer with any tracking. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | IR - Interface Requirement |
| **Requirement Revision** | F |
| **Revision Date** | 24-Jan-2022 14:25 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Add Stream\_Id to response  Add "S" to "SERVICE" in topic name |

# Configuration Requirements

The Video Recorder Service will require the configuration information listed below to be stored in non-volatile memory or in configuration DIDs.

## DCR-REQ-410444/B-General Configurations

Below is a list of general data configurations that should be maintained in order for   
Video Recorder Service to fulfil the functional and non-functional requirements.

The size, and initial or default values below are recommendations only, and are subject to change during development and testing.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name / Purpose** | **Data Type** | **Size** | **Recommended Initial / Default Value** | **Units** |
| **Camera\_Time\_Out**  The amount of time Video Recorder should wait for a response from Camera Manager. | int | 4 digits | 0800 | milliseconds |
| **Camera\_Retry**  The number of times Video Recorder should retry sending a request to the camera manager when no response is received back. | int | 1 digit | 0 | N/A |
| **Out\_Of\_Space\_Min**  Used to trigger deletion of unprotected files for Out of Space Strategy, when Free Space is less than or equal to this value.  Also used to trigger an Out Of Space warning in the recording status when Available\_Space is less than or equal to this value. | int |  | TBD during implementation |  |
| **Available\_Space\_Min**  Used to terminate recording when “Available Space” is less than or equal to this value.  Also used for selecting a storage device under some circumstances. “Available Space” must be greater than this value to start a recording. | int |  | TBD during implementation |  |
| **Metadata\_Frequency**  The frequency at which metadata shall be gathered and written to the file. | int | 4 digits | 0200 | milliseconds |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | DCR - Diagnostic Configuration Requirement |
| **Requirement Revision** | B |
| **Revision Date** | 18-Oct-2021 10:43 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** | Added metadata\_frequency |

## DCR-REQ-436741/A-List Metadata Configuration

The Video Recorder Service will need to store and maintain the information below to provide the consumer with information about the metadata that can be logged along with the video recording.

If more supported metadata is added in the future the listed information will be expanded.

|  |  |  |
| --- | --- | --- |
| Metadata Name | Privacy Classification | Description |
| Date | Not PII | Date in mm-dd-yyyy format. |
| Time | Not PII | Time of day in 24 hour format, like 21:15:12 |
| Vehicle Speed | Sensitive | Vehicle Speed as displayed in the Instrument Panel, either in Miles per hour (mph) or kilometers per hour (km/h) |
| Vehicle Location | PII | The GNSS information below will be provided |
| Latitude | PII | In degree format, DDD° MM' SS.S" [N / S]. Sample - 32° 18' 23.1" N |
| Longitude | PII | In degree format, DDD° MM' SS.S" [W / E]. Sample - 122° 36' 52.5" W |
| Altitude | PII | Feet or meters above Mean Sea Level (MSL) |
| Heading | PII | Compass direction |
| VIN | PII | The Vehicle Identification Number of the vehicle where the recording was made. |
| Gas Pedal Position | Sensitive | A percentage interpretation of the Accelerator pedal position:  0% = released pedal.  100% = maximum pedal. |
| Braking Torque | Sensitive | Indication of braking force in newton\*meters (nm).  Includes braking applied by:  - Driver request (brake pedal)  - Adaptive Cruise Control system  - Collision Mitigation by Braking (CMbB) system |
| Driver Braking Indication | Sensitive | Indicates if the driver is braking by pushing on the brake pedal (Yes or No). |
| Perimeter Alarm Triggers | Not PII | The current trigger for a Perimeter alarm event. |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | DCR - Diagnostic Configuration Requirement |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

## Metadata Sources

The table below provides information on possible sources for the supported metadata.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Metadata Name** | **VIM Service** | **Primitive Name / CAN Signal** | **Units** | **Translation Required** |
| Date | GLOBALCLOCK | GlblClkYr\_No\_Actl  GlblClkDay\_No\_Actl | N/A | N |
| Time | GLOBALCLOCK | GlblClkHr\_No\_Actl  GlblClkMnte\_No\_Actl  GlblClkScnd\_No\_Actl | N/A | N |
| Vehicle Speed | New –  To be requested as part of implementation | Veh\_V2\_Dsply  Or  Veh\_V\_Dsply  And  MetricActv\_B\_Dsply | km/h  or mph | Y  (for units) |
| VIN | New or SPCMVDMVEHICLESTATUSSERVICE  Or  CAN\_AUTHENTICATION | N/A | N/A | N |
| Vehicle Location1 |  |  |  |  |
| - Latitude | GNSSINFOWITHDEADRECKONING | GNSS\_Loc1\_LatDegInt  GNSS\_Loc1\_LatSign  GNSS\_Loc1\_LatDegFrac | Degrees o | ? |
| -Longitude | GNSSINFOWITHDEADRECKONING | GNSS\_Loc1\_LongDegInt  GNSS\_Loc1\_LongDegFrac  GNSS\_Loc1\_LongSign | Degrees o | ? |
| - Altitude | GNSSEXTRAINFO | GNSS\_Loc2\_MslAlt |  | N |
| -Heading | GNSSEXTRAINFO | GNSS\_Loc2\_Heading  Or ?  GNSS\_Loc2\_CompDir |  | N |
| Perimeter Alarm Trigger | New –  To be requested as part of implementation | PrmtrAlrmEvnt\_D\_Stat | N/A | Y |
| Gas Pedal Position | New –  To be requested as part of implementation | ApedPos\_Pc\_ActlArb | Percent % |  |
| Driver Braking | New –  To be requested as part of implementation | BpedDrvAppl\_D\_Actl | N/A | Y |
| Brake Torque | New –  To be requested as part of implementation | BrkTot\_Tq\_RqArb | Nm  (Newton meters) | N |

1 – May need to use Shifted GNSS in China Market

## DCR-REQ-436750/A-Metadata Translations

The Video Recorder Service shall utilize the following translation information for the specified metadata fields. This information could be hard coded, persisted in memory, or kept as configuration information.

|  |  |  |  |
| --- | --- | --- | --- |
| **Metadata Name** | **CAN Signal** | **Value** | **Interpretation** |
| Vehicle Speed Units | MetricActv\_B\_Dsply | 0 | mph |
| 1 | km/h |
| Driver Braking | BpedDrvAppl\_D\_Actl | 0 | fault |
| 1 | No |
| 2 | Yes |
| 3 | fault |
| Perimeter Alarm Trigger | PrmtrAlrmEvnt\_D\_Stat | 0x0 | NULL |
|  |  | 0x1 | DF\_DOOR |
|  |  | 0x2 | DR\_DOOR |
|  |  | 0x3 | PF\_DOOR |
|  |  | 0x4 | PR\_DOOR |
|  |  | 0x5 | HOOD |
|  |  | 0x6 | DECKLID |
|  |  | 0x7 | LG\_DOOR |
|  |  | 0x8 | IGN\_TAMPER |
|  |  | 0x9 | INCLINATION |
|  |  | 0xA | INTRUSION |
|  |  | 0xB | PANIC |
|  |  | 0xC | POST\_CRASH |
|  |  | 0xD | SHOCK\_SENSOR |
|  |  | 0xE | TRAILER |
|  |  | 0xF | DIAG\_TAMPER |

|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | DCR - Diagnostic Configuration Requirement |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

## DCR-REQ-437650/A-Unwritable Devices

The Video Recorder Service shall maintain a list of Device IDs that were tested and found that the service could not write to them. This shall be persisted across ignition cycles. The list will be used when selecting an appropriate Storage device at the time of recording, and when providing storage device information to the consumer.

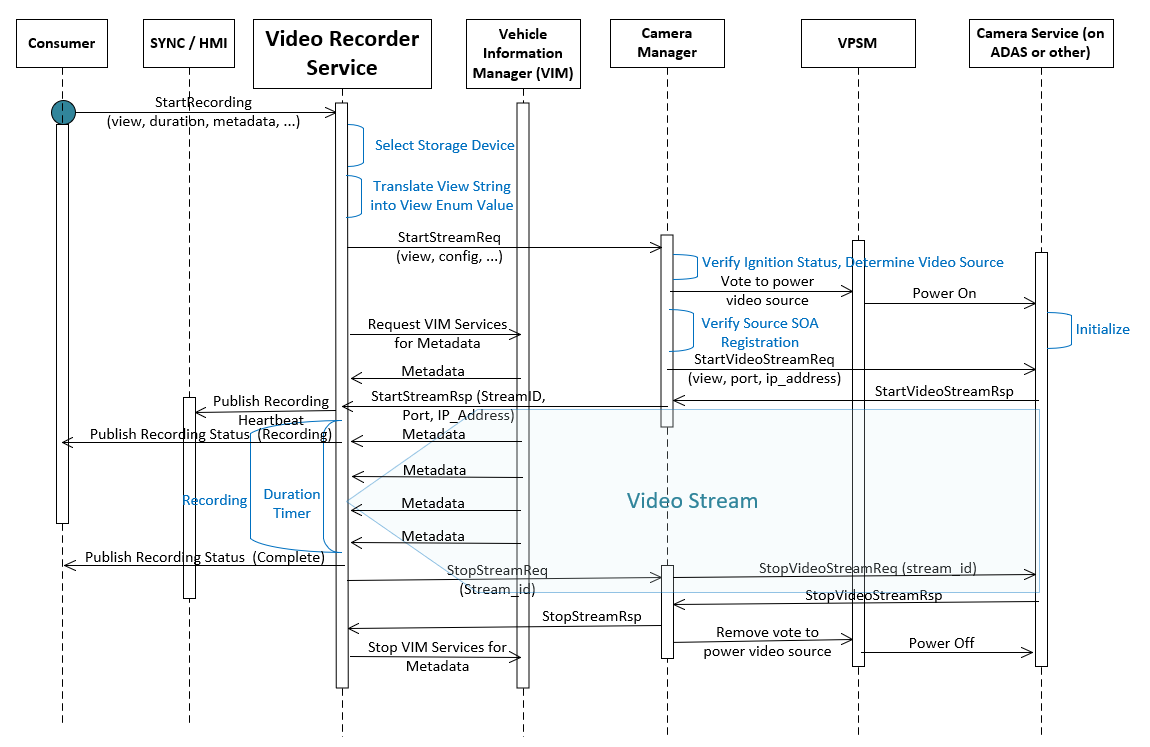
|  |  |
| --- | --- |
| **Requirement Information** | |
| **Requirement Type** | DCR - Diagnostic Configuration Requirement |
| **Requirement Revision** | A |
| **Revision Date** | 27-Aug-2021 13:31 |
| **Revised By** | Morris, Melissa (mmorr183) |
| **Revision Status** | Released |
| **Revision Comments** |  |

# Service Behavior Diagrams

## Recording Sequence Diagram

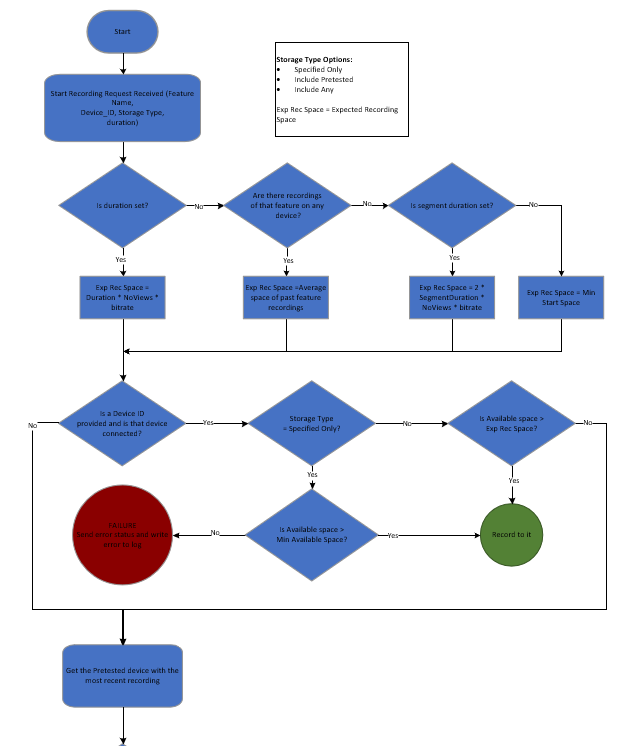
Below is a sample sequence diagram depicting the happy path for a consumer requesting to record a view for a set duration.

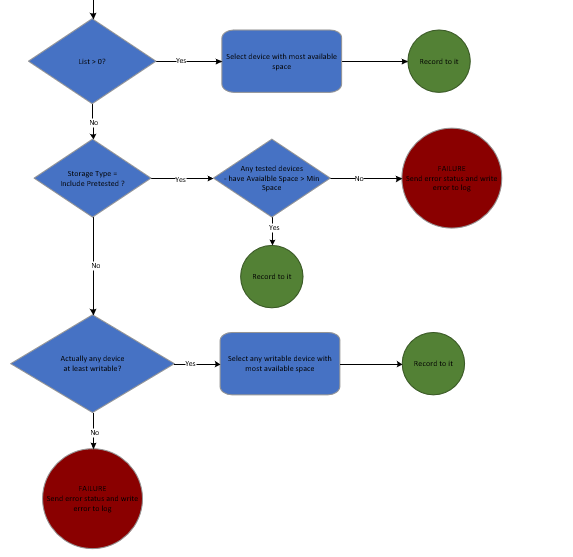
In this example the consumer did NOT arrange the video stream in advance, so the Video Recorder Service must request the video stream from Camera Manager. Ignition is off and Camera Manager must power the video source.



## System Selects Storage Device

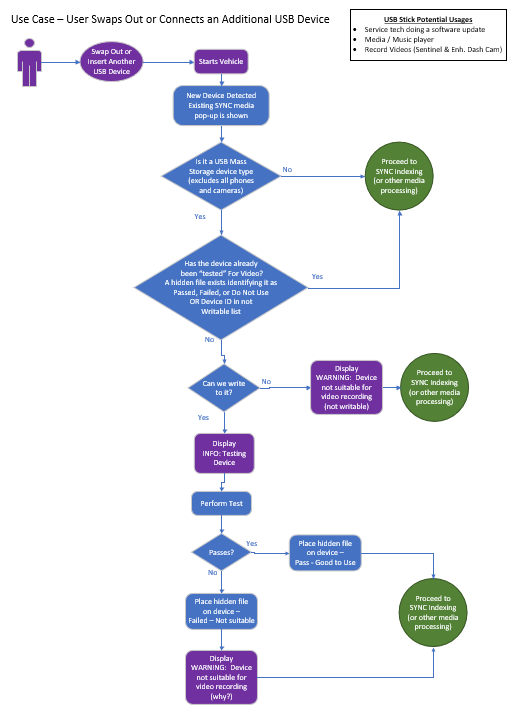
Below is an activity diagram with a recommended flow for selecting the appropriate storage device at the beginning of a recording session.





## Detect New USB Device Connected

Below is an activity diagram for a recommended flow when a new USB Device is detected in the vehicle.



# GPB Files (GitHub Links)

The Google Protobuf (GPB) files, used as interface definition language for coding, are available from several sources.

**Released in VSEM under:**

Function Group: Fn009448

Function ID: Fn015482

VSEM Document: VDOC101993

Note: The actual Proto Files are found under “General Data Artifacts” of the Function, using the My Team Center View.

**Github Repository:**

**Draft GBP Files are at:** <https://github.ford.com/sw-architecture/idl/tree/master/Services/VideoRecorderService>

Note: The Proto Buf files are still being created/updated.

**Master Ford GBP Repository is**: <https://github.ford.com/FNV/idl>

Please note that once an in house development team is engaged to work on the Video Recorder Service, the GPB files will be moved from the Draft location above to the common Ford Master Repository.