**Drive Video Record**

**UART Communication PROTOCOL**

**V1.1**

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**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Ver** | **Notes** | |
| **June. 17, 2022** | **1.0** | * **Initial Release** | **Niu, Kobe (Y.) initial.** |
| **Dec. 03, 2022** | **1.1** | * **Update all sections according to UE V4.0.0** | **Niu, Kobe (Y.) update.** |
|  |  |  |  |

# **Overview**

The interaction between DVR user and DVR system mainly depends on APIM HMI, communication between IDCM and APIM is based on a UART channel over FPD-Link, UART will be used to synchronize DVR system work status and HMI command control, this document defines the UART message layout.

# **Message Frame Structure**

Message frame consists of below elements:

1. Frame Head: 0xAA, 0x55
2. Data Block
3. ~~Frame Tail: 0xA5, 0x5A~~

And data block consists of below elements:

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Length | Flag | Description |
| 1 | 1 | Type | Data type to Synchronize the purpose of the data usage |
| 2 | 1 | Sub Type | Sub data type to Synchronize the purpose of the data usage |
| 3 | 1 | Data Length | The whole data block length |
| 4 ~ 3+N | N | Data | Content of data, length is N, N>0 |
| 4+N | 1 | Checksum | Checksum from #1 to #(3+N) |

Message frame example:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Position | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | ~~#9~~ | ~~#10~~ |
| Flag | Frame Head | Frame Head | Type | Sub Type | Data Length | Data | Data | Checksum | ~~Frame Tail~~ | ~~Frame Tail~~ |
| Example | 0xAA | 0x55 | 0x11 | 0x01 | 0x02 | 0x21 | 0x36 | 0x6B | ~~0xA5~~ | ~~0x5A~~ |

# **UART Configuration**

UART configuration:

* Baud Rate: 9600 or 38400
* Stop Bit: 1
* Data Bits: 8
* Parity Check: No

# **Heartbeat Message Requirement**

Heartbeat message is used to synchronize the alive status of IDCM and APIM, IDCM and APIM will handshake periodically, heartbeat message will also include DVR working status and error status to make sure the synchronization between IDCM and APIM HMI.

## First Launch Strategy

As APIM may need long time to startup, the first heartbeat message should be initialed by APIM, once IDCM receive it, IDCM should start to send heartbeat message <IDCM\_Heartbeat\_Enum> to APIM every 250ms, and APIM should feedback heartbeat message <APIM\_Heartbeat\_Enum> immediately. Heartbeat message should also contain a increasing counter number to label the message sequence.

## Heartbeat Message Timeout Strategy

If IDCM could not receive APIM heartbeat feedback msg in 1 seconds, IDCM should record the error status and keep sending IDCM heartbeat msg until get feedback, the heartbeat counter should keep increasing.

If APIM could not receive DVR heartbeat msg in 1 seconds, APIM should record error status and DTC code, then pop up Error msg to customer, all DVR HMI control should not be available.

# **Application Message Requirement**

Application message is used to support data exchange between IDCM and APIM, which defined in section 6 and section 7.

## HMI Command Message Timeout Strategy

If a command msg <APIM\_HMICommand\_Enum> is sent from APIM to IDCM, and APIM could not receive IDCM <Command Reception Succeed> msg, APIM should keep sending same msg max to 3 times, then APIM should record error status and DTC code, then pop up Error msg to customer.

## Key Performance Strategy

Below strategy should be met:

|  |  |
| --- | --- |
| Wakeup / Sleep | Once ECU boots up, message should be published.  Once ECU falls asleep, message publishing should stop. |
| ECU Reset | Fresh data on ECU Reset. |
| Missing/Invalid | Missing Strategy: ECU should record an error status until recover.  Invalid Strategy: Ignore message value. |

# **Message from IDCM to APIM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type | Sub Type | Name | TX Model | Interval (ms) |
| 0x01 | 0x01 | IDCM\_Heartbeat\_Int | Event & Periodic | 1000 |
| 0x02 | 0x01 | IDCM\_CommandRsp\_Enum | Event | / |
| 0x02 | IDCM\_RecordProgress\_Int | Event & Periodic | 1000 |
| 0x03 | IDCM\_FileOptProgress\_Int | Event & Periodic | 500 |
| 0x04 | IDCM\_BrowseLocation\_Int | Event & Periodic | 500 |
| 0x03 | 0x01 | IDCM\_EmergencyVideoInfo\_Int | Event | / |
| 0x04 | 0x01 | IDCM\_NormalVideoSwitch\_Enum | Event | / |
| 0x02 | IDCM\_VehicleMonitorSwitch\_Enum | Event | / |
| 0x03 | IDCM\_SetEmergencyDuration\_Enum | Event | / |
| 0x04 | IDCM\_SetCollideSensitive­\_Enum | Event | / |
| 0x05 | 0x01 | IDCM\_WiFiHotspotSwitch\_Enum | Event | / |
| 0x02 | IDCM\_WiFiSSID\_ASCII | Event | / |
| 0x03 | IDCM\_WiFiPASSWD\_ASCII | Event | / |
| 0x06 | 0x01 | IDCM\_SystemInfoRsp\_Int | Event | / |
| 0x07 | 0x01 | IDCM\_UpgradeStatus\_Enum | Event & Periodic | 1000 |
| 0x08 | 0x01 | IDCM\_VINCodeReq\_Enum | Event | / |
| 0x09 | 0x01 | IDCM\_BackDoorRsp\_Enum | Event | / |
| 0x0A | 0x01 | IDCM\_DVRDiagRsp\_Enum | Event | / |
| 0x0B | 0x01 | IDCM\_LoadshieldRsp\_Enum | Event | / |

## IDCM Heartbeat Message [Type:0x01]

### IDCM\_Heartbeat\_Int [Type:0x01][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Heartbeat Count | 0x00~0xFF | 8 | 1 | 7 | 0x00 | Cycle from 0x00 to 0xFF, start from 0x00 |
| 2 | Video Output Page | 1. Liveview Page 2. Normal Data List Page 3. Key Data List Page 4. TF Data List Page 5. Video Playing Page 6. Photo Playing Page   Other: Reserved | 4 | 2 | 7 | 0x01 | IDCM LVDS video output page |
| 3 | Video Record Status | 1. Normal Recording 2. Emergency Recording 3. Manual Recording 4. No Recording 5. System Failure   Other: Reserved | 4 | 2 | 3 | 0x04 | IDCM video recording status |
| 4 | Engineering Mode Status | 1. Disabled 2. Enabled   Other: Reserved | 2 | 3 | 7 | 0x01 | IDCM should disable most of the function in Engineering mode |
| 5 | Wi-Fi Connection Status | 1. Hotspot Disabled 2. No Connection 3. Connection Successful 4. Initializing 5. Error   Other: Reserved | 4 | 3 | 5 | 0x01 | IDCM Wi-Fi connection status |
| 6 | DVR System Failure Status | 1. No Error 2. System Error Exist   Other: Reserved | 2 | 3 | 1 | 0x01 | DVR system failure status |
| 7 | Lens Block Status | 1. Normal 2. Blocked | 1 | 4 | 7 | 0x01 | IDCM lens block status |
| 8 | Image Sensor Status | 1. Normal 2. Error | 1 | 4 | 6 | 0x01 | IDCM image sensor status |
| 9 | eMMC Status | 1. Normal 2. EOL—End of Life 3. Error 4. Reserved | 2 | 4 | 5 | 0x01 | IDCM eMMC status |
| 10 | TF Card Status | 1. TF Pull Out 2. TF Inserted 3. TF Full 4. TF Need Format 5. TF Error 6. TF Format Ongoing   Other: Reserved | 4 | 4 | 3 | 0x01 | TF card status |

## IDCM Operation Feedback Message [Type:0x02]

### IDCM\_CommandRsp\_Enum [Type:0x02][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | DVR Command Response | 1. Enter Live View Page 2. Enter Normal Data Page 3. Enter Key Data Page 4. Enter TF Data Page   -------------------------------------------------   1. Photo Capture 2. Video Capture 3. Stop Video Capture 4. Smart Copy(一键锁存)   -------------------------------------------------   1. Scroll to Previous Page 2. Scroll to Next Page 3. File Edit Mode 4. File List Mode 5. Select All File 6. Unselect All File 7. TF Card Copy 8. TF Card Copy Stop 9. TF Card Delete 10. TF Card Delete Stop   -------------------------------------------------   1. Play Previous File 2. Play Next File 3. Video Screenshot   -------------------------------------------------   1. Format TF Card 2. DVR Setting Reset 3. Start SW Update(reserve)   Other: Reserved | 8 | 1 | 7 | 0xFF | Command type feedback to APIM |
| 2 | DVR Command Result | 1. Command Reception Succeed 2. Command Reception Failed 3. Command Execution Succeed 4. Command Execution Failed   Other: Reserved | 8 | 2 | 7 | 0xFF | Command reception and execution result feedback to APIM |
| \* If all the other command control logic in this FIS should follow the same command reception strategy: If DVR Command Result == Command Reception Failed or APIM could not receive this response in 2 seconds (reception timeout), APIM should try to send the command another 3 times, and if still get DVR Command Result == Command Reception Failed or reception timeout, APIM should pop up a command failure result to customer. | | | | | | | |

### IDCM\_RecordProgress\_Int [Type:0x02][Subtype:0x02]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Video Recording Timer | 0x00~0xB4  Other: Reserved | 8 | 1 | 7 | 0xFF | Video recording timer, unit is second, which is used to update manual or emergency video recording timestamp |

### IDCM\_FileOptProgress\_Int [Type:0x02][Subtype:0x03]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Operation Type | 1. File Copy 2. File Deletion   Other: Reserved | 8 | 1 | 7 | 0xFF | File operation type |
| 2 | Total Files Selected | 0x0000~0xFFFF | 8\*2 | 2 | 7 | 0xFFFF | The quantity of file selected to operation |
| 3 | Qty of Complete | 0x0000~0xFFFF | 8\*2 | 4 | 7 | 0xFFFF | The quantity of operation complete |
| 4 | Operation Progress | 0x00~0x64 (0%~100%)  Other: Reserved | 8 | 6 | 7 | 0xFF | Operation complete progress |

### IDCM\_BrowseLocation\_Int [Type:0x02][Subtype:0x04]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | File List Mode | 1. List Mode 2. Edit Mode   Other: Reserved | 8 | 1 | 7 | 0x01 | File list mode send to APIM |
| 2 | File Folder Status | 1. Empty 2. Not Empty   Other: Reserved | 8 | 2 | 7 | 0xFF | Identify current file folder status |
| 3 | File Selected Status | 1. All Selected 2. All Unselected   0xFF=Invalid  Other: Reserved | 8 | 3 | 7 | 0x02 | Identify current file selection status |
| 4 | Qty of Files Selected | 0x0000~0xFFFF | 8\*2 | 4 | 7 | 0xFFFF | The quantity of file selected by customer |

## IDCM Emergency Video Message [Type:0x03]

### IDCM\_EmergencyVideoInfo\_Int [Type:0x03][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Qty of Video | 0x01~0x0A  Other: Reserved | 8 | 1 | 7 | 0xFF | Synchronize the number of video captured as emergency video record or vehicle monitor result |
| 2 | Type of Video | 1. Emergency Video 2. Vehicle Monitor Video   Other: Reserved | 8 | 2 | 7 | 0xFF | Synchronize the type of video captured |

## IDCM Setting Feedback Message [Type:0x04]

### IDCM\_NormalVideoSwitch\_Enum [Type:0x04][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Normal Video Switch Response | 1. Enabled 2. Disabled   Other: Reserved | 8 | 1 | 7 | 0xFF | IDCM feeds back the normal video switch status |

### IDCM\_VehicleMonitorSwitch\_Enum [Type:0x04][Subtype:0x02]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Vehicle Monitor Switch Response | 1. Enabled 2. Disabled   Other: Reserved | 8 | 1 | 7 | 0xFF | IDCM feeds back the vehicle monitor switch status |

### IDCM\_SetEmergencyDuration\_Enum [Type:0x04][Subtype:0x03]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Emergency Video Duration Response | 0x01: 15 seconds  0x02: 30 seconds  0x03: 45 seconds  Other: Reserved Other: Reserved | 8 | 1 | 7 | 0xFF | IDCM feeds back the emergency video duration |

### IDCM\_SetCollideSensitive\_Enum [Type:0x04][Subtype:0x04]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Collision Detection Sensitive Level | 1. High 2. Middle 3. Low   Other: Reserved | 8 | 1 | 7 | 0xFF | IDCM feeds back the collision detection sensitive level |

## IDCM WiFi Information Message [Type:0x05]

### IDCM\_WiFiHotspotSwitch\_Enum [Type:0x05][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Wi-Fi Hotspot Switch Response | 1. Enabled 2. Disabled   Other: Reserved | 8 | 1 | 7 | 0xFF | IDCM feeds back the DVR Wi-Fi hotspot function switch status |

### IDCM\_SetWiFiSSID\_ASCII [Type:0x05][Subtype:0x02]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | DVR Wi-Fi SSID Response | 0x21~0x7E  Other: Invalid Value | 8\*12 | 1 | 7 | 0xFF\*12 | IDCM feeds back the DVR Wi-Fi hotspot SSID in ASCII format |

### IDCM\_SetWiFiPSWD\_ASCII [Type:0x05][Subtype:0x03]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | DVR Wi-Fi Password Response | 0x21~0x7E  Other: Invalid Value | 8\*8 | 1 | 7 | 0xFF\*8 | IDCM feeds back the DVR Wi-Fi hotspot password in ASCII format |

## IDCM System Information Message [Type:0x06]

### IDCM\_SystemInfoRsp\_Int [Type:0x06][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | IDCM SW Version | 0x00~0x63  Other: Invalid Value | 8\*2 | 1 | 7 | 0xFF\*2 | Example: vXX.YY  Byte #1 is XX.  Byte #2 is YY. |
| 2 | IDCM eMMC Storage | 0x00~0x64  Other: Invalid Value | 8\*5 | 3 | 7 | 0xFF\*5 | Byte #1: Percent of normal video  Byte #2: Percent of Emergency video  Byte #3: Percent of manual video  Byte #4: Percent of manual photo  Byte #5: Percent of idle space |
| 3 | IDCM TF Card Storage | 0x00~0x64  Other: Invalid Value | 8\*5 | 8 | 7 | 0xFF\*5 | Byte #1: Percent of normal video  Byte #2: Percent of Emergency video  Byte #3: Percent of manual video  Byte #4: Percent of manual photo  Byte #5: Percent of idle space |
| 4 | TF Card Size | 0x08~0x100  Other: Invalid Value | 8 | 13 | 7 | 0xFF | Size of TF card |

## IDCM Software Update Message [Type:0x07]

### IDCM\_UpgradeStatus\_Enum [Type:0x07][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | IDCM Upgrade Status | 1. Need To Update S/W 2. MCU Updating 3. DSP Updating 4. Update Succeed 5. Update Failed   Other: Reserved | 8 | 1 | 7 | 0xFF | IDCM SW update status |
| 2 | IDCM Upgrade Progress | 0x00~0x64  Other: Reserved | 8 | 2 | 7 | 0xFF | IDCM SW update progress |

## IDCM VIN Request Message [Type:0x08]

### IDCM\_VINCodeReq\_Int [Type:0x08][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Request VIN | 1. Request   0xFF=Invalid  Other: Reserved | 8 | 1 | 7 | 0xFF | IDCM requests VIN from APIM |

## IDCM Backdoor Response Message [Type:0x09]

### IDCM\_BackDoorRsp\_Int [Type:0x09][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Engineering Mode Response | 1. Disabled 2. Enabled   Other: Reserved | 8 | 1 | 7 | 0x01 | Feedback to APIM if entered engineering mode |
| 2 | Clear Data Response | 1. Succeed 2. Failed   Other: Reserved | 8 | 1 | 7 | 0x01 | Feedback to APIM if all data in eMMC are cleared. |
| 3 | Veh\_Monitor Timer Response | 0x00~0x1E  Other: Reserved | 8 | 1 | 7 | 0x05 | Feedback to APIM the vehicle monitor function days timer |
| 4 | Veh\_Monitor Counter Response | 0x00~0x3C  Other: Reserved | 8 | 1 | 7 | 0x0A | Feedback to APIM the vehicle monitor function times counter |

## IDCM Diagnostic Response Message [Type:0x0A]

### IDCM\_DVRDiagRsp\_Int [Type:0x0A][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | G-Sensor Diagnostic | 1. Normal 2. Error   Other: Reserved | 2 | 1 | 7 | 1 | Diagnostic feedback to IVI |
| 2 | WiFi Module Diagnostic | 1. Normal 2. Error   Other: Reserved | 2 | 1 | 5 | 1 |
| 3 | eMMC Diagnostic | 1. Normal 2. Error   Other: Reserved | 2 | 1 | 3 | 1 |
| 4 | Image Sensor Diagnostic | 1. Normal 2. Error   Other: Reserved | 2 | 1 | 1 | 1 |
| 5 | TF Card Diagnostic | 1. Normal 2. Error   Other: Reserved | 2 | 2 | 7 | 1 |
| 6 | Reserved | Reserved | 6 | 2 | 5 | 0 |

## IDCM Loadshield Response Message [Type:0x0B]

### IDCM\_LoadshieldRsp\_Int [Type:0x0B][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Vehicle Loadshield Response | 1. Received   0xFF=Invalid  Other: Reserved | 8 | 1 | 7 | 0xFF | Feedback to APIM if received loadshield status |

# **Message from APIM to IDCM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type | Sub Type | Name | TX Model | Interval (ms) |
| 0x11 | 0x01 | APIM\_Heartbeat\_Enum | Event & Periodic | 1000 |
| 0x12 | 0x01 | APIM\_VehicleSpeed\_Int | Periodic | 20 |
| 0x02 | APIM\_Brake\_Enum | Event + Periodic | 200 |
| 0x03 | APIM\_VIN\_ASCII | Event | / |
| 0x04 | APIM\_Watermark\_Enum | Periodic | 500 |
| 0x13 | 0x01 | APIM\_HMICommand\_Enum | Event | / |
| 0x02 | APIM\_HMICoordinate\_Int | Event + Periodic | 100 |
| 0x14 | 0x01 | APIM\_NormalVideoSwitch\_Enum | Event | / |
| 0x02 | APIM\_VehicleMonitorSwitch\_Enum | Event | / |
| 0x03 | APIM\_SetEmergencyDuration\_Enum | Event | / |
| 0x04 | APIM\_SetCollideSensitive\_Enum | Event | / |
| 0x05 | APIM\_WiFiHotspotSwitch\_Enum | Event | / |
| 0x06 | APIM\_SetWiFiSSID\_ASCII | Event | / |
| 0x07 | APIM\_SetWiFiPSWD\_ASCII | Event | / |
| 0x08 | APIM\_ReqDVRInformation\_Enum | Event | / |
| 0x15 | 0x01 | APIM\_BackDoorReq\_Enum | Event | / |
| 0x16 | 0x01 | APIM\_DVRDiagReq\_Enum | Event | / |
| 0x17 | 0x01 | APIM\_LoadshieldReq\_Enum | Event | / |

## APIM Heartbeat Message [Type:0x11]

### APIM\_Heartbeat\_Enum [Type:0x11][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Heartbeat Count | 0x00~0xFF | 8 | 1 | 7 | 0x00 | Cycle from 0x00 to 0xFF, start from 0x00 |
| 2 | GPS Year Data | 0x00~0x63  0xFF: Invalid  Other: Reserved | 8 | 2 | 7 | 0xFF | Actually display year data = 0x7D0 (2000) + GPS Year Data |
| 3 | GPS Month Data | 0x01~0x0C  0xFF: Invalid  Other: Reserved | 8 | 3 | 7 | 0xFF | Month data value |
| 4 | GPS Day Data | 0x01~0x1F  0xFF: Invalid  Other: Reserved | 8 | 4 | 7 | 0xFF | Day data value |
| 5 | GPS Hour Data | 0x00~0x17  0xFF: Invalid  Other: Reserved | 8 | 5 | 7 | 0xFF | Hour data value |
| 6 | GPS Minute Data | 0x00~0x3B  0xFF: Invalid  Other: Reserved | 8 | 6 | 7 | 0xFF | Minute data value |
| 7 | GPS Second Data | 0x00~0x3B  0xFF: Invalid  Other: Reserved | 8 | 7 | 7 | 0xFF | Second data value |
| \*If APIM could not get GPS data from CAN, APIM should send all 0xFF to IDCM as GPS invalid. | | | | | | | |

## APIM Vehicle Data Collection [Type:0x12]

### APIM\_VehicleSpeed\_Int [Type:0x12][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Vehicle Speed | 0x0000~0xFFFF | 8\*2 | 1 | 7 | 0x0000 | Vehicle speed input  Unit: kph |

### APIM\_Brake\_Enum [Type:0x12][Subtype:0x02]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Vehicle Brake Pedal Status | 1. Driver\_Braking 2. Driver\_Not\_Braking   0xFF: Invalid  Other: Reserved | 8 | 1 | 7 | 0xFF | FNV2.1 CAN signal name: BpedDrvAppl\_D\_Actl  FNV2.1 CAN msg name: HS3-0x165  EngBrakeData  (Press brake pedal fully and release Signal has value "Driver\_Braking" when brake pedal fully pressed and "Driver\_not\_braking" when released) |

### APIM\_VIN\_ASCII [Type:0x12][Subtype:0x03]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | VIN Code | 0x30~0x39 or 0x41~0x5A | 8\*17 | 1 | 7 | 0x41\*17 | VIN number input, ASCII format |

### APIM\_Watermark\_Enum [Type:0x12][Subtype:0x04]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Vehicle Gear Position | 1. P 2. R 3. N 4. D   0xFF: Invalid  Other: Reserved | 8 | 1 | 7 | 0xFF | Gear Position input |
| 2 | Cluster Cornering Lamp Status | 1. Left 2. Right 3. Left & Right 4. Off   0xFF: Invalid  Other: Reserved | 8 | 2 | 7 | 0x04 | Cornering lamp status input |
| 3 | Cluster Seatbelt  Lamp Status | 1. On 2. Off   0xFF: Invalid  Other: Reserved | 8 | 3 | 7 | 0x02 | Seatbelt lamp status input |

## APIM Command Control Message [Type:0x13]

### APIM\_HMICommand\_Enum [Type:0x13][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | HMI Command | 1. Enter Live View Page 2. Enter Normal Data Page 3. Enter Key Data Page 4. Enter TF Data Page   -------------------------------------------------   1. Photo Capture 2. Video Capture 3. Stop Video Capture 4. Smart Copy(一键锁存)   -------------------------------------------------   1. Scroll to Previous Page 2. Scroll to Next Page 3. File Edit Mode 4. File List Mode 5. Select All File 6. Unselect All File 7. TF Card Copy 8. TF Card Copy Stop 9. TF Card Delete 10. TF Card Delete Stop   -------------------------------------------------   1. Play Previous File 2. Play Next File 3. Video Screenshot   -------------------------------------------------   1. Format TF Card 2. DVR Setting Reset 3. Start SW Update(reserve)   Other: Reserved | 8 | 1 | 7 | 0xFF | Command sent from APIM to IDCM |

### APIM\_HMICoordinate\_Int [Type:0x13][Subtype:0x02]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Finger Action Type | 1. Pressed 2. Moving 3. Released   0xFF: Invalid  Other: Reserved | 8 | 1 | 7 | 0xFF | Customer finger action type input to IDCM |
| 2 | X-Axis Coordinate | 0x00~0xFFFF | 8\*2 | 2 | 7 | 0xFFFF | X-Axis Coordinate of finger touch |
| 3 | Y-Axis Coordinate | 0x00~0xFFFF | 8\*2 | 3 | 7 | 0xFFFF | Y-Axis Coordinate of finger touch |

## APIM Setting Message [Type:0x14]

### APIM\_NormalVideoSwitch\_Enum [Type:0x14][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Normal Video Record Switch | 0x01: Enable  0x02: Disable  Other: Reserved | 8 | 1 | 7 | 0xFF | Enable or disable normal video record function |

### APIM\_VehicleMonitorSwitch\_Enum [Type:0x14][Subtype:0x02]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Vehicle Monitor Function Switch | 0x01: Enable  0x02: Disable  Other: Reserved | 8 | 1 | 7 | 0xFF | Enable or disable vehicle monitor function |

### APIM\_SetEmergencyDuration\_Enum [Type:0x14][Subtype:0x03]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Emergency Video Duration | 0x01: 15 seconds  0x02: 30 seconds  0x03: 45 seconds  Other: Reserved | 8 | 1 | 7 | 0xFF | DVR user could modify emergency video duration via this configuration |

### APIM\_SetCollideSensitive\_Enum [Type:0x14][Subtype:0x04]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | G-Sensor Collide Sensitive | 0x01: Low  0x02: Middle  0x03: High  Other: Reserved | 8 | 1 | 7 | 0xFF | DVR user could modify collide sensitive via this configuration, works for emergency video capture and vehicle monitor functions |

### APIM\_WiFiHotspotSwitch\_Enum [Type:0x14][Subtype:0x05]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Wi-Fi Hotspot Switch | 0x01: Enable  0x02: Disable  Other: Reserved | 8 | 1 | 7 | 0xFF | DVR user could enable or disable DVR Wi-Fi hotspot function via this configuration |

### APIM\_SetWiFiSSID\_ASCII [Type:0x14][Subtype:0x06]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | DVR Wi-Fi SSID | 0x21~0x7E  0xFF: Invalid | 8\*8~8\*12 | 1 | 7 | 0xFF\*8~  0xFF\*12 | DVR user could set DVR Wi-Fi hotspot SSID via this configuration, the SSID could contain max to 12 ASCII characters |

### APIM\_SetWiFiPSWD\_ASCII [Type:0x14][Subtype:0x07]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | DVR Wi-Fi Password | 0x21~0x7E  0xFF: Invalid | 8\*8 | 1 | 7 | 0xFF\*8 | DVR user could set DVR Wi-Fi hotspot password via this configuration, the password could contain max to 8 ASCII characters |

### APIM\_ReqDVRInformation\_Enum [Type:0x14][Subtype:0x08]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Request Type | 0x01: Request DVR Parameter  0x02: Request DVR WiFi Information  0x03: Request System Information  0xFF=Invalid  Other: Reserved | 8 | 1 | 7 | 0xFF | APIM requests DVR key information from IDCM |

## APIM Backdoor Request Message [Type:0x15]

### APIM\_BackDoorReq\_Enum [Type:0x15][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Engineering Mode Request | 1. Disable 2. Enable   0xFF=Invalid  Other: Reserved | 8 | 1 | 7 | 0x01 | APIM requests to entere engineering mode |
| 2 | Clear Data Request | 0x01: Request  0xFF=Invalid  Other: Reserved | 8 | 1 | 7 | 0xFF | APIM requests to clear all data in eMMC or TF card of IDCM |
| 3 | Veh\_Monitor Timer Request | 0x00~0x1E  0xFF=Invalid  Other: Reserved | 8 | 1 | 7 | 0x05 | APIM requests to change vehicle monitor function continue days |
| 4 | Veh\_Monitor Counter Request | 0x00~0x3C  0xFF=Invalid  Other: Reserved | 8 | 1 | 7 | 0x0A | APIM requests to change vehicle monitor function video counter |

## APIM DVR Diagnostic Request Message [Type:0x16]

### APIM\_DVRDiagReq\_Enum [Type:0x16][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Request IDCM Diagnostic | 0x01: Request  0xFF=Invalid  Other: Reserved | 8 | 1 | 7 | 0xFF | APIM requests IDCM Diagnostic |

## APIM DVR Loadshield Request Message [Type:0x17]

### APIM\_LoadshieldReq\_Enum [Type:0x17][Subtype:0x01]

Data structure:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ID | Name | Value | Size  (Bits) | Byte  Position | Bit  Position | Default  Value | Comments |
| 1 | Request Loadshield Status | 0x01: Request  0xFF=Invalid  Other: Reserved | 8 | 1 | 7 | 0xFF | APIM reports vehicle Loadshield Status to IDCM |