**DVR Communication UART PROTOCOL**

**V1.0**

**Revision History**

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Notes | Author | Date |
| V1.0 | Initial Release | Niu, Kobe (Y.) | Aug/01/2022 |

目录

[**1.** **Overview** 6](#_Toc110240605)

[**2.** **Message Frame Structure** 6](#_Toc110240606)

[**3.** **UART Communication Configuration** 6](#_Toc110240607)

[**4.** **Heartbeat Strategy** 6](#_Toc110240608)

[**5.** **Message from IDCM to APIM** 6](#_Toc110240609)

[5.1. IDCM Heartbeat Message [Type:0x01] 7](#_Toc110240610)

[5.1.1. IDCM\_Heartbeat\_Enum [Type:0x01][Subtype:0x01] 7](#_Toc110240611)

[5.2. IDCM Operation Feedback Message [Type:0x02] 8](#_Toc110240612)

[5.2.1. IDCM\_CommandRsp\_Enum [Type:0x02][Subtype:0x01] 8](#_Toc110240613)

[5.2.2. IDCM\_ProgressSync\_Int [Type:0x02][Subtype:0x02] 9](#_Toc110240614)

[5.2.3. IDCM\_VehicleMonitor\_Int [Type:0x02][Subtype:0x03] 9](#_Toc110240615)

[5.3. IDCM File List Message [Type:0x03] 9](#_Toc110240616)

[5.3.1. IDCM\_BrowseLocation\_Int [Type:0x03][Subtype:0x01] 9](#_Toc110240617)

[5.4. IDCM Setting Feedback Message [Type:0x04] 10](#_Toc110240618)

[5.4.1. IDCM\_NormalVideoSwitch\_Enum [Type:0x04][Subtype:0x01] 10](#_Toc110240619)

[5.4.2. IDCM\_SetNormalDuration\_Enum [Type:0x04][Subtype:0x02] 10](#_Toc110240620)

[5.4.3. IDCM\_SetManualDuration\_Enum [Type:0x04][Subtype:0x03] 10](#_Toc110240621)

[5.4.4. IDCM\_SetResolution\_Enum [Type:0x04][Subtype:0x04] 10](#_Toc110240622)

[5.4.5. IDCM\_SetCollideSensitive\_Enum [Type:0x04][Subtype:0x06] 10](#_Toc110240623)

[5.4.6. IDCM\_WatermarkSwitch\_Enum [Type:0x04][Subtype:0x08] 10](#_Toc110240624)

[5.5. IDCM WiFi Information Message [Type:0x05] 11](#_Toc110240625)

[5.5.1. IDCM\_WiFiHotspotSwitch\_Enum [Type:0x05][Subtype:0x01] 11](#_Toc110240626)

[5.5.2. IDCM\_SetWiFiSSID\_ASCII [Type:0x05][Subtype:0x02] 11](#_Toc110240627)

[5.5.3. IDCM\_SetWiFiPSWD\_ASCII [Type:0x05][Subtype:0x03] 11](#_Toc110240628)

[5.5.4. IDCM\_WiFiConnection\_Enum [Type:0x05][Subtype:0x04] 11](#_Toc110240629)

[5.6. IDCM System Information Message [Type:0x06] 11](#_Toc110240630)

[5.6.1. IDCM\_UpgradeStatus\_Enum [Type:0x06][Subtype:0x01] 11](#_Toc110240631)

[5.6.2. IDCM\_StorageStatus\_ASCII [Type:0x06][Subtype:0x02] 12](#_Toc110240632)

[**6.** **Message from APIM to IDCM** 12](#_Toc110240633)

[6.1. APIM Heartbeat Message [Type:0x11] 13](#_Toc110240634)

[6.1.1. APIM\_Heartbeat\_Enum [Type:0x11][Subtype:0x01] 13](#_Toc110240635)

[6.2. APIM Vehicle Data Collection [Type:0x12] 13](#_Toc110240636)

[6.2.1. APIM\_VehicleSpeed\_Int [Type:0x12][Subtype:0x01] 13](#_Toc110240637)

[6.2.2. APIM\_LowBeam\_Enum [Type:0x12][Subtype:0x02] 13](#_Toc110240638)

[6.2.3. APIM\_HighBeam\_Enum [Type:0x12][Subtype:0x03] 13](#_Toc110240639)

[6.2.4. APIM\_CorneringLamp\_Enum [Type:0x12][Subtype:0x04] 14](#_Toc110240640)

[6.2.5. APIM\_Airbag\_Enum [Type:0x12][Subtype:0x05] 14](#_Toc110240641)

[6.2.6. APIM\_ABS\_Enum [Type:0x12][Subtype:0x06] 14](#_Toc110240642)

[6.2.7. APIM\_Accelerate\_Enum [Type:0x12][Subtype:0x07] 14](#_Toc110240643)

[6.2.8. APIM\_Seatbelt\_Enum [Type:0x12][Subtype:0x08] 14](#_Toc110240644)

[6.2.9. APIM\_Brake\_Enum [Type:0x12][Subtype:0x09] 14](#_Toc110240645)

[6.2.10. APIM\_VIN\_ASCII [Type:0x12][Subtype:0x0A] 15](#_Toc110240646)

[6.3. APIM GPS Clock Synchronization Message [Type:0x13] 15](#_Toc110240647)

[6.3.1. APIM\_Year\_Int [Type:0x13][Subtype:0x01] 15](#_Toc110240648)

[6.3.2. APIM\_Month\_Int [Type:0x13][Subtype:0x02] 15](#_Toc110240649)

[6.3.3. APIM\_Day\_Int [Type:0x13][Subtype:0x03] 15](#_Toc110240650)

[6.3.4. APIM\_Hour\_Int [Type:0x13][Subtype:0x04] 15](#_Toc110240651)

[6.3.5. APIM\_Minute\_Int [Type:0x13][Subtype:0x05] 15](#_Toc110240652)

[6.3.6. APIM\_Second\_Int [Type:0x13][Subtype:0x06] 15](#_Toc110240653)

[6.4. APIM Command Control Message [Type:0x14] 16](#_Toc110240654)

[6.4.1. APIM\_HMICommand\_Enum [Type:0x14][Subtype:0x01] 16](#_Toc110240655)

[6.5. APIM Setting Message [Type:0x15] 16](#_Toc110240656)

[6.5.1. APIM\_NormalVideoSwitch\_Enum [Type:0x15][Subtype:0x01] 16](#_Toc110240657)

[6.5.2. APIM\_SetNormalDuration\_Enum [Type:0x15][Subtype:0x02] 17](#_Toc110240658)

[6.5.3. APIM\_SetManualDuration\_Enum [Type:0x15][Subtype:0x03] 17](#_Toc110240659)

[6.5.4. APIM\_SetResolution\_Enum [Type:0x15][Subtype:0x04] 17](#_Toc110240660)

[6.5.5. APIM\_SetCollideSensitive\_Enum [Type:0x15][Subtype:0x06] 17](#_Toc110240661)

[6.5.6. APIM\_WatermarkSwitch\_Enum [Type:0x15][Subtype:0x08] 17](#_Toc110240662)

[6.5.7. APIM\_WiFiHotspotSwitch\_Enum [Type:0x15][Subtype:0x09] 17](#_Toc110240663)

[6.5.8. APIM\_SetWiFiSSID\_ASCII [Type:0x15][Subtype:0x0A] 18](#_Toc110240664)

[6.5.9. APIM\_SetWiFiPSWD\_ASCII [Type:0x15][Subtype:0x0B] 18](#_Toc110240665)

# **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, to synchronize the DVR system work status and HMI command control, this document defines the UART message layout and list.

# **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\_Enum | Event & Periodic | 250 |
| 0x02 | 0x01 | IDCM\_CommandRsp\_Enum | Event | / |
| 0x02 | IDCM\_ProgressSync\_Int | Event & Periodic | 500 |
| 0x03 | IDCM\_EmergencyVideo\_Int | Event | / |
| 0x03 | 0x01 | IDCM\_BrowseLocation\_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 | / |
| 0x04 | IDCM\_WiFiConnection\_Enum | Event | / |
| 0x06 | 0x01 | IDCM\_UpgradeStatus\_Enum | Event | / |
|  | 0x02 | IDCM\_StorageStatus\_Int | Event | / |

## IDCM Heartbeat Message [Type:0x01]

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Heartbeat Count | 1 | 0x00~0xFF | Cycle from 0x00 to 0xFF, start from 0x00 |
| 2 | Video Output Page | 1 | 1. Liveview Page (Default Value) 2. Normal Video List Page 3. Key Data List Page 4. TF Card List Page 5. Data Playing Page (Video or Photo) 6. Reserved 7. Invalid Value | Synchronize DVR page output status |
| 3 | Video Record Status | 1 | 1. Manual Recording 2. Emergency Recording 3. Normal Recording 4. No Recording 5. Reserved 6. Invalid Value | Synchronize Video record status |
| 4 | Normal Video Record Enable Status | 1 | 1. Enabled 2. Disabled 3. Reserved 4. Invalid Value | Synchronize normal video enable/disable status |
| 5 | Data Operation Status | 1 | 1. Data Copy Ongoing 2. Data Deletion Ongoing 3. Reserved 4. Invalid Value | Synchronize data operation status to APIM |
| 6 | DVR Wi-Fi Connection Status | 1 | 0x01: Connect successfully  0x01: No connection setup  0x02: Initialization failed  0x03: Authentication failed  0x04: Connection refused  0x05: Connection failed  0x06: reserved   1. 0x07: invalid value | Synchronize the Wi-Fi connection status between IDCM and Smart Phone |
| 7 | DVR System Failure Status | 1 | 1. Camera Failure 2. System Failure 3. Reserved | Synchronize DVR failure status |
| 8 | eMMC Status | 1 | 1. Lifecycle End 2. No eMMC detected 3. Reserved 4. Invalid Value | Synchronize eMMC status |
| 9 | TF Card Status | 1 | 1. TF Empty 2. TF Pull out 3. TF Full 4. TF Need Format 5. TF Insert 6. TF Error 7. TF Recovering 8. Reserved 9. Invalid Value | Synchronize TF card status |

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

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | DVR Command Response | 1 | 1. Enter Live View Page 2. Enter System Setting Page 3. Enter Playback Normal Page 4. Enter Playback Key Data Page 5. Enter Playback TF Page 6. Format TF Card 7. Setting Reset to Default 8. Factory Reset 9. TF Card Copy 10. TF Card Copy Stop 11. TF Card Delete 12. TF Card Delete Stop 13. Play Selected File 14. Start Video Play 15. Pause Video Play 16. Play Last File 17. Play Next File 18. Finger Touch Start 19. Finger Touch Continue 20. Finger Touch End 21. Go To Timestamp Y 22. Selected File X 23. Unselect File X 24. Select All File 25. Unselect All File 26. Video Capture 27. Stop Video Capture 28. Photo Capture 29. Play Newest Manual Video 30. Play Newest Manual Photo 31. Exit DVR APP 32. Smart Copy(一键锁存) 33. Video Screenshot 34. Scroll to Previous Page 35. Scroll to Next Page 36. Reserved 37. Reserved 38. Invalid Value | Command type feedback from IDCM to APIM |
| 2 | DVR Command Result | 1 | 1. Command Reception Succeed 2. Command Reception Failed 3. Execution Succeed 4. Execution Failed 5. Reserved 6. invalid Value | Command result feedback from IDCM to APIM |
| 3 | DVR Command Failed Reason | 1 | 1. eMMC Failure 2. TF card Failure 3. Camera Failure 4. Pre-condition not met 5. Reserved 6. Invalid Value | Reason of command failed |
| Tips:   1. Once APIM receives “Command Reception Succeed”, HMI should go to corresponding page. 2. Before APIM receives “Execution Succeed”, HMI should show a progress bar to DVR user. | | | | |

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Total File Number | 1 | 0x00~0xFF | Total file number need to copy or delete |
| 2 | Current File ID | 1 | 0x00~0xFF | File ID under copying or deleting |
| 3 | Data Operation Progress | 1 | 0x01: 10%  0x02: 20%  0x03: 30%  0x04: 40%  0x05: 50%  0x06: 60%  0x07: 70%  0x08: 80%  0x09: 90%  0x0A: 100%  0x0B: Reserved  0x0C: Invalid Value | Synchronize data copy or delete status |
| 4 | Video Recording Timer | 1 | 0x00~0xFF | Video recording timer, unit is second, default value is 0x00, which is used to show the manual or emergency video recording timestamp |

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Vehicle Emergency Video Number | 1 | 0x01~0x0A | Synchronize the number of video captured as emergency video or vehicle monitor function result. |

## IDCM File List Message [Type:0x03]

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Currently Storage Location | 1 | 0x01: eMMC (local)  0x02: TF Card  0x03: Reserved  0x04: Invalid Value | Currently storage location |
| 2 | Total Page Number | 1 | 0x00~0xFF | Totally page number |
| 3 | Currently Page Number | 1 | 0x00~0xFF | Current page number |
| 4 | Total File Number | 1 | 0x00~0xFF | Totally file number |
| 5 | Currently File Number | 1 | 0x00~0x06 | Current file number |

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

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Normal Video Switch Response | 1 | 1. Enabled 2. Disabled 3. Reserved 4. Invalid Value | IDCM feeds back the normal video switch status |

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Vehicle Monitor Switch Response | 1 | 1. Enabled 2. Disabled 3. Reserved 4. Invalid Value | IDCM feeds back the vehicle monitor switch status |

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Emergency Video Duration Response | 1 | 1. 15 seconds 2. 30 seconds 3. 45 seconds 4. Reserved 5. Invalid Value | IDCM feeds back the emergency video duration |

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Collision Detection Sensitive Level | 1 | 1. High 2. Middle 3. Low 4. Reserved 5. Invalid Value | 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 | Length (Byte) | Value | Comments |
| 1 | Wi-Fi Hotspot Switch Response | 1 | 0x01: Enable  0x02: Disable  0x03: Reserved  0x04: Invalid Value | IDCM feeds back the DVR Wi-Fi hotspot function switch status |

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | DVR Wi-Fi SSID Response | 12 | 0x21~0x7E  0xFF: Invalid Value | IDCM feeds back the DVR Wi-Fi hotspot SSID |

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | DVR Wi-Fi Password Response | 8 | 0x21~0x7E  0xFF: Invalid Value | IDCM feeds back the DVR Wi-Fi hotspot password |

### IDCM\_WiFiConnection\_Enum [Type:0x05][Subtype:0x04]

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | DVR Wi-Fi Connection Status | 1 | 0x01: Connect successfully  0x01: No connection setup  0x02: Initialization failed  0x03: Authentication failed  0x04: Connection refused  0x05: Connection failed  0x06: reserved  0x07: invalid value | Synchronize the Wi-Fi connection status between IDCM and Smart Phone |

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

### IDCM\_UpgradeStatus\_Enum [Type:0x06][Subtype:0x01]

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | IDCM SW Version | 2 | 0x00~0x63 | Example: vXX.YY  Byte #1 is XX.  Byte #2 is YY. |
| 2 | IDCM Software Upgrade Status | 1 | 0x01: Need to update S/W  0x02: MCU updating  0x03: DSP updating  0x04: update successful  0x05: update fail  0x06: reserved  0x07: invalid value | IDCM feeds back the software update status to APIM |

### IDCM\_StorageStatus\_Int [Type:0x06][Subtype:0x02]

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | IDCM eMMC Storage Status | 5 | 0x00~0x64 | 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 |
| 2 | IDCM TF Card Storage Status | 4 | 0x00~0x64 | 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 |

# **Message from APIM to IDCM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type | Sub Type | Name | TX Model | Interval (ms) |
| 0x11 | 0x01 | APIM\_Heartbeat\_Enum | Event & Periodic | 250 |
| 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\_GPSDateTime\_Int | Event | / |
| 0x14 | 0x01 | APIM\_HMICommand\_Enum | Event | / |
| 0x02 | APIM\_HMICoordinate\_Int | Event + Periodic | 100 |
| 0x15 | 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 | / |

## APIM Heartbeat Message [Type:0x11]

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Heartbeat Count | 1 | 0x00~0xFF | Cycle from 0x00 to 0xFF, start from 0x00, should be a feedback value to IDCM heartbeat count. |
| 2 | AR Function Status | 1 | 0x01: On  0x02: Off | Synchronize if AR HUD or AR Navigation function is enabled or disabled |
|  |  |  |  |  |

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

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Vehicle Speed | 2 | 0x0000~0xFFFF | Vehicle speed input  Unit: kph |

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Vehicle Brake Pedal Status | 1 | 1. Driver\_Braking 2. Driver\_Not\_Braking | 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 | Length (Byte) | Value | Comments |
| 1 | Vehicle VIN number | 17 | 0x30~0x39 or 0x41~0x5A | VIN number input |

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Vehicle Gear Position | 1 | 1. P 2. R 3. N 4. D | Gear Position input |
| 2 | Cluster Cornering Lamp Status | 1 | 1. Left 2. Right 3. Left & Right 4. Off | Cornering lamp status input |
| 3 | Cluster Seatbelt  Lamp Status | 1 | 1. On 2. Off | Seatbelt lamp status input |

## APIM GPS Clock Synchronization Message [Type:0x13]

### APIM\_GPSDateTime\_Int [Type:0x13][Subtype:0x01]

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Year Data | 1 | 0x00~0xFF | Actual year value = 0x7D0 (2000) + year offset |
| 2 | Month Data | 1 | 0x00~0x0C | Month value |
| 3 | Day Data | 1 | 0x00~0x1F | Day value |
| 4 | Hour Data | 1 | 0x00~0x0C | Hour value |
| 5 | Minute Data | 1 | 0x00~0x3C | Minute value |
| 6 | Second Data | 1 | 0x00~0x3C | Second value |

## APIM Command Control Message [Type:0x14]

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | HMI Command | 1 | 1. Enter Live View Page 2. Enter System Setting Page 3. Enter Playback Normal Page 4. Enter Playback Key Data Page 5. Enter Playback TF Page 6. Format TF Card 7. Setting Reset to Default 8. Factory Reset 9. TF Card Copy 10. TF Card Copy Stop 11. TF Card Delete 12. TF Card Delete Stop 13. Play Selected File 14. Start Video Play 15. Pause Video Play 16. Play Last File 17. Play Next File 18. Finger Touch Start 19. Finger Touch Continue 20. Finger Touch End 21. Go To Timestamp Y 22. Selected File X 23. Unselect File X 24. Select All File 25. Unselect All File 26. Video Capture 27. Stop Video Capture 28. Photo Capture 29. Play Newest Manual Video 30. Play Newest Manual Photo 31. Exit DVR APP 32. Smart Copy(一键锁存) 33. Video Screenshot 34. Scroll to Previous Page 35. Scroll to Next Page 36. Reserved 37. Reserved 38. Invalid Value | Command sent from APIM to IDCM |
| 2 | File X Value | 1 | 0x01~0x0A  0x00: Invalid Value | Synchronize the file selection in current page.  0x00 means no file selected. |
| 3 | Timestamp X Value | 1 | 0x00~0xFF | Timestamp value located when video replay |
| 4 | X-Axis Coordinate | 2 | 0x00~0xFFFF  0x00: Invalid Value | X-Axis Coordinate of finger touch |
| 5 | Y-Axis Coordinate | 2 | 0x00~0xFFFF  0x00 : Invalid Value | Y-Axis Coordinate of finger touch |

### APIM\_HMICoordinate\_Int [Type:0x14][Subtype:0x02]

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | X-Axis Coordinate | 2 | 0x00~0xFFFF | X-Axis Coordinate of finger touch |
| 2 | Y-Axis Coordinate | 2 | 0x00~0xFFFF | Y-Axis Coordinate of finger touch |

## APIM Setting Message [Type:0x15]

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

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Normal Video Record Switch | 1 | 0x01: Enable  0x02: Disable  0x03: Reserved  0x04: Invalid Value | Enable or disable normal video record function |

### APIM\_VehicleMonitorSwitch\_Enum [Type:0x15][Subtype:0x02]

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Vehicle Monitor Function Switch | 1 | 0x01: Enable  0x02: Disable  0x03: Reserved  0x04: Invalid Value | Enable or disable vehicle monitor function |

### APIM\_SetEmergencyDuration\_Enum [Type:0x15][Subtype:0x03]

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Emergency Video Duration | 1 | 0x01: 15 seconds  0x02: 30 seconds  0x03: 45 seconds  0x04: Reserved  0x05: Invalid Value | DVR user could modify emergency video duration via this configuration |

### APIM\_SetCollideSensitive\_Enum [Type:0x15][Subtype:0x04]

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | G-Sensor Collide Sensitive | 1 | 0x01: Low  0x02: Middle  0x03: High  0x04: Reserved  0x05: Invalid Value | DVR user could modify collide sensitive via this configuration, works for emergency video capture and vehicle monitor functions |

### APIM\_WiFiHotspotSwitch\_Enum [Type:0x15][Subtype:0x05]

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | Wi-Fi Hotspot Switch | 1 | 0x01: Enable  0x02: Disable  0x03: Reserved  0x04: Invalid Value | DVR user could enable or disable DVR Wi-Fi hotspot function via this configuration |

### APIM\_SetWiFiSSID\_ASCII [Type:0x15][Subtype:0x06]

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | DVR Wi-Fi SSID | 12 | 0x21~0x7E | 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:0x15][Subtype:0x07]

Data structure:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Name | Length (Byte) | Value | Comments |
| 1 | DVR Wi-Fi Password | 8 | 0x21~0x7E | DVR user could set DVR Wi-Fi hotspot password via this configuration, the password could contain max to 8 ASCII characters |