**Chrysler CCD/SCI Scanner UART Protocol**

**Preliminary documentation, not complete! Last update: 2018.07.26**

**1. UART Frame Format**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Start of Frame | Used for checksum calculation | | | | | | End of Frame |
| SOF | Data length | | Data description | | Data | | EOF |
| **SYNC** | **LENGTH HB** | **LENGTH LB** | **DATA CODE** | **SUB-DATA CODE** | | **PAYLOAD** | **CHECKSUM** |
| $33 | $00 | $04 | $45 | $01 | | $00 $22 | $9F |

Table 1. Serial Frame Format.

1.1 **SYNC** byte: fixed value ($33) at the beginning of every packet.

1.2 **LENGTH** bytes: number of bytes following until the CHECKSUM byte is reached. Size: 2 bytes (High Byte + Low Byte).

1.3 **DATA CODE** byte: contains the source/target of the packet and broadly describes what’s inside the packet. Size: 1 byte.

1.4 **SUB-DATA CODE** byte: describes the packet further if needed. Reads $00 if the DATA CODE byte is enough to explain the packet’s meaning. Size: 1 byte

1.5 **PAYLOAD** byte(s): optional. Arbitrary data can be stored here (e.g. CCD/SCI-bus messages) and sent later to the laptop when connected. Size: 0-1018 bytes (max. 1024-6 bytes)

1.6 **CHECKSUM** byte: every byte after the SYNC byte is summed and the lower byte of the result is kept as error detection. Size: 1 byte.

**2. UART Frames in detail**

**2.1 DATA CODE byte description**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| DATA CODE byte | | | | | | | |
| High nibble | | | | Low nibble | | | |
| Source | | Target | | DC command | | | |
| **bit 7** | **bit 6** | **bit 5** | **bit 4** | **bit 3** | **bit 2** | **bit 1** | **bit 0** |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |

Table 2. DATA CODE byte description.

Bit 7:6 describe the source of the packet:   
- 2b00: USB - 2b01: CCD-bus  
- 2b10: SCI-bus (PCM) - 2b11: SCI-bus (TCM)  
  
Bit 5:4 describe the target of the packet:   
- 2b00: USB - 2b01: CCD-bus  
- 2b10: SCI-bus (PCM) - 2b11: SCI-bus (TCM)

Bit 3:0 contain the actual DC (Data Code) command ($00-$0F) that broadly describes what this packet means:  
- 4b0000 ($00): Reboot scanner  
- 4b0001 ($01): Handshake request (for USB-connection)  
- 4b0010 ($02): Status report request  
- 4b0011 ($03): Change scanner settings

- 4b0100 ($04): General request to the scanner  
- 4b0101 ($05): General response from the scanner  
- 4b0110 ($06): Send message to the CCD/SCI-bus  
- 4b0111 ($07): Send message(s) repeatedly to the CCD/SCI-bus  
- 4b1000 ($08): Stop message flow to the CCD/SCI-bus  
- 4b1001 ($09): Message forwarded from the CCD/SCI-bus  
- 4b1010 ($0A): Run self-diagnostics  
- 4b1011 ($0B): Create scanner settings backup  
- 4b1100 ($0C): Restore scanner settings  
- 4b1101 ($0D): Restore default scanner settings  
- 4b1110 ($0E): Debug  
- 4b1111 ($0F): OK/ERROR

**2.2 SUB-DATA CODE byte description**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| SUB-DATA CODE byte | | | | | | | |
| **bit 7** | **bit 6** | **bit 5** | **bit 4** | **bit 3** | **bit 2** | **bit 1** | **bit 0** |
| 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |

Table 3. SUB-DATA CODE byte description.

Related DC command: $03 (Change scanner settings)

- $00: NOT USED

- $01-$FF: RESERVED

Related DC command: $04 (General request from the scanner)

- $00: NOT USED

- $01-$FF: RESERVED

Related DC command: $05 (General response from the scanner)

- $00: NOT USED

- $01-$FD: RESERVED

Related DC command: $06 (Send message to the CCD/SCI-bus)

- $00-$FF: RESERVED

PAYLOAD contains the message

Related DC command: $07 (Send message(s) repeatedly to the CCD/SCI-bus)

- $00: Same message over and over again

- $01: Variable message (explained in PAYLOAD)

- $02-$FF: RESERVED

PAYLOAD contains the message (described later on)

Related DC command: $09 (Message forwarded from the CCD/SCI-bus)

- $00: NOT USED

- $01-$FF: RESERVED

PAYLOAD contains the message

Related DC command: $0E (Debug)

- $00: NOT USED

- $01-$FF: RESERVED

Related DC command: $0F (OK/ERROR)

- $00: OK: general acknowledgement

- $01: ERROR: SYNC, invalid value

- $02: ERROR: LENGTH, invalid value

- $03: ERROR: DATA CODE, packet source and target cannot be the same

- $04: ERROR: DATA CODE, packet source and target conflict

- $05: ERROR: DATA CODE, invalid target

- $06: ERROR: DATA CODE, invalid DC command

- $07: ERROR: SUB-DATA CODE, invalid value

- $08: ERROR: SUB-DATA CODE, not enough information

- $09: ERROR: PAYLOAD, missing value(s)

- $0A: ERROR: PAYLOAD, invalid value(s)

- $0B: ERROR: CHECKSUM, invalid value

- $0C: ERROR: PACKET, invalid frame format

- $0D: ERROR: PACKET, timeout occurred

- $0E: ERROR: PACKET, unknown source

- $0F: ERROR: SCANNER, internal error

- $FF: ERROR: FATAL

- $10-$FE: RESERVED

**3. Example packets (don’t use these yet)**

**3.1 Sent from laptop:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SYNC** | **LENGTH HB** | **LENGTH LB** | **DATA CODE** | **SUB-DATA CODE** | **PAYLOAD** | **CHECKSUM** |
| $33 | $00 | $02 | $00 | $00 |  | $02 |

Table 4. Reboot scanner (simplest packet there is).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SYNC** | **LENGTH HB** | **LENGTH LB** | **DATA CODE** | **SUB-DATA CODE** | **PAYLOAD** | **CHECKSUM** |
| $33 | $00 | $02 | $01 | $00 |  | $03 |

Table 5. Handshake request (another simple packet).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SYNC** | **LENGTH HB** | **LENGTH LB** | **DATA CODE** | **SUB-DATA CODE** | **PAYLOAD** | **CHECKSUM** |
| $33 | $00 | $17 | $01 | $00 | $43 $48 $52 $59 $53 $4C $45 $52 $43 $43 $44 $53 $43 $49 $53 $43 $41 $4E $4E $45 $52 | $37 |

Table 6. Handshake response.

In the PAYLOAD section the scanner responds with an ASCII encoded text:

$43 $48 $52 $59 $53 $4C $45 $52 $43 $43 $44 $53 $43 $49 $53 $43 $41 $4E $4E $45 $52 = CHRYSLERCCDSCISCANNER

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SYNC** | **LENGTH HB** | **LENGTH LB** | **DATA CODE** | **SUB-DATA CODE** | **PAYLOAD** | **CHECKSUM** |
| $33 | $00 | $02 | $02 | $00 |  | $04 |

Table 7. Scanner status report request.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SYNC** | **LENGTH HB** | **LENGTH LB** | **DATA CODE** | **SUB-DATA CODE** | **PAYLOAD** | **CHECKSUM** |
| $33 | $00 | $XX | $02 | $00 | $XX $XX $XX $XX $XX $XX $XX $XX | $CS |

Table 8. Scanner status report response.

$XX $XX = some bytes describing something...

$XX $XX = same

$XX $XX = same

$XX $XX = same

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SYNC** | **LENGTH HB** | **LENGTH LB** | **DATA CODE** | **SUB-DATA CODE** | **PAYLOAD** | **CHECKSUM** |
| $33 | $00 | $08 | $16 | $00 | $B2 $20 $22 $00 $00 $F4 | $06 |

Table 9. Send a DRB request message to the CCD-bus.

DRB request message: $B2 $20 $22 $00 $00 $F4

- $B2: DRB request message ID byte

- $20: target module on the CCD-bus (Body Control Module, BCM)

- $22: command: read RAM/ROM/EEPROM value

- $00: RAM/ROM/EEPROM address high byte

- $00: RAM/ROM/EEPROM address low byte

- $F4: checksum

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SYNC** | **LENGTH HB** | **LENGTH LB** | **DATA CODE** | **SUB-DATA CODE** | **PAYLOAD** | **CHECKSUM** |
| $33 | $00 | $08 | $49 | $00 | $F2 $20 $22 $15 $EA $33 | $B7 |

Table 10. Response to a DRB request message from the CCD-bus.

DRB response message: $F2 $20 $22 $15 $EA $33

- $F2: DRB response message ID byte

- $20: responding module on the CCD-bus (Body Control Module, BCM)

- $22: responding to this command: read RAM/ROM/EEPROM

- $15: RAM/ROM/EEPROM value at the previously given 16-bit address ($0000)

- $EA: RAM/ROM/EEPROM value at the next 16-bit address ($0001)

- $F7: checksum

Convert DATA CODE byte from hexadecimal to binary and refer to Table 2. to figure out the source, target and command bits.