# Communication Protocol

**System Profile**

The system is composed of three parts.

1. PC: it will run a GUI based on windows. The main task

of PC are: 1. Select MCU type ; 2. Select S19 file; 3. Parse S19 file to op-code; 4. Control Bridge to program target.

1. Bridge: Receive Command via USB from PC, than control Target according to

the received command.

1. Target: program flash controlled by Bridge.

**P C**

**Target**

USB

**Bridge**

CAN

CAN

CAN BUS

## PC - Bridge protocol

**Overview**

The PC communicates with the Bridge via virtual COM (USB CDC class) , The baudrate is 115200bps, 1 stop bit and no parity bit. using big endian for multiple bytes’ data.

Every time PC sends one packet to Bridge, it should feed ACK Response back to indicate the receiving status.

**Packet format**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Header  (4 bytes) | Command  (1 byte) | Data Length  ( 1 byte) | Data[0]…Data[n]  (n bytes) | Checksum  (1 byte) | End  ( 4 bytes) |

|  |  |
| --- | --- |
| **Packet Field** | **Description** |
| Header | 0x55,0x55,0x55,0x55 |
| Command | The command code define the action to be executed by the bridge |
| Data length | The number of bytes in Data field. |
| Data | This can be either the command parameters or the formatted data sent in response to a command. The size of the data varies depending on the command |
| Checksum | The complement of the LSB of all byte’s sum in Data length field and Data field. |
| End | 0xAA,0xAA,0xAA,0xAA |

**PC’s Command summary**

|  |  |  |
| --- | --- | --- |
| **Command** | **Description** | **Data** |
| ~~0x00~~ | ~~Set CAN Bitrate~~ | ~~Data[0]: BRP;Data[1]: PHS1; Data[2]: PHS2;Data[3]:SJW.~~ |
| 0x01 | Mass Erase Target | None |
| 0x02 | Sector Erase Target | Data[0..3]: Started Address of the sector. |
| 0x03 | Blank Check Target | None |
| 0x04 | Program Target | Data[0..3]: Started Address; Data[4]-Data[n < 36]: code |
| 0x05 | Verify Target | None |
| 0x06 | Read Target | Data[0..3]: Started Address; Data[4..7]: Byte length.  (Byte Length <= 64) |
| 0x07 | Unsecure Target | Data[0..7]: Backdoor key. |

**Bridge’s Response Summary**

|  |  |  |
| --- | --- | --- |
| Command | Description | Data |
| 0x80 | Response Flash content of target | Data[0..n]: flash content. The data length is specified in Read Target Command. |
| 0x81 | Response the result of Blank check | Data[0]: the result.  0xF0---Flash is not blank, 0xFF---Flash is blank. |
| 0xFF | Acknowledge | Data[0]: 0x01----ACK OK, 0x00---ACK Error |

**Bridge - Target Protocol**

**Overview**

The Bridge communicates with target via CAN bus. Bit rate should be 250Kbps.

**Command Summary**

There are 9 commands supported. See the following list.

|  |  |  |  |
| --- | --- | --- | --- |
| **Command** | **Host sent message** | **Target response message** | **Action** |
| UNSEC | CAN ID 0x011 + 64-bit backdoor key | CAN ID 0x001 + 64-bit backdoor key | Security code if the flash is secured and backdoor key is enabled. When unsecure successfully, send the response message. |
| SET\_ADDR | CAN ID 0x012 +  32-bit start  address + 32-bit number of bytes | CAN ID 0x002 +  32-bit start  address + 32-bit number of bytes | Start address is stored for programming flash.  Size of download are stored for programming flash |
| LOAD\_DATA | CAN ID 0x013 +  8 to 64 bits of raw  binary data | CAN ID 0x003 +  8 to 64 bits of raw  binary data | 1 to 8 bytes opcode. The opcode will be programmed to flash from the start address gotten from the CAN frame whose ID is 0x012 |
| MASS\_ERASE | CAN ID 0x014 without data | CAN ID 0x004 without data | The target should mass erase its flash. When finish erasing, send the response message. |
| SECTOR\_ERASE | CAN ID 0x015 + 32-bit address | CAN ID 0x005 + 32-bit address | The target should erase the flash sector including the address. When finish erasing, send the response message. |
| BURST\_PROG | CAN ID 0x016 without data | CAN ID 0x006 without data | The target should start to burst program flash. When finish programming, send the response message. |
| BYTE\_PROG | CAN ID 0x017 + 32 bit address + 8 bit data | CAN ID 0x007 + 32 bit address + 8 bit data | The target should byte program the flash with the address and the data.  When finish programming, send the response message. |
| BLANK\_CHECK | CAN ID 0x018 without data. | CAN ID 0x008 with blank check result. | The target should verify all flash memory bytes are erased and return the result: 0xF0---Flash is not blank, 0xFF---Flash is blank. |
| READ\_TARGET | CAN ID 0x019+ 32-bit address + 32-bit byte length | CAN ID 0x009 + 8-byte data | The target should return its flash data from the specific address. |

* The Bridge will be polling the response message from the target after it sends one command. If 1 second passed but no message received still, The Bridge will terminate the polling and recognize this action failed, then raise ACK with failed operation to Host.
* Bridge program Target procedure:

MASS ERASE/SECTOR ERASE --🡪 SET\_ADDR-🡪LOAD\_DATA-🡪BURST\_PROG