**M-2900 Communication Interface Specification**

|  |  |  |  |
| --- | --- | --- | --- |
| Cell color meanings | Light gray |  | Supported command |
| Light Green |  | Differentiated function command |

|  |  |  |  |
| --- | --- | --- | --- |
| No. | **Command Code** | **Name** | **Command Description** |
| Reader Control Commands | | | |
| 1 | **0x70** | **cmd\_reset** | Reset reader |
| 2 | **0x71** | **cmd\_set\_uart\_baudrate** | Set baud rate of serial port |
| 3 | **0x72** | **cmd\_get\_firmware\_version** | Get firmware version |
| 4 | **0x73** | **cmd\_set\_reader\_address** | Set reader’s address |
| 5 | **0x74** | **cmd\_set\_work\_antenna** | Set working antenna |
| 6 | **0x75** | **cmd\_get\_work\_antenna** | Query current working antenna |
| 7 | **0x76** | **cmd\_set\_output\_power** | Set RF output power |
| 8 | **0x77** | **cmd\_get\_output\_power** | Query current RF output power |
| 9 | **0x78** | **cmd\_set\_frequency\_region** | Set RF frequency spectrum |
| 10 | **0x79** | **cmd\_get\_frequency\_region** | Query RF frequency spectrum |
| 11 | **0x7A** | **cmd\_set\_beeper\_mode** | Set reader’s buzzer behavior |
| 12 | **0x7B** | **cmd\_get\_reader\_temperature** | Check reader’s internal temperature |
| 13 | **0x60** | **cmd\_read\_gpio\_value** | GetGPIO1,GPIO2 status |
| 14 | **0x61** | **cmd\_write\_gpio\_value** | Set GPIO3,GPIO4 status |
| 15 | **0x62** | **cmd\_set\_ant\_connection\_detector** | Set antenna detector status |
| 16 | **0x63** | **cmd\_get\_ant\_connection\_detector** | Get antenna detector status |
| 17 | **0x66** | **cmd\_set\_temporary\_output\_power** | Set RF power without saving to flash |
| 18 | **0x67** | **cmd\_set\_reader\_identifier** | Set reader’s identification bytes |
| 19 | **0x68** | **cmd\_get\_reader\_identifier** | Get reader’s identification bytes |
| 20 | **0x69** | **cmd\_set\_rf\_link\_profile** | Set RF link profile |
| 21 | **0x6A** | **cmd\_get\_rf\_link\_profile** | Get RF link profile |
| 22 | **0x7E** | **cmd\_get\_rf\_port\_return\_loss** | Get current antenna port’s return loss |
| 18000-6C Commands | | | |
| 23 | **0x80** | **cmd\_inventory** | Inventory EPC C1G2 tags to buffer |
| 24 | **0x81** | **cmd\_read** | Read EPC C1G2 tag(s) |
| 25 | **0x82** | **cmd\_write** | Write EPC C1G2 tag(s) |
| 26 | **0x83** | **cmd\_lock** | Lock EPC C1G2 tag(s) |
| 27 | **0x84** | **cmd\_kill** | Kill EPC C1G2 tag(s) |
| 28 | **0x85** | **cmd\_set\_access\_epc\_match** | Set tag access filter by EPC |
| 29 | **0x86** | **cmd\_get\_access\_epc\_match** | Query access filter by EPC |
| 30 | **0x89** | **cmd\_real\_time\_inventory** | Inventory tags in real time mode |
| 31 | **0x8A** | **cmd\_fast\_switch\_ant\_inventory** | Real time inventory with fast ant switch |
| 32 | **0x8B** | **cmd\_customized\_session\_target\_inventory** | Inventory with desired session and inventoried flag |
| 33 | **0x8C** | **cmd\_set\_impinj\_fast\_tid** | Set impinj Fast TID function  (Without saving to FLASH) |
| 34 | **0x8D** | **cmd\_set\_and\_save\_impinj\_fast\_tid** | Set impinj Fast TID function  (Save to FLASH) |
| 35 | **0x8E** | **cmd\_get\_impinj\_fast\_tid** | Get current Fast TID setting |
| 18000-6B Commands | | | |
| 36 | **0xB0** | **cmd\_iso18000\_6b\_inventory** | Inventory18000-6B tag(s) |
| 37 | **0xB1** | **cmd\_iso18000\_6b\_read** | Read 18000-6B tag |
| 38 | **0xB2** | **cmd\_iso18000\_6b\_write** | Write 18000-6Btag |
| 39 | **0xB3** | **cmd\_iso18000\_6b\_lock** | Lock 18000-6B tag data byte |
| 40 | **0xB4** | **cmd\_iso18000\_6b\_query\_lock** | Query lock18000-6B tag data byte |
| Buffer Control Commands | | | |
| 41 | **0x90** | **cmd\_get\_inventory\_buffer** | Get buffered data without clearing |
| 42 | **0x91** | **cmd\_get\_and\_reset\_inventory\_buffer** | Get and clear buffered data |
| 43 | **0x92** | **cmd\_get\_inventory\_buffer\_tag\_count** | Query how many tags are buffered |
| 44 | **0x93** | **cmd\_reset\_inventory\_buffer** | Clear buffer |

Note: Specific Command Format please refer to *UHF RFID Reader Serial Interface Protocol V3.1*

Working Antenna ID：

Working Antenna ID in Response Packet of **Cmd 0x89、0x90、0x8A、0x8B**:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **FreqAnt** | **RSSI** | **Check** |
| 0xA0 |  |  |  |  |  |  |
|  | | | | | | |
| Parameter  Description | Cmd | 0x89 | FreqAnt | The high 6 bits are frequency parameter; the low 2 bits are antenna ID. | | |
| 0x8A |
| 0x8B | RSSI | When high bit is 0: Antenna ID 1/2/3/4;  When high bit is 1: Antenna ID 5/6/7/8.  Note：The High bit just used to get Ant ID, no RSSI. | | |
| 0x90 |

Working Antenna ID in Response Packet of **Cmd 0x81、0x82、0x83、0x84**:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **AntID** | **Count** | **Check** |
| 0xA0 |  |  |  |  |  |  |
|  | | | | | | |
| Parameter  Description | Cmd | 0x89 | AntID | The high 6 bits are frequency parameter; the low 2 bits are antenna ID. | | |
| 0x8A |
| 0x8B | Count | When high bit is 0: Antenna ID 1/2/3/4;  When high bit is 1: Antenna ID 5/6/7/8.  Note：The High bit just used to get Ant ID, no Count. | | |
| 0x90 |

2.1.5 cmd\_set\_work\_antenna

Host packet:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **AntennaID** | **Check** |
| 0xA0 | 0x04 |  | 0x74 |  |  |
|  | | | | | |
| Parameter  Description | AntennaID | | 0x00 | Antenna 1 | |
| 0x01 | Antenna 2 | |
| 0x02 | Antenna 3 | |
| 0x03 | Antenna 4 | |
| 0x04 | Antenna 5 | |
| 0x05 | Antenna 6 | |
| 0x06 | Antenna 7 | |
| 0x07 | Antenna 8 | |

**◆Succeeded:**

Response packet:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **ErrorCode** | **Check** |
| 0xA0 | 0x04 |  | 0x74 | CommandSuccess |  |

**◆Failed:**

Response packet:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **ErrorCode** | **Check** |
| 0xA0 | 0x04 |  | 0x74 |  |  |
|  | | | | | |
| Parameter  Description | ErrorCode | Error code. | | | |

2.1.6 cmd\_get\_work\_antenna

Host packet:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **Check** |
| 0xA0 | 0x04 |  | 0x75 |  |

**◆Succeeded:**

Response packet:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **AntennaID** | **Check** |
| 0xA0 | 0x04 |  | 0x75 |  |  |
|  | | | | | |
| Parameter  Description | AntennaID | | 0x00 | Antenna 1 | |
| 0x01 | Antenna 2 | |
| 0x02 | Antenna 3 | |
| 0x03 | Antenna 4 | |
| 0x04 | Antenna 5 | |
| 0x05 | Antenna 6 | |
| 0x06 | Antenna 7 | |
| 0x07 | Antenna 8 | |

2.1.7 cmd\_set\_output\_power

Host packet:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **RfPower** | **Check** |
| 0xA0 | 0x04 |  | 0x76 |  |  |
|  | | | | | |
| Parameter  Description | RfPower | RF output power, range from 0 to 33(0x00 – 0x21),  the unit is dBm. | | | |

Or:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Add** | **Cmd** | **Power**  **1** | **Power**  **2** | **Power**  **3** | **Power**  **4** | **Power**  **5** | **Power**  **6** | **Power**  **7** | **Power**  **8** | **CC** |
| 0xA0 | 0x0B |  | 0x76 |  |  |  |  |  |  |  |  |  |
|  | | | | | | | | | | | | |
| Parameter  Description | | Power1 | | Output power of antenna 1, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power2 | | Output power of antenna 2, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power3 | | Output power of antenna 3, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power4 | | Output power of antenna 4, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power5 | | Output power of antenna 5, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power6 | | Output power of antenna 6, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power7 | | Output power of antenna 7, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power8 | | Output power of antenna 8, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |

**◆Succeeded:**

Response packet:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **ErrorCode** | **Check** |
| 0xA0 | 0x04 |  | 0x76 | CommandSuccess |  |

**◆Failed:**

Response packet:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **ErrorCode** | **Check** |
| 0xA0 | 0x04 |  | 0x76 |  |  |
|  | | | | | |
| Parameter  Description | ErrorCode | Error code. | | | |

The output power value will be saved to the internal flash so that it won’t be lost after power off.

**Attention:**

**★This command consumes more than 100mS.**

**★If you want you change the output power frequently, please use Cmd\_set\_temporary\_output\_power command, which doesn’t reduce the life of the**

**internal flash memory.**

2.1.8 cmd\_get\_output\_power

Host packet:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **Check** |
| 0xA0 | 0x03 |  | 0x77 |  |

If all antennas have the same output power value, then

Response packet:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **Output Power** | **Check** |
| 0xA0 | 0x04 |  | 0x77 |  |  |
|  | | | | | |
| Parameter  Description | Output Power | Current RF output power. | | | |

Otherwise response packet is:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Add** | **Cmd** | **Power**  **1** | **Power**  **2** | **Power**  **3** | **Power**  **4** | **Power**  **5** | **Power**  **6** | **Power**  **7** | **Power**  **8** | **CC** |
| 0xA0 | 0x0B |  | 0x77 |  |  |  |  |  |  |  |  |  |
|  | | | | | | | | | | | | |
| Parameter  Description | | Power1 | | Output power of antenna 1, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power2 | | Output power of antenna 2, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power3 | | Output power of antenna 3, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power4 | | Output power of antenna 4, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power5 | | Output power of antenna 5, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power6 | | Output power of antenna 6, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power7 | | Output power of antenna 7, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |
| Power8 | | Output power of antenna 8, range from 0 to 33(0x00 – 0x21), the unit is dBm. | | | | | | | | |

2.2.9 cmd\_fast\_switch\_ant\_inventory

Host packet:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Add** | **Cmd** | **A** | **Stay** | **B** | **Stay** | **C** | **Stay** | **D** | **Stay** | **E** | **Stay** | **F** | **Stay** | **G** | **Stay** | **H** | **Stay** | **CC** |
| 0xA0 | 0x0B |  | 0x8A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | | | | | | | | | | | | | | | | | | | | |
| Parameter  Description | | A | | First working ant (00 – 07). If set this byte above 07 means ignore it. | | | | | | | | | | | | | | | | |
| Stay | | Inventory round for an antenna. Every antenna has this parameter. | | | | | | | | | | | | | | | | |
| B | | Second working ant (00 – 07). If set this byte above 07 means ignore it. | | | | | | | | | | | | | | | | |
| C | | Third working ant (00 – 07). If set this byte above 07 means ignore it. | | | | | | | | | | | | | | | | |
| D | | Fourth working ant (00 – 07). If set this byte above 07 means ignore it. | | | | | | | | | | | | | | | | |
| E | | Fifth working ant (00 – 07). If set this byte above 07 means ignore it. | | | | | | | | | | | | | | | | |
| F | | Sixth working ant (00 – 07). If set this byte above 07 means ignore it. | | | | | | | | | | | | | | | | |
| G | | Seventh working ant (00 – 07). If set this byte above 07 means ignore it. | | | | | | | | | | | | | | | | |
| H | | Eighth working ant (00 – 07). If set this byte above 07 means ignore it. | | | | | | | | | | | | | | | | |
| Interval | | Rest time between switching antennas. During the cause of rest, RF output will be cancelled, thus power consumption and heat generation are both reduced. | | | | | | | | | | | | | | | | |
| Repeat | | Repeat the inventory with above ant switch sequence. | | | | | | | | | | | | | | | | |

When reader gets this command, the inventory for EPC GEN2 tags starts, tag data will NOT be stored in the internal buffer. The tag data is transferred in real time. Meanwhile, the inventory duration is minimized in order to switch to the next antenna as soon as possible. If there’s no tag, or only one or two tags in the RF field, the inventory duration on one antenna could be around 30mS. If there are more tags, the inventory duration on one antenna will increase. This command is an ideal solution for fast antenna switch applications on multi ant devices.

**Attention:**

**★The hardware has a dual CPU architecture, main CPU is responsible for tag inventory,and assistant CPU is responsible for data management. Inventory and data transfer are parallel and simultaneous. So the data transfer via serial port doesn’t affect the efficiency of reader.**

**★In massive tag applications, please use cmd\_real\_time\_inventory command which is more effective for large tag quantity applications.**

If there is(are) tag(s), reader responses below packets(multiple):

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **FreqAnt** | **PC** | **EPC** | **RSSI** | **Check** |
| 0xA0 |  |  | 0x8A |  | 2 bytes | N bytes |  |  |
|  | | | | | | | | | |
| Parameter  Description | FreqAnt | | The high 6 bits are frequency parameter; the low 2 bits are antenna ID.  When high bit of RSSI is 0: Antenna ID 1/2/3/4;  When high bit of RSSI is 1: Antenna ID 5/6/7/8. | | | | | | |
| PC | | Tag’s PC. 2 bytes. | | | | | | |
| EPC | | Tag’s EPC. | | | | | | |
| RSSI | | The RSSI when tag is identified.  Note：The High bit just used to get Ant ID, no RSSI. | | | | | | |

If the antenna detector is on, and antenna is not well connected, you might get below data package:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **AntID** | **ErrorCode** | **Check** |
| 0xA0 | 0x05 |  | 0x8A |  | 0x22 |  |
|  | | | | | | |
| Parameter  Description | AntID | | Unconnected antenna ID(00 – 03). | | | |
| ErrorCode | | 0x22, error code for antenna is missing. | | | |

After that, the command response is:

**◆Succeeded:**

Response packet:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **TotalRead** | **CommandDuration** | **Check** |
| 0xA0 | 0x0A |  | 0x8A |  | 4 bytes |  |
|  | | | | | | |
| Parameter  Description | TotalRead | | How many tag data have been sent. an integer is stored in 3 bytes, high bits are aligned to the left. | | | |
| CommandDuration | | Command duration in millisecond, an integer is stored in 4 bytes, high bits are aligned to the left. | | | |

**◆Failed:**

Response packet:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Head** | **Len** | **Address** | **Cmd** | **ErrorCode** | **Check** |
| 0xA0 | 0x04 |  | 0x8A |  |  |
|  | | | | | |
| Parameter  Description | ErrorCode | Error code. | | | |