

I. Communication Protocol

DMR818 provides standard UART interface to send the command to modify and read the parameters.

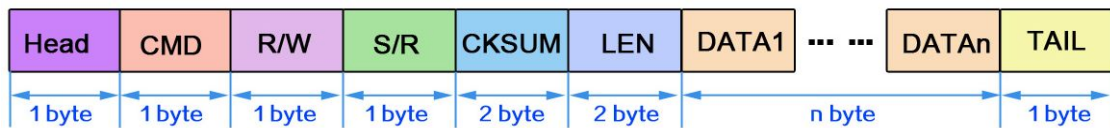
1. UART format:

Baud Rate: 57600 bps ; Date Bit: 8 ; Stop: 1 ; Parity: None

2. Frame format:

All instructions in this communication protocol are hex code , MSB. Begin with 0x68 (Head), end with 0x10 (Tail).

Format as below:



UART Protocol Packet Format

Offset	Flag	Length	Comment	Detail
0	Head	1	Packet header	0x68
1	CMD	1	command	
2	R/W	1	Read/write operation	0x00: reading; 0x01: writing; 0x02: initiative sending
3	S/R	1	Setting/Responding	setting: 0x01: start Responding : 0x00 Done 0x01 busy or fail 0x02 no channel or channel errors 0x07 module killed 0x09 check error Note: setting of sms and voice are different, details see below
4、 5	CHKSUM	2	checksum	Checksum of the frame
6、 7	LEN	2	Data length	Data length, , LEN is 0 when no data
8	DATA	len	Data info	Contend of the data
	TAIL	1	Tail of packet	0x10

The definition of protocol as below

3. Checksum calculation

Checksum calculation of data frames: From the start, every 2 bytes will organize into 16bit hex code, the first byte is MSB. Details algorithm refer to the below function.

For example , if the data is :

Example 1: (The last word is 2 byte)

68 01 02 03 04 05 06 07 08 09 0a 10

The checksum is : (0x 6801 + 0x0203 + 0x 0405 + 0x0607 +0x0809 + 0x0a10) ^ 0xffff =

Example 2: (the last word is one byte, LSB 0x00 is added)

68 01 02 03 04 05 06 07 08 09 0a 0b 10

The checksum is : (0x 6801 + 0x0203 + 0x 0405 + 0x0607 +0x0809 + 0x0a0b + 0x1000) ^ 0xffff =

```
uint16 PcCheckSum(uint8 * buf, int16 len)
```

```
{
    uint32 sum=0;
    while(len >1)
    {
        sum += 0xFFFF & (*buf<<8|*(buf+1));
        buf+=2;
        len-=2;
    }
    if (len)
    {
        sum += (0xFF & *buf)<<8;
    }
    while (sum>>16)
    {
        sum = (sum & 0xFFFF)+(sum >> 16);
    }
    return( (uint16) sum ^ 0xFFFF);
}
```

NOTE: Normally checksum is not 0x0000.if user don't want to calculate the checksum , it can send the checksum as 0x0000, the module will ignore the checksum.

4. Command description

4.1. Channel changing command : 0x01

4.1.1. Channel changing instruction

Description: change the channels of DMR818

Format: 68 01 01 01 CHKSUM 00 01 Channel 10

Parameter Description:

Channel :1 byte, Channel number (0x01~0x10)

For example:

change to channel 1:

68 01 01 01 95 EC 00 01 01 10

4.1.2 response of change channel command

Description: responds from the module after received the changing channel command

Respond Format: 68 01 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte, flag of responding

0x00 -> Done

0x01 -> busy or fail

0x02 -> channel errors

0x07-> module killing

0x09 -> check error

For example:

Channel setting done:

68 01 00 00 87 FE 00 00 10

4.2 volume setting command : 0x02

4.2.1 Instruction format

Description: : set volume in the receiver

Format: 68 02 01 01 CHKSUM 00 01 Volume 10

Parameter Description:

Volume : 1 byte, Volume level (0x01~0x09), The higher the value, the higher the volume

For example:

Setting volume to level 9 :

68 02 01 01 8D EB 00 01 09 10

4.2.2 Respond of volume setting command

Description:

Format: 68 02 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte, flag of responding

0x00 -> Done

0x01 -> busy or fail

0x02 -> channel errors

0x07-> module killing

0x09 -> check error

For example:

Setting volume done:

68 02 00 00 87 FD 00 00 10

4.3 frequency scanning on/off command 0x03

4.3.1 scanning frequency Turn on/off

Description: Turn on/off frequency scanning

Format: 68 03 01 01 CHKSUM 00 01 Scan 10

Parameter Description:

Scan : 1 byte

0x01-> turn on scanning function

0xFF-> Turn off

For example:

Turn on frequency scanning:

68 03 01 01 95 EA 00 01 01 10

4.3.2 Respond of command 0x03

Description:

Format: 68 03 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte, answer sign
0x00 -> Done
0x01 -> busy or fail
0x02 -> channel errors
0x07-> module killing
0x09 -> check error

For example:

Start scanning:

68 03 00 00 87 FC 00 00 10

4.4 Instruction of checking scanning status (command : 0x27)

4.4.1 Description: Check the module if it is doing scanning

Format: 68 27 01 01 CHKSUM 00 01 01 10

Parameter Description:

None

For example:

Check scanning status:

68 27 01 01 95 C6 00 01 01 10

4.4.2 Respond of 0x27

Description:

Format: 68 27 00 S/R CHKSUM 00 01 Scan 10

Parameter Description:

S/R : 1 byte, answer sign
0x00 -> Done
0x01 -> busy or fail
0x07-> module killing
0x09 -> check error

Scan: 1 byte, scanning
0x00 ->turn off
0x01 ->turn on

For example:

Status as turn on:

68 27 00 00 96 C7 00 01 01 10

4.5 Check module status (command : 0x04)

4.5.1 checking the status of the module if it is transmitting or receiving or standby

Description: check current status

Format: 68 04 01 01 CHKSUM 00 01 01 10

Parameter Description:

None

For example:

Check current status:

68 04 01 01 95 E9 00 01 01 10

4.5.2 respond

Description: return the module the status

Form 1 (if command is correct): 68 04 00 S/R CHKSUM 00 01 Status 10

Form 2 (if command is error): 68 04 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,

0x00 -> Done

0x01 -> busy or fail

0x02 -> channel errors

0x07-> module killing

0x09 -> check error

Status: 1 byte, module status

0x01-> receiving

0x02-> transmitting

0x03-> Standby (calling / being called)

For example:

Stand by:

68 04 00 00 94 EA 00 01 03 10

4.6 RSSI (command 0x05)

4.6.1 Read the RSSI of the module

Format: 68 05 01 01 CHKSUM 00 01 01 10

Parameter Description:

None

For example:

68 05 01 01 95 E8 00 01 01 10

4.6.2 Respond :

Description: return the signal strength

Form 1 (if the command is correct): 68 05 00 S/R CHKSUM 00 01 Rssi 10

Form 2 (if the command is error): 68 05 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,

0x00 -> Done

0x01 -> busy or fail

0x02 -> channel errors

0x07-> module killing

0x09 -> check error

Rssi: 1 byte, signal strength level (0x00~0x05) , The higher the value, the stronger of the signal.

For example:

Current signal strength as 3:

68 05 00 00 94 E9 00 01 03 10

4.7 Calling / being called 0x06 & check calling person 0x10

4.7.1 Turn on/off calling instruction

Description: turn on/off calling, replace PTT operation, same as PTT key is pressed or not.

Format: 68 06 01 S/R CHKSUM 00 04 Call_type CallNum 10

Parameter Description:

S/R : 1 byte,

0x01 -> start calling

0xFF -> stop calling

Call_type: 1 byte, calling type

0x01-> single calling

0x02-> group calling

0x03-> calling without address

0x04-> whole calling and broadcast

CallNum : 3 bytes, ID to be called

For example:

Calling number is 0x000001, which is the group calling contact:

68 06 01 01 84 F3 00 04 02 00 00 01 10

4.7.2 Respond when checksum of command 0x06 is error

Description: **Respond when checksum of command 0x06 is error**

Format: 68 06 01 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte, answer sign

0x09 -> check error

For example:

calling instruction error:

68 06 00 09 87 F0 00 00 10

4.7.3 Respond when checksum of command 0x06 is correct, this respond will happen when PTT is released. (without contact ID)

Description: calling status changed, DMR818 upload status automatically

Format: 68 06 02 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,

0x62 -> calling end (PTT released or turn off command is sent out by command 0x06)

0x6E -> calling time out

0x6D -> transmit refused

0x6C -> BS active time out

0x6F -> being called ends (the module is receiving , but the other side stop transmission)

For example:

calling end:

68 06 02 62 85 97 00 00 10

4.7.4 3 Respond when checksum of command 0x06 is correct, this respond will happen when PTT is released. (with contact ID)

Description:

Form 2: 68 06 02 S/R CHKSUM 00 04 Call_type CallNum 10

Parameter Description:

S/R : 1 byte,

0x60 -> being called start

0x61 -> calling start

Call_type: 1 byte, calling type

0x01-> single calling

0x02-> group calling

0x03-> calling without address

0x04-> whole calling and broadcast

CallNum : 3 bytes, contact ID of the person

For example:

Calling start:

68 06 02 61 83 93 00 04 02 00 00 01 10

Note: analog mode, Call type and Call Num are 0.

4.7.5 check who is calling (command 0x10)

Description:

Format: 68 10 01 01 CHKSUM 00 01 01 10

Parameter Description:

None

For example:

Check calling ID:

68 10 01 01 95 DD 00 01 01 10

Respond of command 0x10

Description: respond who is calling

Format: 68 10 00 01 CHKSUM 00 04 Call_type CallNum 10

Parameter Description:

Call_type: 1 byte,

0x01-> single calling

0x02-> group calling

0x03-> calling without address

0x04-> whole calling and broadcast

CallNum : 3 bytes, contacts ID

For example:

Calling type is group calling, calling contacts ID is 0x000001

68 10 00 01 85 E9 00 04 02 00 00 01 10

4.8 SMS Tx and Rx command 0x07 & pick up message content command 0x11

4.8.1 SMS Tx

Description: message sent out

Format: 68 07 01 01 CHKSUM LEN Msg_type CallNum Msg 10

Parameter Description:

LEN: 2 bytes, message length +4

Msg_type: 1 byte, message type

0x01-> IP confirmed

0x02-> IP unconfirmed

0x09-> group calling

CallNum: 3 bytes, contact ID

Msg : message content, ASCII format

For example:

Sending message "123" to number 0x000377:

68 07 01 01 00 00 00 0a 02 00 03 77 31 00 32 00 33 00 10

4.8.2 Respond of SMS TX

Description: Respond only when IP confirmed message is sent out

Format: 68 07 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,

0x70 -> message received successfully

0x7e -> receive response time out

For example:

Sending message successfully:

68 07 00 71 87 87 00 00 10

4.8.3 SMS Rx

Description: received message, inform external device by uart interface

Format: 68 07 02 70 CHKSUM 00 00 10

Parameter Description:

None

For example:

Receiving message successfully:

68 07 02 70 9A 05 00 00 10

Note: this command only remind that one message is received , nothing with specific message content

4.8.4 read message content

Description:

Format: 68 11 01 01 CHKSUM 00 01 01 10

Parameter Description:

None

For example:

Check message content:

68 11 01 01 95 DC 00 01 01 10

4.8.4 Respond of reading message content command

Description:

Format: 68 11 00 01 CHKSUM LEN CallNum Msg 10

Parameter Description:

LEN: 2 bytes, message length+4

CallNum: 3 bytes, message sender contact ID

Msg : message content

For example:

Received message "123" from contact ID 0x000001:

68 11 00 01 00 00 00 09 00 00 01 31 00 32 00 33 00 10

4.9 Emergency alarm command : 0x09

4.9.1 Turn on/off emergency alarm

Description:.

Format: 68 09 01 01 CHKSUM 00 01 Alarm 10

Parameter Description:

Alarm: 1 byte, turn on/off emergency alarm

0x01-> turn on emergency alarm

0xFF-> turn off emergency alarm

For example:

Turn on emergency alarm:

68 09 01 01 95 E4 00 01 01 10

4.9.2 Respond of command 0x09

Description:

Form 68 09 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,

0x00 -> Done

0x01 -> busy or fail

0x02 -> channel errors

0x07-> module killing

0x09 -> check error

For example:

68 09 00 00 87 F6 00 00 10

4.9.3Emergency alarm upload (command 0x09)

Description: received the Emergency alarm from the transmitter, and upload this message via serial interface.

Format:

68 09 02 91 CHKSUM 00 03 CallNum 10

Parmteres:

CallNum : 3 bytes, message sender contact ID

For example:

Received the emergency alarm from ID 0x000001

68 09 02 91 94 52 00 03 00 00 01 10

Note

- 1 Emergency alarm is only available in DMR channel
- 2, some special parameters must be set by PC software before sent this command
- 3, Emergency alarm is enable for default setting:

4.9 Additional function (command 0x0A)

4.9.1 Turn on the additional function of the receiver

Form : 68 0A 01 01 CHKSUM 04 FUN CallNum 10

Parameter Description:

FUN: One byte

- 0x01: check if the receiver with callNum iD is online
- 0x02: Reserved
- 0x03: Listen to the receiver whatever ID it is talking to
- 0x04: Kill the receiver
- 0x05: rescue the killed receiver

CallNum : 3 bytes, message receiver contact ID

For example:

Kill the receiver with ID 0x000001

68 0A 01 01 91 E0 04 04 00 00 01 10

4.9.2 Respond of command 0x0a

Description:

Form 68 0a 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,

- 0x00 -> Done
- 0x01 -> busy or fail
- 0x02 -> channel errors
- 0x07-> module killing
- 0x09 -> check error

For example :

68 0a 00 00 87 F6 00 00 10

4.9.3 Indicator of setting additional function

Form: 68 0A 02 S/R CHKSUM 00 00 10

Parameter Description:

S/R: One byte

- 0xa1: the receiver with callNum iD is online
- 0xa2: Reserved
- 0xa3: succeed Listen to the receiver whatever ID it is talking to
- 0xa4: succeed to Kill the receiver
- 0xa5: succeed to rescue the killed receiver
- 0xaf: failed to set additional function

For example :

succeed to Kill the receiver

68 0A 02 A4 85 51 00 00 10

4.10 Mic gain set command 0x0b

Form: 68 0B 01 01 CHKSUM 00 01 Gain 10

Parameters:

Gain: one byte, mic gain (0x00 ~0x0F), Gain is higher with value bigger

For example:

Set Mic Gain with level 9:

68 0B 01 01 8D E2 00 01 09 10

4.10.2 Respond of command 0x0b

Description:

Form 68 0B 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,

0x00 -> Done

0x01 -> busy or fail

0x02 -> channel errors

0x07-> module killing

0x09 -> check error

For example :

68 0B 00 00 87 F4 00 00 10

4.11 Duty working mode command 0x0C

4.11.1

Description: To save power, the module works in duty cycle mode.

Form: 68 0C 01 01 CHKSUM 00 03 Switch Time Mode 10

Parameters:

Switch: One byte, on/off duty cycle mode

0x01 -> on

0xFF -> off

Time : one byte, time for sleep, range 10~60 s

Mode: one byte , Duty cycle

0x01-> 1:1

0x02-> 1:2

0x04-> 1:4

For example :

Duty cycle working mode, sleep time 10s, duty 1:4

68 0C 01 01 91 D5 00 03 01 0A 04 10

4.11.2 Respond of command 0x0C

Description:

Form : 68 0C 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,

0x00 -> Done

0x01 -> busy or fail

0x02 -> channel errors

0x07-> module killing

0x09 -> check error

For example :

68 0C 00 00 87 F3 00 00 10

4.12 Set Tx /Rx Frequency (command 0x0D)

4.12.1

From: 68 0D 01 01 CHKSUM 00 08 Rx_Freq Tx_Freq 10

Parameters:

Rx_Freq: 4 byte, Rx frequency

Tx_Freq: 4 byte, Tx frequency

For example:

Rx frequency = 409.75MHz, Tx frequency = 415.75MHz

68 0D 01 01 F2 96 00 08 F0 49 6C 18 70 D7 C7 18 10

Frequency value is LSB, for example :

415.75MHz=415750000Hz=0x18C7D770,

The data to be sent is : 0x70、0xD7、0xC7、0x18

4.12.2 Respond of command 0x0D

Description:

Form 68 0D 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,

0x00 -> Done

0x01 -> busy or fail

0x02 -> channel errors

0x07-> module killing

0x09 -> check error

For example :

68 0D 00 00 87 F2 00 00 10

4.14 SQ setting command 0x12

4.14.1

Form: 68 12 01 01 CHKSUM 00 01 Level 10

Parameters:

Level: 1 byte, SQ level

0x00 -> normal level

0x01 -> strong level

0x02 -> stronger level

For example:

Set the SQ as strong level:

68 12 01 01 95 DB 00 01 01 10

Note: only available for analog channel, and valid when no CTCSS/CDSSS

4.14.2 Respond of command 0x12

Description:

Form 68 12 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,
0x00 -> Done
0x01 -> busy or fail
0x02 -> channel errors
0x07-> module killing
0x09 -> check error

For example :

68 12 00 00 87 ED 00 00 10

4.15 select CTCSS / CDCSS command 0x13

Description : this command only available for analog channel

Form: 68 13 01 01 CHKSUM 00 02 RX_CXCSS_TYPE TX_CXCSS_TYPE 10

Parameter Description:

RX_CTCSS_TYPE: 1byte for RX

0x00 -> No ctcss and no cdcss
0x01 -> ctcss
0x02 -> cdcss
0x03 -> in-cdcss

TX_CTCSS_TYPE: 1byte for TX

0x00 -> No ctcss and no cdcss
0x01 -> ctcss
0x02 -> cdcss
0x03 -> in-cdcss

For example:

68 13 01 01 86 E8 00 02 00 01 10

4.15.2 Respond of command 0x13

Description:

Form 68 13 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,
0x00 -> Done
0x01 -> busy or fail
0x02 -> channel errors
0x07-> module killing
0x09 -> check error

For example :

68 13 00 00 87 EC 00 00 10

4.16 CTCSS /CDCSS setting command 0x14

4.16.1

Form:

68 14 01 01 CHKSUM 00 02 RX_CXCSS TX_CXCSS 10

Parameters:

RX_CXCSS: 1byte, CTCSS/CDCSS code, ctcss (0~50), CDCSS (0~83)

TX_CXCSS: 1byte, CTCSS/CDCSS code, ctcss (0~50), CDCSS (0~83)

For example:

RX-CDCSS : 23I, TX-CTCSS : 62.5Hz

68 14 01 01 86 E8 00 02 00 00 10

Note: detailed relation between the code and actually value are in sub-appendix

4.16.2 Respond of command 0x14

Description:

Form : 68 14 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,

0x00 -> Done

0x01 -> busy or fail

0x02 -> channel errors

0x07-> module killing

0x09 -> check error

For example :

68 14 00 00 87 EB 00 00 10

4.17 monitor mode command 0x15

4.17. 1 on/off monitor mode

Description : on/off monitor mode, only for analog channel, when module works in monitor mode, SQ won't be measured and audio always outputted.

Form: 68 15 01 01 CHKSUM 00 01 SWITCH 10

Parameter Description:

SWITCH: 1byte

0x01 -> on

0xFF -> off

For example:

68 15 01 01 95 D8 00 01 01 10

4.17.2 Respond of command 0x15

Description:

Form : 68 15 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,

0x00 -> Done

0x01 -> busy or fail

0x02 -> channel errors

0x07-> module killing

0x09 -> check error

For example :

68 15 00 00 87 EA 00 00 10

4.18 Set Tx power command 0x17

4.18.1

Description : high /Low output power selected.

Form: 68 17 01 01 CHKSUM 00 01 Power 10

Parameter Description::

Power: 1byte, power options:

0x01 -> high power

0xFF -> low power

For example :

68 17 01 01 97 D5 00 01 FF 10

4.18.2 Respond of command 0x17

Description:

Form : 68 17 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,

0x00 -> Done

0x01 -> busy or fail

0x02 -> channel errors

0x07-> module killing

0x09 -> check error

For example :

68 17 00 00 87 E8 00 00 10

4.19 Set contact ID command 0x18

4.19.1

Description : The contact ID will be sent out after succeed setting this command, the contact ID will be lost when powered off.

Form: 68 18 01 01 CHKSUM 00 04 Call_type CallNum 10

Parameter Description::

Call_type: 1 byte

0x01-> single calling

0x02-> group calling

0x03-> calling without address

0x04-> whole calling and broadcast

CallNum : 3 bytes, contact ID

For example :

68 18 01 01 85 E1 00 04 01 00 00 01 10

4.19.2 Respond of command 0x18

Description:

Form : 68 18 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,
0x00 -> Done
0x01 -> busy or fail
0x02 -> channel errors
0x07-> module killing
0x09 -> check error

For example :

68 18 00 00 87 E7 00 00 10

4.20 encryption on/off command 0x19

4.20.1

Description : encryption on/off, only available at DMR channel

Form: 68 19 01 01 CHKSUM 00 01 SWITCH 10

Parameter Description::

SWITCH: 1 bute
0x01-> on
0xFF-> off

For example :

68 19 01 01 95 D4 00 01 01 10

4.20.2 Respond of command 0x19

Description:

Form : 68 19 00 S/R CHKSUM 00 00 10

Parameter Description:

S/R : 1 byte,
0x00 -> Done
0x01 -> busy or fail
0x02 -> channel errors
0x07-> module killing
0x09 -> check error

For example :

68 19 00 00 87 E6 00 00 10

Note : this command can only be with specified PC software

4.22 check the contact ID command 0x22

4.22.1

From: 68 22 01 01 CHKSUM 00 01 01 10

For example :

68 22 01 01 95 CB 00 01 01 10

4.22.2 Respond of command 0x22

Form: 68 22 00 S/R CHKSUM 00 0E Call_name Call_num Call_type 10

Parameter Description::

S/R : 1 byte,
0x00 -> Done
0x01 -> busy or fail
0x02 -> channel errors
0x07-> module killing
0x09 -> check error

Call_name: 10 byte, name of contact ID

Call_num: 3byte, contact ID number

Call_type: 1byte, contact ID type

0x01-> single calling
0x02-> group calling
0x03-> calling without address
0x04-> whole calling and broadcast

For example :

68 22 00 00 A5 FF 00 0E 43 61 6C 6C 31 00 00 00 00 00
00 00 01 02 10

4.23 Check the ID of the module itself: command 0x24

4.23.1

Form: 68 24 01 01 CHKSUM 00 01 01 10

Parameter Description:

For example:

68 24 01 01 95 C9 00 01 01 10

4.23.2 Respond of command 0x24

Description:

Form : 68 24 00 S/R CHKSUM 00 03 Self_num 10

Parameter Description:

S/R : 1 byte,
0x00 -> Done
0x01 -> busy or fail
0x02 -> channel errors
0x07-> module killing
0x09 -> check error

Self_num : 3 byte, ID number of module itself

For example :

68 24 00 00 96 C8 00 03 00 00 01 10

4.24 check the version number of the module command : 0x25

4.24.1

For example :

68 25 01 01 95 C8 00 01 01 10

4.24.2 Respond of command 0x25

Description:

Form : 68 25 00 S/R CHKSUM 00 12 Version 10

Parameter Description:

S/R : 1 byte,
0x00 -> Done
0x01 -> busy or fail
0x02 -> channel errors
0x07-> module killing
0x09 -> check error

Version : 18 byte, Version number of the module

For example : if the version number of the module is : Mobile_AF_20150917

68 25 00 00 01 14 00 12 4D 6F 62 69 6C 65 5F 41 46 5F
32 30 31 35 30 39 31 37 10

4.26 check the module is encryption or not

Form : 68 28 01 01 CHKSUM 00 01 01 10

For example:

68 28 01 01 95 C5 00 01 01 10

4.26.2 Respond of command 0x28

Description:

Form : 68 28 00 S/R CHKSUM 00 01 SWITCH 10

Parameter Description:

S/R : 1 byte,
0x00 -> Done
0x01 -> busy or fail
0x02 -> channel errors
0x07-> module killing
0x09 -> check error

Switch : 1 byte,
0x00 -> off
0x01 -> on

For example

68 28 00 00 96 C6 00 01 01 10

4.27 Set the receive group ID 0x29

4.27.1

Description: Add new group ID to receive group list, and turn to this receive group list

Form: 68 29 01 01 CHKSUM 00 04 INDEX CallNum 10

Parameter Description:

INDEX: 1 byte, index of receive group list(1~32)

CallNum: 3 bytes, group ID

For example:

Add group ID 0x000001 to receive group list 2

68 29 01 01 84 D0 00 04 02 00 00 01 10

4.27.2 Respond of command 0x29

Description:

Form: 68 29 00 S/R CHKSUM 00 00 10

Parameter Description:

- S/R : 1 byte,
- 0x00 -> Done
- 0x01 -> busy or fail
- 0x02 -> channel errors
- 0x07-> module killing
- 0x09 -> check error

For example

68 29 00 00 87 D6 00 00 10

4.28 Delete receive group list 0x30

4.28.1

Description:

Form: 68 30 01 01 CHKSUM 00 01 INDEX 10

Parameter Description:

INDEX:1 byte, index of receive group list(1~32)

For example

Delete receive group list 1

68 30 01 01 95 BD 00 01 01 10

4.28.2 Respond of command 0x30

Description:

Form: 68 30 00 S/R CHKSUM 00 00 10

Parameter Description:

- S/R : 1 byte,
- 0x00 -> Done
- 0x01 -> busy or fail
- 0x02 -> channel errors
- 0x07-> module killing
- 0x09 -> check error

For example

68 30 00 00 87 CF 00 00 10

4.29 Set self contact ID 0x1B

4.29.1

Description:

Form: 68 1B 01 01 CHKSUM 00 03 SelfNum 10

Parameter Description:

SelfNum: 3bytes, self contact ID

For example

Set self contact ID to 0x000001:

68 1B 01 01 95 D0 00 03 00 00 01 10

4.29.2 Respond of command 0x1B

Description:

Form: 68 1B 00 S/R CHKSUM 00 00 10

Parameter Description:

- S/R : 1 byte,
- 0x00 -> Done
- 0x01 -> busy or fail
- 0x02 -> channel errors
- 0x07-> module killing
- 0x09 -> check error

For example

68 1B 00 00 87 E4 00 00 10

4.30 Set color code 0x31

4.30.1

Description:

Form: 68 31 01 01 CHKSUM 00 03 ColorCode 10

Parameter Description:

ColorCode: 1 byte, color code(0~15)

For example

Set color code to 1:

68 31 01 01 95 BC 00 01 01 10

4.30.2 Respond of command 0x1B

Description:

Form: 68 31 00 S/R CHKSUM 00 00 10

Parameter Description:

- S/R : 1 byte,
- 0x00 -> Done
- 0x01 -> busy or fail
- 0x02 -> channel errors
- 0x07-> module killing
- 0x09 -> check error

For example

68 31 00 00 87 CE 00 00 10

4.31 Set band width of Analog 0x32

4.31.1

Description:

Form: 68 32 01 01 CHKSUM 00 01 BW 10

Parameter Description:

- BW: 1byte, band width of Analog
- 0x00 ->12.5K
- 0x80 ->25K

For example

Set band width to 12.5k:

68 32 01 01 96 BB 00 01 00 10

4.31.2 Respond of command 0x32

Description:

Form: 68 32 00 S/R CHKSUM 00 00 10

Parameter Description:

- S/R : 1 byte,
- 0x00 -> Done
- 0x01 -> busy or fail
- 0x02 -> channel errors
- 0x07-> module killing
- 0x09 -> check error

For example

68 32 00 00 87 CD 00 00 10

II. Function description

1. powered on and off

1.1 powered on

- (1) powered connected
- (2) CS leave open or connected to high level
- (3) T/R pin will output high level for 1s when the module is powered on successfully

1.2 power off

The module will enter sleep mode when pull low CS pin

2. Process of calling and being called

Note: To get communication correctly :

- 1 ,The tx-freq of the transmitter must be same as the Rx frequency of the receiver
- 2, CTCSS or CDCSS must be same in analog mode
- 3, contact ID must be same in DMR mode
- 4, The modules can communicate with each other when the channel is same for default setting

2.1Calling

Operation process	Description
<pre> graph TD A[Standby] --> B[External device send command to Start calling] B --> C[Module reply the status for calling start command] </pre>	Pull low PTT or send command :
	68 06 01 01 84 F3 00 04 02 00 00 01 10
	Calling successfully , the module will output via serial port :
	68 06 02 61 83 93 00 04 02 00 00 01 10

	T/R pin is high level
	Pull high PTT or send command : 68 06 01 FF 83 F5 00 04 02 00 00 01 10
	Calling end , the module output : 68 06 02 62 85 97 00 00 10
	T/R pin is low level

2.2 being called

Operation process	Description
<pre> graph TD A[Standby] --> B[Module reply external device for the info of been called] B --> C[Voice Receiving] C --> D[Module reply external device the end of receiving] D --> E[Receiving End] </pre>	Received calling from contact ID: 0x000001, module output 68 06 02 60 83 94 00 04 02 00 00 01 10
	SPK_EN is high level
	Calling end. Module output 68 06 02 6F 85 8A 00 00 10
	SPK_EN is low level

3.SMS process

3.1group SMS sending

Operation process	Description
<pre> graph TD A[Standby] --> B[External device Configure contact ID and SMS content] </pre>	

	Send SMS group, receive ID is 0x000001, SMS content is : "123" 68 07 01 01 E7 EB 00 0A 09 00 00 01 31 00 32 00 33 00 10

3.2 SMS confirmation (confirm receive has got the message or not)

Operation process	Description
<pre> graph TD A[Standby] --> B[External device Configure contact ID and SMS content] B --> C[SMS transmission] C --> D[SMS transmitting end] D --> E[Module reply to external device status of SMS transmission] E --> F[SMS transmitting end] </pre>	Send IP confirmed SMS, receive ID is 0x000001, SMS content is : "123" 68 07 01 01 EF EB 00 0A 01 00 00 01 31 00 32 00 33 00 10
	Receiver has got the SMS. 68 07 00 71 87 87 00 00 10

3.3 SMS reception process

Operation process	Description
<pre> graph TD A[Standby] --> B[Module reply the reception of SMS] B --> C[External send command to check SMS content] C --> D[Module reply the content of SMS] D --> E[SMS receive end] </pre>	
	SMS received, 68 07 02 70 85 88 00 00 10
	External device send command to check the content of SMS. 68 11 01 01 95 DC 00 01 01 10
	Tx ID is 0x000001, SMS content is : "123" 68 11 00 01 00 00 00 09 00 00 01 31 00 32 00 33 00 10

Sub-appendix:: CTCSS/CDCSS table

CTCSS number	Ctcss frequency		CDCSS number	CDCSS code		Inversed CDCSS	CDCSS code
0	62.5		0	023I		0	023N
1	67		1	025I		1	025N
2	69.3		2	026I		2	026N
3	71.9		3	031I		3	031N
4	74.4		4	032I		4	032N
5	77		5	043I		5	043N
6	79.7		6	047I		6	047N
7	82.5		7	051I		7	051N
8	85.4		8	054I		8	054N
9	88.5		9	065I		9	065N
10	91.5		10	071I		10	071N
11	94.8		11	072I		11	072N
12	97.4		12	073I		12	073N
13	100		13	074I		13	074N
14	103.5		14	114I		14	114N

15	107.2		15	115I		15	115N
16	110.9		16	116I		16	116N
17	114.8		17	125I		17	125N
18	118.8		18	131I		18	131N
19	123		19	132I		19	132N
20	127.3		20	134I		20	134N
21	131.8		21	143I		21	143N
22	136.5		22	152I		22	152N
23	141.3		23	155I		23	155N
24	146.2		24	156I		24	156N
25	151.4		25	162I		25	162N
26	156.7		26	165I		26	165N
27	159.8		27	172I		27	172N
28	162.2		28	174I		28	174N
29	165.5		29	205I		29	205N
30	167.9		30	223I		30	223N
31	171.3		31	226I		31	226N
32	173.8		32	243I		32	243N
33	177.3		33	244I		33	244N
34	179.9		34	245I		34	245N
35	183.5		35	251I		35	251N
36	186.2		36	261I		36	261N
37	189.9		37	263I		37	263N
38	192.8		38	265I		38	265N
39	196.6		39	271I		39	271N
40	199.5		40	306I		40	306N
41	203.5		41	311I		41	311N
42	206.5		42	315I		42	315N
43	210.7		43	331I		43	331N

44	218.1		44	343I		44	343N
45	225.7		45	346I		45	346N
46	229.1		46	351I		46	351N
47	233.6		47	364I		47	364N
48	241.8		48	365I		48	365N
49	250.3		49	371I		49	371N
50	254.1		50	411I		50	411N
			51	412I		51	412N
			52	413I		52	413N
			53	423I		53	423N
			54	431I		54	431N
			55	432I		55	432N
			56	445I		56	445N
			57	464I		57	464N
			58	465I		58	465N
			59	466I		59	466N
			60	503I		60	503N
			61	506I		61	506N
			62	516I		62	516N
			63	532I		63	532N
			64	546I		64	546N
			65	565I		65	565N
			66	606I		66	606N
			67	612I		67	612N
			68	624I		68	624N
			69	627I		69	627N
			70	631I		70	631N
			71	632I		71	632N
			72	654I		72	654N

			73	662I		73	662N
			74	664I		74	664N
			75	703I		75	703N
			76	712I		76	712N
			77	723I		77	723N
			78	731I		78	731N
			79	732I		79	732N
			80	734I		80	734N
			81	743I		81	743N
			82	754I		82	754N

Sub-appendix: working area of instructon

CMD	Function	working area	Save when powered off	Analog parameters	DMR parameters	Valid when module is transmitting	Valid when module is receiving
0x01	Channel change		R	R	R	R	R
0x02	Receive volume	All	R	R	R		R
0x03	scanning	current channel		R	R		
0x04	Transceiver status checking	current channel		R	R	R	R
0x05	Signal strength value	current channel		R	R	R	R
0x06	Various call modes (Call Type)	current channel		R	R	R	R
0x07	Message mode setting and transmit	current channel			R	R	R
0x09	Emergency alarm	current channel			R		
0x0a	Enhancements	current channel			R		
0x0b	Mic Gain configuration	All	R		R		
0x0c	Power-saving mode	All	R	R	R		

	configuration						
0x0d	Transceiver frequency	current channel	R	R	R		
0x0e	Repeater/off-web	current channel			R		
0x10	Receive/call type, number output	current channel			R		R
0x11	Read received data	current channel			R		
0x12	SQ setting	current channel	R	R			
0x13	Mode of CTCSS/CDCSS	current channel	R	R			
0x14	CTCSS/CDCSS	current channel	R	R			
0x15	Monitor switch	current channel		R			
0x17	High/low power	current channel	R	R	R		
0x18	Contact person	current channel			R		
0x19	Encryption switch	current channel			R		
0x1a	Completed initialization			R	R		R
0x22	Transmit contacts information	current channel		R	R		
0x24	ID reading	All		R	R		
0x25	Firmware Version reading	All		R	R		
0x27	Checking scan status	current channel		R	R		
0x28	Checking encryption status	current channel			R		
0x29	Set the receive group ID	current channel	R		R		
0x30	Delete receive group list	current channel	R		R		
0x1B	Set self contact ID	All	R		R		
0x31	Set color code	current channel	R		R		
0x32	Set band width of Analog	current channel	R	R			