

# DC510 \_People\_Counter

## \_Protocol\_NB-IoT

Confidential

V1.0

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## Changed Note

V1.0 Initial version.

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# 1 Terminal Upload Data Format

Transfer Protocol:TCP.

Note: The data is sent by in hexadecimal.

Upload data format:

Field	Packet head	Forced bit	Device type	Report data type	Packet size	Payload	Packet tail
<b>Instruction</b>	Packet head	Forced bit	Device type	Active reporting or answering	Packet length	Data content	Packet tail
<b>Size</b>	1byte	1byte	1byte	1byte	1byte	0-255byte	1byte

## 1.1 Packet Header

Packet head:0x80; length:1byte.

## 1.2 Forced Bit

Forced bit:0x00; length:1byte

## 1.3 Device Type

For DC510 sensor default:0x01,1byte

Command	Device type
0X15	DC510

## 1.4 Report Data Type

Report data type: 0x01-0x03, 1byte

Command	Type
0x01	Abnormal reporting type, such as TEMP alarm, etc.
0x02	Heartbeat data
0x03	Confirmation reply for downlink commands

## 1.5 Packet Size

The size of the total packet, 1 byte, in hex. For example: 0x1E means 30bytes.

## 1.6 Payload

**The Payload format1**(Report data type 0x01 and 0x02):

S/N	1	2	3	4	5	6	7	8
Payload	People count	People Count status	Battery status	Battery voltage	RSRP	Device ID	Time stamp	Frame count
size	2byte	1byte	1byte	2byte	4byte	8byte	4byte	2byte

### Payload field definition:

**1 People count:** Accumulated number of people passing by; 2bytes, in hex. The max count is 65535. For example, 001E means 30.

**2 People count status:**Limited number of alarm status bits; 1byte; 00:no alarm ; 01:counter alarm.

**3 Battery status:** 1byte; 00: the battery is normal, 01: lower battery alarm.

**4 Battery voltage:**battery voltage value; 2bytes in hex; Unit:10mV; For example, 014A means that the battery voltage is  $330*10mV=3.3V$ .

**5 RSRP:**Reference Signal Receiving Power;4byte; Floating point IEEE standard, single precision.

**6 Device ID:** 8bytes; 1+IMEI.

**7 Timestamp:**the time when report. Device get the time from NB-IoT base station; Unix time in hex; For example, 5EBB9D61 means 1589353825 in decimal.

**8 Frame count:** 2bytes in hex, Max 65535.

**The payload format2**(data type:0x03):

S/N	1	2	3	4
Payload	Firmware version	Heartbeat interval	People count alarm threshold	Battery alarm threshold
Size	2byte	1byte	2byte	1byte
S/N	5	6	7	8

Payload	Simcard NO.	Server mode	Server address	Device ID
Size	8byte	1byte	Max50byte	8byte

### Payload field definition:

1 **Firmware version:** the Firmware version of device;2byte;The upper 8 bits are the main version number in hex, and the lower 8 bits are the small version number in hex. For example, 010C means V1.12.

2 **Heartbeat interval:** Heartbeat interval; 2byte in hex, unit: hours; For example, 000A means the heartbeat interval is 10hours.

3 **People count alarm threshold:** 2byte in hex; For example, 01F4 means 500 people;

4 **Battery alarm threshold:** 2byte in hex; For example, 1E means 30%;

5 **Simcard NO.:** International Mobile Subscriber Identity; It is 1+IMSI; For example, 1460111174736920 means that the IMSI of SIM card is 460111174736920;

6 **Server mode:** 1byte; Default 00.

7 **Server address:**Max50bytes: ; The calculation ends at this part; at the same time, the port numbers are separated; if the ip address is 47.104.91.39, the code is 0x34 37 2E 31 30 34 2E 39 31 2E 33 39. Port 8080 (decimal), expressed as 0x1F 90. Intermediate use The semicolon is separated by 0x3B, and there is a semicolon after the IP address and port number.

8 **Device ID:** 8bytes; 1+IMEI.

## 1.7 Packet Tail

Packet tail:0x81;1byte.

## 1.8 Example

### Report data type0x01:

80 00 15 01 1E 0005 01 00 01 A4 00 80 68 C4 18 65 38 50 60 02 98 72 63 41 2E 93 0001 81

### Payload field definition:

80: packet header

00: Reserved

15: Device type  
01: Report data type  
**1E**: Length,30 bytes.  
**0005**: People counter.  
01: People counter status, counter alarm.  
00: Battery status, battery is normal.  
**01A4**: volt, unit 10mv.  $420*10=4.2V$ .  
**00 80 68 C4**: RSRP.  
**1865385060029872**: Device ID,1+IMEI, IMEI:865385060029872  
**63412E93**: Time stamp, 1665216147;  
0001:Frame counter.  
81: Packet tail

### Report data type 0x03:

80 00 15 03 2D **01 01 00 18 00 05** 14 **1460111174736920 00** 31 32 30 2E 39 32  
2E 38 39 2E 31 32 32 3B **23 82** 3B **18 65 38 50 60 02 98 72 81**

### Payload field definition:

80: packet header  
00: Reserved  
15: Device type  
03: Report data type03  
**2D**: Length, 45bytes.  
01 01:Firmware version,v1.1  
0018: Upload time, 24hours..  
0005: People counter,5  
14: alarm level for battery, 20%  
**1460111174736920**: 1+IMSI, IMSI: 460111174736920;  
**00** : server mode 0.  
31 32 30 2E 39 32 2E 38 39 2E 31 32 32 3B **23 82** 3B: IP, 120.92.89.122, port,  
9090  
**1865385060029872**: Device ID,1+IMEI, IMEI:865385060029872  
81: Packet tail

## 2 Terminal Downlink Command Format

Downlink command format:

Field	Packet head	Command type	Payload			Packet tail
Instruction	Packet head	Command type	Payload header	Command code	content	Packet tail
Size	1byte	1byte	2byte	1byte	n	1byte

### Packet head

Packet head: 0x80; 1byte.

### Command type

Command type	Instruction
0x02	Configure device parameters through the downlink
...	...

### Payload

Payload header: 9999 by default

Command code:

Command code	Function Description
01	Setting Periodic upload time
02	Set people counter alarm threshold
05	Setting battery alarm value
06	Setting server1 address, IP and port
08	Setting the cycle detection time
09	Switch function setting
0D	Setting APN
0H	Set band
0K	Set protocol

Content: please refer to detailed command description part2.1-2.9

### Packet tail

Packet tail: 0x81,1byte.



## 2.1 0x01 Setting Periodic Upload Time

Function: setting periodic upload time interval

Default: 24 hours

Range: 1~168 hours

Format:

Field	Packet head	Command type	Payload			Packet tail
Instruction	80	02	9999	01	Content	81
Size	1byte	1byte	2byte	1byte	1byte	1byte

**Content:** 1byte, in hex. Unit: hour. Value range: 1-168.

**Example 1:** Set the periodic reporting interval to 10 hours,

Command:80029999010A81

## 2.2 0x02 Set people counter alarm threshold

Function: Set people counter alarm threshold

Default: 500

Range: 1-65535

Format:

Field	Packet head	Command type	Payload			Packet tail
Instruction	80	02	9999	02	Content	81
Size	1byte	1byte	2byte	1byte	2byte	1byte

**Content:** 2byte, in hex; Range:1-65535.

**For example1:** set the people count alarm threshold to 500,

Command:800299990201F481

## 2.3 0x05 Setting battery alarm value

**Function:**Setting battery alarm value

Default: 20%

Modifiable range 5%-99%

Command sending type: sent in ASCII, from computer to terminal.

**Format:**

Field	Packet head	Command type	Payload			Packet tail
Instruction	80	02	9999	05	Content	81

<b>Size</b>	1byte	1byte	2byte	1byte	2byte	1byte
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Content: 1 byte, expressed in hexadecimal. unit:%. Value range: 5% -99%.

Example 1: Set the low battery alarm threshold to 20%,

Command: 80029999051481

## 2.4 0x06 Setting Server1 Address

Function: setting server1 address,IP and port

Default: Dingtek server address

Transfer Protocol: TCP from server to device

Format:

Field	Packet head	Command type	Payload			Packet tail
<b>Instruction</b>	80	02	9999	06	Content	81
<b>Size</b>	1byte	1byte	2byte	1byte	n	1byte

**Content:** IP;PORT;

**Note:** Two English semicolons must not be less, otherwise errors will occur error.

**For example1:** Setting server1 address to 135.48.56.123:8890

Command: 8002999906135.48.56.123;8890;81

## 2.5 0x08 Set the cyclic detection time

Function: Set the cyclic detection time

Default: 10min

Range: 1-60min

Format:

Field	Packet head	Command type	Payload			Packet tail
<b>Instruction</b>	80	02	9999	08	Content	81
<b>Size</b>	1byte	1byte	2byte	1byte	1byte	1byte

**Content:** 1 byte, expressed in hexadecimal. Unit: minute. Value range: 1-60

**Example 1:** Set the cycle detection time to 20 min,

Command:80029999081481

## 2.6 0x09 Switch function setting

**Function:** Switch function setting

**Format:**

Field	Packet head	Command type	Payload			Packet tail
<b>Instruction</b>	80	02	9999	09	Content	81
<b>Size</b>	1byte	1byte	2byte	1byte	1byte	1byte

**Content:** 02,0B/0C,05/06,0D,0F

02: Reset system

0B/0C: Turn on/off echo

05/06: set the work mode0/1; work mode 0: cyclic detection, cyclic upload at upload interval, recommend for battery version.

work mode 1: cyclic upload at detection interval, recommend for external power supply version.

0D: factory reset.

0F: zero people counter. Counter from zero.

**Example1:** Turn on echo

Command: 80029999090B81

## 2.7 0x0D Setting APN

**Function:** setting APN

**Default:** CTNB

**Transfer Protocol:** TCP from server to device

**Format:**

Field	Packet head	Command type	Payload			Packet tail
<b>Instruction</b>	80	02	9999	0D	Content	81
<b>Size</b>	1byte	1byte	2byte	1byte	n	1byte

**Content:** APN;Username;Password;

It can be left blank if there is no username or password,like APN;;;

**Note:** Three English semicolons must not be less, otherwise errors will occur error.

**For example1:** Setting APN to internet, no username, no password,

Command: 800299990Dinternet;;;81

## 2.8 0x0H Setting Band

**Function:** setting NB-IoT band

Default: 0-all enabled

Format:

Field	Packet head	Command type	Payload			Packet tail
Instruction	80	02	9999	0H	Content	81
Size	1byte	1byte	2byte	1byte	1 byte	1byte

#### Content:

0--all, 3--band3, 5--band5,8--band8,20--band20,28--band28

**For example1:** Setting band to band20,

Command: 800299990H1481

## 2.9 0x0K Select protocol

Function: select protocol

Default: 0-standard TCP socket

Format:

Field	Packet head	Command type	Payload			Packet tail
Instruction	80	02	9999	0H	Content	81
Size	1byte	1byte	2byte	1byte	1 byte	1byte

#### Content:

0--standard tcp socket, 1--mqtt,4--TBPE tcp socket.

**For example1:** Select protocol MQTT,

Command: 800299990K0481

## 3 Demo Code

### 3.1 Java script code

<https://github.com/cndingtek/NB-IoT-JS->

### 3.2 Python code

[https://github.com/cndingtek/NB-IoT\\_Gateway](https://github.com/cndingtek/NB-IoT_Gateway)