

# cNIBP Protocol (v2.0)

## 1、Bluetooth Service Information (UUIDs):

|                             |                                      |
|-----------------------------|--------------------------------------|
| Comm Service:               | 49535343-FE7D-4AE5-8FA9-9FAFD205E455 |
| Send Characteristic:        | 49535343-1E4D-4BD9-BA61-23C647249616 |
| Receive Characteristic:     | 49535343-8841-43F4-A8D4-ECBE34729BB3 |
| Rename Characteristic:      | 00005343-0000-1000-8000-00805F9B34FB |
| MAC Address Characteristic: | 00005344-0000-1000-8000-00805F9B34FB |

PS: Host application should use the notification of the 'Send Characteristic' for package fetching.

## 2、Device Packet (Device to Host):

**Packet1 length:** 16 bytes

**Packet1 Frequency:** Fixed (1 Hz)

**Packet1 Format:**

|                    |                                          |
|--------------------|------------------------------------------|
| Byte0: 0xff        | Head mark1                               |
| Byte1: 0xaa        | Head mark2                               |
| Byte2: PktIndex    | Packet index                             |
| Byte3: SpO2Sat     | Blood oxygen saturation                  |
| Byte4: PulseRate   | Pulse rate (i.e. heart rate)             |
| Byte5: PerfuIndex  | Blood perfusion index                    |
| Byte6: SBP         | Systolic blood pressure                  |
| Byte7: DBP         | Diastolic blood pressure                 |
| Byte8: SBP_Ref     | Systolic blood pressure reference value  |
| Byte9: DBP_Ref     | Diastolic blood pressure reference value |
| Byte10: Age        | Patient age                              |
| Byte11: Height     | Patient height                           |
| Byte12: Weight     | Patient weight                           |
| Byte13: Battery    | Battery power in percent                 |
| Byte14: PacketFreq | Packet2 sending frequency                |
| Byte15: Checksum   | Checksum of the whole packet             |

**Packet2 length:** 6 bytes

**Packet2 Frequency:** Adjustable (Default is 200 Hz)

**Packet2 Format:**

|                  |                              |
|------------------|------------------------------|
| Byte0: 0xff      | Head mark1                   |
| Byte1: 0xbb      | Head mark2                   |
| Byte2: PktIndex  | Packet index                 |
| Byte3: Status    | Measurement status info      |
| Byte4: PlethWave | Plethysmography wave         |
| Byte6: Checksum  | Checksum of the whole packet |

#### Packet1 bytes description:

|             |                                                                                                                                             |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| PktIndex:   | Range (0~255), the index of current packet, auto increment by 1                                                                             |
| SpO2Sat:    | Range (35~100, invalid value=127), unit: %                                                                                                  |
| PulseRate:  | Range (25~250, invalid value=255), unit: bpm                                                                                                |
| PerfuIndex: | Range (1~200, invalid value=0), unit: %                                                                                                     |
| SBP:        | Range (40~230, invalid value=0), unit: mmHg                                                                                                 |
| DBP:        | Range (40~230, invalid value=0), unit: mmHg                                                                                                 |
| SBP_Ref:    | Range (40~230, invalid value=0), unit: mmHg                                                                                                 |
| DBP_Ref:    | Range (40~230, invalid value=0), unit: mmHg                                                                                                 |
| Age:        | Range (20~70), unit: years old                                                                                                              |
| Height:     | Range (140~190), unit: cm                                                                                                                   |
| Weight:     | Range (40~100), unit: kg                                                                                                                    |
| Battery:    | Range (0~100), unit: %                                                                                                                      |
| PacketFreq: | Range (1, 50, 100, 200)<br>Represent for current packets sending frequency,<br>valid values: 1, 50, 100, 200, means 1Hz, 50Hz, 100Hz, 200Hz |
| Checksum    | Range (0~255)<br>Formula: Checksum = (Byte0+Byte1+...+Byte18) % 256,<br>% is mod operator                                                   |

#### Packet2 bytes description:

|            |                                                                                                        |
|------------|--------------------------------------------------------------------------------------------------------|
| PktIndex:  | Range (0~255), the index of current packet, auto increment by 1                                        |
| Status:    | 0x01 SpO2 Sensor Error<br>0x02 No finger Detected<br>0x04 No Pulse Detected<br>0x08 Pulse Beat Martker |
| PlethWave: | Range (1~100, invalid value=0)                                                                         |
| Checksum   | Range (0~255)<br>Formula: Checksum = (Byte0+Byte1+...+Byte18) % 256,<br>% is mod operator              |

### 3、Host Command (Host to Device):

| Command | Byte1      | description                                                            |
|---------|------------|------------------------------------------------------------------------|
| 0xff    | N/A        | Get software version                                                   |
| 0xfe    | N/A        | Get hardware version                                                   |
| 0xfd    | Age        | Set patient age value, Range (20~70)                                   |
| 0xfc    | Height     | Set patient height value, Range (140~190)                              |
| 0xfb    | Weight     | Set patient weight value, Range (40~100)                               |
| 0xfa    | SBP_Ref    | Set SBP reference value, Range (40~230)                                |
| 0xf9    | DBP_Ref    | Set DBP reference value, Range (40~230)                                |
| 0xf8    | PacketFreq | Set packet2 sending frequency, Range (1, 50, 100, 200)                 |
| 0xf7    | on/off     | Switch SBP&DBP reference correction function,<br>0x00---Off, 0x01---On |

For example:

- Sending “0xff” 1 bytes, means to get software version.
- Sending “0xfe” 1 bytes, means to get hardware version.
- Sending “0xfd 0x28” 2 bytes, means set patient age value to 40 years old.
- Sending “0xfc 0xaa” 2 bytes, means set patient height value to 170 cm.
- Sending “0xfb 0x46” 2 bytes, means set patient weight value to 70 kg.
- Sending “0xfa 0x78” 2 bytes, means set SBP reference value to 120 mmHg.
- Sending “0xf9 0x50” 2 bytes, means set DBP reference value to 80 mmHg.
- Sending “0xf8 0xc8” 2 bytes, means set packets sending frequency to 200 Hz.
- Sending “0xf7 0x00” 2 bytes, means switch reference to Off.

● Software Version Package Example (16 bytes):

0xff 0xaa 0x53 0x56 0x31 0x2e 0x30 0x34 0x2e 0x30 0x30 0x2e 0x33 0x36 0x00 0x3a

0xff 0xaa       ----- Packet head mark

0x53           ----- ASCII ‘S’, identification of software version

0x56 0x31 0x2e 0x30 0x34 0x2e 0x30 0x30 0x2e 0x33 0x36

----- ASCII string ‘V1.04.00.36’, current software version content

0x00           ----- Padding bytes of packet

0x3a           ----- Checksum byte

● Hardware Version Package Example:

0xff 0xaa 0x48 0x56 0x32 0x2e 0x30 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0xd7

0xff 0xaa       ----- Packet head mark

0x48           ----- ASCII ‘H’, identification of hardware version

0x56 0x32 0x2e 0x30

----- ASCII string ‘V2.0’, current hardware version content

0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00

----- Padding bytes of packet

0xd7           ----- Checksum byte