LM3001 Bluetooth Access Point User Guide Application Note

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Reference: 2.2

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Overview

This document explains how to set up and operate the LM3001 Bluetooth Access Point with the LM068 Bluetooth serial adapter. The LM3001 is a device used to bridge connected Bluetooth devices to wired network infrastructure.

To follow this guide, the user will require the following items:

- LM Technologies' LM3001
- LM068 Bluetooth serial adapter with mini-USB cable for power
- Ethernet cable
- 12 V, 1 A, DC power supply with negative outer sleeve. Connector size, 11 mm x 5.5 mm
- Serial and TCP/IP Terminal Application

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1. LM3001

1.1. Features

- Web configuration capable with internet browser using default IP 192.168.1.111
- Supports point to multipoint wireless connections
- Supported internet protocols: TCP/IP, HTTP, FTP, ARP, DHCP
- Bluetooth 5.0 supported (LE 2Mbps is disabled by software)
- Supports Bluetooth SPP connections as a central or peripheral device
- Supports connections as a Bluetooth Low Energy central device
- Supports Bluetooth pairing
- Up to 4 external antennas supported

1.2. Overview

The LM3001 features several LEDs for UI as well as multiple ports for user interaction.

Figure 1: LM3001 Overview Image

Status LEDs (from left to right)	Purpose
PWR	On when the device is powered

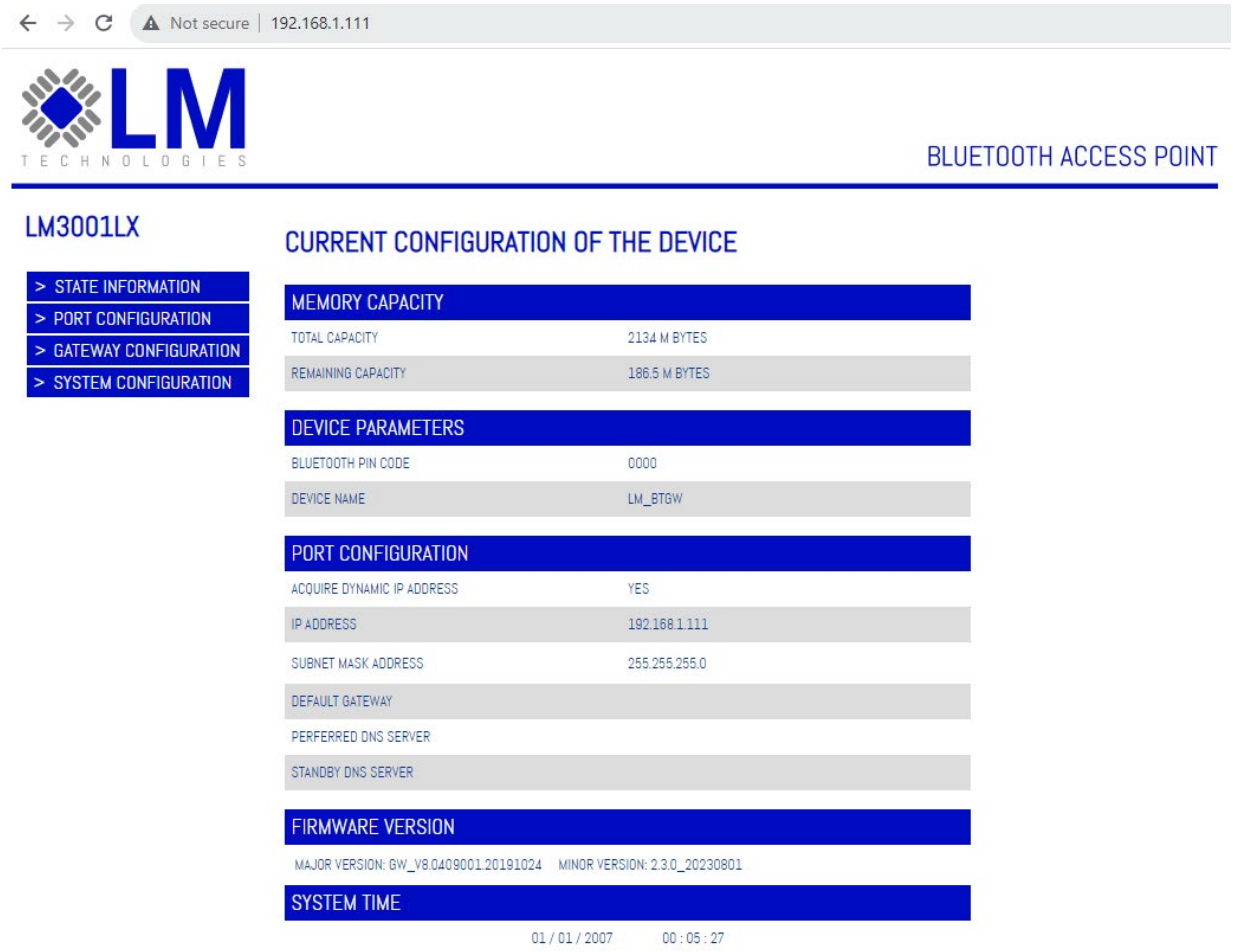
LAN	On when the device is connected to a wired network
RST	On briefly at power up. On when the device is performing a factory reset
USB	On when system is undergoing an upgrade
SYS	Flashes quickly at start up. When system is running, it flashes four times to indicate that all four Bluetooth modules are working as expected
STAT	Status LED, on after start up

2. Using the LM3001 with an Internet Browser

2.1. Accessing the LM3001

The LM3001 can be accessed for configuration using an internet browser when the device is powered and connected, via ethernet, to a personal computer (PC). Follow the instructions below to gain access to the device for configuration.

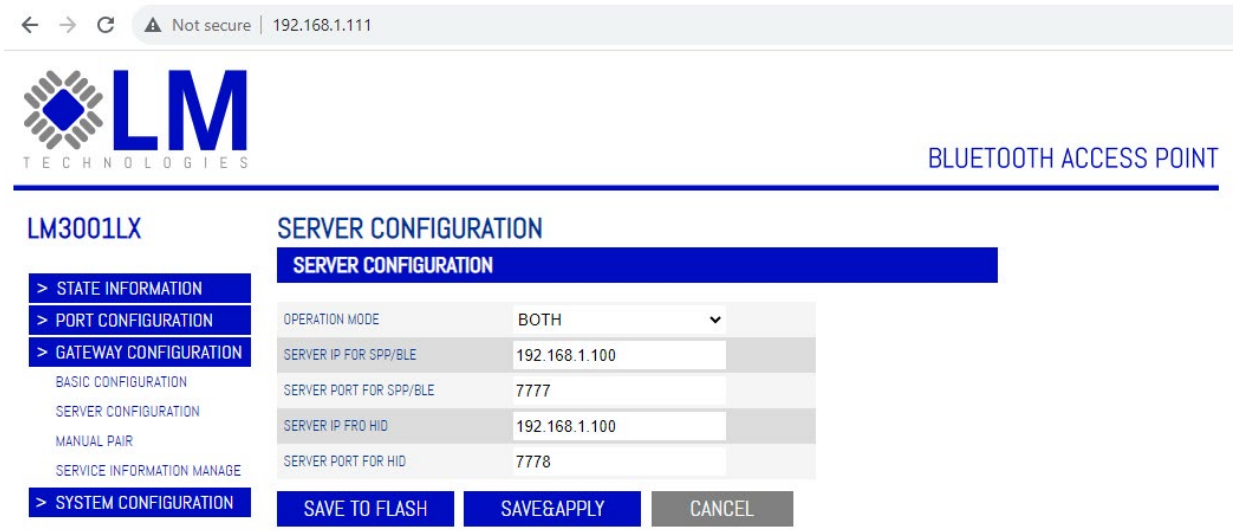
1. Connect a LAN cable to the connector located at reference "K" to connect the LM3001 to a PC/router/etc.
2. Connect an appropriate power supply to the power port at reference "L".
3. After the LM3001 is powered, the System Status LED at reference "B" will flash rapidly. After a few seconds, when the device is initialized, the System Status LED will repeat a pattern of flashing four times and then stopping, indicating that all four Bluetooth devices are functioning correctly. The Power LED at reference "F" will remain on and solid.
4. When the LM3001 is connected to a wired, ethernet network, the LAN Indicator LED will remain on and solid.
5. Using an internet browser, navigate to the address http://192.168.1.111/ (the default IP address) to access the configuration settings for the device. The default username is "admin" and the default password is "admin". Please note that the IP address, username and password can be changed by the user.



2.2. Establishing TCP Connection with the LM3001 as a Client

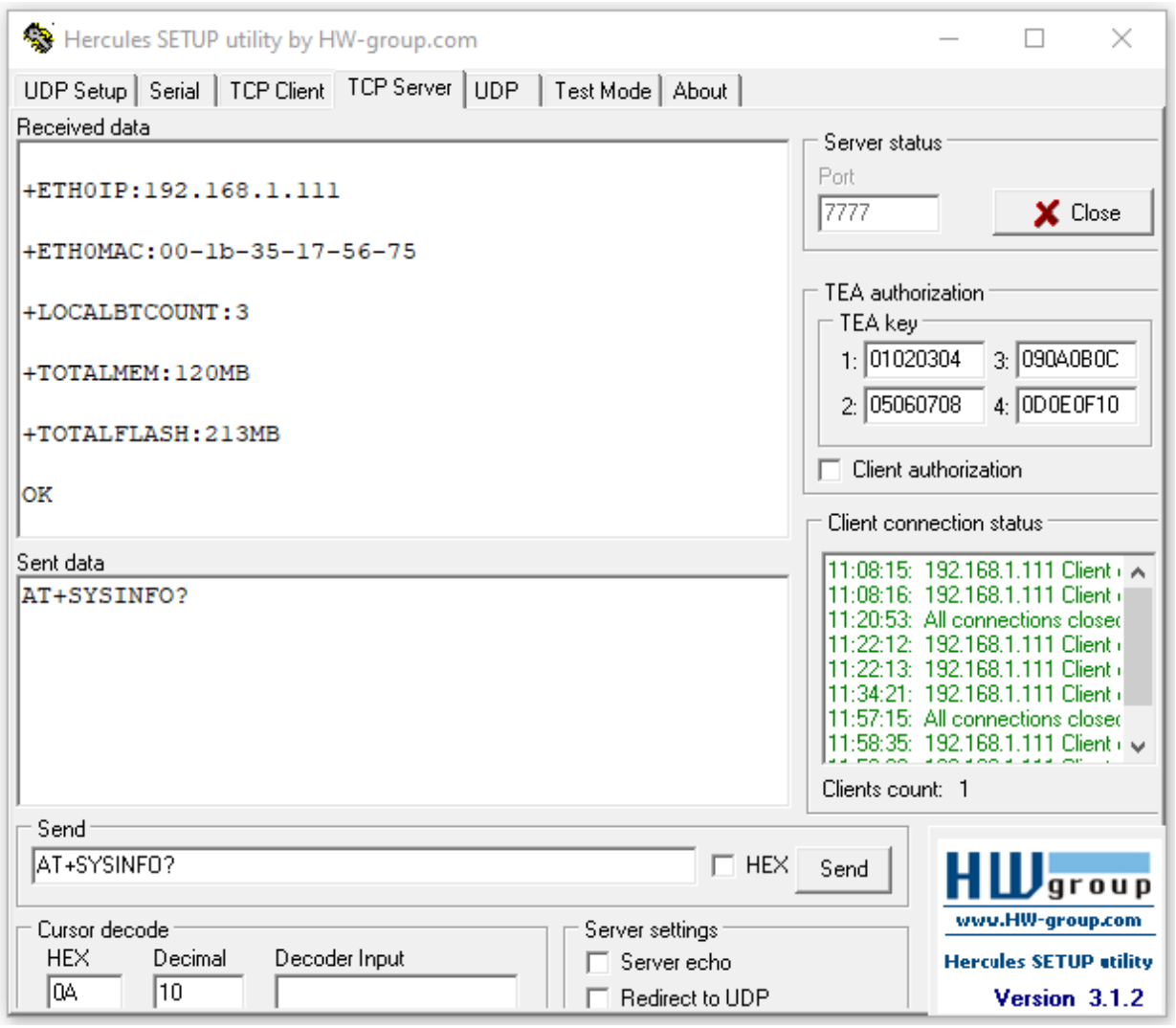
By default, the LM3001 is capable of accepting Bluetooth connections as an SPP peripheral device. This means that connecting devices must be configured as an SPP central device, capable of performing scans and establishing connections.

To ensure that Bluetooth devices can connect to the wired network, via the LM3001, the LM3001 must first establish a TCP connection to a device, such as a PC. Using an internet browser, navigate to the LM3001 using the default address http://192.168.1.111/. From there, navigate to Gateway Configuration -> Server Configuration as shown in the image below.



In the text box labelled "Server IP for SPP/BLE" enter the IP address of the PC which will be connecting to the LM3001. Click "Save and Apply", then "Save to Flash" and lastly, restart the LM3001.

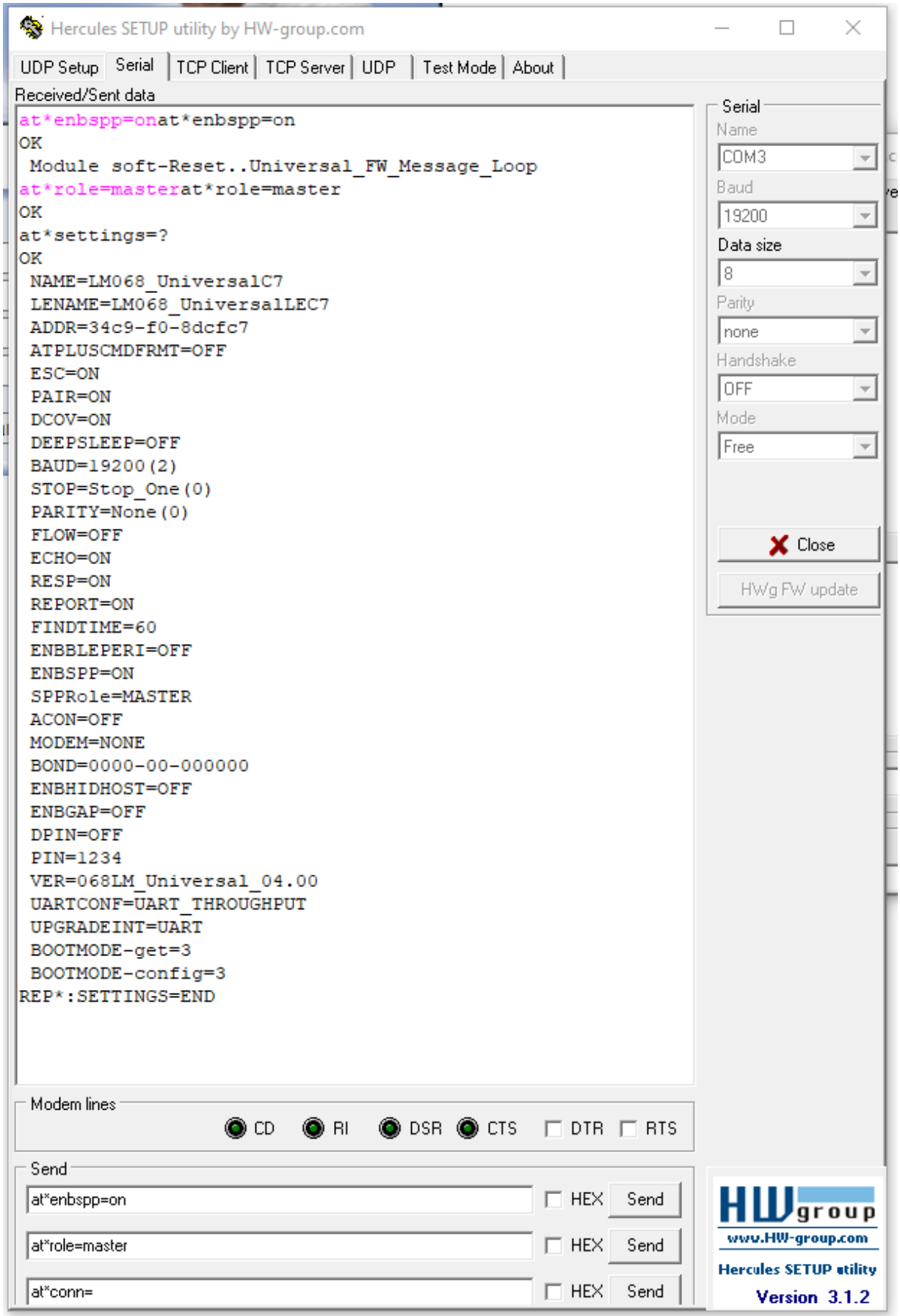
The LM3001 can now be accessed via a TCP Server inspection tool. In this guide, the Hercules SETUP Utility is used as an example. See the image below in which a test command, "AT+SYSINFO?\r\n" is sent to the LM3001 and configuration details are printed.



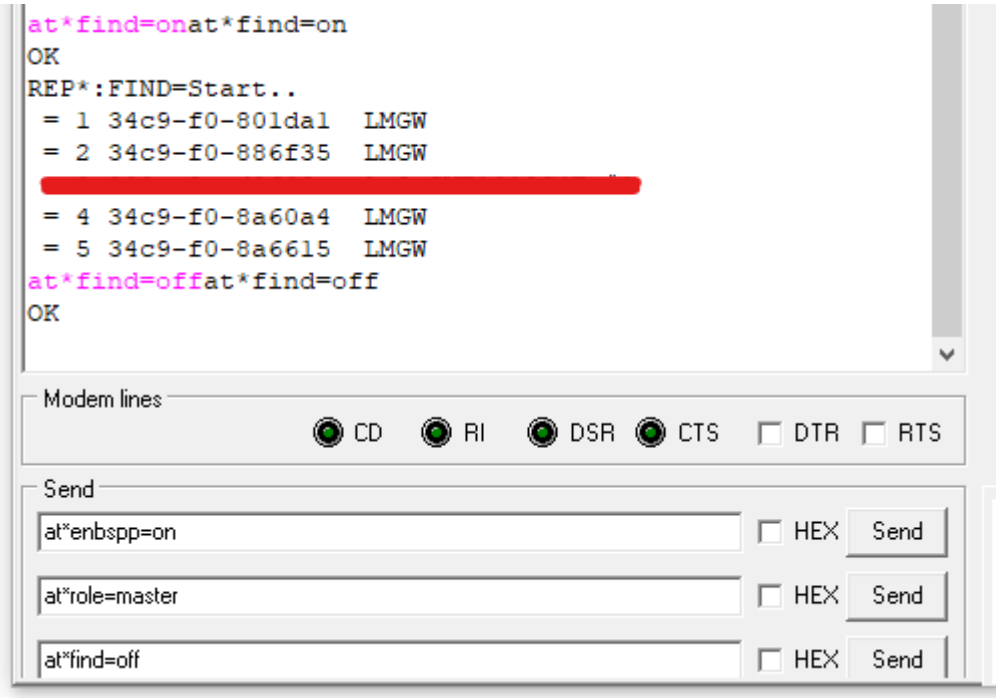
2.3. Establishing a Bluetooth Connection with LM3001 as Peripheral

The LM068 serial adaptor can be used to establish a Bluetooth connection to the LM3001. If using an LM068 with firmware version UNI_0300 or above, the LM068 must be initialized as an SPP central device before connecting to the LM3001. A serial terminal application is needed to interact with the LM068. In this case another instance of Hercules is being used.

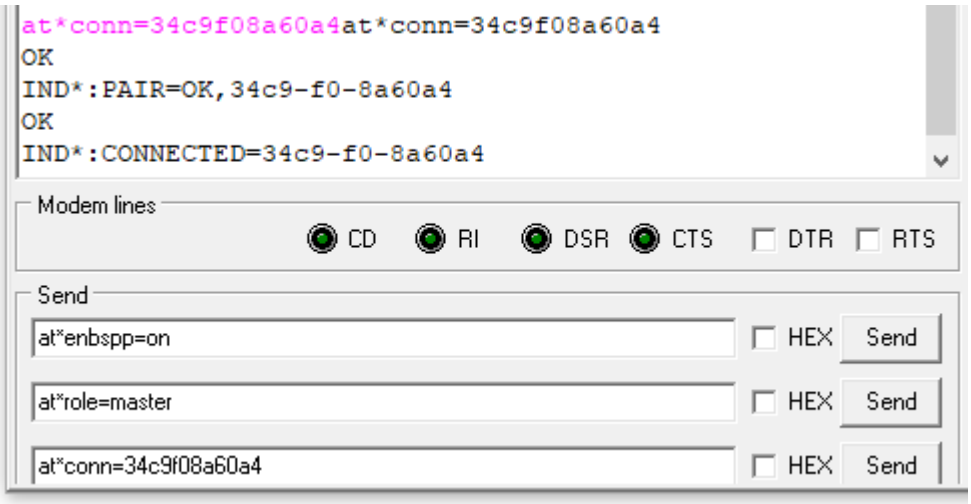
Use the commands “AT*ENBSPP=ON\r\n” and “AT*ROLE=MASTER\r\n” to ensure the LM068 is configured correctly. See the image below for the correct settings for the LM068.


Hercules SETUP utility by HW-group.com
UDP Setup
Serial
TCP Client
TCP Server
UDP
Test Mode
About
Received/Sent data
at*enbspp=onat*enbspp=on
OK
Module soft-Reset..Universal_FW_Message_Loop
at*role=masterat*role=master
OK
at*settings=?
OK
NAME=LM068_UniversalC7
LENAME=LM068_UniversalLEC7
ADDR=34c9-f0-8dcfc7
ATPLUSCMDFRMT=OFF
ESC=ON
PAIR=ON
DCOV=ON
DEEPSLEEP=OFF
BAUD=19200(2)
STOP=Stop_One(0)
PARITY=None(0)
FLOW=OFF
ECHO=ON
RESP=ON
REPORT=ON
FINDTIME=60
ENBBLEPERI=OFF
ENBSPP=ON
SPPRole=MASTER
ACON=OFF
MODEM=NONE
BOND=0000-00-000000
ENBHIDHOST=OFF
ENBGAP=OFF
DPIN=OFF
PIN=1234
VER=068LM_Universal_04.00
UARTCONF=UART_THROUGHPUT
UPGRADEINT=UART
BOOTMODE-get=3
BOOTMODE-config=3
REP*:SETTINGS=END
Serial
Name
COM3
Baud
19200
Data size
8
Parity
none
Handshake
OFF
Mode
Free
Close
HWg FW update
Modem lines
CD
RI
DSR
CTS
DTR
RTS
Send
at*enbspp=on
HEX
Send
at*role=master
HEX
Send
at*conn=
HEX
Send
HWgroup
www.HW-group.com
Hercules SETUP utility
Version 3.1.2

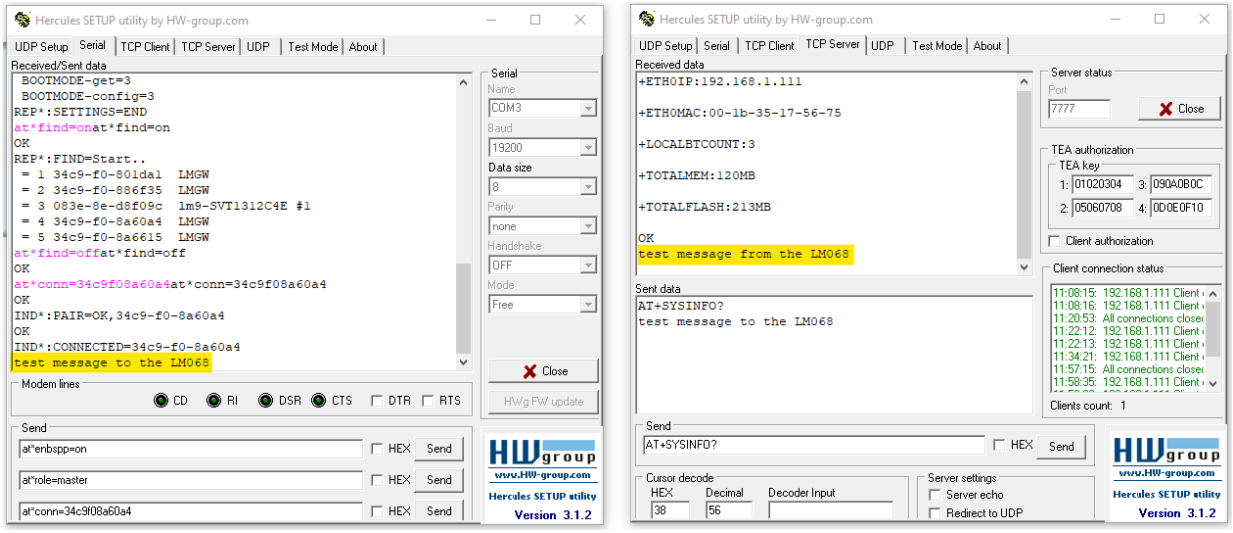
Next use the "AT*FIND=ON\r\n" command to begin scanning for LM3001, with the default Bluetooth name of LMGW. Once the LM3001 is found, use the command "AT*FIND=OFF\r\n" to end the scan. See the image below for an example.



Now, use the command "AT*CONN=<ADDRESS>\r\n", where <ADDRESS> is the selected device's Bluetooth address in the format "34c9f0123456", which is case insensitive. The image below shows a successful connection.



Once the Bluetooth connection is established, data can be sent between the Bluetooth device and the LM3001. See image below for example.

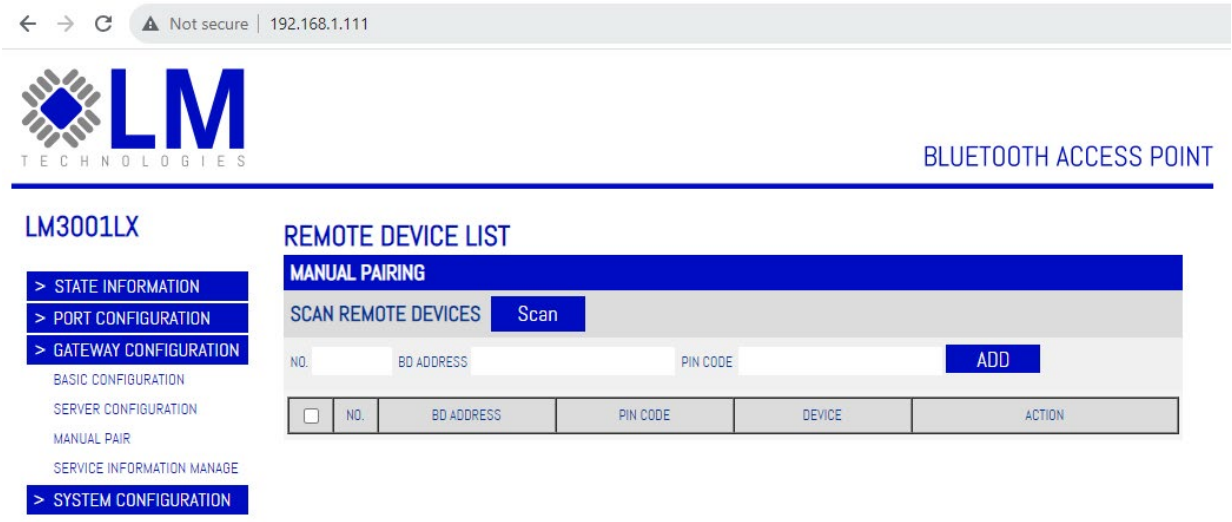


For further information on setting up and operating the LM068, please see the LM068 product page on the LM Technologies' website.

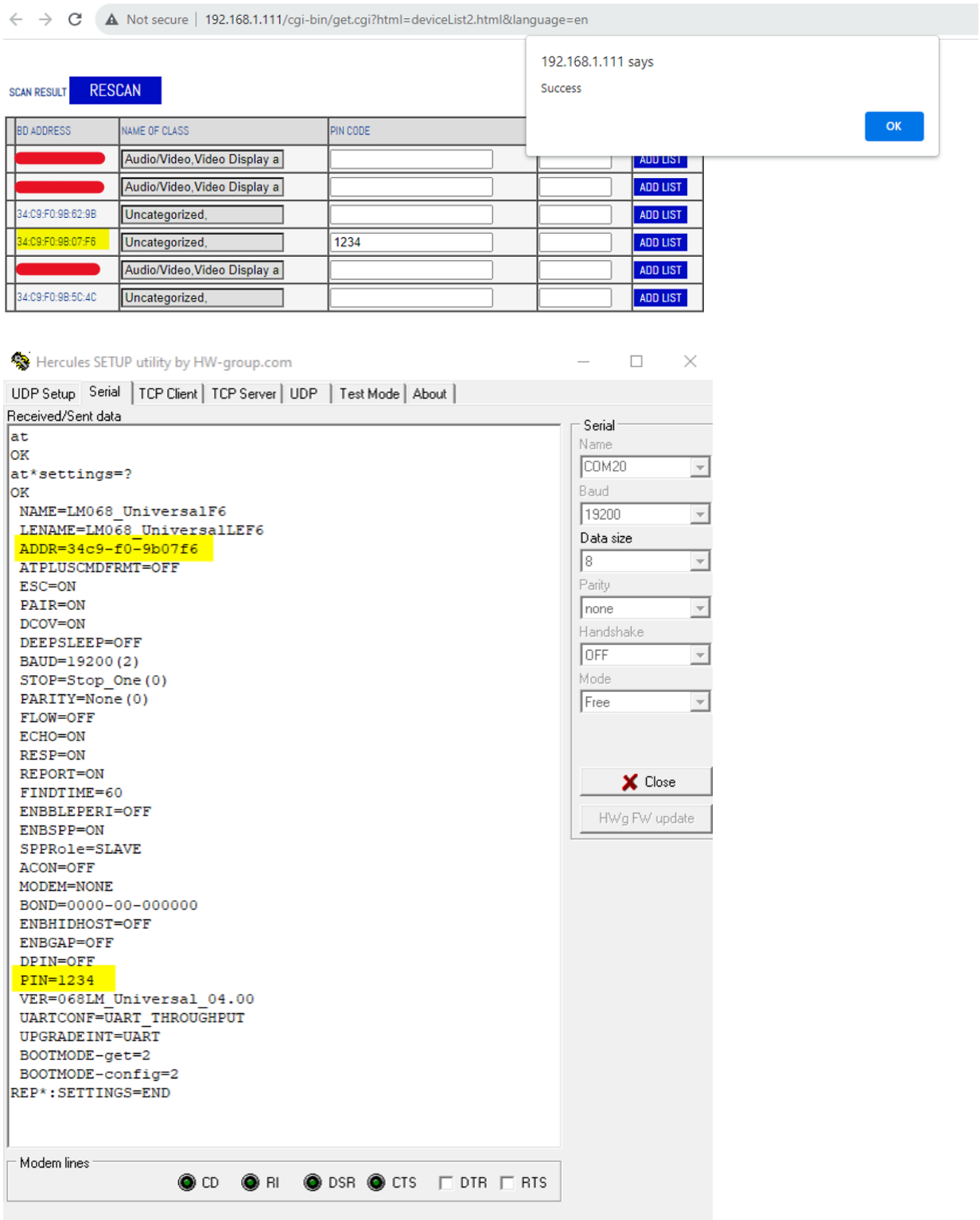
2.4. Establishing a Bluetooth Connection with LM3001 as Central

The LM3001 is also able to connect to Bluetooth peripheral devices, with the LM3001 acting as the central device. In this configuration, the LM3001 is able to automatically establish connections with peripheral devices which have already been paired. In this guide an LM068 serial adapter is used as a Bluetooth peripheral device. If using an LM068 with firmware version UNI_0400 or above, then the commands "AT*ENBSPP=ON\r\n" and "AT*ROLE=SLAVE\r\n" will need to be used to ensure that the LM068 is configured correctly.

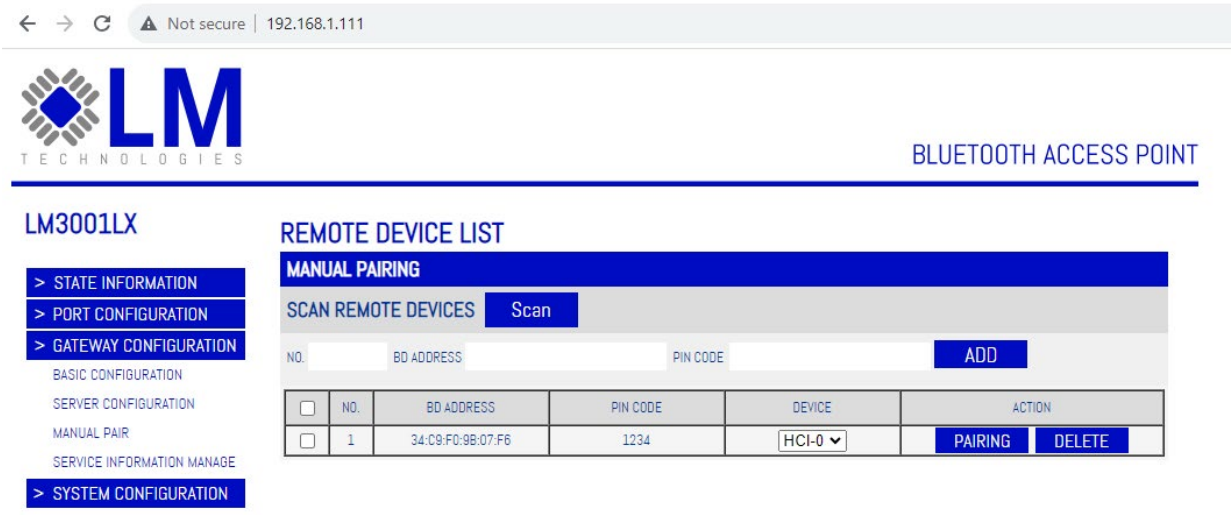
Using an internet browser, navigate to the default LM3001 address of http://192.168.1.111/ to access the configuration settings. Navigate to the Gateway Configuration -> Manual Pairing section to configure Bluetooth devices. Use the scan button, shown in the image below, on the Manual Pairing page to begin searching for the LM068



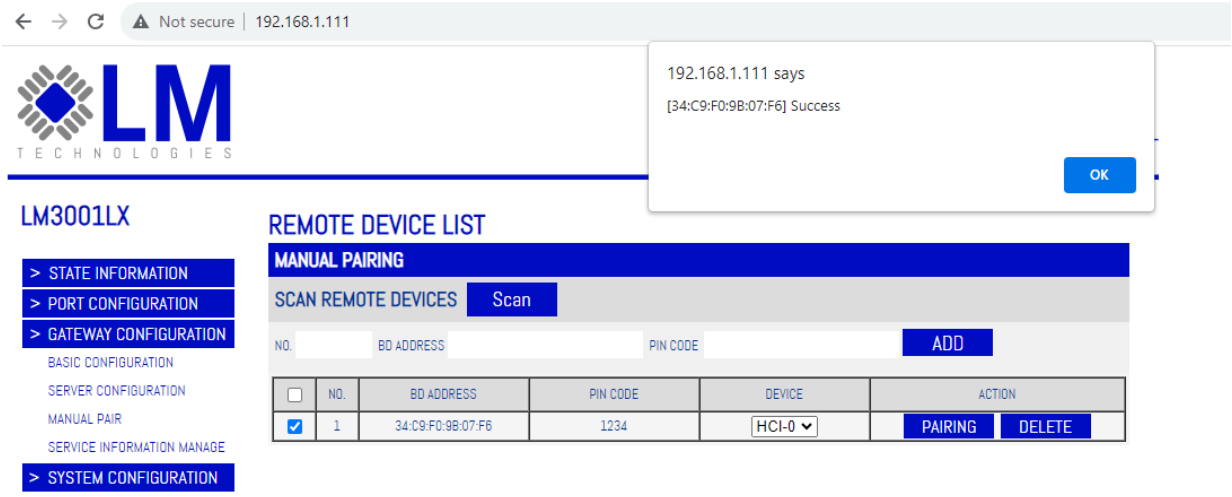
A new tab will open while the LM3001 is searching for Bluetooth devices to connect with. When the appropriate device becomes available, put the pin code in the text box and click the "Add List" button. The following image shows where to find the pin code and Bluetooth address when using the LM068.



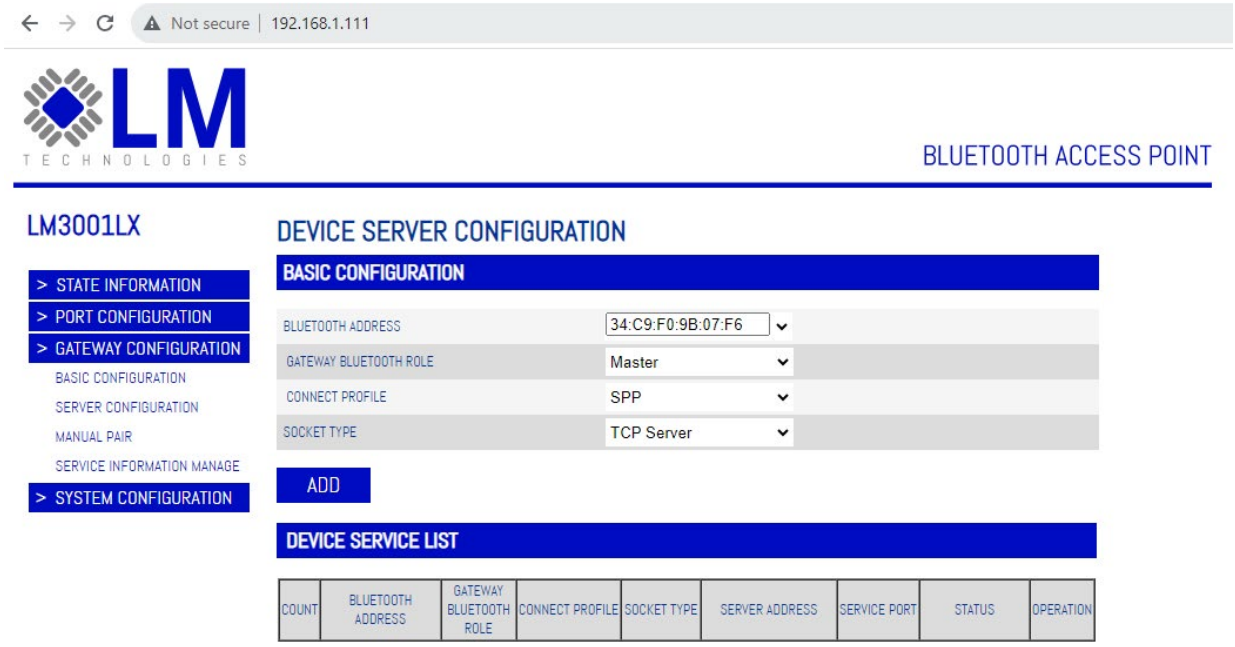
Navigate back to the original Manual Pairing page and refresh to view the previously discovered device. Using the "Device" drop down list to select one of the HCI device, corresponding to Bluetooth devices on the LM3001, in this case HCI-0 is used. See image below for reference.



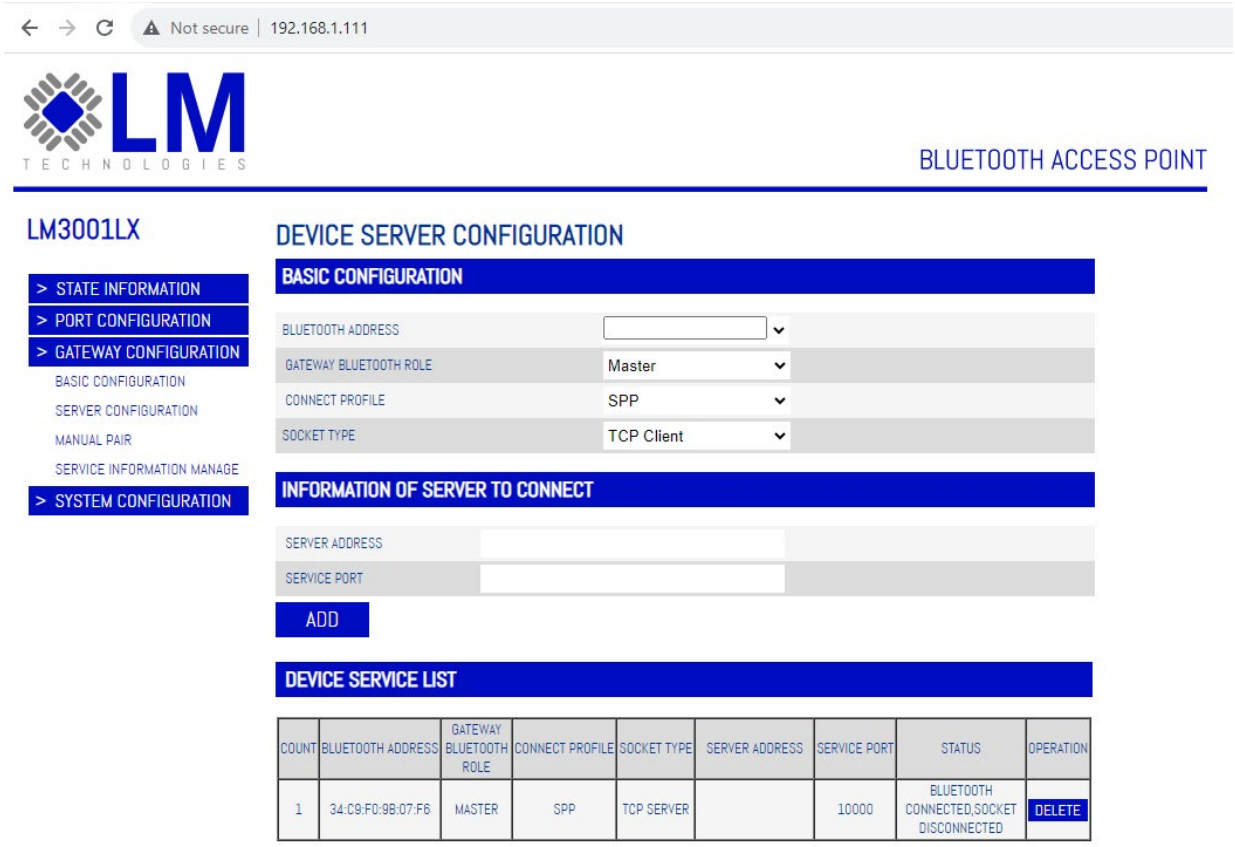
After the device is selected and configured, click the "Pairing" button to pair the LM068 with the LM3001. The web page should show a success message, as shown in the image below.



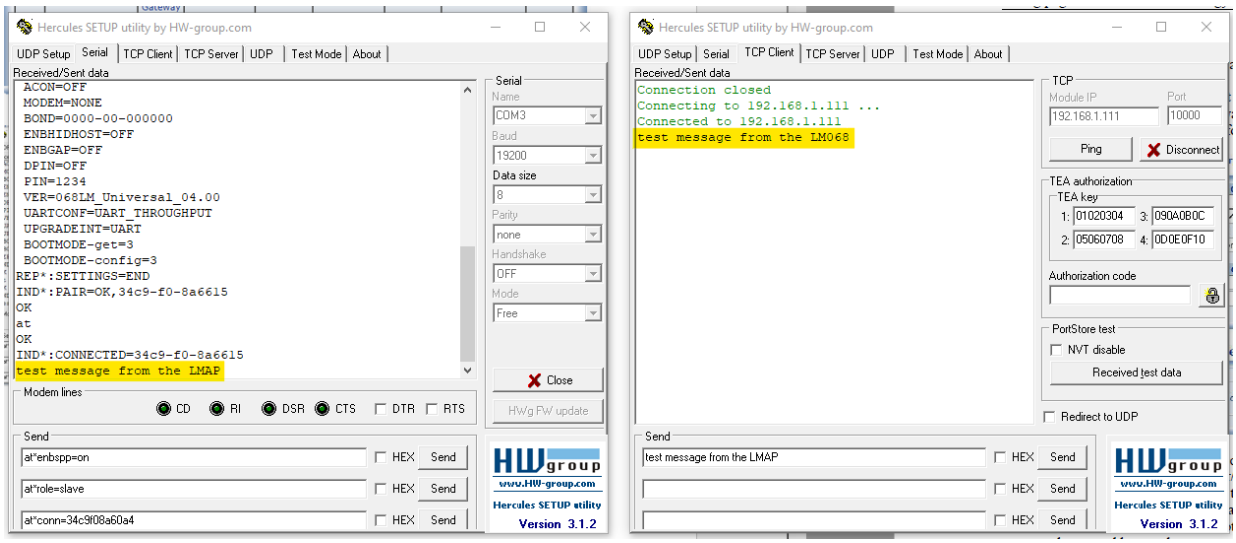
Next, Navigate to the Gateway Configuration -> Server Information Manage page and select the device which was previously paired from the drop down box using its Bluetooth Address. Configure the device to be a Master, using the SPP profile and the socket type required. In this case, the LM3001 is configured as a TCP server. See following image for reference. Click the "Add" button when done.



When the device has been added successfully, it's connection status and port can be viewed as shown in the following image.



At this stage the devices are connected via Bluetooth and data can be transferred using the terminal app Hercules, as shown in the image below.



3. Using the LM3001 with AT Commands

3.1. Accessing the AT Command Interface

Follow the four steps in section 2.1. Accessing the LM3001 to ensure the LM3001 is properly connected to the host device. When these steps are complete, it is necessary to use a TCP terminal application (such as Hercules) to establish communications with the LM3001. Users must connect to LM3001's IP address (default is 192.168.1.111) and the fixed IP port 1500 to send AT commands.

The AT commands are case insensitive, and every AT command must end with the characters "\r\n" (which are the carriage return and new line characters or ASCII characters 0x0D 0x0A).

3.2. AT Commands

3.2.1 Query System Information

Command	Reply
AT+SYSINFO?\r\n	\r\n+ETH0IP:<eth0ip>\r\n \r\n+ETH0MAC:<eth0mac>\r\n \r\n+WLAN0IP:<wlan0ip>\r\n \r\n+WLAN0MAC:<wlan0mac>\r\n \r\n+LOCALBTCOUNT:<count>\r\n \r\n+TOTALMEM:<memorysize>\r\n \r\n+TOTALFLASH:<flashsize>\r\n \r\nOK\r\n

Parameter description

eth0ip: Ethernet IP address
eth0mac: Ethernet MAC address
wlan0ip: wireless network IP address
wlan0mac: wireless network MAC address
count: amount of Bluetooth modules embedded in the gateway
memorysize ： memory size of the gateway
flashsize ： storage size of the gateway

Command description:

This command is used for the server to inquire basic information of connected gateway. When there are various Bluetooth gateways in a distributed system, users can locate, distinguish Bluetooth gateway and some other information based on MAC address.

3.2.2 Query System State

Command	Reply
AT+SYSSTATE?\r\n	\r\n+BLECONNCOUNT:<count>\r\n \r\n+IDLEMEM:<idlememorysize>\r\n \r\n+IDLEFLASH:<idleflashsize>\r\n \r\n+IDLECPU:<idlecpupercentage>\r\n \r\nOK\r\n

Parameter description ：

count: number of connected devices
idlememorysize ： Current idle memory size
idleflashsize ： Current idle flash size
idlecpupercentage ： Current idle CPU percentage

Command description:

This command is used for the server to query the running status of the Bluetooth gateway.

3.2.3 Set System Username and Password

Command	Reply
AT+USERACCOUNT=<name>,<password>\r\n	\r\nOK\r\n

3.2.4 Set/Query System Time

Command	Reply
AT+SETDATE=<year>,<month>,<day>,<hour>,<minute>,<second>\r\n	\r\nOK\r\n
AT+GETDATE?\r\n	\r\nGETDATE:<year>,<month>,<day>,<hour>,<minute>,<second>\r\n \r\nOK\r\n

Example ：

AT+SETDATE=2023,1,5,16,35,12\r\n

3.2.5 Set/Query NTP Server

Command	Reply
AT+NTPSERVER=<server>\r\n	\r\nOK\r\n
AT+NTPSERVER?\r\n	\r\NTPSERVER:<server>\r\n \r\nOK\r\n

Example：
AT+SETDATE=2023,1,5,16,35,12\r\n

3.2.6 Query Major Version

Command	Reply
AT+MAJORVER?\r\n	\r\n+MAJORVER:<version>\r\n \r\nOK\r\n

Parameter description：
version: query Bluetooth gateway system version
Command description:
This command is used for server to query Bluetooth gateway system version

3.2.7 Query Minor Version

Command	Reply
AT+MINORVER?\r\n	\r\n+MINORVER:<version>\r\n \r\nOK\r\n

Parameter description：
version: query Bluetooth gateway system version
Command description:
This command is used for server to query Bluetooth gateway system version

3.2.8 Set/Query Ethernet DHCP

Command	Reply
AT+ETHDHCP=<dhcp>\r\n	\r\nOK\r\n
AT+ETHDHCP?\r\n	\r\n+ETHDHCP:<dhcp>\r\n \r\nOK\r\n

Parameter description:
dhcp: 0 Disabled, using static IP
1 enable
Example:
AT+ETHDHCP=1\r\n

3.2.9 Set/Query Ethernet IP

Command	Reply

AT+ETHIP=<ipaddr>\r\n	\r\nOK\r\n
AT+ETHIP?\r\n	\r\n+ETHIP:<ipaddr>\r\n \r\nOK\r\n

Parameter description:

ipaddr: Ethernet IP address

Example:

AT+ETHIP=192.168.1.111\r\n

3.2.10 Set/Query Ethernet Subnet Mask

Command	Reply
AT+ETHMASK=<ipaddr>\r\n	\r\nOK\r\n
AT+ETHMASK?\r\n	\r\n+ETHMASK:<ipaddr>\r\n \r\nOK\r\n

Parameter description:

ipaddr: Ethernet IP address subnet mask

Example:

AT+ETHMASK=255.255.255.0\r\n

3.2.11 Set/Query Ethernet Gateway IP

Command	Reply
AT+ETHGATEWAY=<ipaddr>\r\n	\r\nOK\r\n
AT+ETHGATEWAY?\r\n	\r\n+ETHGATEWAY:<ipaddr>\r\n \r\nOK\r\n

Parameter description:

ipaddr:

Example:

AT+ETHGATEWAY=192.168.1.1\r\n

3.2.12 Set/Query Ethernet DNS

Command	Reply
AT+ETHFIRSTDNS=<ipaddr>\r\n	\r\nOK\r\n
AT+ETHFIRSTDNS?\r\n	\r\n+ETHFIRSTDNS:<ipaddr>\r\n \r\nOK\r\n
AT+ETHSECONDDNS=<ipaddr>\r\n	\r\nOK\r\n
AT+ETHSECONDDNS?\r\n	\r\n+ETHSECONDDNS:<ipaddr>\r\n \r\nOK\r\n

Parameter description:

ipaddr:

Example:

AT+ETHFIRSTDNS=8.8.8.8\r\n

3.2.13 Query Ethernet MAC Address

Command	Reply
AT+ETHMAC?\r\n	\r\n+ETHMAC:<mac>\r\n \r\nOK\r\n

3.2.14 Set/Query Gateway Name

Command	Reply
AT+BTDEVICENAME=<name>\r\n	\r\nOK\r\n
AT+BTDEVICENAME?\r\n	\r\n+BTDEVICENAME:<name>\r\n \r\nOK\r\n

Parameter description:
name: less than 64 bytes
Example:
AT+BTDEVICENAME=LM_GATEWAY\r\n

3.2.15 Set/Query Gateway Name

Command	Reply
AT+BTDEVICENAME=<name>\r\n	\r\nOK\r\n
AT+BTDEVICENAME?\r\n	\r\n+BTDEVICENAME:<name>\r\n \r\nOK\r\n

Parameter description:
name: less than 64 bytes
Example:
AT+BTDEVICENAME=LM_GATEWAY\r\n

3.2.16 Set/Query Classic Bluetooth Pincode

Command	Reply
AT+BTPINCODE=<pincode>\r\n	\r\nOK\r\n
AT+BTPINCODE?\r\n	\r\n+BTPINCODE:<pincode>\r\n \r\nOK\r\n

Parameter description:
pincode: max 16 bytes
Example:
AT+BTPINCODE=1234\r\n

3.2.17 Set/Query Classic Bluetooth Encryption

Command	Reply
AT+BTENCENABLE=<enable>\r\n	\r\nOK\r\n
AT+BTENCENABLE?\r\n	\r\n+BTENCENABLE:<enable>\r\n

	\r\nOK\r\n

Parameter description:

enable: 0 disable
1 enable

Example:

AT+BTENCENABLE=1\r\n

3.2.18 Set/Query Classic Bluetooth Device Code

Command	Reply
AT+BTCOD=<cod>\r\n	\r\nOK\r\n
AT+BTCOD?\r\n	\r\n+BTCOD:<cod>\r\n \r\nOK\r\n

Parameter description:

cod: 6 bytes, all characters are hexadecimal digits or letters. That is, 0 ∽ 9、A、B、C、D、E、F

Example:

AT+BTCOD=000100\r\n

3.2.19 Set/Query Classic Bluetooth Superversion Timeout

Command	Reply
AT+BTSUPTIMEOUT=<timeout>\r\n	\r\nOK\r\n
AT+BTSUPTIMEOUT?\r\n	\r\n+BTSUPTIMEOUT:<timeout>\r\n \r\nOK\r\n

Parameter description:

timeout: unit: second. Range: 1-40

Example:

AT+BTSUPTIMEOUT=5\r\n

3.2.20 Set/Query Classic Bluetooth Save Link Key

Command	Reply
AT+BTSAVELINKKEY=<enable>\r\n	\r\nOK\r\n
AT+BTSAVELINKKEY?\r\n	\r\n+BTSAVELINKKEY:<enable>\r\n \r\nOK\r\n

Parameter description:

enable: 0 Not save
1 save

Example:

AT+BTSAVELINKKEY=1\r\n

3.2.21 Set Remote Bluetooth address and Pincode

Command	Reply

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AT+SETSPECIFICPINCODE=<addr>,<pincode>\r\n	\r\nOK\r\n

Parameter description:

addr: Mac address of remote BT device

pincode ： max 16 bytes

Example:

AT+SETSPECIFICPINCODE=00A3C80653F9,1234\r\n

3.2.22 Delete Remote Bluetooth address and Pincode

Command	Reply
AT+DELSPECIFICPINCODE=<addr>\r\n	\r\nOK\r\n

Parameter description:

addr: Mac address of remote BT device

Example:

AT+SETSPECIFICPINCODE=00A3C80653F9,1234\r\n

3.2.23 Query Remote Bluetooth address and Pincode

Command	Reply
AT+GETSPECIFICPINCODE?\r\n	\r\n+GETSPECIFICPINCODE:<addr>,<pincode>\r\n \r\nOK\r\n

Parameter description:

addr: Mac address of remote BT device

pincode ： max 16 bytes

3.2.24 Set/Query Classic Bluetooth mode

Command	Reply
AT+BTSERVICEMODE=<mode>\r\n	\r\nOK\r\n
AT+BTSERVICEMODE?\r\n	\r\n+BTSERVICEMODE:<mode>\r\n \r\nOK\r\n

Parameter description:

mode: 1 SPP
2 HID
3 Both SPP and HID

Example:

AT+BTSERVICEMODE=3\r\n

3.2.25 Set/Query SPP Server IP

Command	Reply
AT+BTSPPSERVERIP=<ipaddr>\r\n	\r\nOK\r\n
AT+BTSPPSERVERIP?\r\n	\r\n+BTSPPSERVERIP:<ipaddr>\r\n \r\nOK\r\n

Parameter description:
ipaddr:
Example:
AT+BTSPPSERVERIP=192.168.1.100\r\n

3.2.26 Set/Query SPP Server Port

Command	Reply
AT+BTSPPSERVERPORT=<port>\r\n	\r\nOK\r\n
AT+BTSPPSERVERPORT?\r\n	\r\n+BTSPPSERVERPORT:<port>\r\n \r\nOK\r\n

Parameter description:
port: port number of TCP socket, less than 65536
Example:
AT+BTSPPSERVERPORT=7777\r\n

3.2.27 Set/Query HID Server IP

Command	Reply
AT+BTHIDSERVERIP=<ipaddr>\r\n	\r\nOK\r\n
AT+BTHIDSERVERIP?\r\n	\r\n+BTHIDSERVERIP:<ipaddr>\r\n \r\nOK\r\n

Parameter description:
ipaddr:
Example:
AT+BTHIDSERVERIP=192.168.1.100\r\n

3.2.28 Set/Query HID Server Port

Command	Reply
AT+BTHIDSERVERPORT=<port>\r\n	\r\nOK\r\n
AT+BTHIDSERVERPORT?\r\n	\r\n+BTHIDSERVERPORT:<port>\r\n \r\nOK\r\n

Parameter description:
port: port number of TCP socket, less than 65536
Example:
AT+BTHIDSERVERPORT=7778\r\n

3.2.29 Query Surrounding Classic Bluetooth Device

Command	Reply
AT+BTINQ\r\n	\r\n+BTINQ:<addr>,<cod>\r\n \r\nOK\r\n

Parameter description:

addr: MAC address of remote BT device
cod： Device code of remote BT device

3.2.30 Pair with Classic Bluetooth Device

Command	Reply
AT+BTPAIR=<addr>,<hcix>\r\n	\r\n+BTPAIR:<addr>,<result>\r\n \r\nOK\r\n

Parameter description:
addr: MAC address of remote BT device
hcix： serial number of BT module embedded in the gateway. Range：0-3
result： pairing result. 0: fail. 1: succeed.
Note: Please first send command AT+SETSPECIFICPINCODE to set the pair password of the remote Bluetooth device, then send this command AT+BTPAIR to pair the remote Bluetooth device
Example:
AT+BTPAIR=00A3C80653F9,3\r\n

3.2.31 Delete the Pair Information of Classic Bluetooth Device

Command	Reply
AT+BTPAIRDEL=<addr>\r\n	\r\nOK\r\n

Parameter description:
addr: MAC address of remote BT device
Example:
AT+BTPAIRDEL=00A3C80653F9\r\n

3.2.32 Query the Paired Information of all Paired Classic Bluetooth Devices

Command	Reply
AT+BTPAIREDLIST\r\n	\r\n+BTPAIREDLIST:<addr>,<hcix>\r\n \r\nOK\r\n

Parameter description:
addr: MAC address of remote BT device
hcix： the serial number of BT module embedded in the gateway, range：0 - 3

3.2.33 Add the Server Configuration Information of a Classic Bluetooth Device

Command	Reply
AT+ADDBTDEVICESERVERCONFIG=<addr>,<role>,<profile>, <sockettype>\r\n	\r\nOK\r\n
AT+ADDBTDEVICESERVERCONFIG=<addr>,<role>,<profile>, <sockettype>,<serverip>,<serverport>\r\n	\r\nOK\r\n

Parameter description:

addr: MAC address of remote BT device
role : 0 the gateway works as slave device
1 the gateway works as master device
profile: 1 SPP
2 HID
sockettype: 0 TCP Client
1 TCP Server
2 UDP Client
3 UDP Server
Note : The serverip and serverport parameters need to be set only when the gateway is working as the client.
serverip:
serverport: port number, less than 65536

Example:

AT+ADDBTDEVICESERVERCONFIG=00A3C80653F9,0,1,1\r\n
AT+ADDBTDEVICESERVERCONFIG=00A3C80653F9,0,1,0,192.168.1.100,7777\r\n

3.2.34 Delete the Server Configuration Information of Classic Bluetooth Device

Command	Reply
AT+DELBTDEVICESERVERCONFIG=<addr>,<role>,<profile>\r\n	\r\nOK\r\n

Parameter description:

addr: MAC address of remote BT device
role : 0 the gateway works as slave device
1 the gateway works as master device
profile: 1 SPP
2 HID

Example:

AT+DELBTDEVICESERVERCONFIG=00A3C80653F9,0,1\r\n

3.2.34 Query the Server Configuration Information of Classic Bluetooth Devices

Command	Reply
AT+GETBTDEVICESERVERCONFIG?\r\n	\r\n+GETBTDEVICESERVERCONFIG:<addr>, <role>,<profile>,<sockettype>,<serverip>, <serverport>,<status>\r\n \r\nOK\r\n

Parameter description:

addr: MAC address of remote BT device
role: 0 the gateway works as slave device
1 the gateway works as master device
profile: 1 SPP
2 HID
sockettype: 0 TCP Client
1 TCP Server
2 UDP Client
3 UDP Server

serverip: IP address
serverport: port number, less than 65536
status: 0 Bluetooth connected, socket connected
1 Bluetooth connected, socket unconnected
2 reserved
3 Bluetooth disconnected
4 Bluetooth is connecting

3.2.35 Query Paired BLE Devices

Command	Reply
AT+BLEPAIRED?\r\n	\r\n+BLEPAIRED:<index>,<addr> \r\nOK\r\n

Command description:
When connecting to BLE device, if the BLE device requires authentication, the Bluetooth gateway performs simple authentication. For BLE devices that do not require authentication, the Bluetooth gateway does not perform authentication when connecting to them. For connections that go through the authentication pairing process, the Bluetooth gateway will record the pairing information of these devices. This command is used to query information about authenticated BLE devices stored on the current Bluetooth gateway.
Parameter description:
index: the serial number of BT module embedded in the gateway
addr： MAC address of paired BLE device

3.2.36 Delete the Paired BLE Device

Command	Reply
AT+BLEUNPAIR=<index>,<addr>\r\n	\r\nOK\r\n

Command description:
Delete the paired BLE device
Parameter description:
Index: the serial number of BT module embedded in the gateway
addr: MAC address of paired BLE device

3.2.37 Scan Surrounding BLE Device

Command	Reply
AT+BLEINQ=<operation>,<filter>,<time>\r\n	\r\nOK\r\n

Command description:
This command is used to start or stop scanning for surrounding BLE devices.
Parameter description:
operation:
0 Stop scanning
1 Start scanning
filter：
0 During the scanning process, it will return one record when searched one broadcasting data, no matter it is the same broadcast data sent by the same device.

1 During this search, the same broadcast data of the same device is returned only once time: indicates the duration of the scanning, unit: second. If set it to 0, the duration is unlimited.

Note: When the gateway is in the scanning state, if the server sends a connection command or the Bluetooth module in the Bluetooth gateway is experiences an error, then the scanning may be automatically stopped.

Scan Result
\r\n+BLEINQRESULT:<addr>,<addrtype>,<name>,<bctype>,<bcdata>,<rssi>\r\n

Parameter description:

addr： MAC address of scanned BLE device

addrtype: address type of scanned BLE device

0 PUBLIC

1 RANDOM

name： name of BLE device, may be empty

bctype： broadcast type of scanned BLE device. Refer to section [Vol 2] PartE, 7.7.65.2 of Bluetooth Technical Specification Core_V4.2 for the definition of the specific broadcast type.

0 ADV_IND

1 ADV_DIRECT_IND

2 ADV_SCAN_IND

3 ADV_NONCONN_IND

4 SACN_RSP

bcdata： Refer to section [Vol 3] Part C 11 of Bluetooth Technical Specification Core_V4.2 for the specific broadcast format.

rssi: signal strength between BLE device and Bluetooth gateway

Scan Complete Response
\r\n+BLEINQCOMPLETE:<state>\r\n

Parameter description:

state:

0 fail to start scanning surrounding BLE devices, resulting in the scanning completed

1 scanning completed normally

3.2.38 Query Paired BLE Devices

Command	Reply
AT+BLECONN=<addr>,<addrtype>\r\n	\r\nOK\r\n

Parameter description:

addr: MAC address of the BLE device to be connected

addrtype: address type of BLE device

0 PUBLIC

1 RANDOM

Connection Result
\r\n+BLECONN:<addr>,<state>\r\n

Parameter description:

addr: MAC address of the connected BLE device

state： connection result

0 fail
1 succeed

3.2.39 Disconnect BLE Device

Command	Reply
AT+BLEDISC=<addr>\r\n	\r\nOK\r\n

Parameter description:
addr: MAC address of the BLE device to be disconnected

3.2.40 Query the Characteristic Value of BLE Device

Command	Reply
AT+CHAR=<addr>\r\n	\r\nOK\r\n

Parameter description:
addr: MAC address of the BLE device to be disconnected

Query Result
\r\n+CHARACTERISTIC:<addr>,<serviceuuid>,<charuuid>,<properties>\r\n

Parameter description:
addr: MAC address of the connected BLE device
serviceuuid： service UUID
charuuid： characteristic UUID
properties： characteristic properties
0x01 BROADCAST
0x02 READ
0x04 WRITE_WITHOUT_RESP
0x08 WRITE
0x10 NOTIFY
0x20 INDICATE
0x40 AUTH
0x80 EXT_PROP

Command description:
Note: After the BLE remote device is successfully connected, the gateway automatically returns the characteristic value of the BLE device. Users can also query this information using this command.

3.2.41 Read the Characteristic Value of BLE Device

Command	Reply
AT+READCHAR=<addr>,<charuuid>\r\n	\r\nOK\r\n

Parameter description:
addr: MAC address of the connected BLE device
charuuid： characteristic UUID

Read Result
\r\n+READCHAR:<addr>,<charuuid>,<data>\r\n

Parameter description:

addr: MAC address of the connected BLE device

charuuid：characteristic UUID

data: data read from characteristic

3.2.42 Write the Characteristic Value of BLE Device

Command	Reply
AT+WRITECHAR=<addr>,<charuuid>,<data>\r\n	\r\nOK\r\n

Command description:

This command is used to send data to the characteristic that supports write attributes.

Parameter description:

addr: MAC address of the connected BLE device

charuuid：characteristic UUID

data: data written to characteristic

3.2.43 Notify the Characteristic Value of BLE Device

Notification Result
\r\n+NOTIFY:<addr>,<charuuid>,<data>\r\n

Command description:

This command is used to notify the server after the gateway received the data from the connected BLE device.

Parameter description:

addr: MAC address of the connected BLE device

charuuid：characteristic UUID

data: data notified from peripheral

3.2.44 Query the Signal Strength of the Connected BLE Device

Command	Reply
AT+RSSI=<addr>\r\n	\r\n+RSSI: <addr>,<rssi>\r\n \r\nOK\r\n

Parameter description:

addr: MAC address of the connected BLE device

rssi: signal strength between BLE device and gateway

3.2.45 Reset the Local Bluetooth Module

Command	Reply
AT+RESETBT\r\n	\r\nOK\r\n

Note: After this command is sent, the Bluetooth modules in the Bluetooth gateway will be reset, and all the previously connected devices will be disconnected.

3.2.46 System Restart

Command	Reply
AT+reboot\r\n	\r\nOK\r\n

Command description:
This command is used for the server to restart the gateway. After the gateway successfully restarted, it will re-establish the TCP Socket connection with the server.

3.2.47 Restore Factory Parameter Setting

Command	Reply
AT+RESTORESET\r\n	\r\nOK\r\n

Command description:
This command is used to restore the LM3001 to factory settings.

3.2.48 Query MAC Address of Local Bluetooth Module

Command	Reply
AT+GETLOCALBT\r\n	\r\n+GETLOCALBT:<hcix>,<addr>\r\n \r\nOK\r\n

Parameter description:
hcix： serial number of local BT module embedded in the gateway, range：0 - 3
addr: MAC address of local BT module

3.2.49 Query the Current Connection State of Bluetooth Gateway

Command	Reply
AT+BTCONNLIST\r\n	\r\n+BTCONNLIST:<no>,<hcix>,<addr>,<name>, <lq>,<rssi>,<port>,<conntime>\r\n \r\nOK\r\n

Parameter description:
no: index number
hcix： serial number of local BT module embedded in the gateway, range：0 - 3
addr: MAC address of connected BT device
name: device name of connected BT device
lq: link quality
rssi: signal strength
port: socket port number corresponding to the current link. It can be obtained only after sending command AT+ADDBTDEVICESERVERCONFIG to set the server configuration information of the Bluetooth device.
conntime:connection time

Glossary

Terms

Term	Definition
SPP	Serial Port Profile
LM3001	LM Bluetooth Access Point
TCP	Transport Control Protocol
IP	Internet Protocol
LAN	Local Area Network
WLAN	Wireless Local Area Network

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

§15.19 Labelling requirements.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

§ 15.21 Information to user.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

§ 15.105 Information to the user.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

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