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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



# 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

LM Technologies Ltd, Sierra Quebec Bravo, 2<sup>nd</sup> Floor, 77 Marsh Wall, Canary Wharf, London E14 9SH United Kingdom. Company Reg. 05303785



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 <u>http://192.168.1.111/</u> (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.



← → C ▲ Not secure | 192.168.1.111



#### BLUETOOTH ACCESS POINT

# LM3001LX STATE INFORMATION PORT CONFIGURATION GATEWAY CONFIGURATION

> SYSTEM CONFIGURATION

CURRENT	CONFIGURATION	OF THE	DEVICE
---------	---------------	--------	--------

MEMORY CAPACITY	
TOTAL CAPACITY	2134 M BYTES
REMAINING CAPACITY	186.5 M BYTES
DEVICE PARAMETERS	
BLUETOOTH PIN CODE	0000
DEVICE NAME	LM_BTGW
PORT CONFIGURATION	
ACQUIRE DYNAMIC IP ADDRESS	YES
IP ADDRESS	192.168.1.111
SUBNET MASK ADDRESS	255.255.255.0
DEFAULT GATEWAY	
PERFERRED DNS SERVER	
STANDBY DNS SERVER	
FIRMWARE VERSION	
MAJOR VERSION: GW_V8.0409001.2019102	4 MINOR VERSION: 2.3.0_20230801
SYSTEM TIME	
(	01/01/2007 00:05:27

# 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 <u>http://192.168.1.111/</u>. From there, navigate to Gateway Configuration -> Server Configuration as shown in the image below.



← → C ▲ Not secure	192.168.1.111			
				BLUETOOTH ACCESS POINT
LM3001LX	SERVER CONFIGU	RATION		
	SERVER CONFIGURATI	ION		
> STATE INFORMATION				
> PORT CONFIGURATION	OPERATION MODE	BOTH	~	
> GATEWAY CONFIGURATION	SERVER IP FOR SPP/BLE	192.168.1.100		
BASIC CONFIGURATION	SERVER PORT FOR SPP/BLE	7777		
SERVER CONFIGURATION	SERVER IP FRO HID	192.168.1.100		
SERVICE INFORMATION MANAGE	SERVER PORT FOR HID	7778		
> SYSTEM CONFIGURATION	SAVE TO FLASH	SAVE&APPLY	CANCEL	

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.



Second Sector HW-group.com		_		$\times$
UDP Setup Serial TCP Client TCP Server UDP Test Mode About				
Received data	⊏ Server statu			
+ETH0IP:192.168.1.111	Port 7777	1	×	lose
+ETHOMAC:00-1b-35-17-56-75				
+LOCALBTCOUNT:3	TEA authori: TEA key =	zation -		
+TOTALMEM:120MB	1: 010203	304	3: 090A0	BOC
TOTAL FLASH 213MB	2: 050607	708	4: ODOEC	F10
+TOTALFLASH.215HD	Client au	thorizat	ion	
ok		(nonea)		
	Client conne	ection s	status —	
Sent data	11:08:15: 1	92,168	3.1.111 Cli	ient i 🔺
AT+SYSINFO?	11:08:16: 1	92.168 W.copp	3.1.111 Cli ections of	ent i
	11:22:12: 1	92.168	8.1.111 Cli	ient i
	11:22:13: 1	92,168	8.1.111 Cli	ent i
	11:57:15: A	NI conn	ections cl	osec
	11:58:35: 1	92,168	3.1.111 Cli	ent i 🧹
	Clients coun	t 1		
r Send ────				
AT+SYSINFO?	Send	111		
		П	<b>g</b> r	oup
Cursor decode Server settings			HW-grou	ap.com
HEX Decimal Decoder Input 🗌 Server echo		Herce	les SETU	P stility
0A 10 Redirect to UDP			Version	3.1.2

# 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.



Second Sector American Sector American Second Secon	- 🗆 X	
UDP Setup Serial TCP Client TCP Server UDP Test Mode About		
Received/Sent data		
at*enbsnn=onat*enbsnn=on	Serial	
or chappe our chappe ou	Name	H
Medule soft Beset Universal FW Message Leen	СОМЗ 🚽	с
Module Solt-ResetOniversal_FW_Message_Loop	Paud	Ŀ.
at*role=masterat*role=master	bauu	'e
OK	19200 🔽	
at*settings=?	Data size	Г
OK		
NAME=LM068_UniversalC7		
LENAME=LM068_UniversalLEC7	Parity	
ADDR=34c9-f0-8dcfc7	none 🔻	
ATPLUSCMDFRMT=OFF	Handshake	
ESC=ON		
PAIR=ON		
DCOV=ON	Mode	
DEEPSLEEP=OFF	Free	
BAUD=19200(2)		
STOP=Stop One(0)		
PARITY=None(0)		
FLOW=OFF		Ŀ.
ECHO=ON	X Close	
RESP=ON		Г
REPORT=ON	HWg FW update	
FINDTIME=60		
FNBBIEDEDT=OFF		
ENBSDD=ON		
SPDDolo-MASTED		
JCON-OFF		
ACON-OFF MODEM-NONE		L
HODEM-NONE		H
BOND=0000-00-00000		Г
ENBHIDHOST=OFF		Ŀ.
ENBGAP=OFF		
DPIN=OFF		
PIN=1234		H
VER=068LM_Universal_04.00		
UARTCONF=UART_THROUGHPUT		
UPGRADEINT=UART		
BOOTMODE-get=3		
BOOTMODE-config=3		
REP*:SETTINGS=END		
Modem lines		
		L
Send		
at*enbspp=on	HIII	
	group	
at*role=master	www.HW-group.com	
	Hercules SETUP utility	
at*conn= □ HEX Send	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.

<pre>at*find=onat*find=on OK REP*:FIND=Start = 1 34c9-f0-801dal LMGW = 2 34c9-f0-886f35 LMGW</pre>	
= 4 34c9-f0-8a60a4 LMGW = 5 34c9-f0-8a6615 LMGW at*find=offat*find=off OK	~
Modern lines	🗖 DTR 🗖 RTS
Send	
at*enbspp=on	☐ HEX Send
at*role=master	☐ HEX Send
at*find=off	☐ HEX Send

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.

at*conn=34c9f08a60a4at*conn=34c9f08a60a4 OK IND*:PAIR=OK,34c9-f0-8a60a4 OK		
IND*:CONNECTED=34c9-f0-8a60a4		~
Modem lines	DTR	TRTS
at <sup>x</sup> enbspp=on	☐ HEX	Send
at*role=master	🗆 HEX	Send
at*conn=34c9f08a60a4	🗖 HEX	Send

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



SETUP utility by HW-group.com	- 🗆 🗙	S Hercules SETUP utility by HW-group.com	– 🗆 X
UDP Setup Serial TCP Client TCP Server UDP Test Mode About		UDP Setup Serial TCP Client TCP Server UDP Test Mode About	
Received/Sent data		Received data	
BOOTMODE-get=3	Serial	+ETH0IP:192.168.1.111	Server status
BOOTMODE-config=3	Name		Port
REP*:SETTINGS=END	СОМЗ 🚽	+ETHOMAC:00-1b-35-17-56-75	7777 🗶 Close
at*find=onat*find=on	Baud		
OK	19200	+LOCALBTCOUNT:3	- TEA and advantage
REP*:FIND=Start			TEA luan
= 1 34c9-f0-801da1 LMGW	Data size	+TOTALMEM: 120MB	I DECEMBER OF DECEMBER
= 2 34c9-f0-886f35 LMGW	8 🗾		1: U1U2U3U4 3: 090A0B0C
= 3 083e-8e-d8f09c 1m9-SVT1312C4E #1	Parity	+TOTALFLASH:213MB	2: 05060708 4: 0D0E0F10
= 4 34c9-f0-8a60a4 LMGW	none		
= 5 34c9-f0-8a6615 LMGW		OK	Client authorization
at*find=offat*find=off	Handshake	test message from the LM068	,
OK	OFF 🗾	×	Client connection status
at*conn=34c9f08a60a4at*conn=34c9f08a60a4	Mode	Sent data	11-00-15, 100-100-1-111 (Kenter)
OK	Free	AT+SYSTNF02	11:08:16: 192:168:1.111 Client
IND*:PAIR=OK,34c9-f0-8a60a4	,	test message to the IM068	11:20:53: All connections closer
OK		best message to the mitted	11:22:12: 192.168.1.111 Client (
IND*:CONNECTED=34c9-f0-8a60a4			11:22:13: 192.168.1.111 Client
test message to the LM068 🗸 🗸	V Class		11:57:15: All connections closer
Modem lines	V Close		11:58:35: 192.168.1.111 Client v
● CD ● RI ● DSR ● CTS   DTR   RTS	HWg FW update		Clients count: 1
Send		Send	
at"enbspp=on	HIUgroup	AT+SYSINFO?	Send
	him Hill-group com		www.HW-group.com
at*role=master	Henryles SETIID stilling	HEX Decimal Decoder Input	Hercules SETIID stility
at*conn=34c9f08a60a4	Version 3.1.2	38 56 Redirect to UDP	Version 3.1.2

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 <u>http://192.168.1.111/</u> 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.

CAN RESULT RES	SCAN		192.168.1.111 says Success
BD ADDRESS	NAME OF CLASS	PIN CODE	ок
	Audio/Video,Video Display a		AUD LIST
	Audio/Video Video Display a		
2.4-00-E0-08-62-08	Uncatogorized		
54.03.F0.30.02.30	Uncategonzed,		
34:C9:F0:98:07:F6	Uncategorized,	1234	
	Audio/Video,Video Display a		ADD LIST
34:C9:F0:9B:5C:4C	Uncategorized,		ADD LIST
Hercules SET JDP Setup Seria eceived/Sent dat it X	TUP utility by HW-group.com al TCP Client TCP Server UDF ta	P   Test Mode   About	Serial
t*settings	;=?		COM20
K			Baud
NAME=LM068	UniversalF6		19200
ADDR=34c9-	·f0-9b07f6		Data size
ATPLUSCMDF	RMT=OFF		8
ESC=ON			Parity
PAIR=ON DCOV=ON			none
DEEPSLEEP=	OFF		Handshake
BAUD=19200	(2)		OFF
STOP=Stop_	One (0)		Mode
PARITY=Non	ie (0)		Free
ECHO=ON			
RESP=ON			
REPORT=ON			
FINDTIME=6	OFF		
ENBSEPERI	.=011		HWg FW update
SPPRole=SL	AVE		
ACON=OFF			
MODEM=NONE			
ENBHIDHOST	-00-000000 '=0FF		
ENBGAP=OFF			
DPIN=OFF			
PIN=1234			
VER=068LM	Universal_04.00		
UPGRADEINT	=UART		
BOOTMODE-g	jet=2		
BOOTMODE-c	config=2		
EP*:SETTIN	IGS=END		



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.

<b>≫LM</b>						
IEGHNULUUIES						DECENSION ACCESSION
LM3001LX	REM	OTE	DEVICE LIST			
	MAN	JAL PA	IRING			
> STATE INFORMATION	CCAN					
> PORT CONFIGURATION	SUAN	KEMU	JIE DEVICES SUAII			
> GATEWAY CONFIGURATION	NO.		BD ADDRESS	PIN COD	E	ADD
BASIC CONFIGURATION						
SERVER CONFIDURATION		NO.	BD ADDRESS	PIN CODE	DEVICE	ACTION
MANUAL PAIR		1	34:C9:F0:9B:07:F6	1234	HCI-0 V	PAIRING DELETE

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.

				19 [34	2.168.1.111 says I:C9:F0:9B:07:F6] Success	0
-M3001LX	REMO	DTE	DEVICE LIST			
<ul><li>&gt; STATE INFORMATION</li><li>&gt; PORT CONFIGURATION</li></ul>	MANU/ SCAN	al pa Remo	IRING ITE DEVICES Scan			
> GATEWAY CONFIGURATION	N0.		BD ADDRESS	PIN CO	DE	ADD
BASIC CONFIGURATION		NO	BD ADDRESS	PIN CODE	DEVICE	ACTION
BASIC CONFIGURATION SERVER CONFIGURATION		NU.				

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.



← → C ▲ Not secure | 192.168.1.111



**BLUETOOTH ACCESS POINT** 

LM3001LX	DEVICE SERVER CONFIGURATION						
> STATE INFORMATION	BASIC CONFIGURATIO	N					
> PORT CONFIGURATION	BLUETOOTH ADDRESS	(	34:C9:F0:9B:0	7:F6 🗸			
> GATEWAY CONFIGURATION	GATEWAY BLUETOOTH ROLE		Master	~			
SERVER CONFIGURATION	CONNECT PROFILE		SPP	~			
MANUAL PAIR	SOCKET TYPE		TCP Server	~			
SERVICE INFORMATION MANAGE SYSTEM CONFIGURATION	ADD						
	DEVICE SERVICE LIST	ſ					
	COUNT BLUETOOTH B	GATEWAY BLUETOOTH CONNECT PROFIL ROLE	E SOCKET TYPE	SERVER ADDRESS	SERVICE PORT	STATUS	OPERATION

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



LM3001LX	DEV	ICE SERVER	R CONF	IGURATIO	N				
> STATE INFORMATION	BAS	IC CONFIGURATI	ON						
> PORT CONFIGURATION	BLUET	TOOTH ADDRESS				~			
> GATEWAY CONFIGURATION	GATE	WAY BLUETOOTH ROLE		P	Aaster	~			
SERVER CONFIGURATION	CONN	IECT PROFILE		5	8PP	~			
MANUAL PAIR	SOCK	ET TYPE		1	CP Client	~			
> SYSTEM CONFIGURATION	INFO	DRMATION OF SE	ERVER TO	CONNECT					
	SERV A DEV	ICE PORT	ST						
	COUNT	BLUETOOTH ADDRESS	GATEWAY BLUETOOTH ROLE	CONNECT PROFILE	SOCKET TYPE	SERVER ADDRESS	SERVICE PORT	STATUS	OPERATION
	1	34:C9:F0:9B:07:F6	MASTER	SPP	TCP SERVER		10000	BLUETOOTH CONNECTED,SOCKET DISCONNECTED	DELETE



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.

S Hercules SETUP utility by HW-group.com	- 🗆 🗙	Security HW-group.com	- 🗆 X
UDP Setup Serial TCP Client TCP Server UDP Test Mode About		UDP Setup Serial TCP Client TCP Server UDP Test Mode About	
Beesewd/Sant data         ACON=OFF         MODEM=NONE         BOND=0000-00-000000         ENBHIDH0ST=OFF         DPIN=07F         PIN=1234         VER=068LM_Universal_04.00         UARTCONF=URIT_ITROUGHPUT         UPGRADELTN=UART         BOOTMODE-config=3         REP:SETIING=END         IND::FAIR=0K,34c9=f0-8a6615         OK         at         OK         IND::CONNECTED=34c9=f0-8a6615         OK         Modem lines <ul> <li>CD</li> <li>RI</li> <li>DSR</li> <li>CTS</li> <li>DTR</li> <li>RTS</li> </ul>	Serial           Name           CODM3         ¥           Baud         19200           Jota size         8           Pathy         >           Node         ¥           Free         ¥           Mode         ¥           Free         ¥           HWg PW update         ¥	Received/Sent data Connection closed Connecting to 192.163.1.111 Connected to 192.163.1.111 test message from the LMO68	TCP           Module IP           192:168.1.111           192000           TEA authorization           TEA authorization           1:[01020304           2:[05060708           2:[05060708           4:[000E0F10]           Authorization code           PortStore test           Received jest data           T           Redirect to UDP
Send           at*enbspp=on              HEX Send	HWgroup	Send Test message from the LMAP	Send HUUgroup
atrole=slave	www.HW-group.com Hercules SETUP utility		Send www.HW-group.com Hercules SETUP stility
at"conn=34c9f08a60a4	Version 3.1.2	T HEX	Send Version 3.1.2

# 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+SYSINF0?\r\n	\r\n+ETH0IP: <eth0ip>\r\n</eth0ip>
	\r\n+ETHOMAC: <ethomac>\r\n</ethomac>
	\r\n+WLAN0IP: <wlan0ip>\r\n</wlan0ip>
	\r\n+WLANOMAC: <wlan0mac>\r\n</wlan0mac>
	\r\n+LOCALBTCOUNT: <count>\r\n</count>
	\r\n+TOTALMEM: <memorysize>\r\n</memorysize>
	\r\n+T0TALFLASH: <flashsize>\r\n</flashsize>
	\r\n0K\r\n

#### Parameter description



ethOip: Ethernet IP address ethOmac: Ethernet MAC address wlanOip: wireless network IP address wlanOmac: 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</count>
	\r\n+IDLEMEM: <idlememorysize>\r\n</idlememorysize>
	\r\n+IDLEFLASH: <idleflashsize>\r\n</idleflashsize>
	\r\n+IDLECPU: <idlecpupercentage>\r\n</idlecpupercentage>
	\r\n0K\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</password></name>	\r\n0K\r\n

# 3.2.4 Set/Query System Time

Command	Reply
AT+SETDATE= <year>,<month>,<day>,<hour>,<minu< td=""><td>\r\n0K\r\n</td></minu<></hour></day></month></year>	\r\n0K\r\n
te>, <second>\r\n</second>	
AT+GETDATE?\r\n	\r\nGETDATE: <year>,<month>,<day>,<hour>,<minut< td=""></minut<></hour></day></month></year>
	e>, <second>\r\n</second>
	\r\n0K\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</server>	\r\n0K\r\n
AT+NTPSERVER?\r\n	\r\NTPSERVER: <server>\r\n</server>
	\r\n0K\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</version>
	\r\n0K\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</version>
	\r\n0K\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</dhcp>	\r\nOK\r\n
AT+ETHDHCP?\r\n	\r\n+ETHDHCP: <dhcp>\r\n</dhcp>
	\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</ipaddr>	\r\n0K\r\n
AT+ETHIP?\r\n	\r\n+ETHIP: <ipaddr>\r\n</ipaddr>
	\r\n0K\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</ipaddr>	\r\n0K\r\n
AT+ETHMASK?\r\n	\r\n+ETHMASK: <ipaddr>\r\n</ipaddr>
	\r\n0K\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</ipaddr>	\r\n0K\r\n
AT+ETHGATEWAY?\r\n	\r\n+ETHGATEWAY: <ipaddr>\r\n</ipaddr>
	\r\n0K\r\n

# Parameter description:

```
Example:
```

AT+ETHGATEWAY=192.168.1.1\r\n

# 3.2.12 Set/Query Ethernet DNS

Command	Reply
AT+ETHFIRSTDNS= <ipaddr>\r\n</ipaddr>	\r\nOK\r\n
AT+ETHFIRSTDNS?\r\n	\r\n+ETHFIRSTDNS: <ipaddr>\r\n</ipaddr>
	\r\n0K\r\n
AT+ETHSECONDDNS= <ipaddr>\r\n</ipaddr>	\r\n0K\r\n
AT+ETHSECONDDNS?\r\n	\r\n+ETHSECONDDNS: <ipaddr>\r\n</ipaddr>
	\r\n0K\r\n

#### Parameter description:

ipaddr:

# Example:

AT+ETHFIRSTDNS=8.8.8\r\n

ipaddr:



# 3.2.13 Query Ethernet MAC Address

Command	Reply
AT+ETHMAC?\r\n	\r\n+ETHMAC: <mac>\r\n</mac>
	\r\n0K\r\n

#### 3.2.14 Set/Query Gateway Name

Command	Reply
AT+BTDEVICENAME= <name>\r\n</name>	\r\n0K\r\n
AT+BTDEVICENAME?\r\n	\r\n+BTDEVICENAME: <name>\r\n</name>
	\r\n0K\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</name>	\r\n0K\r\n
AT+BTDEVICENAME?\r\n	\r\n+BTDEVICENAME: <name>\r\n</name>
	\r\n0K\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</pincode>	\r\n0K\r\n
AT+BTPINCODE?\r\n	\r\n+BTPINCODE: <pincode>\r\n</pincode>
	\r\n0K\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</enable>	\r\n0K\r\n
AT+BTENCENABLE?\r\n	\r\n+BTENCENABLE: <enable>\r\n</enable>



\r\n0K\r\n

Parameter description: enable: O 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</cod>	\r\n0K\r\n
AT+BTCOD?\r\n	\r\n+BTCOD: <cod>\r\n</cod>
	\r\n0K\r\n

# Parameter description:

cod: 6 bytes, all characters are hexadecimal digits or letters. That is,  $0 \sim 9$ , 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</timeout>	\r\n0K\r\n
AT+BTSUPTIMEOUT?\r\n	\r\n+BTSUPTIMEOUT: <timeout>\r\n</timeout>
	\r\n0K\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</enable>	\r\n0K\r\n
AT+BTSAVELINKKEY?\r\n	\r\n+BTSAVELINKKEY: <enable>\r\n</enable>
	\r\nNK\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
---------	-------



AT+SETSPECIFICPINCODE=<addr>,<pincode>\r\n \r\n0K\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</addr>	\r\n0K\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</pincode></addr>
	\r\n0K\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</mode>	\r\n0K\r\n
AT+BTSERVICEMODE?\r\n	\r\n+BTSERVICEMODE: <mode>\r\n \r\nOK\r\n</mode>

#### Parameter description:

1 SPP 2 HID 3 Both SPP and HID

#### Example:

mode:

AT+BTSERVICEMODE=3\r\n

# 3.2.25 Set/Query SPP Server IP

Command	Reply
AT+BTSPPSERVERIP= <ipaddr>\r\n</ipaddr>	\r\n0K\r\n
AT+BTSPPSERVERIP?\r\n	\r\n+BTSPPSERVERIP: <ipaddr>\r\n</ipaddr>
	\r\n0K\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</port>	\r\n0K\r\n
AT+BTSPPSERVERPORT?\r\n	\r\n+BTSPPSERVERPORT: <port>\r\n</port>
	\r\n0K\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</ipaddr>	\r\n0K\r\n
AT+BTHIDSERVERIP?\r\n	\r\n+BTHIDSERVERIP: <ipaddr>\r\n</ipaddr>
	\r\n0K\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</port>	\r\n0K\r\n
AT+BTHIDSERVERPORT?\r\n	\r\n+BTHIDSERVERPORT: <port>\r\n</port>
	\r\n0K\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</cod></addr>
	\r\n0K\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</hcix></addr>	\r\n+BTPAIR: <addr>,<result>\r\n</result></addr>
	\r\nUK\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</addr>	\r\n0K\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</hcix></addr>
	\r\n0K\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>,</profile></role></addr>	\r\n0K\r\n
<sockettype>\r\n</sockettype>	
AT+ADDBTDEVICESERVERCONFIG= <addr>,<role>,<profile>,</profile></role></addr>	\r\n0K\r\n
<sockettype>,<serverip>,<serverport>\r\n</serverport></serverip></sockettype>	

Parameter description:



addr: MAC address of remote BT device

role :	O 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 se	rverip 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</profile></role></addr>	\r\n0K\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	<pre>\r\n+GETBTDEVICESERVERCONFIG:<addr>,</addr></pre>
	<role>,<profile>,<sockettype>,<serverip>,</serverip></sockettype></profile></role>
	<serverport>,<status>\r\n</status></serverport>
	\r\n0K\r\n

# Parameter description:

addr: MAC address of remote BT device

role:	O 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></addr></index>
	\r\n0K\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</addr></index>	\r\n0K\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</time></filter></operation>	\r\n0K\r\n

#### Command description:

This command is used to start or stop scanning for surrounding BLE devices.

#### Parameter description:

#### operation:

- O Stop scanning
- 1 Start scanning

filter :

O 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:

 $\ensuremath{\mathsf{0}}$  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</addrtype></addr>	\r\n0K\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</state></addr>	

#### 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</addr>	\r\n0K\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</addr>	\r\n0K\r\n

#### Parameter description:

addr: MAC address of the BLE device to be disconnected

Ouer	/ Resul <sup>.</sup>	t
·		

\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</charuuid></addr>	\r\n0K\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</data></charuuid></addr>	\r\n0K\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</data></charuuid></addr>
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</addr>	\r\n+RSSI: <addr>,<rssi>\r\n</rssi></addr>
	\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\n0K\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\n0K\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\n0K\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</addr></hcix>
	\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>,</name></addr></hcix></no>
	<lq>,<rssi>,<port>,<conntime>\r\n</conntime></port></rssi></lq>
	\r\n0K\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
ТСР	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.