SIM7022 Series_ CoAP_Application Note

LPWA Module

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About Document

Version History

Revision	Date	Author	Description
1.00	2022-02-22	Xinsheng.wu	New version

Scope

This document applies to the following products

Name	Type	Size(mm)	Comments
SIM7022	NB1	17.6*15.7*2.1	Band 1/3/5/8/20/28

Contents

1 Introduction

1.1 Purpose of the document

The CoAP (Constrained Application Protocol) is an Internet Application Protocol dedicated to constrained devices that enables constrained devices called "nodes" to communicate with the broader Internet using similar protocols.

This document mainly introduces how to use the COAP function of SIMCom SIM7022 module through AT commands.

1.2 Related documents

[1] SIM7022 Series_AT Command Manual

1.3 Conventions and abbreviations

Abbreviation	Description
CoAP	Constrained Application Protocol
HTTP	Hypertext Transfer Protocol
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
URL	Uniform Resource Locator

2 Introduction to CoAP protocol

2.1 CoAP protocol

The CoAP protocl is similar to a web protocol for Internet of things. The CoAP specification is defined in RFC 7252. As the name implies, CoAP is used for the Internet of things with limited resources.

The CoAP protocol main supported features are as following:

1) The network transport layer of CoAP protocol is changed from transmission control protocol (TCP) to user datagram protocol (UDP).

2) The resource address of the server has the same URL format as the Internet. The client also uses post, get, put, and delete methods to access the server to simplify hypertext transfer protocol (HTTP).

3) CoAP is in binary format and HTTP is in text format. CoAP is more compact than HTTP.

4) CoAP is lightweight; the minimum length of CoAP is only 4 bytes, while HTTP header has dozens of bytes.

5) Supports reliable transmission, data retransmission, and block transmission. CoAP ensures reliable data arrival.

6) CoAP supports IP multicast, that is, it can send requests to multiple devices at the same time.

7) Short connection communication is suitable for low-power Internet of things scenarios.

The CoAP protocol message types are as follows:

- Con: A request that requires an acknowledgment. If a con request is sent, the other party must respond. This is similar to TCP, where the other party must confirm that the message is received for reliable message transmission.
- Non: A request that does not require an acknowledgment. If a non request is sent, the other party need not respond. This applies to the messages that are sent repeatedly and frequently, and packet loss does not affect normal operation. This is similar to UDP. It is used for unreliable message transmission.
- ACK: A reply message that corresponds to the reply of con message.
- RST: A reset message; when the received message is unknown or wrong during reliable transmission, and when the ACK message cannot be returned, the rst message must be returned.

CoAP requests and responses are as follows:

- Get method: Used to get a resource
- Post method: Used to create a resource
- Put method: Used to update a resource
- Delete method: Used to delete a resource

2.2 CoAP server

The CoAP server name is coap.me. For debugging, use the AT commands to communicate with the coap.me CoAP server. The AT commands are used to create and delete a CoAP client and are used to send and receive the CoAP data. The CoAP server replies to the CoAP client.

2.3 AT commands for interaction with CoAP server

The CoAP AT commands are designed according to the functional division of CoAP, including the following AT commands:

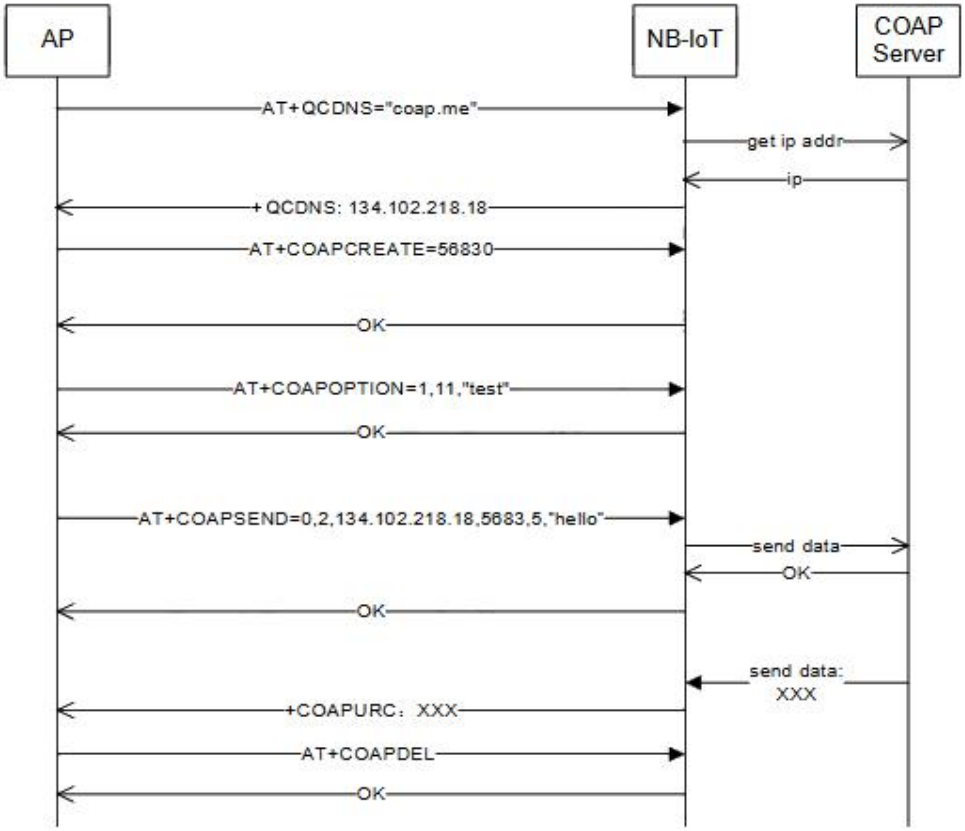
- CoAP create – Creates socket connection and the CoAP client.
- CoAP delete – Deletes CoAP, including CoAP connection and socket connection.
- CoAP add resource – Adds resource; this command has not been extensively tested and currently it is not supported.
- CoAP head – Configures the ID and token of the CoAP head.
- CoAP option – Configures the various CoAP options.
- CoAP status – Queries the status of CoAP sent data.
- CoAP config – Configures the display options when receiving data.
- CoAP send – Sends data to the cloud platform. According to the CoAP protocol, if there is bad network state, CoAP may resend data. When using the CoAP send command, the CoAP may receive multiple data from the server, that is, multiple "+ coapurc:" is displayed.
- CoAP receive – Receives the data sent by the CoAP server

2.4 AT commands flow

The AT command flow while using the CoAP is as following:

1) Use "AT+QCDNS" to obtain the IP address of the CoAP server.
2) Use CoAP create to create a CoAP client.
3) Use CoAP option to configure the option.
4) Use CoAP send to send the data.
5) When the CoAP server issues data, the CoAP receive command is automatically received and printed in the format of "+COAPURC:".
6) Use CoAP delete to delete the CoAP connection

The following is a schematic diagram of interaction between SIM7022 and the CoAP server through AT commands:



3 AT Command for CoAP

Command	Description
AT+COAPCREATE	Create a CoAP Client
AT+COAPDEL	Delete the CoAP client
AT+COAPADDRES	Add the CoAP resource.
AT+COAPHEAD	Add the CoAP head.
AT+COAPOPTION	Add the CoAP option
AT+COAPSEND	Send data to the CoAP server
AT+COAPDATASTATUS	Gets the CoAP status
AT+COAPCFG	Configures the CoAP client
+COAPURC	CoAP client received data URC

For detail information, please refer to “SIM7022 Series_AT Command Manual”.

4 Examples

4.1 Power-on inspection process

AT	// Check whether the module is powered on successfully.
OK	
AT+CFUN=1	//Close flight mode
OK	
AT+CEREG?	//Determine the registeration status of the PS domain. If the second parameter is 1 or 5, indicate that PS register successfully.
+CEREG:0,1	
OK	

4.2 Commands for interaction with the CoAP server

//Example for CoAP connect server.	
AT+QCDNS="coap.me"	//obtain the IP address of the server
+QCDNS: "134.102.218.18"	
OK	
AT+COAPCREATE=56830	// Create a CoAP client
OK	
AT+COAPOPTION=1,11,"test"	// Set the URI path to '/ test'.
OK	
AT+COAPSEND=0,2,134.102.218.18,5683,5,"hello"	//Send data request
OK	
+COAPURC: "rsp",2,2.01,32070,7,POST	
AT+COAPDEL	//Delete CoAP client
OK	