PyCom Chat over MQTT and Wifi Analyzer

Ex. 1

Build and test a chat system using your PyCom device. Every user can send one or more text messages to any other user into the system. Also, by using a special command, any user can send information about the sensors of his PyCom to any other user into the system.

Technical details

The system is based on MQTT protocol. The PyCom board has to connect to an MQTT Broker, using the WiFi connection. In order to test your solution you can install the MQTT broker on your local machine. Optionally we will provide a public one to perform further test.

Every user has to subscribe to the following topics:

```
user/<username>/rx
user/broadcast/rx
```

Everytime a message is received, the system should print it on the terminal. A shell should be implemented providing the following commands:

```
> sendto <username|all> msg
> sendto <username|all> diagnostic
```

The first command is used to send a generic text message to a user, the second will be used to send information about PyCom sensors to a user. The user of the application can send the message in unicast or broadcast: to send a message in broadcast the special keyword `all` must be used.

Everytime a user sends a message to another user, the payload has to be encoded in JSON format using the following protocol:

```
{from: <string>, msg: <string>}
```

The `from` field is used to identify the username of the user sending the message, while `msg` should be a plain text string or a base64 encoded message within the sensors data. The sensors data must be provided using the CayenneLPP protocol.

Example

The following is an example of the application output.

```
> sendto mattia hello man!
[->] From mattia: hi there
[->] From elena: hey I am here too!
> sendto mattia diagnostic
[->] From mattia: cool mine is...
[->] From mattia: temperature 25 °C
>
```

Ex. 2

Repeat the part 1 using the bluetooth protocol to send commands to the PyCom board.
Hint: use an Android/iOS app for bluetooth comunication.

Ex. 3

Build a wifi analyzer that alert the user everytime a new host connect to the wifi network. The PyCom must alert the user by sending a message on Telegram, providing the MAC address of the newly connected device. After five minutes of inactivity a host must be considered offline. It is suggested to store a table in memory with the MAC address and the last seen field.

Ex. 4

Repeat the previous exercise but this time using a SigFox uplink to notify when a new host is detected.