



DOP: / / 2023

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Experiment No: 07

Aim: - To study and demonstrate working of CoAP protocol in Contiki OS (simulator).

Theory:

Constrained Application Protocol (CoAP) is a lightweight http protocol that reads and controls the sensors deployed for IoT. It has actions like get, post, put, delete, observe, discover.

This coap can be accessed similar like http, for ex: to access a particular mote (Sensor) with IPv6 like this coap:// [Aasa: 212:7402:2:202].

The above line will fetch the sensor boards peripherals and one can control from the browser itself. Firefox has a Cu plugin to enable CoAP within the browser. CoAP is already available for all the devices like IOS, Android, Windows, Linux, Mac, etc,

Procedure:

Steps to use coap based application using a border router.

Step 1: Contiki Selection

Open instant Contiki (Which runs on VMWare or Virtual Box)

Open Cooja from the Desktop directly or Open the Terminal and give the following steps

```
$] cd /home/user/contiki-2.7/tools/cooja
```

```
$] ant runs If you want to simulate huge number of nodes then
```

```
$] ant run_bigmam
```

Step 2: Selecting Border router

File - New Simulation -> Enter Simulation Name (Leave the defaults as it is) and then Click "Create"

Click Add Motes -> Select Sky Mote

In the firmware, Select the following path /home/user/contiki-2.7/examples/ipv6/rpl- border-router/border-router.c

Click -> Compile (or Clean and then Compile), once compilation is over, Click Create motes and select the number of motes (1 in this case).

Step 3: Selecting the Er Example Server

Click Add Motes -> Sky Motes

In the firmware, select the following path /home/user/er-rest-example/er-example- server.c.

Click Compile -> after compilation, click create motes and select the number of motes (2 in this case).

Step 4: Run the Simulation

In the Simulation Control window, you can press the Start button to start the simulation. Since this application is deployed with IpV6 for all the nodes, it can be seen from the simulation that all the motes have the ipv6 addresses like this

mote 1: aaaa: 212:7401:1:101 for Border router.

A bridge must be made between the border router and the other motes, to enable the bridge, Right Click Border Router Node -> Mote tools for Sky 1 -> Serial Socket (SERVER)

Step 5: Bridge the Border Router

Open a new terminal and select the path as given below

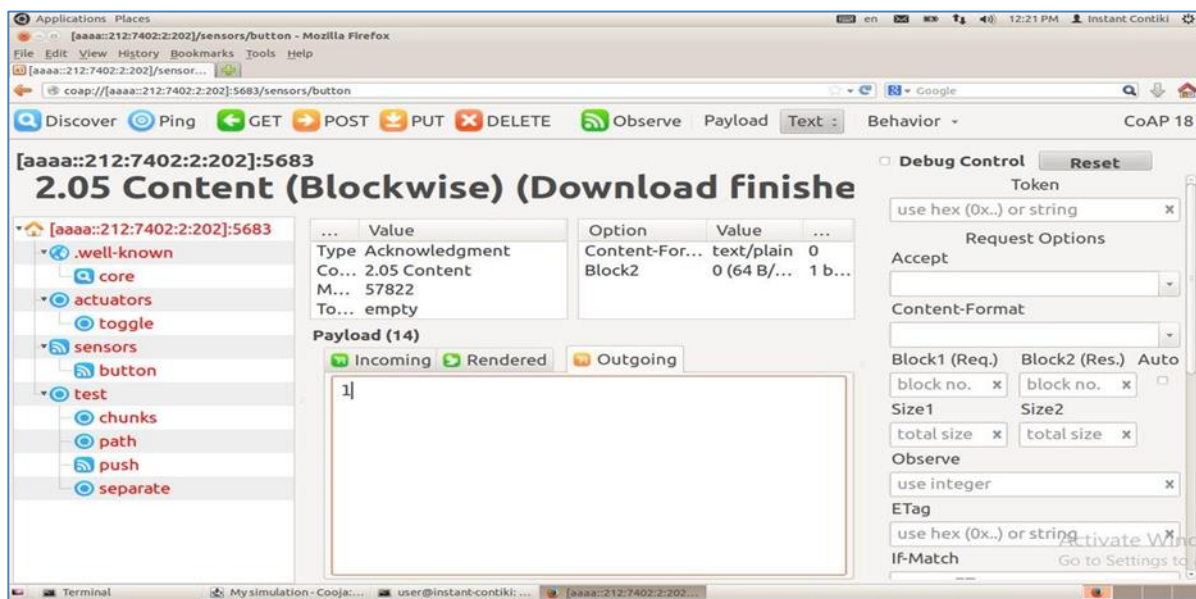
```
$] cd /home/user/examples/ipv6/rpl-border-router/
$] make connect-router-cooja
```

It will ask to input the super user password, after you input, the ipv6 addresses will be assigned to the motes. You may ping it using a new terminal, with the command "ping6 aaaa::212:7402:2:202"

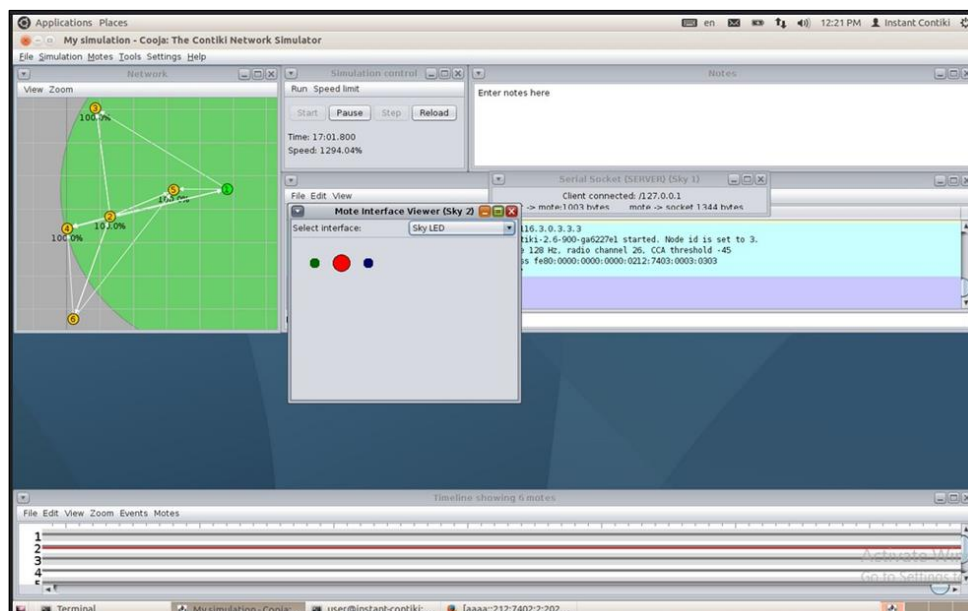
Step 6: Read the sensors

You can read the sensors using the ipv6 addresses by opening the firefox browser. Open the browser and input the following addresses in a new tab `coap://[aaaa::212:7402:2:202]` or any other sensor mote.

Refer the images given below:

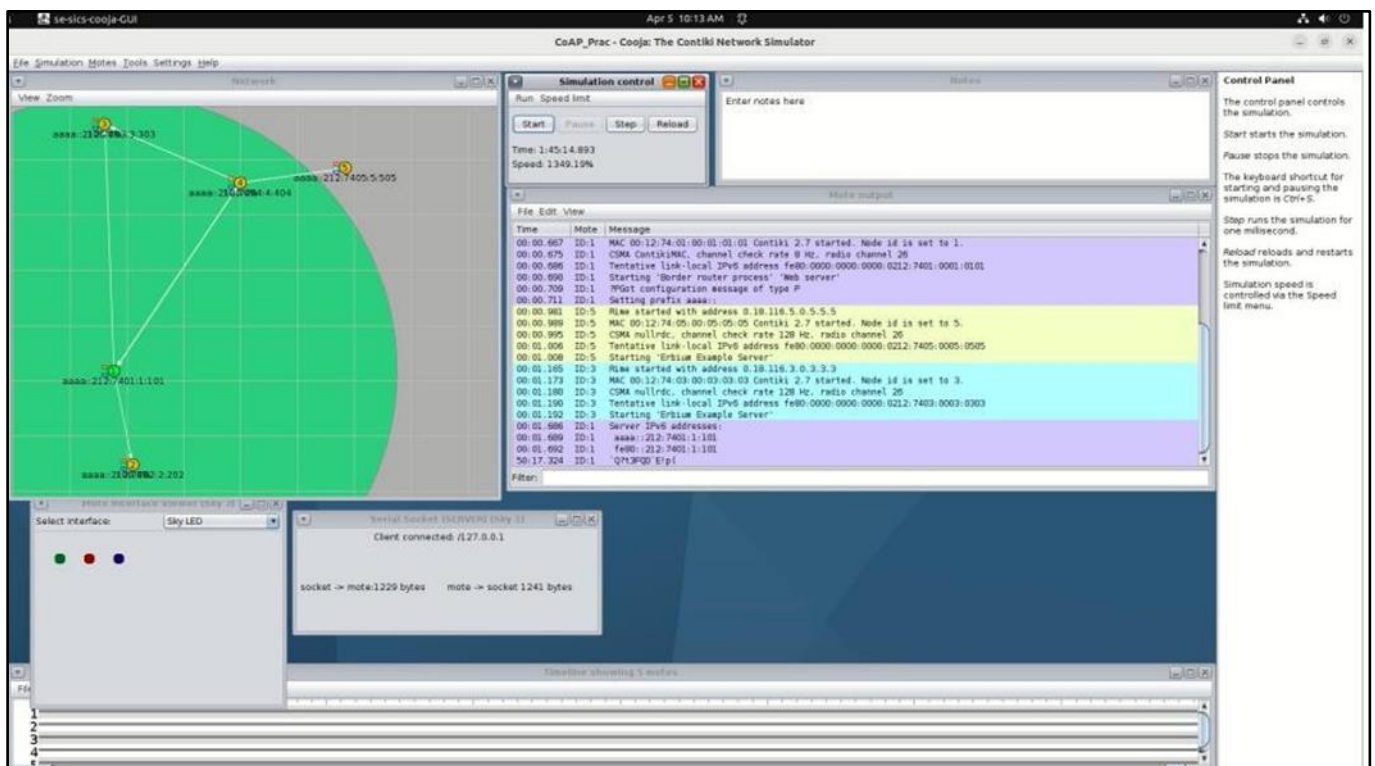
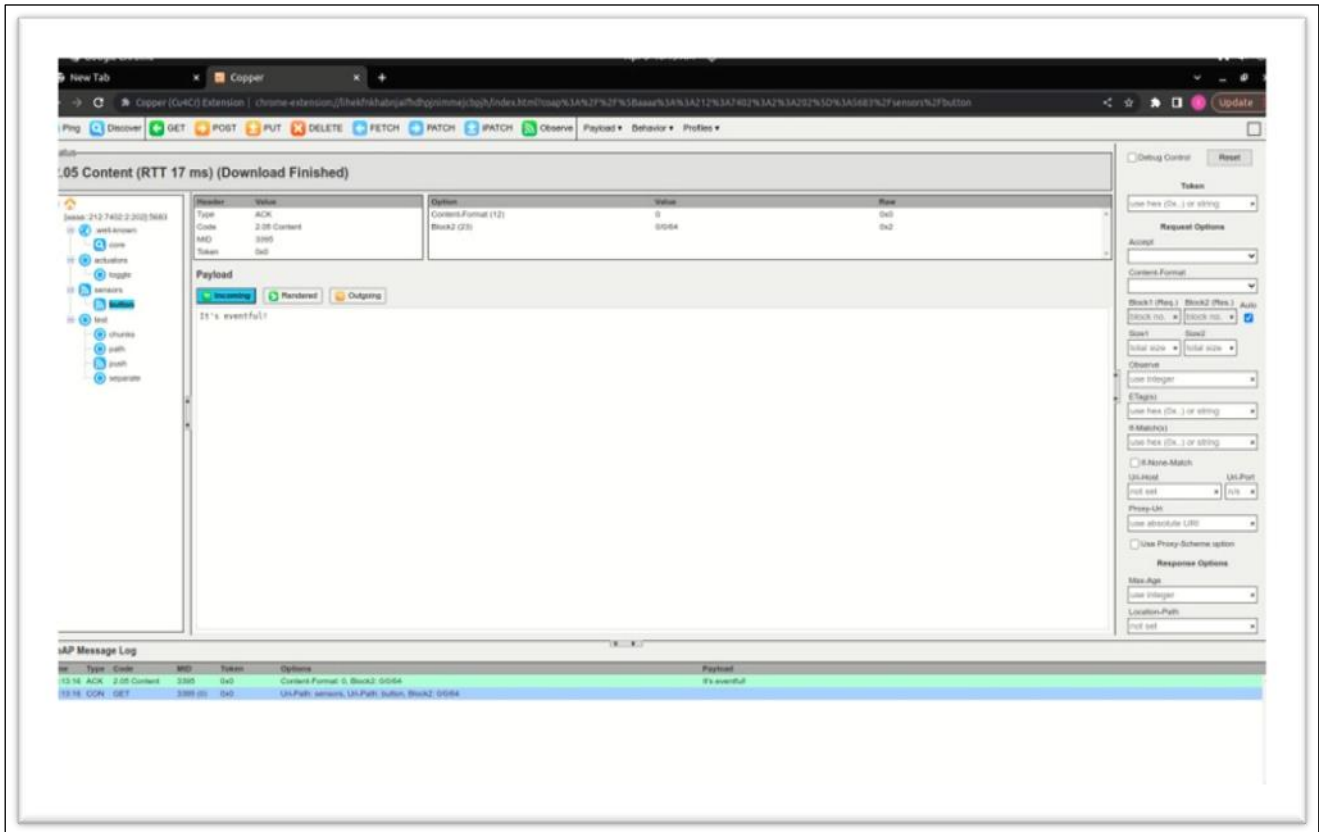


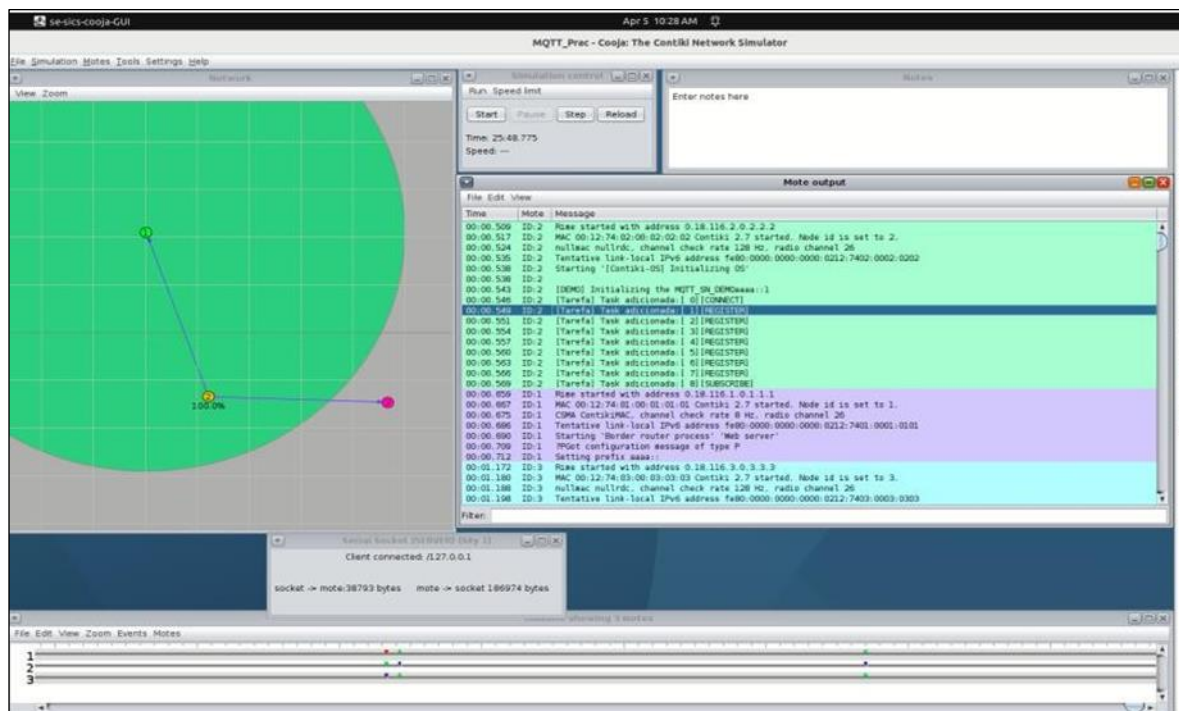
CoAP





Jawahar Education Society's Annasaheb Chudaman Patil College of Engineering, Kharghar, Navi Mumbai





Results: The above two images show Firefox browser with cu plugin to open the ipv6 address and read the sensor values. In the first picture the toggle value 1 for Red LED is sent from the browser by selecting the POST button (OutGoing), Upon receiving the RED LED is glowing in the Mote that indicates that the node is accepting the inputs remotely.

Conclusion: Thus, COAP is very handy when deals with the mote's attributes.