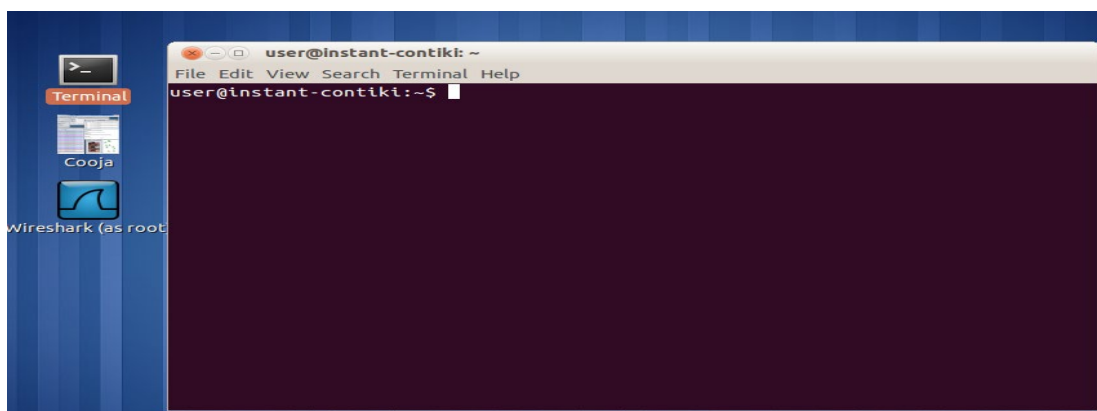


Apéndice F

Para poder ingresar de manera remota por conexión SSH la infraestructura IoT-Lab se debe configurar previamente el acceso remoto, configuración que es descrita en los tutoriales que dicha plataforma ofrece en la sección de *Learn* y que están disponibles en su aplicativo web. (Adjih C., Baccelli E., Fleury E., Harter G., Mitton N., Noel T., Pissard-Gibollet R., Saint-Marcel F., Schreiner G., Vandaele G., 2015).

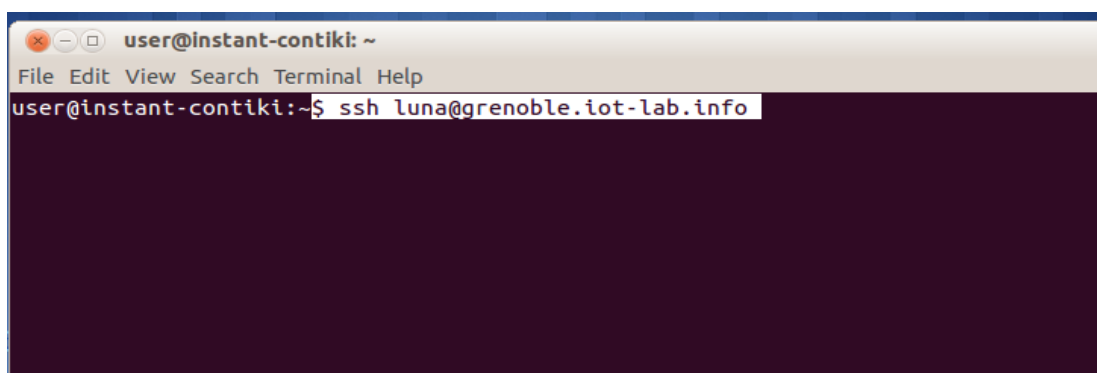
1. Abrir la terminal de Linux.

Figura 1 Paso 1 Procedimiento para experimentación en IoT-Lab



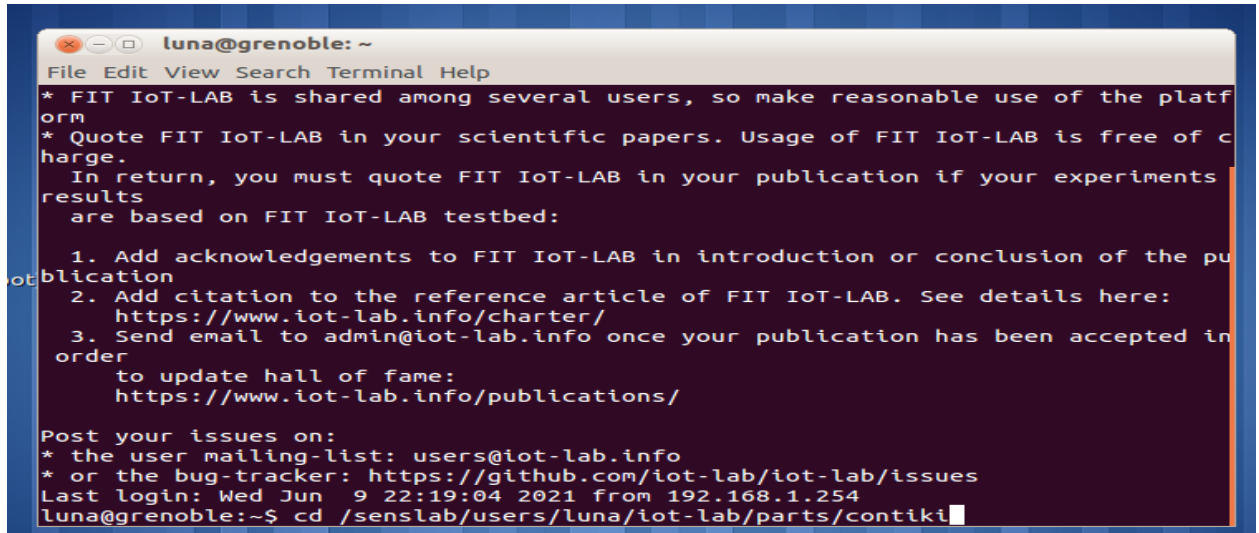
2. Escribir el comando el comando \$ SSH “NombreDeUsuario”@”sitio”.iot-lab.info.

Figura 2 Paso 2 Procedimiento para experimentación en IoT-Lab



3. Luego se accede al fichero donde se encuentra el SO Contiki mediante la siguiente ruta \$
`cd /senslab/users/luna/iot-lab/parts/Contiki`, donde “Luna” es el nombre de usuario de la
 plataforma IoT-Lab.

Figura 3 Paso 3 Procedimiento para experimentación en IoT-Lab



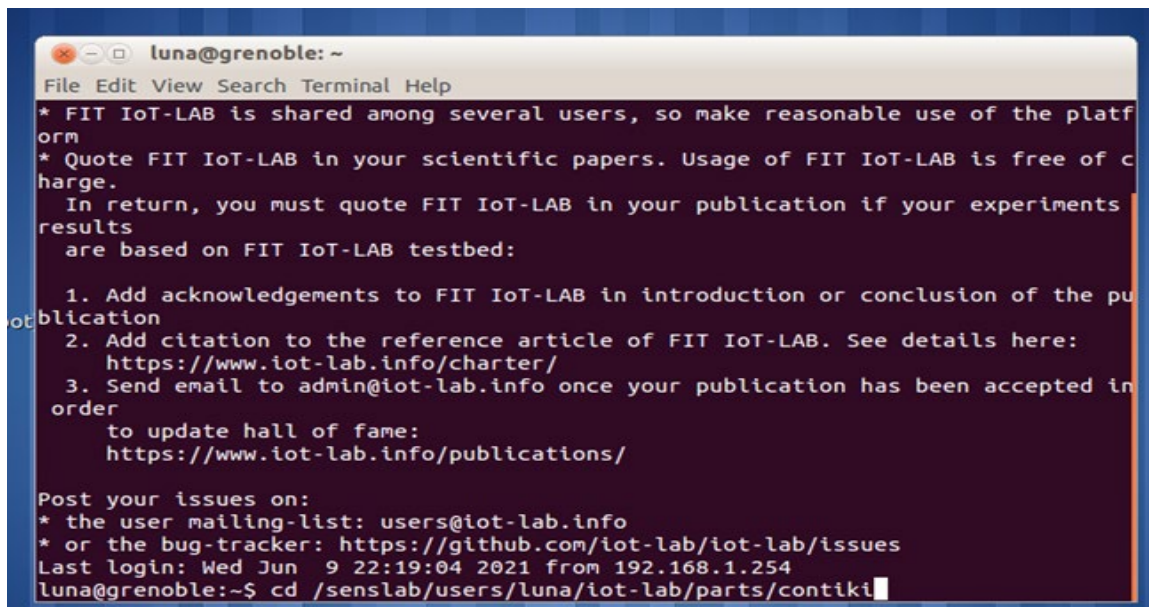
```

luna@grenoble: ~
File Edit View Search Terminal Help
* FIT IoT-LAB is shared among several users, so make reasonable use of the platform
* Quote FIT IoT-LAB in your scientific papers. Usage of FIT IoT-LAB is free of charge.
In return, you must quote FIT IoT-LAB in your publication if your experiments results
are based on FIT IoT-LAB testbed:
1. Add acknowledgements to FIT IoT-LAB in introduction or conclusion of the publication
2. Add citation to the reference article of FIT IoT-LAB. See details here:
https://www.iot-lab.info/charter/
3. Send email to admin@iot-lab.info once your publication has been accepted in order
to update hall of fame:
https://www.iot-lab.info/publications/
Post your issues on:
* the user mailing-list: users@iot-lab.info
* or the bug-tracker: https://github.com/iot-lab/iot-lab/issues
Last login: Wed Jun  9 22:19:04 2021 from 192.168.1.254
luna@grenoble:~$ cd /senslab/users/luna/iot-lab/parts/contiki

```

4. Dar enter.

Figura 4 Paso 4 Procedimiento para experimentación en IoT-Lab



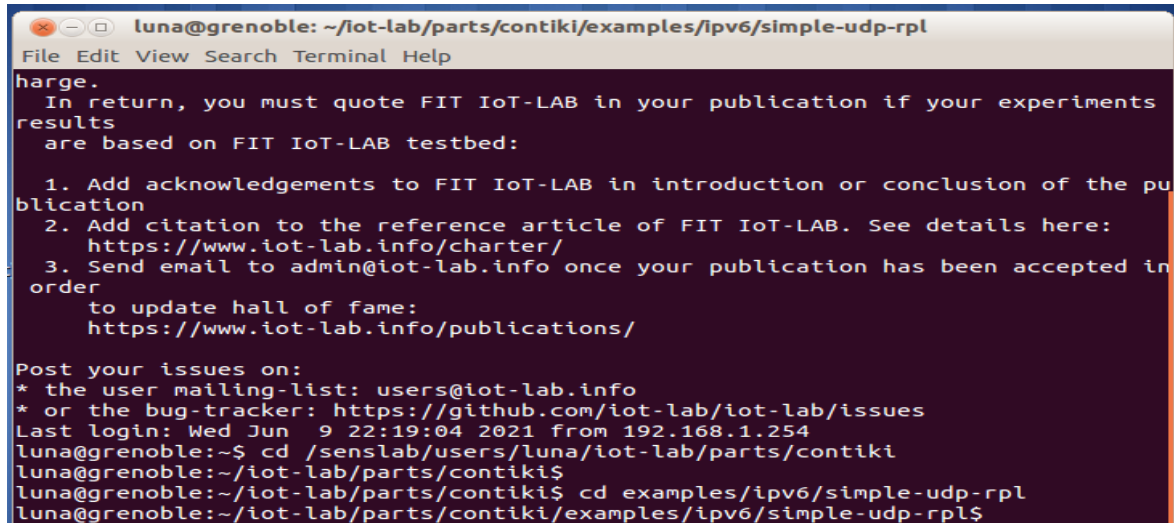
```

luna@grenoble: ~
File Edit View Search Terminal Help
* FIT IoT-LAB is shared among several users, so make reasonable use of the platform
* Quote FIT IoT-LAB in your scientific papers. Usage of FIT IoT-LAB is free of charge.
In return, you must quote FIT IoT-LAB in your publication if your experiments results
are based on FIT IoT-LAB testbed:
1. Add acknowledgements to FIT IoT-LAB in introduction or conclusion of the publication
2. Add citation to the reference article of FIT IoT-LAB. See details here:
https://www.iot-lab.info/charter/
3. Send email to admin@iot-lab.info once your publication has been accepted in order
to update hall of fame:
https://www.iot-lab.info/publications/
Post your issues on:
* the user mailing-list: users@iot-lab.info
* or the bug-tracker: https://github.com/iot-lab/iot-lab/issues
Last login: Wed Jun  9 22:19:04 2021 from 192.168.1.254
luna@grenoble:~$ cd /senslab/users/luna/iot-lab/parts/contiki

```

5. Luego ir al fichero donde se encuentra el firmware a ejecutar, para este ejemplo se usa la siguiente ruta: `cd examples/ipv6/simple-udp-rpl`.

Figura 5 Paso 5 Procedimiento para experimentación en IoT-Lab



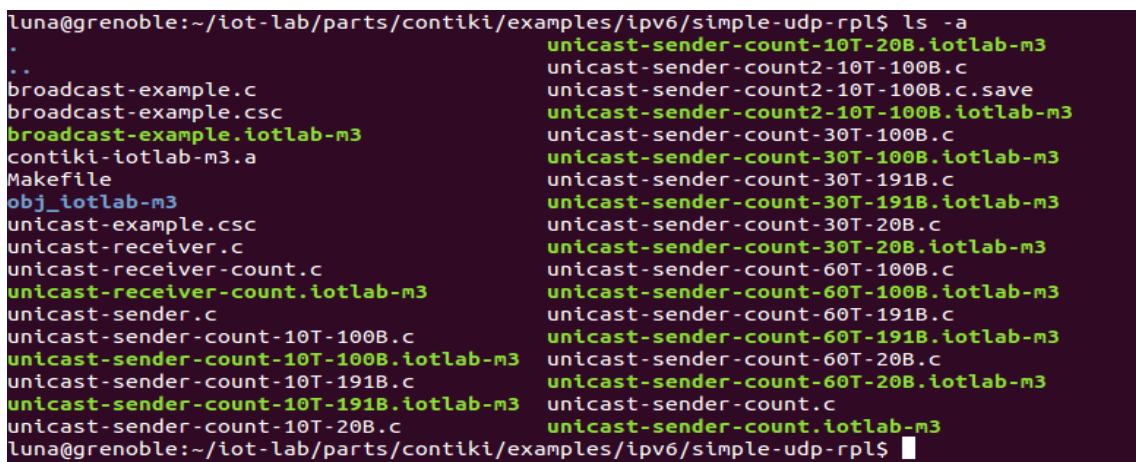
```
luna@grenoble: ~/iot-lab/parts/contiki/examples/ipv6/simple-udp-rpl
File Edit View Search Terminal Help
harge.
In return, you must quote FIT IoT-LAB in your publication if your experiments
results
are based on FIT IoT-LAB testbed:

1. Add acknowledgements to FIT IoT-LAB in introduction or conclusion of the pu
blication
2. Add citation to the reference article of FIT IoT-LAB. See details here:
https://www.iot-lab.info/chapter/
3. Send email to admin@iot-lab.info once your publication has been accepted in
order
to update hall of fame:
https://www.iot-lab.info/publications/

Post your issues on:
* the user mailing-list: users@iot-lab.info
* or the bug-tracker: https://github.com/iot-lab/iot-lab/issues
Last login: Wed Jun 9 22:19:04 2021 from 192.168.1.254
luna@grenoble:~$ cd /senslab/users/luna/iot-lab/parts/contiki
luna@grenoble:~/iot-lab/parts/contiki$
luna@grenoble:~/iot-lab/parts/contiki$ cd examples/ipv6/simple-udp-rpl
luna@grenoble:~/iot-lab/parts/contiki/examples/ipv6/simple-udp-rpl$
```

6. Seleccionar el código que va a ser el firmware del experimento, para este un ejemplo se usa los códigos *unicast-receiver.c* para el nodo receptor de los mensajes y el *unicast-sender.c* para el nodo emisor.

Figura 6 Paso 6 Procedimiento para experimentación en IoT-Lab



```
luna@grenoble:~/iot-lab/parts/contiki/examples/ipv6/simple-udp-rpl$ ls -a
.
..
broadcast-example.c
broadcast-example.csc
broadcast-example.iotlab-m3
contiki-iotlab-m3.a
Makefile
obj_iotlab-m3
unicast-exemple.csc
unicast-receiver.c
unicast-receiver-count.c
unicast-receiver-count.iotlab-m3
unicast-sender.c
unicast-sender-count-10T-100B.c
unicast-sender-count-10T-100B.iotlab-m3
unicast-sender-count-10T-191B.c
unicast-sender-count-10T-191B.iotlab-m3
unicast-sender-count-10T-20B.c
unicast-sender-count-10T-20B.iotlab-m3
unicast-sender-count-30T-100B.c
unicast-sender-count-30T-100B.iotlab-m3
unicast-sender-count-30T-191B.c
unicast-sender-count-30T-191B.iotlab-m3
unicast-sender-count-30T-20B.c
unicast-sender-count-30T-20B.iotlab-m3
unicast-sender-count-60T-100B.c
unicast-sender-count-60T-100B.iotlab-m3
unicast-sender-count-60T-191B.c
unicast-sender-count-60T-191B.iotlab-m3
unicast-sender-count-60T-20B.c
unicast-sender-count-60T-20B.iotlab-m3
unicast-sender-count.c
unicast-sender-count.iotlab-m3
luna@grenoble:~/iot-lab/parts/contiki/examples/ipv6/simple-udp-rpl$
```

7. Entrar con el editor nano al archivo *Makefile* usando el comando *nano Makefile*

Figura 7 Paso 7 Procedimiento para experimentación en IoT-Lab

```
luna@grenoble:~/iot-lab/parts/contiki/examples/ipv6/simple-udp-rpl$ ls -a
.
..
broadcast-example.c
broadcast-example.csc
broadcast-example.iotlab-m3
contiki-iotlab-m3.a
Makefile
obj_iotlab-m3
unicast-example.csc
unicast-receiver.c
unicast-receiver-count.c
unicast-receiver-count.iotlab-m3
unicast-sender.c
unicast-sender-count-10T-100B.c
unicast-sender-count-10T-100B.iotlab-m3
unicast-sender-count-10T-191B.c
unicast-sender-count-10T-191B.iotlab-m3
unicast-sender-count-10T-20B.c
unicast-sender-count-10T-20B.iotlab-m3
unicast-sender-count-30T-100B.c
unicast-sender-count-30T-100B.iotlab-m3
unicast-sender-count-30T-191B.c
unicast-sender-count-30T-191B.iotlab-m3
unicast-sender-count-30T-20B.c
unicast-sender-count-30T-20B.iotlab-m3
unicast-sender-count-60T-100B.c
unicast-sender-count-60T-100B.iotlab-m3
unicast-sender-count-60T-191B.c
unicast-sender-count-60T-191B.iotlab-m3
unicast-sender-count-60T-20B.c
unicast-sender-count-60T-20B.iotlab-m3
unicast-sender-count.c
unicast-sender-count.iotlab-m3
luna@grenoble:~/iot-lab/parts/contiki/examples/ipv6/simple-udp-rpl$ nano Makefile
luna@grenoble:~/iot-lab/parts/contiki/examples/ipv6/simple-udp-rpl$ nano Makefile
```

8. En la primera línea del código donde dice “all:” escribir el nombre del archivo del cual se va a crear el firmware para los nodos, para este ejemplo se escribe *unicast-sender* y *unicast-receiver* separados por un espacio.

Figura 8 Paso 8 Procedimiento para experimentación en IoT-Lab

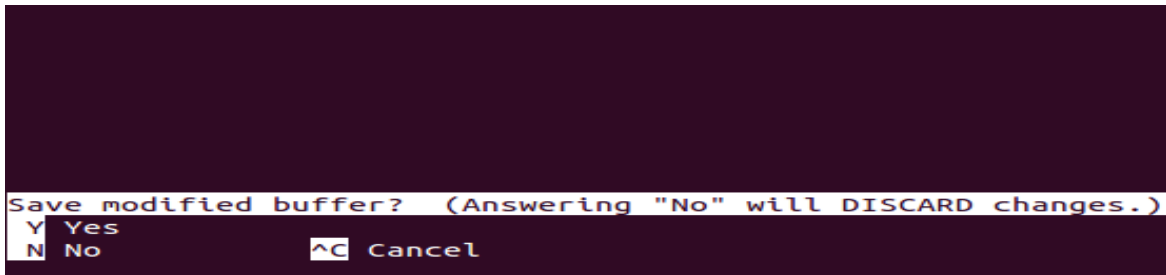
```
GNU nano 3.2
all: unicast-sender unicast-receiver
APPS=servreg-hack
CONTIKI=../..../..

WITH_UIP6=1
UIP_CONF_IPV6=1
CFLAGS+= -DUIP_CONF_IPV6_RPL

include $(CONTIKI)/Makefile.include
```

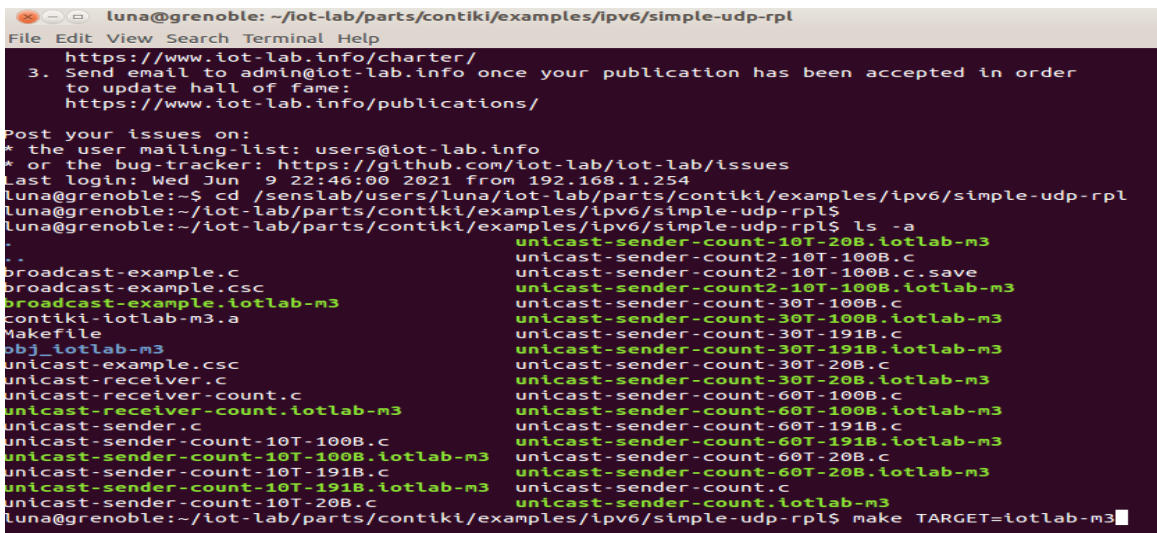
9. Salir y guardar, usar ctrl+ x para salir, presionar “Y” para guardar o “N” para no guardar

Figura 9 Paso 9 Procedimiento para experimentación en IoT-Lab



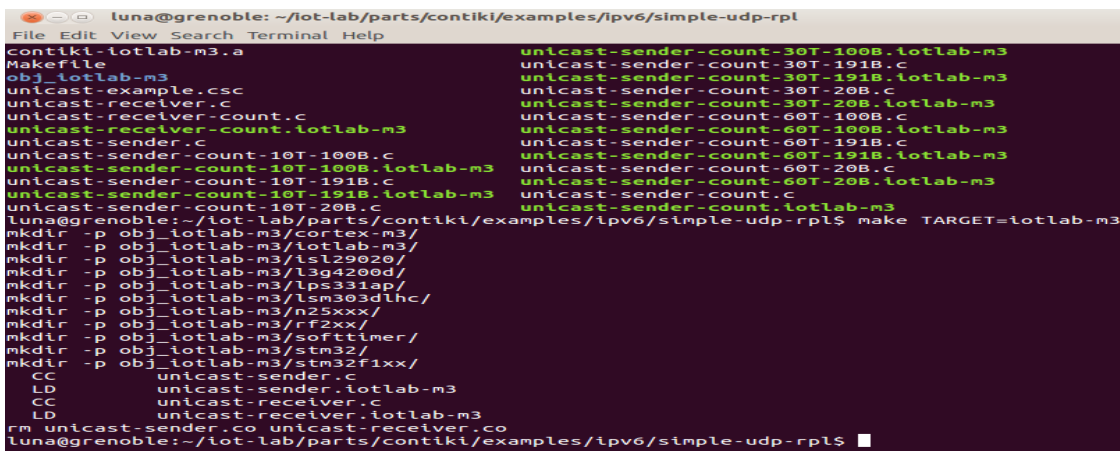
10. Compile el código para los nodos m3 con el comando “`make TARGET=iotlab-m3`”

Figura 10 Paso 10 Procedimiento para experimentación en IoT-Lab




11. Dar enter .

Figura 11 Paso 11 Procedimiento para experimentación en IoT-Lab



12. Con el comando “ls -a” puede observar que se crearon los firmwares de nombre *unicast-receiver.iotlab-m3* y *unicast-sender.iotlab-m3* correspondientes a los códigos que se compilaron.
13. para enviar un experimento una vez creado el firmware usar el comando “iotlab-experiment submit -d 61 -l grenoble, m3, 90+92, unicast-sender-count.iotlab-m3, TrabajoGrado -l grenoble, m3, 86, unicast-receiver-count.iotlab-m3, TrabajoGradoDonde -d es la duración del experimento en minutos, -l es el lugar donde se va a hacer la prueba, m3 es el tipo de nodo en el que se carga el firmware, luego de separar con una coma y se escriben el numero asignado por IoT-Lab separados por signos más “+” separando con coma una vez más y escribiendo el nombre de firmware que se desea que usen los nodos.

Figura 12 Paso 13 Procedimiento para experimentación en IoT-Lab



```

luna@grenoble: ~/iot-lab/parts/contiki/examples/ipv6/simple-udp-rpl
File Edit View Search Terminal Help
1. Add acknowledgements to FIT IoT-LAB in introduction or conclusion of the publication
2. Add citation to the reference article of FIT IoT-LAB. See details here:
   https://www.iot-lab.info/chapter/
3. Send email to admin@iot-lab.info once your publication has been accepted in order
   to update hall of fame:
   https://www.iot-lab.info/publications/
Post your issues on:
* the user mailing-list: users@iot-lab.info
* or the bug-tracker: https://github.com/iot-lab/iot-lab/issues
Last login: Thu Jun 10 00:22:05 2021 from 192.168.1.254
luna@grenoble:~$ cd /senslab/users/luna/iot-lab/parts/contiki/examples/ipv6/simple-udp-rpl
luna@grenoble:~/iot-lab/parts/contiki/examples/ipv6/simple-udp-rpl$ iotlab-experiment submit -d 61 -l grenoble,m3,90+92,unicast-sender-count.iotlab-m3,TrabajoGrado -l grenoble,m3,86,unicast-receiver-count.iotlab-m3,TrabajoGrado
{
  "id": 268491
}
luna@grenoble:~/iot-lab/parts/contiki/examples/ipv6/simple-udp-rpl$

```

