MQTT-SN with public IPv6 network and A8-M3 nodes

Copy into frontend the application files from local pc

You must be positioned in the application directory of your pc and give the following commands

scp main.c rbruzzes@saclay.iot-lab.info:~/main.c

scp Makefile rbruzzes@saclay.iot-lab.info:~/Makefile

Open a terminal and type the following

```
iotlab-auth -u rbruzzes

Roberto123!

then launch an experiment with three A8 nodes

iotlab-experiment submit -n riot_a8 -d 60 -l 5,archi=a8:at86rf231+site=saclay

oppure

iotlab-experiment submit -n riot_m3 -d 60 -l saclay,m3,12

Oppure

iotlab-experiment submit -n riot_a8 -d 60 -l 1,archi=a8:at86rf231+site=saclay -l 3,archi=m3:at86rf231+site=saclay

oppure

iotlab-experiment submit -n riot_a8 -d 60 -l grenoble,a8,188-189 -l grenoble,m3,321-322


in order to know the nodes involved


iotlab-experiment get -i <exp_id> -n
```

```
se si ta facendo esperimento con i nodi M3

login@saclay:~$ mkdir -p ~/riot
login@saclay:~$ cd ~/riot
login@saclay:~/riot$ git clone https://github.com/RIOT-OS/RIOT.git -b 2020.10-branch
```

```
login@saclay:~/riot$ cd RIOT

login@saclay:~/riot/RIOT/$ source /opt/riot.source
login@saclay:~/riot/RIOT/$ make ETHOS_BAUDRATE=500000 DEFAULT_CHANNEL=19 BOARD=iotlab-m3 -C
examples/gnrc_border_router clean all
login>@saclay:~/riot/RIOT/$ iotlab-node --flash examples/gnrc_border_router/bin/iotlab-m3/gnrc_border_router.elf
-l saclay,m3,10
first look at network interface and then choose the ipv6 address
ip addr show | grep tap
ip -6 route
sudo ethos_uhcpd.py m3-1 tap0 2001:660:3207:04c1::1/64
```

You can now view currently used IPv6 prefixes on the frontend SSH with this command:

```
login@saclay:~$ ip -6 route
```

Now, **in another terminal**,

```
ssh rbruzzes@saclay.iot-lab.info

login@saclay:~$ cd riot/RIOT
login@saclay:~/riot/RIOT/$ source /opt/riot.source
login@saclay:~/riot/RIOT/$ make DEFAULT_CHANNEL=19 BOARD=iotlab-m3 -C examples/gnrc_networking clean all
login@saclay:~/riot/RIOT/$ iotlab-node --flash examples/gnrc_networking/bin/iotlab-m3/gnrc_networking.elf -l
saclay,m3,11
you can interact with m3-2 node now
my_computer$ ssh rbruzzes@saclay.iot-lab.info
login@saclay:~$ nc m3-11 20000


Finally do the third node with the application
ssh rbruzzes@saclay.iot-lab.info
```

```
mkdir -p ~/A8/riot

cd ~/A8/riot


git clone https://github.com/RIOT-OS/RIOT.git -b 2020.10-branch

cd RIOT
```

Now build a the Border Router on the first node

```
source /opt/riot.source

I have chosen channel 19 which is in the middle

make ETHOS_BAUDRATE=500000 DEFAULT_CHANNEL=19 BOARD=iotlab-a8-m3 -C examples/gnrc_border_router
clean all

cp examples/gnrc_border_router/bin/iotlab-a8-m3/gnrc_border_router.elf ~/A8/.
```

Now build the networking

make DEFAULT_CHANNEL=19 BOARD=iotlab-a8-m3 -C examples/gnrc_networking clean all

cp examples/gnrc_networking/bin/iotlab-a8-m3/gnrc_networking.elf ~/A8/

MA QUESTO NETWORKING NON LO LANCIA ? PERCHE'?

login@saclay:~$ mkdir -p ~/riot
login@saclay:~$ cd ~/riot/RIOT
login@saclay:~/riot$ cd RIOT

login@saclay:~/riot/RIOT/$ source /opt/riot.source

cd examples
mkdir -p application
cd ~

cp main.c ~/A8/riot/RIOT/examples/application/main.c

cp Makefile ~/A8/riot/RIOT/examples/application/Makefile

ATTENZIONE SE TRATTASI DI M3 fai

mkdir -p ~/riot
cd ~/riot
git clone https://github.com/RIOT-OS/RIOT.git -b 2020.10-branch
cd RIOT
cd examples
mkdir -p application
cd ~

cp main.c ~/riot/RIOT/examples/application/main.c

cp Makefile ~/riot/RIOT/examples/application/Makefile

cp Makefile.ethos.conf ~/riot/RIOT/examples/application/Makefile.ethos.conf

cd riot/RIOT
source /opt/riot.source
make **ETHOS_BAUDRATE=500000 DEFAULT_CHANNEL=19** BOARD=iotlab-m3 -C examples/application clean all
/*cp examples/application/bin/iotlab-m3/application.elf ~ */
iotlab-node --flash examples/application/bin/iotlab-m3/application.elf -l saclay,m3,12
nc m3-12 20000

make ETHOS_BAUDRATE=500000 DEFAULT_CHANNEL=14

```
ifconfig 6 add 2001:db8::1
```
oppure
```
 ifconfig 6 add  2001:660:5307:3000::72
```

ifconfig 6 add 2001:660:3207:4c1:e4d3:6fec:df36:bbf

```
ifconfig 6 add 2001:660:3207:400::66
```

con 2001:660:3207:400::64 1885
sub localgateway_to_awsiot
pub localgateway_to_awsiot

```
## add global ipv6 to tapbr0
$ sudo ip -6 a add 2001:db8::2/64 dev tapbr0
```

Oppure

Ping6 2001:660:3207:400::64

```
 ifconfig 6 add 2001:660:3207:400::65 1885
```

```
ifconfig add a 2001:660:3207:4c1:e4d3:6fec:df36:bbf/64
Sudo ./tapsetup
```

sudo ip -6 addr add 2001:db8:0:f101::1/64 dev tapbr0

SE TRATTASI DI A8 fai il seguente

now build the application NO! perchè non funzionerebbero I sensori

cd ~/A8/riot/RIOT

source /opt/riot.source

make BOARD=iotlab-a8-m3 -C examples/application clean all

cp examples/application/bin/iotlab-a8-m3/application.elf ~/A8/

ssh root@node-a8-3

iotlab_flash A8/application.elf

reset_a8_m3

miniterm.py /dev/ttyA8_M3 500000

Now we flash the firmware on each node

Open the first terminal connection

ssh root@node-a8-1

iotlab_flash A8/gnrc_border_router.elf

cd ~/A8/riot/RIOT/dist/tools/uhcpd

make clean all

cd ../ethos

make clean all

before launching and starting the network we check its availability

```
 ip addr show | grep tap
  ip -6 route
```

Chose the next network address to the busy one

Then reset the board before launching the network with the chosen address

reset_a8_m3

./start_network.sh /dev/ttyA8_M3 tap0 2001:660:3207:401::/64 500000

Now open the second terminal for the Broker

ssh rbruzzes@saclay.iot-lab.info

ssh root@node-a8-100

Edit a file config.conf (vim config.conf)

```
# add some debug output
trace_output protocol

# listen for MQTT-SN traffic on UDP port 1885
listener 1885 INADDR_ANY mqtts
max_connections 100
ipv6 true

# listen to MQTT connections on tcp port 1886
listener 1886 INADDR_ANY
max_connections 100
ipv6 true
```

Take a note of the IPV6 address of this node before starting the Broker

ip -6 -o addr show eth0

broker_mqtts config.conf

Now open the third terminal

ssh rbruzzes@saclay.iot-lab.info

ssh root@node-a8-3

iotlab_flash A8/application.elf

reset_a8_m3

miniterm.py /dev/ttyA8_M3 500000

Use the con command to connect to the MQTT-SN broker on node-a8-2 and subscribe to the topic using the sub command.

Open a fourth terminal

ssh rbruzzes@saclay.iot-lab.info

run the following command

mosquitto_pub -h 2001:660:3207:400::66 -p 1886 -t test/riot -m iotlab

On the RIOT shell (node-a8-3, third terminal), you get the following message:

```
### got publication for topic 'test/riot' [1] ###
iotlab
```

Stop the experiment

iotlab-experiment stop

Per visualizzare il monitoring consumption dal front end dai il comando

ssh rbruzzes@saclay.iot-lab.info -X

cd ~/.iot-lab/273467/consumption/

plot_oml_consum -p -i ~/.iot-lab/last/consumption/m3_10.oml