• Were you able to set up the small ad-hoc network at the start?
– What can you observe in the ad-hoc join traffic in wireshark?
Yes, I was able to set up the small ad-hoc network at the start. I observed that there are a few types of messages in wireshark after applying the 'babel' filter, namely *Babel hello* with 74 bytes, *Babel hello nh router-id update* with 110 bytes and *Babel mh-request* with 86 bytes amongst others. These messages are probably to connect to and utilise the Babel network.

• Why could we need a protocol like babel in addition to 802.11 ad-hoc mode?
It is to speed up the routing process for efficiency as babel converges faster and has no routing loops. It also prevents flooding of the ad-hoc network.

• Which layer is babel operating in?
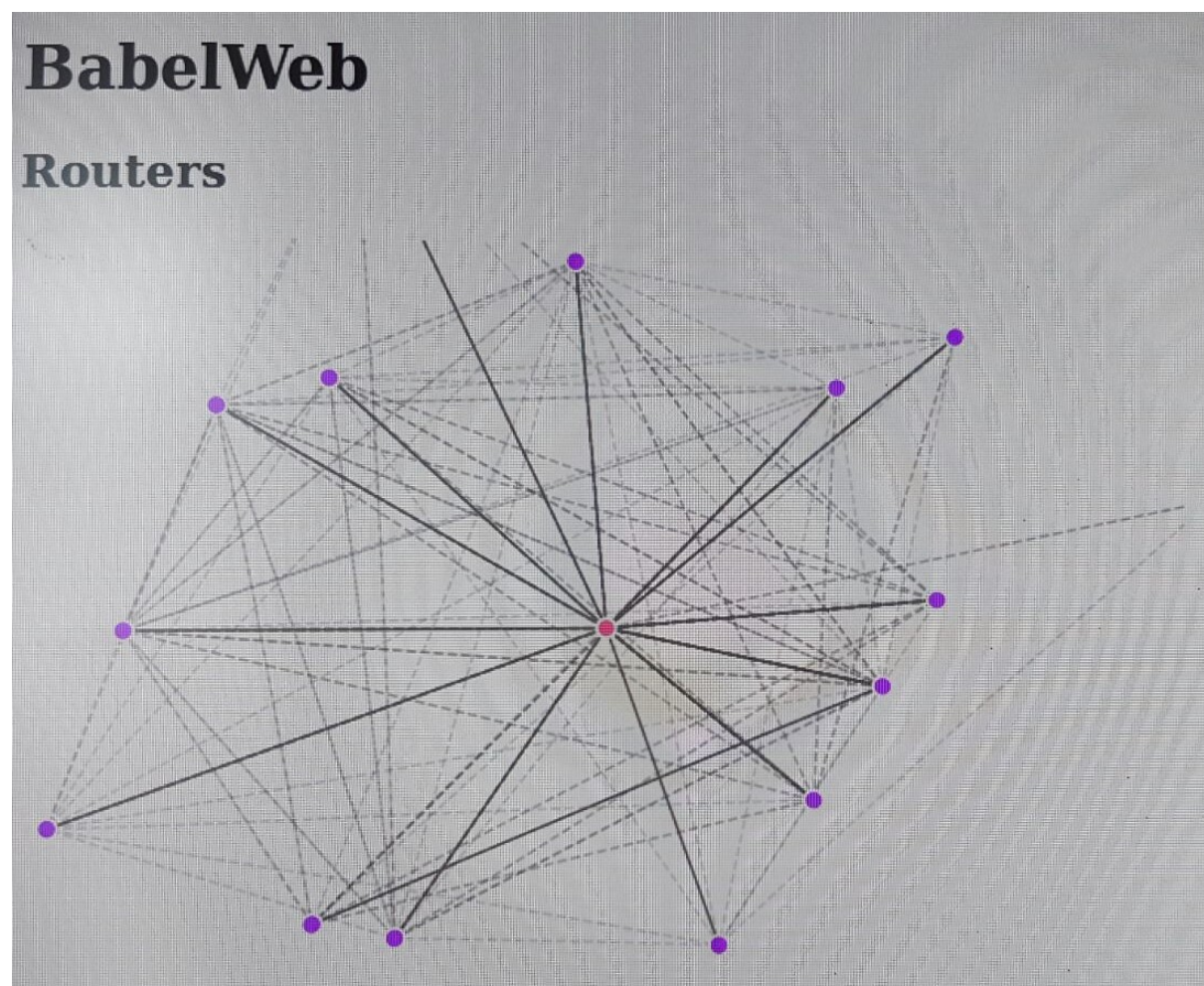Babel is operating in the network layer as it is a layer 3 mesh protocol.

• Which network layer protocol does babel use?
Babel uses the IP protocol (both IPv4 and IPv6).

• In babelweb, could you find out the following?
– What are the neighbours listed?
– What are the routes listed? What does installed mean probably
– What are the redistributed routes?

Overall View of Routers

Neighbours:

Neighbours

address	if	reach	rxcost	txcost	cost	rtt
fe80::471f:e472:6ec9:9d9b	wlp3s0	ffaf	256	260	260	
fe80::39c:6097:144c:4f9f	wlp3s0	ff9d	256	260	260	
fe80::9a97:5336:a7e2:dbc4	wlp3s0	ff7f	257	256	257	
fe80::c400:c286:bec8:baba	wlp3s0	ffff	256	256	256	
fe80::b087:bc7a:7d13:f637	wlp3s0	ffbf	256	256	256	
fe80::52c0:957e:9fe5:545d	wlp3s0	ffff	256	256	256	
fe80::efdf:1062:f0e7:47be	wlp3s0	ff7f	257	256	257	
fe80::d99d:f328:fe4a:4f61	wlp3s0	fd75	261	256	261	
fe80::2e54:e064:18e2:c081	wlp3s0	fff5	256	256	256	
fe80::aebc:32ff:fe8b:64db	wlp3s0	ecff	300	256	300	
fe80::1ab1:d97f:e99e:10ab	wlp3s0	fd7f	261	256	261	
fe80::6907:1ff3:a4aa:5262	wlp3s0	eefe	295	256	295	

Routes:

```
                    Terminal - student@desktop: ~                         —  +  ×
 File  Edit  View  Terminal  Tabs  Help
 root@desktop: ~                        ×    student@desktop: ~                      ×
student@desktop:~$ route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.1.155      10.10.10.12     255.255.255.255 UGH   0      0        0 wlp3s0
10.0.1.168      10.10.10.13     255.255.255.255 UGH   0      0        0 wlp3s0
10.0.1.187      10.10.10.81     255.255.255.255 UGH   0      0        0 wlp3s0
10.0.1.190      10.10.10.78     255.255.255.255 UGH   0      0        0 wlp3s0
10.9.8.0        10.10.10.12     255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.0      0.0.0.0         255.255.255.0   U     600    0        0 wlp3s0
10.10.10.1      10.10.10.1      255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.8      10.10.10.8      255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.12     10.10.10.12     255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.13     10.10.10.13     255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.14     10.10.10.14     255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.55     10.10.10.55     255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.69     10.10.10.69     255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.78     10.10.10.78     255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.81     10.10.10.81     255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.82     10.10.10.82     255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.99     10.10.10.99     255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.145    10.10.10.145    255.255.255.255 UGH   0      0        0 wlp3s0
10.10.10.245    10.10.10.245    255.255.255.255 UGH   0      0        0 wlp3s0
169.254.0.0     0.0.0.0         255.255.0.0     U     1000   0        0 wlp3s0
student@desktop:~$
```

Routes

prefix	metric	refmetric	id	via	if	installed
10.0.1.155/32	65535	0	66:51:06:ff:fe:5a:1f:bf	fe80::d99d:f328:fe4a:4f61	wlp3s0	yes
10.0.1.187/32	448	0	66:51:06:ff:fe:5a:5e:eb	fe80::39c:6097:144c:4f9f	wlp3s0	yes
10.0.1.190/32	558	0	66:51:06:ff:fe:5e:8c:6f	fe80::471f:e472:6ec9:9d9b	wlp3s0	yes
10.0.1.190/32	610	256	66:51:06:ff:fe:5e:8c:6f	fe80::1ab1:d97f:e99e:10ab	wlp3s0	no
10.0.1.190/32	1323	278	66:51:06:ff:fe:5e:8c:6f	fe80::b087:bc7a:7d13:f637	wlp3s0	no
10.9.8.0/32	65535	0	66:51:06:ff:fe:5a:1f:bf	fe80::d99d:f328:fe4a:4f61	wlp3s0	yes
10.10.10.1/32	1045	0	66:51:06:ff:fe:5a:1f:c4	fe80::b087:bc7a:7d13:f637	wlp3s0	yes
10.10.10.1/32	718	364	66:51:06:ff:fe:5a:1f:c4	fe80::1ab1:d97f:e99e:10ab	wlp3s0	no
10.10.10.1/32	969	531	66:51:06:ff:fe:5a:1f:c4	fe80::52c0:957e:9fe5:545d	wlp3s0	no
10.10.10.1/32	1015	457	66:51:06:ff:fe:5a:1f:c4	fe80::471f:e472:6ec9:9d9b	wlp3s0	no
10.10.10.1/32	520	256	66:51:06:ff:fe:5a:1f:c4	fe80::9a97:5336:a7e2:dbc4	wlp3s0	no
10.10.10.8/32	266	0	ac:bc:32:ff:fe:8b:64:db	fe80::aebc:32ff:fe8b:64db	wlp3s0	yes
10.10.10.8/32	694	256	ac:bc:32:ff:fe:8b:64:db	fe80::52c0:957e:9fe5:545d	wlp3s0	no
10.10.10.8/32	631	256	ac:bc:32:ff:fe:8b:64:db	fe80::efdf:1062:f0e7:47be	wlp3s0	no
10.10.10.8/32	695	341	ac:bc:32:ff:fe:8b:64:db	fe80::1ab1:d97f:e99e:10ab	wlp3s0	no
10.10.10.8/32	1301	256	ac:bc:32:ff:fe:8b:64:db	fe80::b087:bc7a:7d13:f637	wlp3s0	no
10.10.10.8/32	554	256	ac:bc:32:ff:fe:8b:64:db	fe80::2e54:e064:18e2:c081	wlp3s0	no
10.10.10.8/32	65535	512	ac:bc:32:ff:fe:8b:64:db	fe80::d99d:f328:fe4a:4f61	wlp3s0	no
10.10.10.12/32	65535	0	66:51:06:ff:fe:5a:1f:bf	fe80::d99d:f328:fe4a:4f61	wlp3s0	yes
10.10.10.13/32	713	265	66:51:06:ff:fe:5a:db:53	fe80::39c:6097:144c:4f9f	wlp3s0	no
10.10.10.13/32	610	256	66:51:06:ff:fe:5a:db:53	fe80::1ab1:d97f:e99e:10ab	wlp3s0	no
10.10.10.13/32	522	256	66:51:06:ff:fe:5a:db:53	fe80::aebc:32ff:fe8b:64db	wlp3s0	no
10.10.10.13/32	524	260	66:51:06:ff:fe:5a:db:53	fe80::9a97:5336:a7e2:dbc4	wlp3s0	no
10.10.10.13/32	65535	264	66:51:06:ff:fe:5a:db:53	fe80::d99d:f328:fe4a:4f61	wlp3s0	no
10.10.10.14/32	557	0	66:51:06:ff:fe:5a:fc:2c	fe80::6907:1ff3:a4aa:5262	wlp3s0	yes
10.10.10.14/32	610	256	66:51:06:ff:fe:5a:fc:2c	fe80::1ab1:d97f:e99e:10ab	wlp3s0	no
10.10.10.14/32	1070	512	66:51:06:ff:fe:5a:fc:2c	fe80::471f:e472:6ec9:9d9b	wlp3s0	no
10.10.10.55/32	375	0	66:51:06:ff:fe:5a:da:b1	fe80::efdf:1062:f0e7:47be	wlp3s0	yes
10.10.10.55/32	646	292	66:51:06:ff:fe:5a:da:b1	fe80::1ab1:d97f:e99e:10ab	wlp3s0	no
10.10.10.55/32	522	256	66:51:06:ff:fe:5a:da:b1	fe80::aebc:32ff:fe8b:64db	wlp3s0	no
10.10.10.55/32	65535	256	66:51:06:ff:fe:5a:da:b1	fe80::d99d:f328:fe4a:4f61	wlp3s0	no
10.10.10.69/32	264	0	0a:9e:01:ff:fe:c5:9f:5d	fe80::9a97:5336:a7e2:dbc4	wlp3s0	yes
10.10.10.78/32	558	0	66:51:06:ff:fe:5e:8c:6f	fe80::471f:e472:6ec9:9d9b	wlp3s0	yes
10.10.10.78/32	610	256	66:51:06:ff:fe:5e:8c:6f	fe80::1ab1:d97f:e99e:10ab	wlp3s0	no
10.10.10.78/32	1323	278	66:51:06:ff:fe:5e:8c:6f	fe80::b087:bc7a:7d13:f637	wlp3s0	no
10.10.10.81/32	448	0	66:51:06:ff:fe:5a:5e:eb	fe80::39c:6097:144c:4f9f	wlp3s0	yes
10.10.10.82/32	298	0	66:51:06:ff:fe:5e:8c:6b	fe80::2e54:e064:18e2:c081	wlp3s0	yes
10.10.10.99/32	521	257	66:51:06:ff:fe:5a:3f:9c	fe80::9a97:5336:a7e2:dbc4	wlp3s0	no
10.10.10.145/32	354	0	66:51:06:ff:fe:5e:5e:de	fe80::1ab1:d97f:e99e:10ab	wlp3s0	yes
10.10.10.245/32	438	0	66:51:06:ff:fe:5e:8c:71	fe80::52c0:957e:9fe5:545d	wlp3s0	yes
10.10.10.245/32	529	265	66:51:06:ff:fe:5e:8c:71	fe80::9a97:5336:a7e2:dbc4	wlp3s0	no
10.8.9.0/32	1462	417	66:51:06:ff:fe:5a:db:53	fe80::b087:bc7a:7d13:f637	wlp3s0	no
10.8.9.0/32	813	256	66:51:06:ff:fe:5a:db:53	fe80::6907:1ff3:a4aa:5262	wlp3s0	no
10.8.9.0/32	713	265	66:51:06:ff:fe:5a:db:53	fe80::39c:6097:144c:4f9f	wlp3s0	no
10.8.9.0/32	814	256	66:51:06:ff:fe:5a:db:53	fe80::471f:e472:6ec9:9d9b	wlp3s0	no
10.0.1.160/32	668	314	66:51:06:ff:fe:5a:3f:9c	fe80::1ab1:d97f:e99e:10ab	wlp3s0	no
10.8.9.0/32	522	256	66:51:06:ff:fe:5a:db:53	fe80::aebc:32ff:fe8b:64db	wlp3s0	no
10.0.1.160/32	521	257	66:51:06:ff:fe:5a:3f:9c	fe80::9a97:5336:a7e2:dbc4	wlp3s0	no
10.8.9.0/32	524	260	66:51:06:ff:fe:5a:db:53	fe80::9a97:5336:a7e2:dbc4	wlp3s0	no
10.10.10.55/32	694	256	66:51:06:ff:fe:5a:da:b1	fe80::52c0:957e:9fe5:545d	wlp3s0	no
10.8.9.0/32	481	0	66:51:06:ff:fe:5a:db:53	fe80::c3a9:3a44:8c7:1249	wlp3s0	yes
10.10.10.13/32	481	0	66:51:06:ff:fe:5a:db:53	fe80::c3a9:3a44:8c7:1249	wlp3s0	yes
10.8.9.0/24	609	128	66:51:06:ff:fe:5a:db:53	fe80::c3a9:3a44:8c7:1249	wlp3s0	yes
10.8.9.0/32	962	524	66:51:06:ff:fe:5a:db:53	fe80::52c0:957e:9fe5:545d	wlp3s0	no
10.10.10.13/32	962	524	66:51:06:ff:fe:5a:db:53	fe80::52c0:957e:9fe5:545d	wlp3s0	no
10.8.9.0/24	1090	652	66:51:06:ff:fe:5a:db:53	fe80::52c0:957e:9fe5:545d	wlp3s0	no

Installed means that the router with the lowest metric number is selected as the representative of its network when others want to route to that network destination. Metric number is a function of distance, time, cost and other factors that we aim to minimize.

Redistributed routes:
(before announcing subnet)

Legend   Installed ● Not installed

Redistributed routes

prefix	metric
10.10.10.253/32	0

(after announcing subnet)

Legend   Installed ● Not installed

Redistributed routes

prefix	metric
10.10.10.253/32	0
192.168.22.1/32	0
192.168.22.0/24	128

Redistributed routes means that it is advertising routes that are learned by some other means, for example, another routing protocol, static routes, or directly connected routes. In this case, they are the routes that are being announced by me. It allows other hosts on the same babel network to route to the redistributed routes advertised by me.

• Which prefix (subnet) did you choose to announce? Could other people ping your eth0 interface in that network?
I chose to announce 192.168.22.1. Yes, other people who were also connected to the *babelNet* ad-hoc network could ping my eth0 interface.