Computer Networks 2021 Exercises - Unit 3

FAN: mcgh0008

NOTE: Each student's work unit is unique. You *must* use the work that has been generated for your FAN. If you do not, then you will fail this work unit.

NOTE: You must record your answers in the answer file EXACTLY as required, and commit and make sure your changes have been pushed to the github server, as they will otherwise not be counted.

NOTE: The topic coordinator will periodically run the automatic marking script, which will cause a file called unit3-results.pdf to be updated in your repository. You should check this file to make sure that your answers have been correctly counted. That file will contain the time and date that the marking script was last run, so that you can work out if it has been run since you last changed your answers. You are free to update your answers as often as you wish, until the deadline for the particular work unit.

1 Understand Computer Network Topologies

For each question, you must record your answer in the unit3-answers.txt file in your git repository. Each statement is either true or false. You must record 't' if you think the statement is true, or 'f', if you think that the statement is false. Your answer must be lower case. Uppercase answers will be marked incorrect. For example, if you believed that the answer to the following question was potato, you would put the word potato at the end of the rj= line in the file unit3-answers.txt.

Question#	Description
rj	*The potato is a white-flesh starchy vegetables from which hot chips are made*

The entry in unit3-answers.txt *would thus look like:*

```
# Question 'rj': The potato is a white-flesh starchy vegetables from which hot chips are made
```
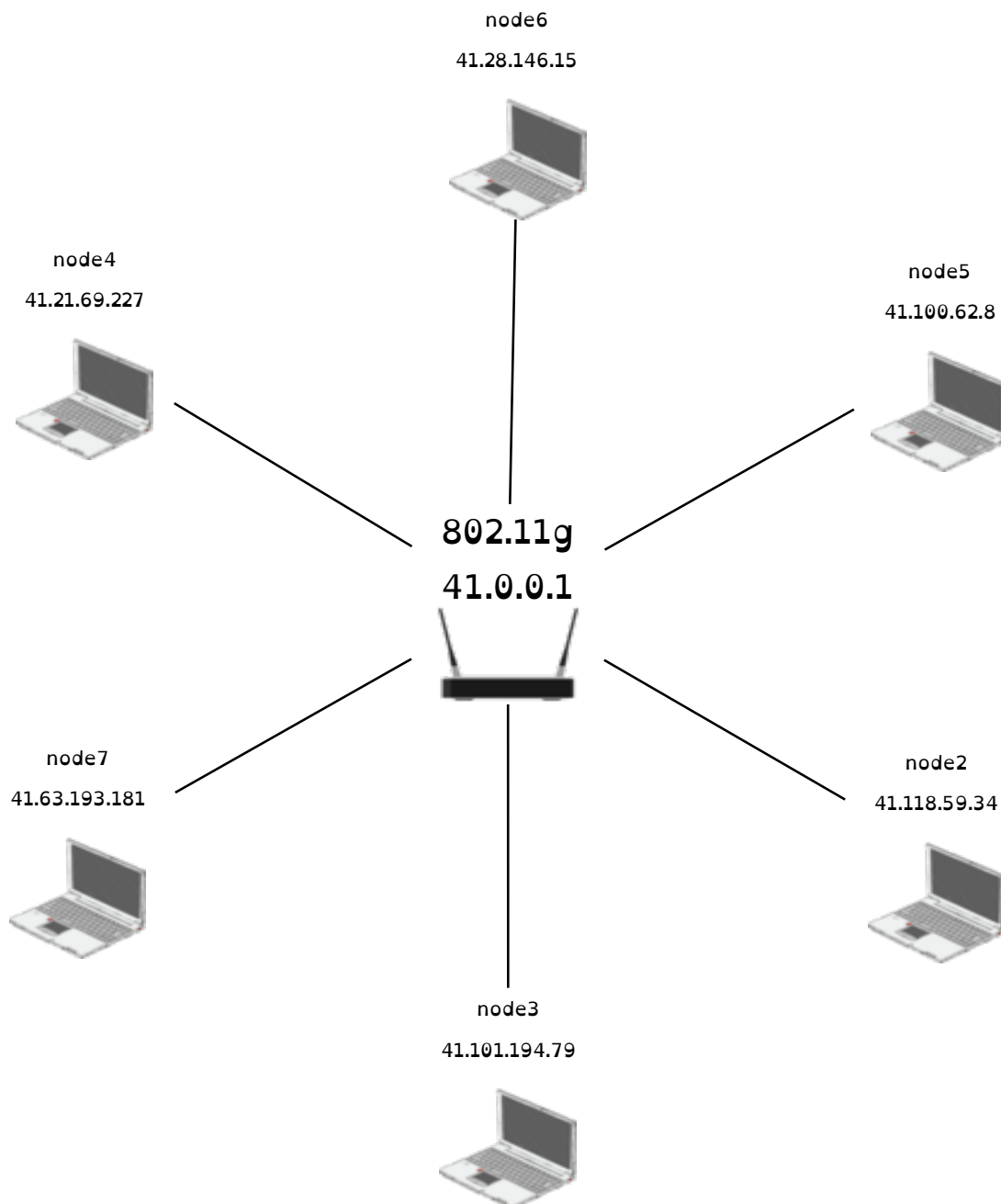
rj=t

Templates for each answer are provided in `unit3-answers.txt` for your convenience. The questions use diagrams to represent various network topologies. These diagrams may contain the following symbols:

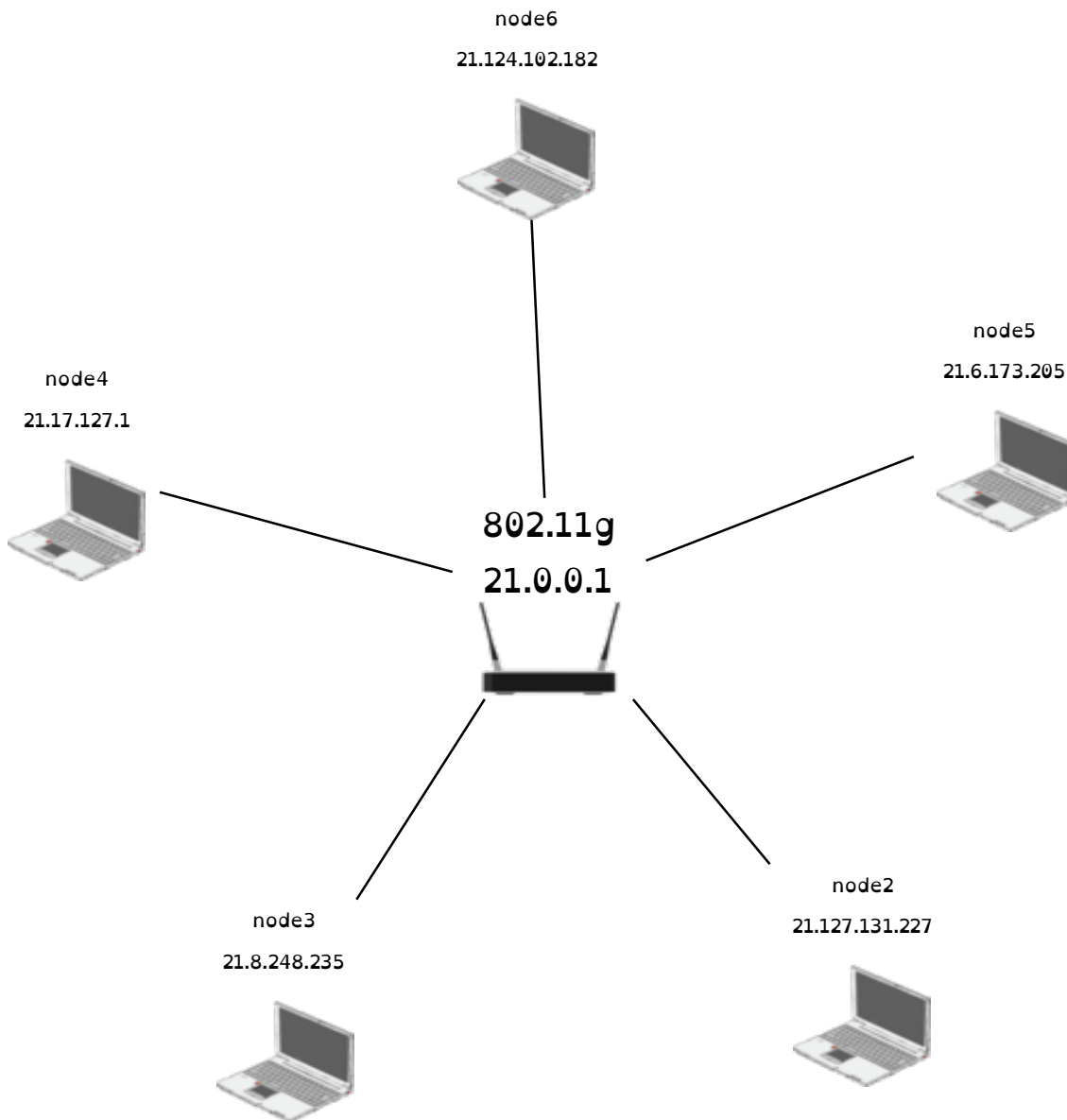| Description	Symbol
A computer that connects to a network using a cable.	A computer 129.69.44.171
A computer that connects to a network using a cable, a wireless connection, or both.	A laptop 10.0.0.14

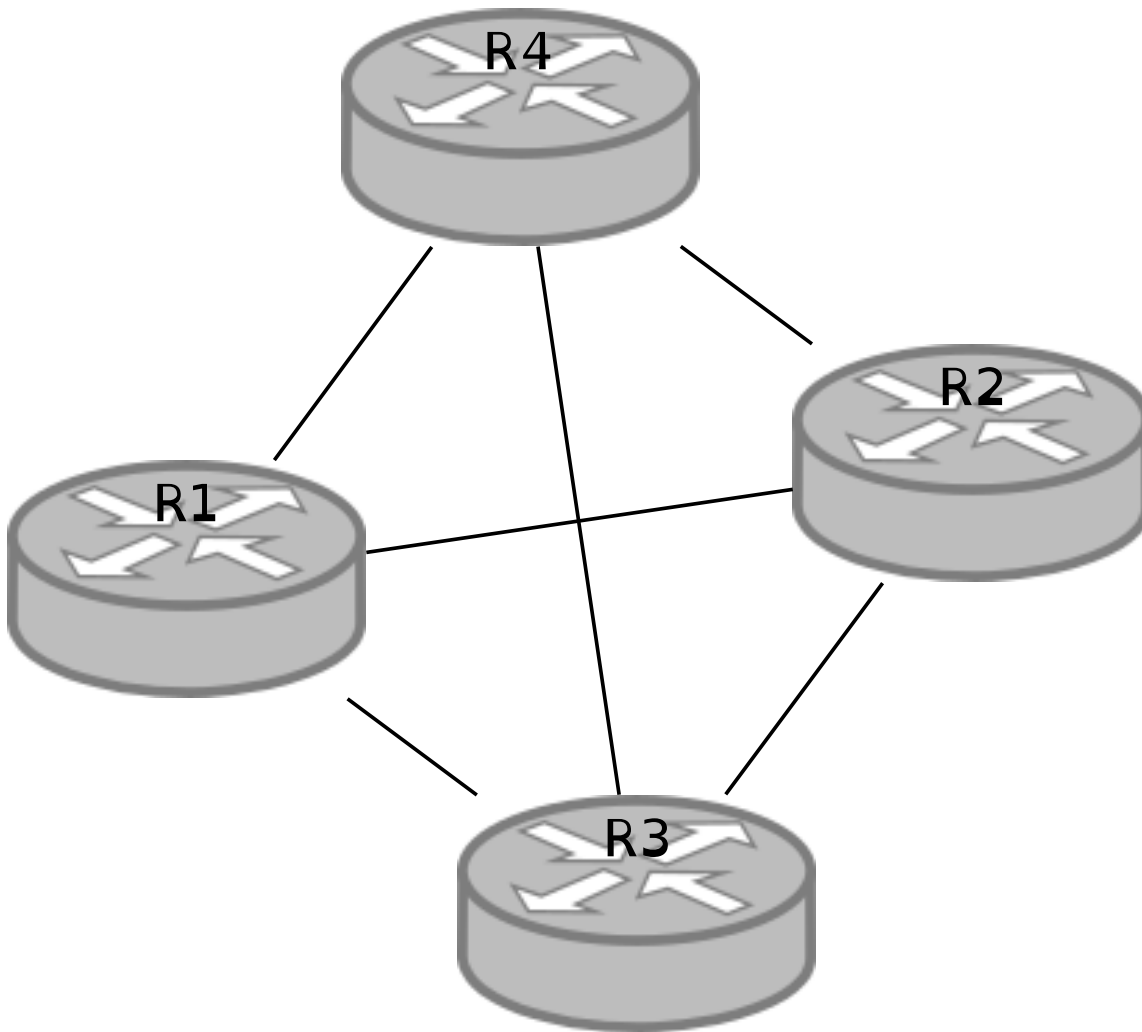| Description	Symbol
A wireless access point that allows devices to connect wirelessly to a network.	A Wi-Fi Access Point 10.0.0.1
A network switch that connects one or more devices together. The numbers represent the ports on the network switch, each of which can connect to one device at a time.	SW1 0 1 2 3 4 5 6 7
A router that connects multiple networks together.	A Router
A network segment to which one or more devices may connect, i.e., a bus.	

Are the following statements true or false?

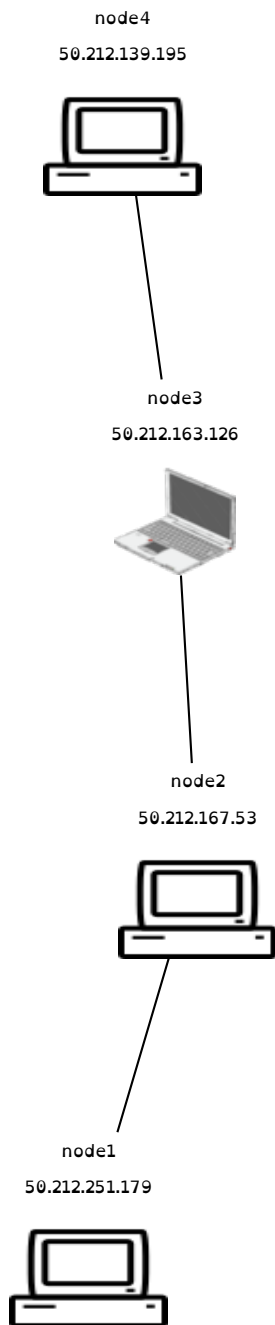## 1.1 ab: Does the following network represent a wireless topology?

node6

41.28.146.15

node4

41.21.69.227

node5

41.100.62.8

802.11g

41.0.0.1

node7

41.63.193.181

node2

41.118.59.34

node3

41.101.194.79

1.2 ac: Does the following network represent a ad-hoc topology?

node6

21.124.102.182

node5

21.6.173.205

node4

21.17.127.1

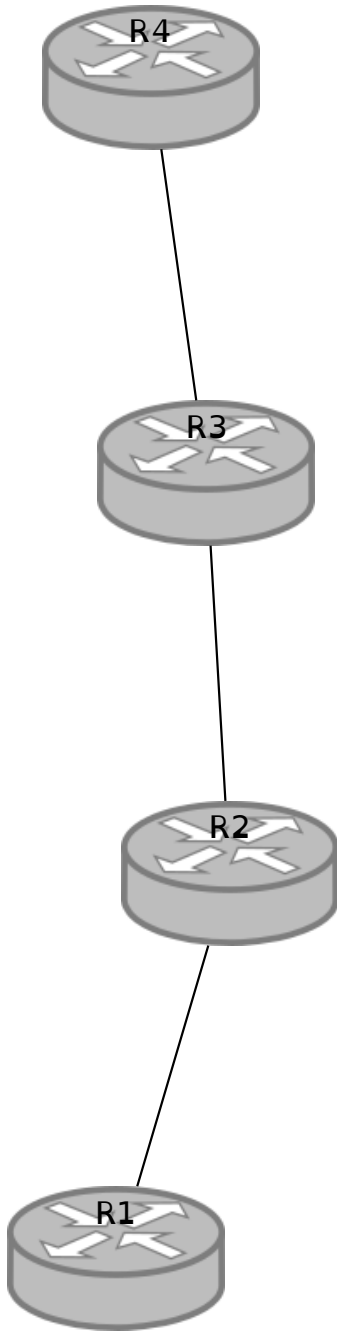**802.11g**

21.0.0.1

node3

21.8.248.235

node2

21.127.131.227

1.3 ad: Does the following network represent a full mesh topology?

1.4 ae: Does the following network represent a tree topology?

node4
50.212.139.195

node3
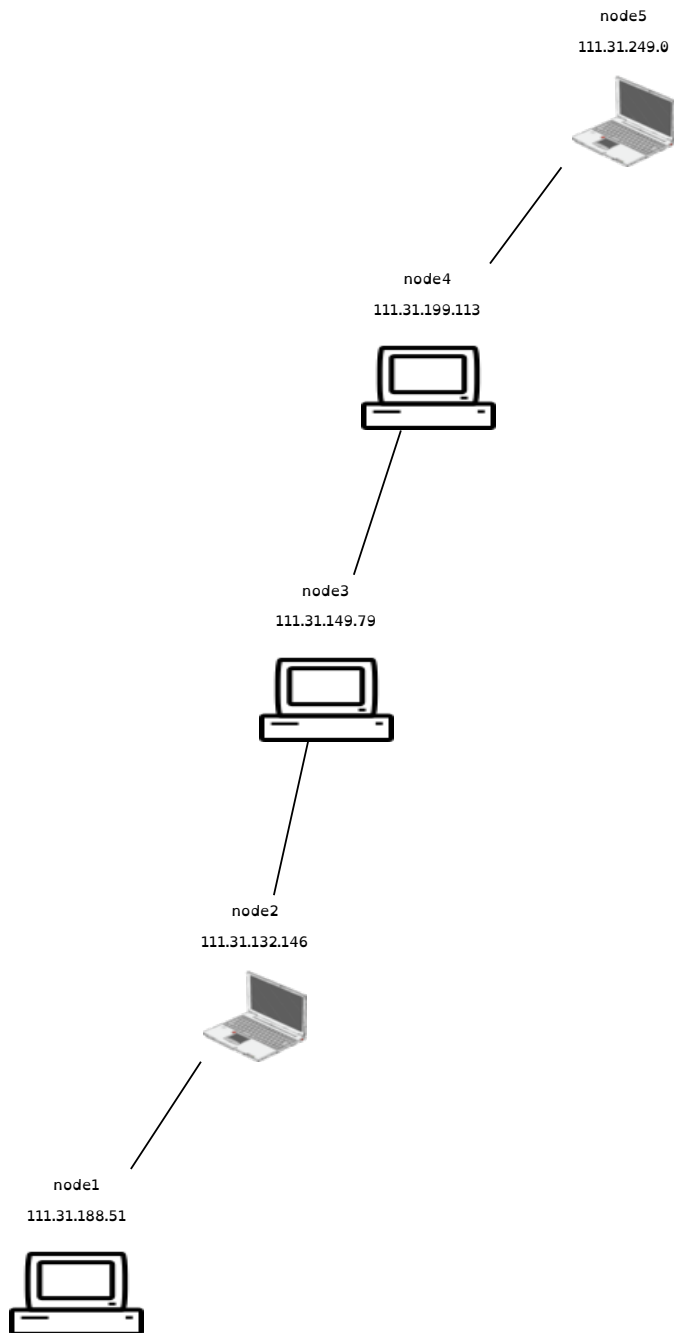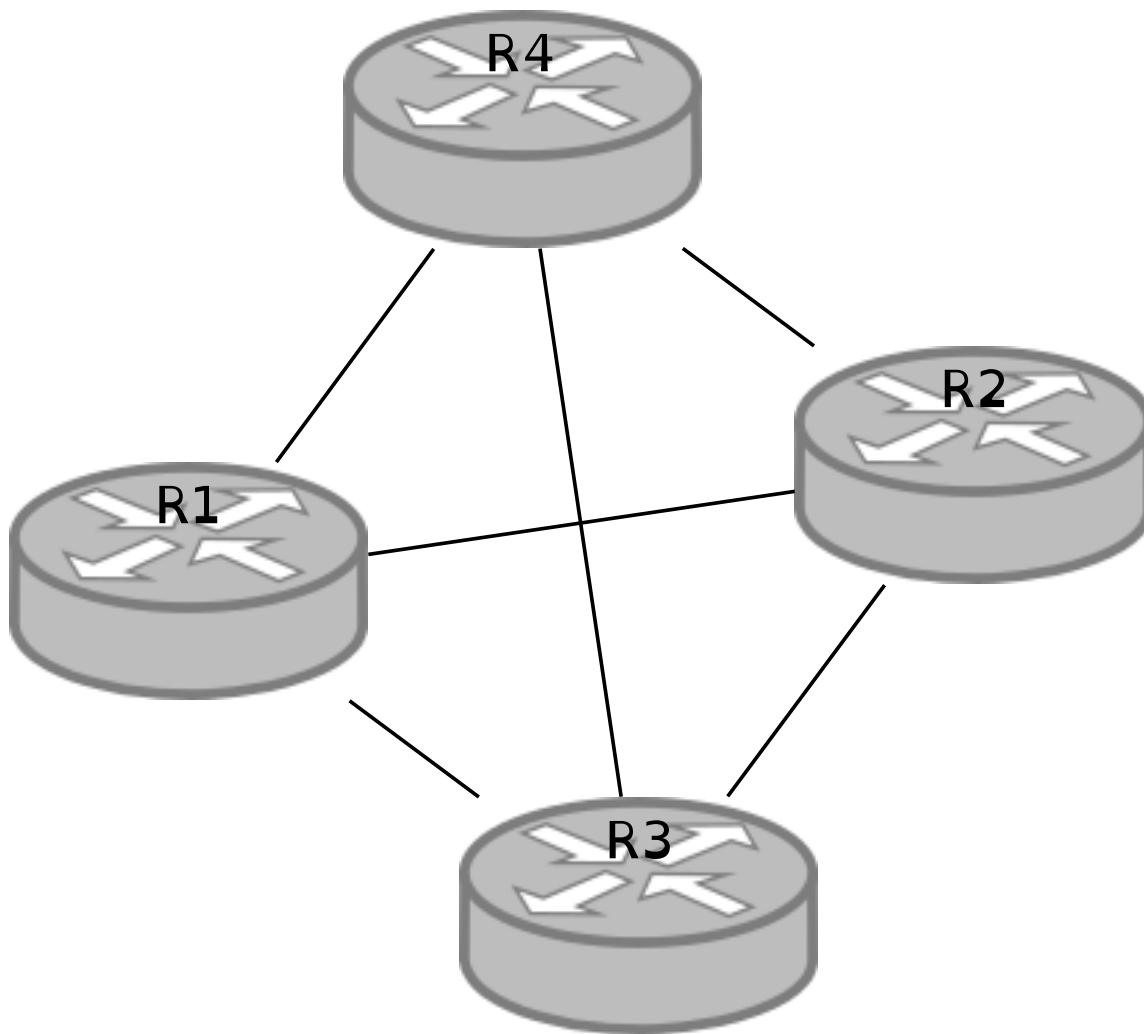50.212.163.126

node2
50.212.167.53

node1
50.212.251.179

1.5 af: Does the following network represent a line topology?

1.6 ag: Does the following network represent a line topology?

node5
111.31.249.0
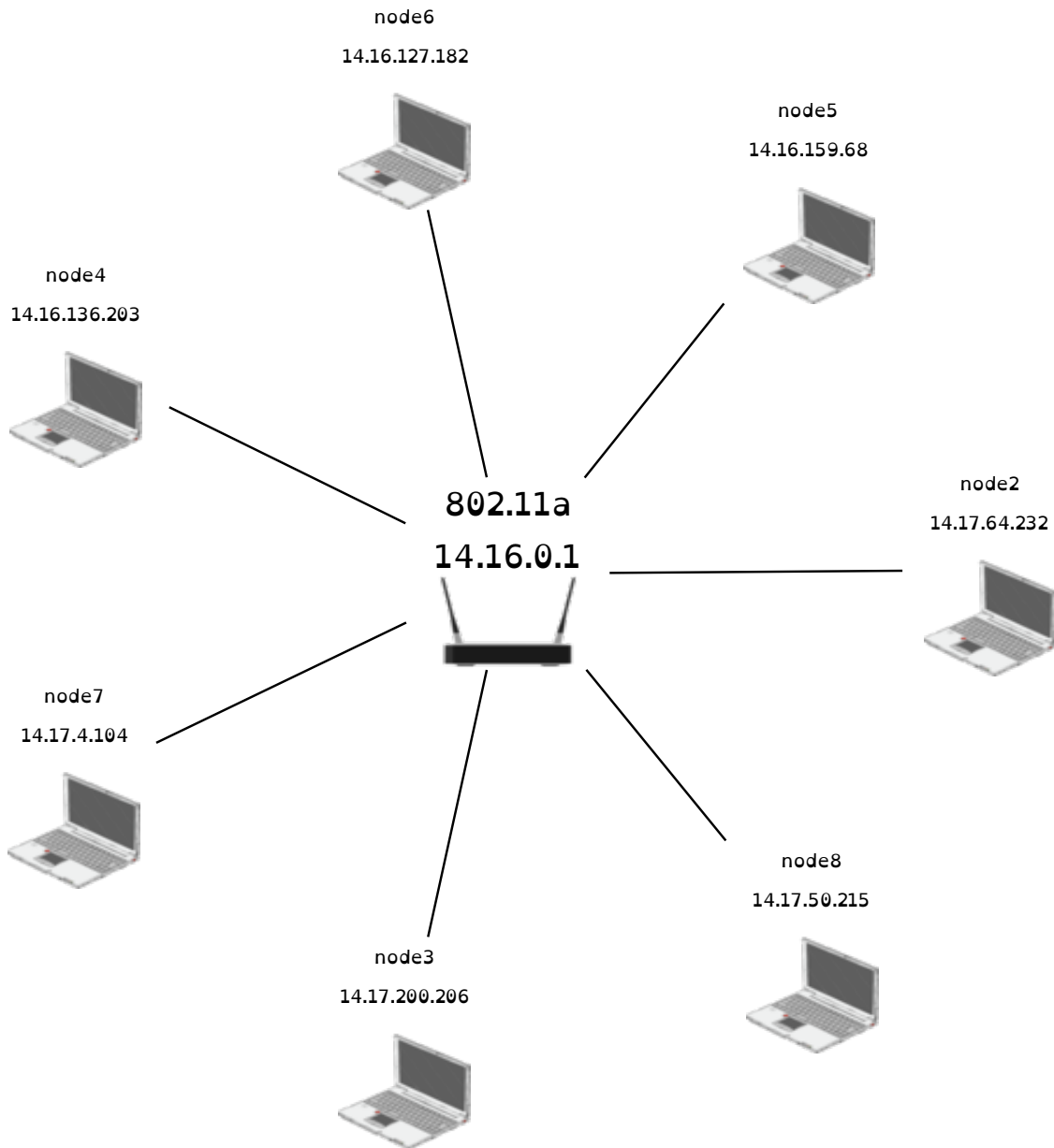
node4
111.31.199.113

node3
111.31.149.79

node2
111.31.132.146

node1
111.31.188.51

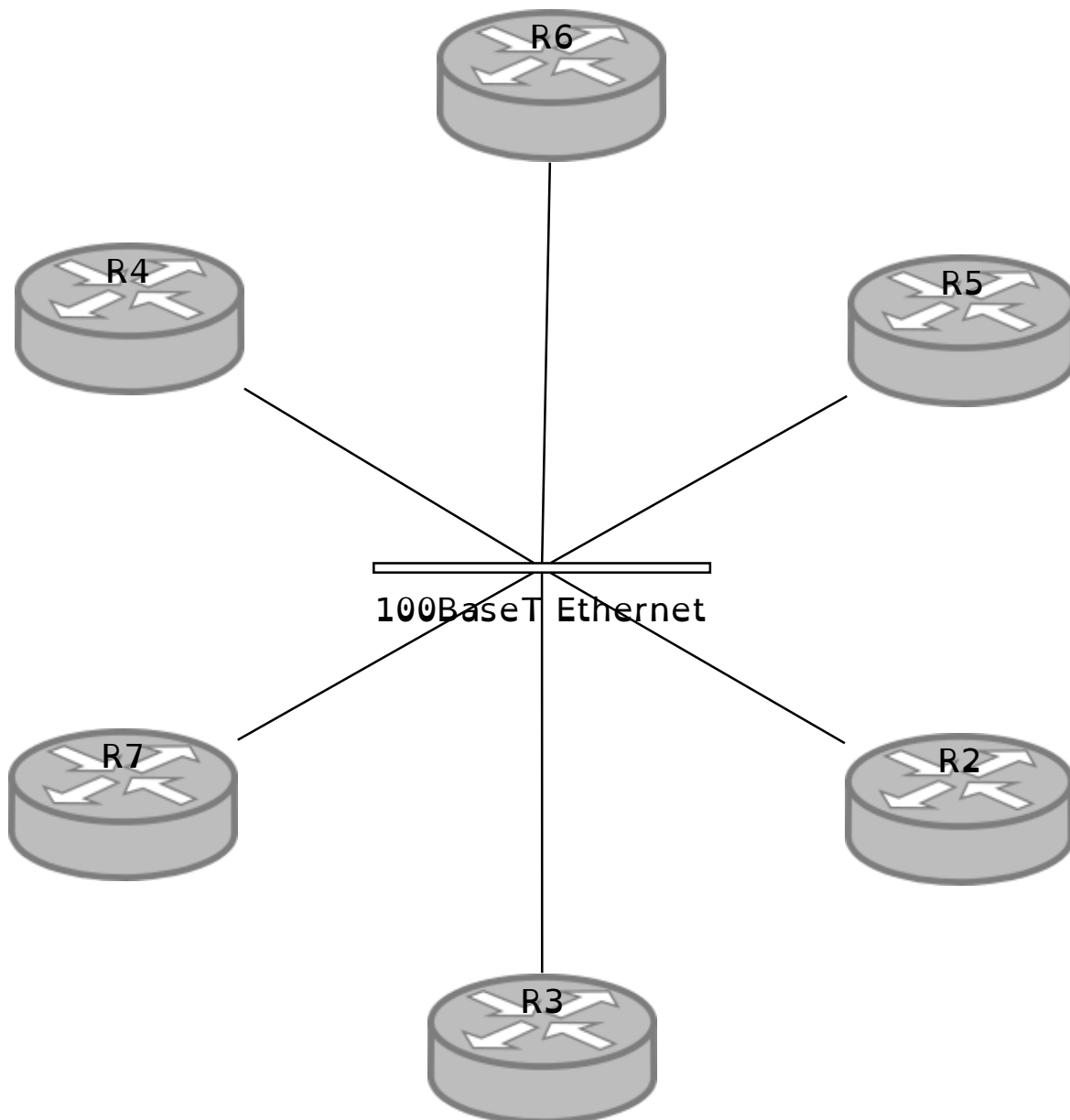## 1.7 ah: Does the following network represent a full mesh topology?

1.8   ai: Does the following network represent a ad-hoc topology?

node6

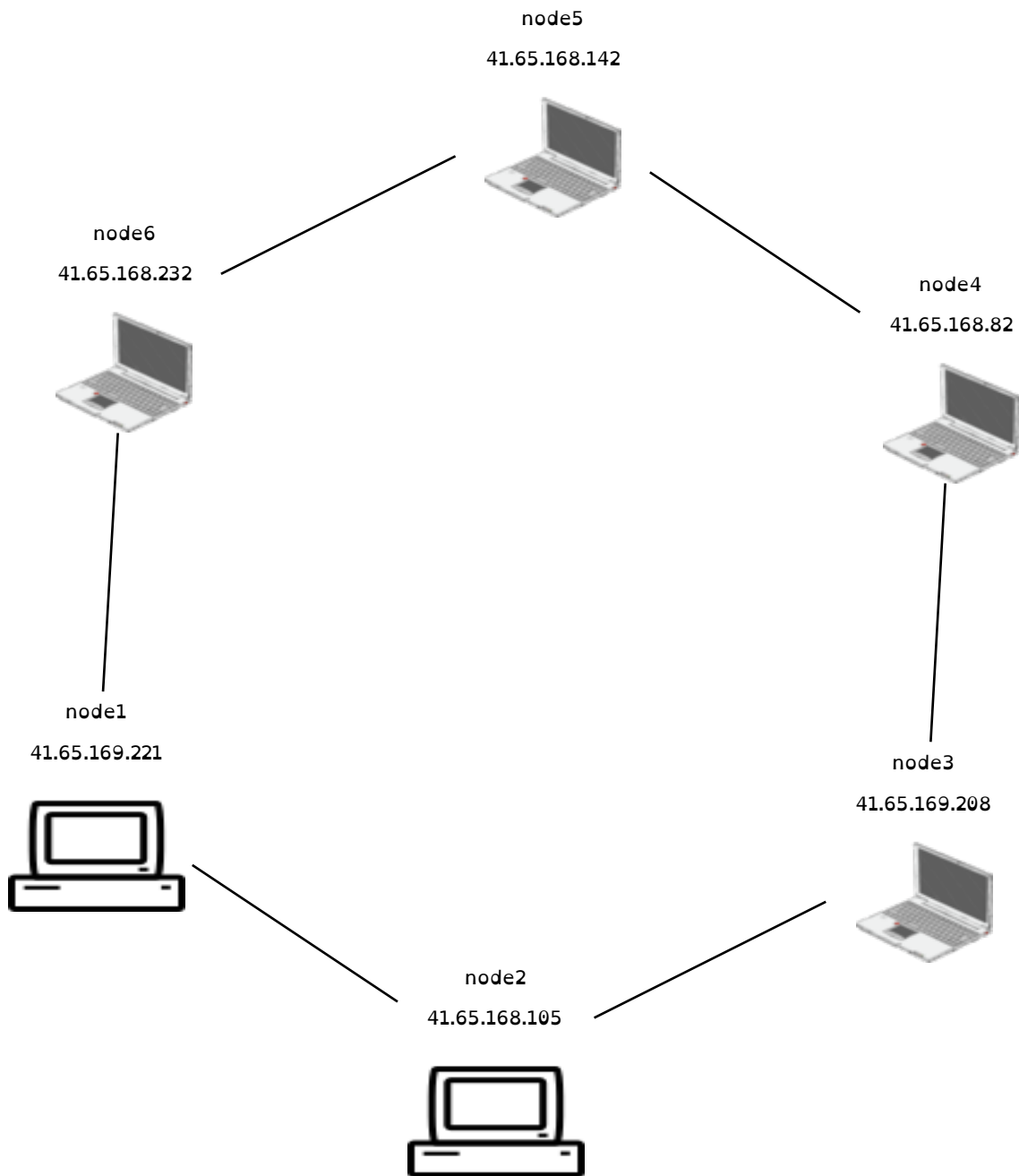14.16.127.182

node5

14.16.159.68

node4

14.16.136.203

802.11a

14.16.0.1

node2

14.17.64.232

node7

14.17.4.104

node8

14.17.50.215

node3

14.17.200.206

1.9 aj: Does the following network represent a full mesh topology?

100BaseT Ethernet

1.10 ak: Does the following network represent a star topology?

node4

71.245.70.114

node5

71.206.174.14

node1

71.226.170.179

node2

71.144.226.67

node3

71.239.78.125

1.11   al: Does the following network represent a ad-hoc topology?

node5
41.65.168.142

node6
41.65.168.232

node4
41.65.168.82

node1
41.65.169.221

node3
41.65.169.208

node2
41.65.168.105

1.12   am: Does the following network represent a ad-hoc topology?

node4

120.103.249.8

node5

120.111.20.214

node3

120.105.176.46

node2

120.97.102.222

node1

120.110.19.215

1.13   an: Does the following network represent a bus topology?

node6
61.152.132.98

node5
61.158.162.94

node4
61.143.168.205

node2
61.150.221.196

1000BaseT Ethernet

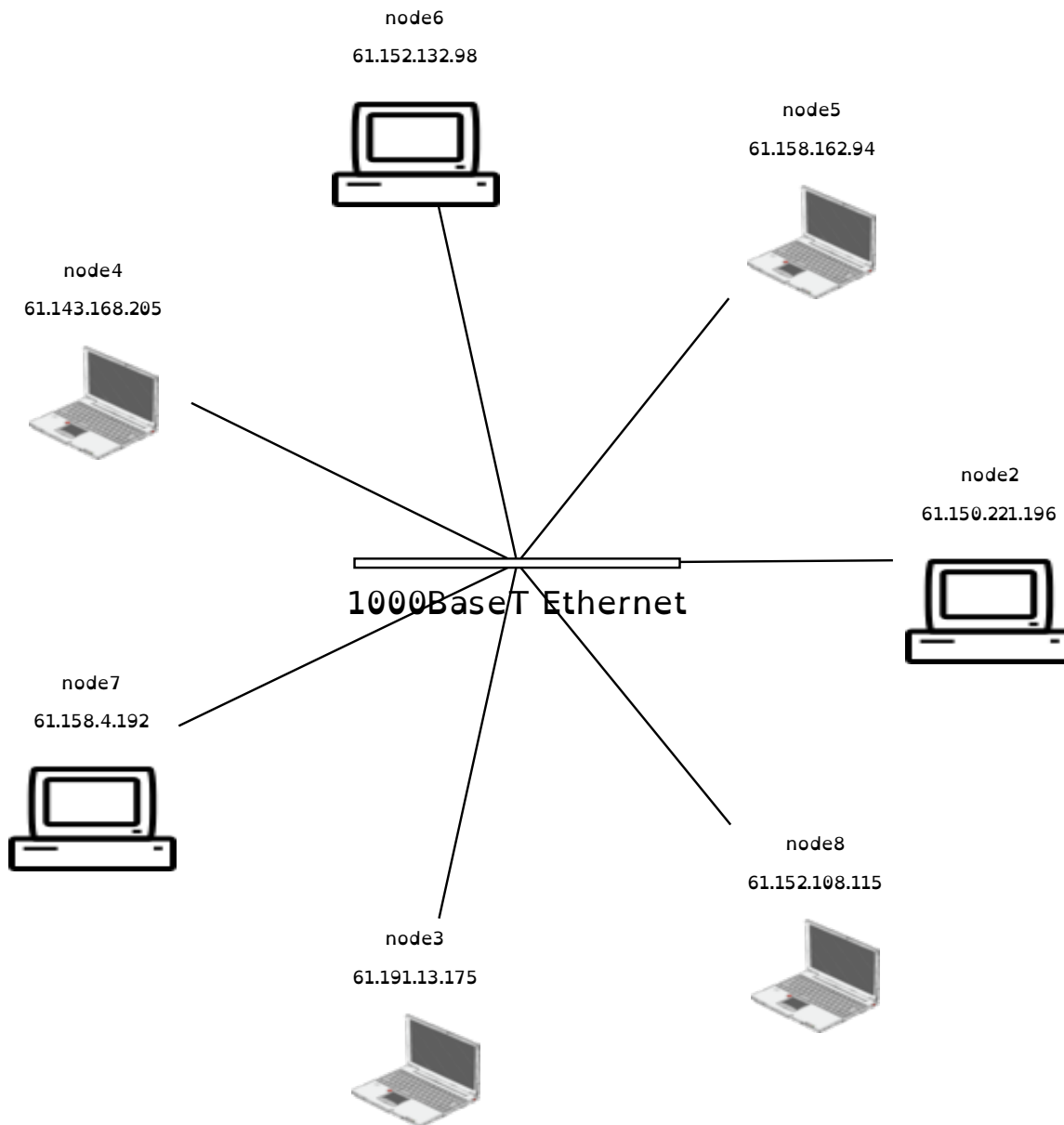node7
61.158.4.192

node8
61.152.108.115

node3
61.191.13.175
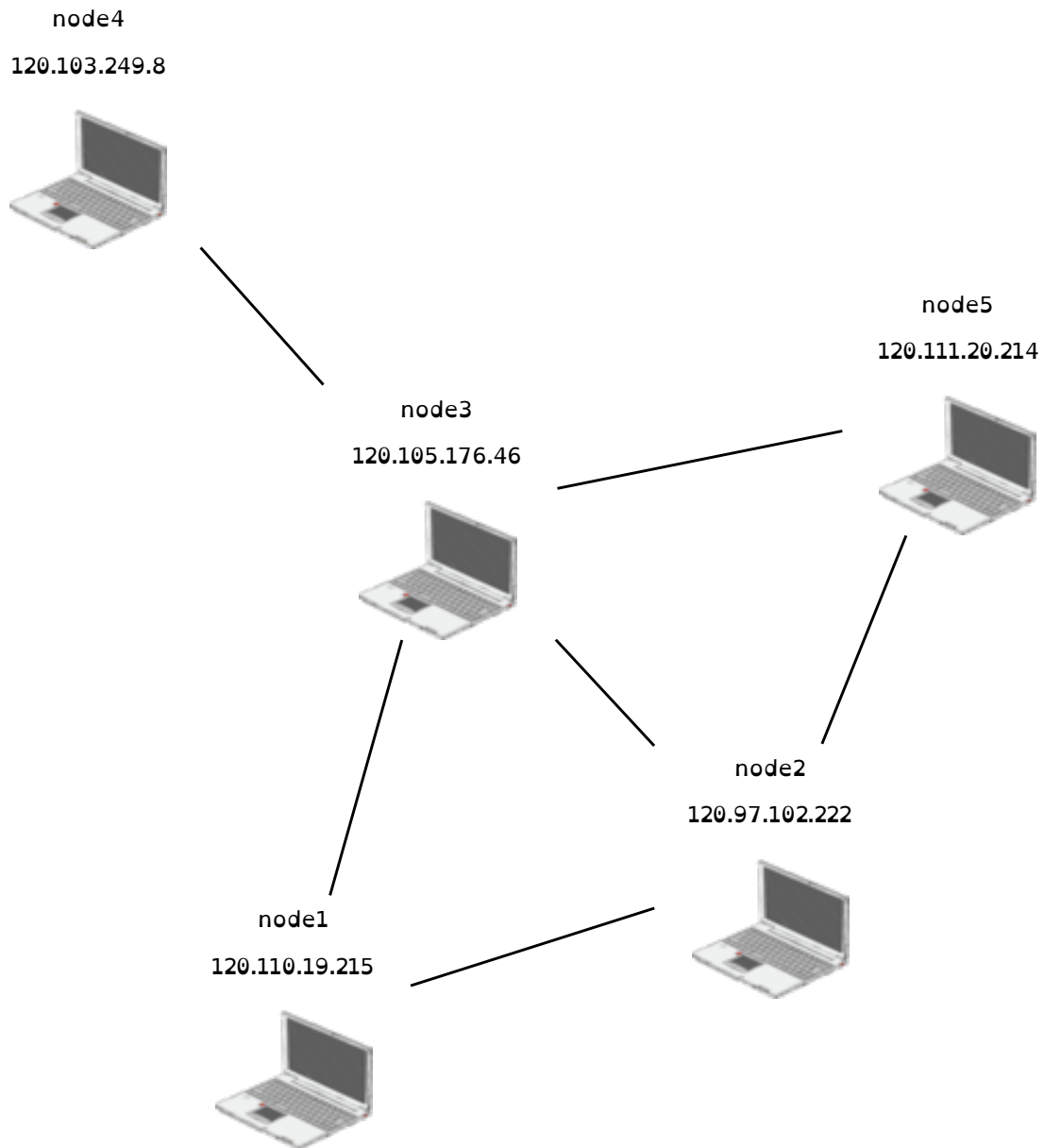
1.14 ao: Does the following network represent a ad-hoc topology?

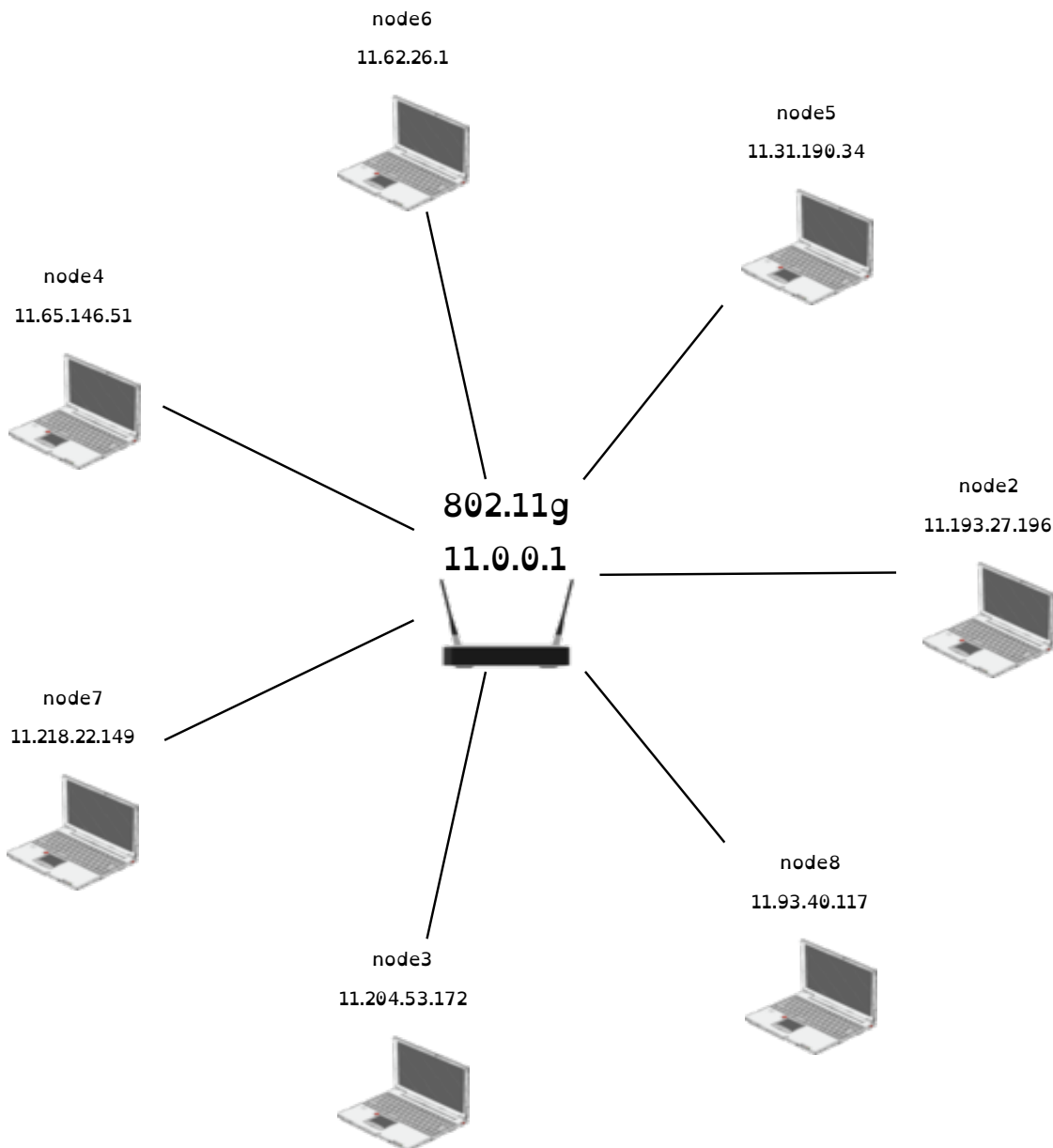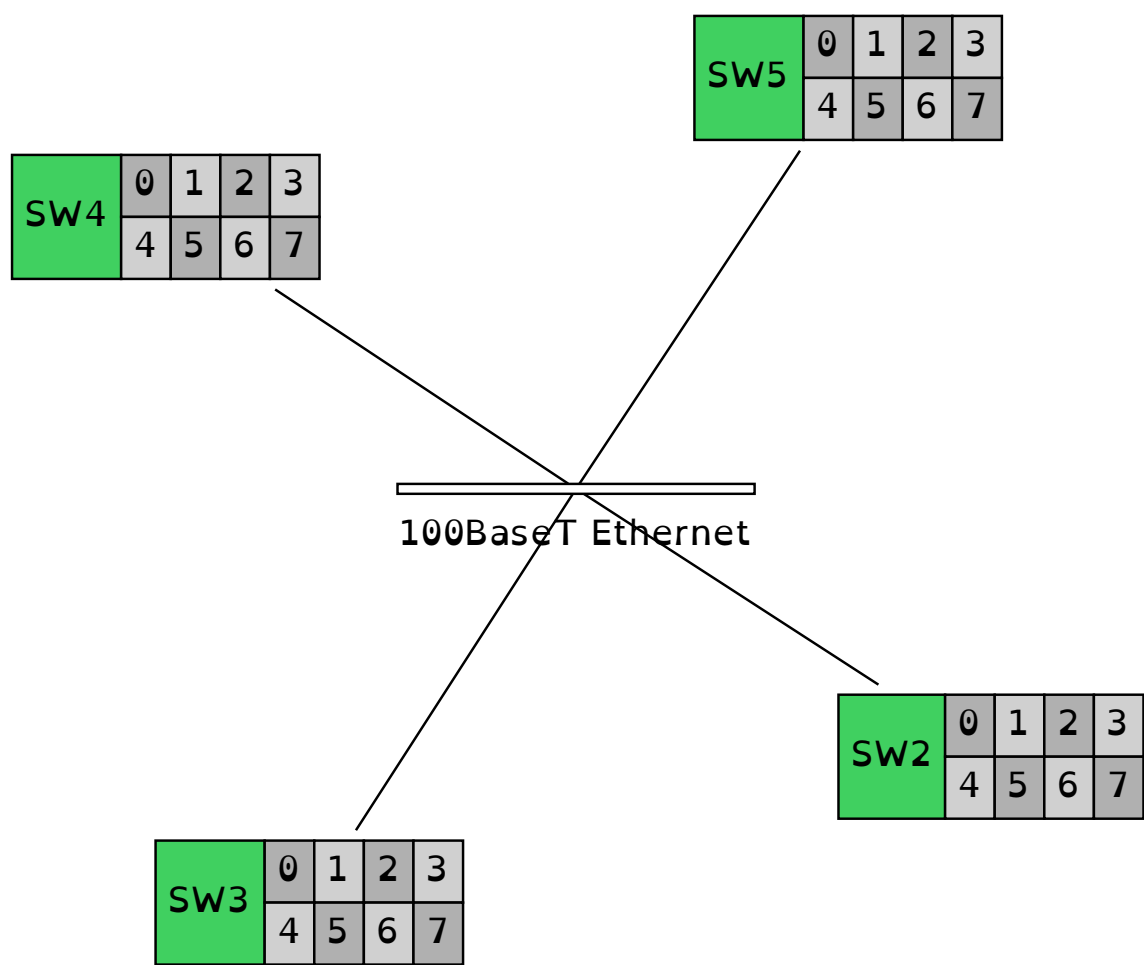## 1.15   ap: Does the following network represent a full mesh topology?

node6
11.62.26.1

node5
11.31.190.34

node4
11.65.146.51

802.11g
11.0.0.1

node2
11.193.27.196

node7
11.218.22.149

node8
11.93.40.117

node3
11.204.53.172

1.16 aq: Does the following network represent a bus topology?
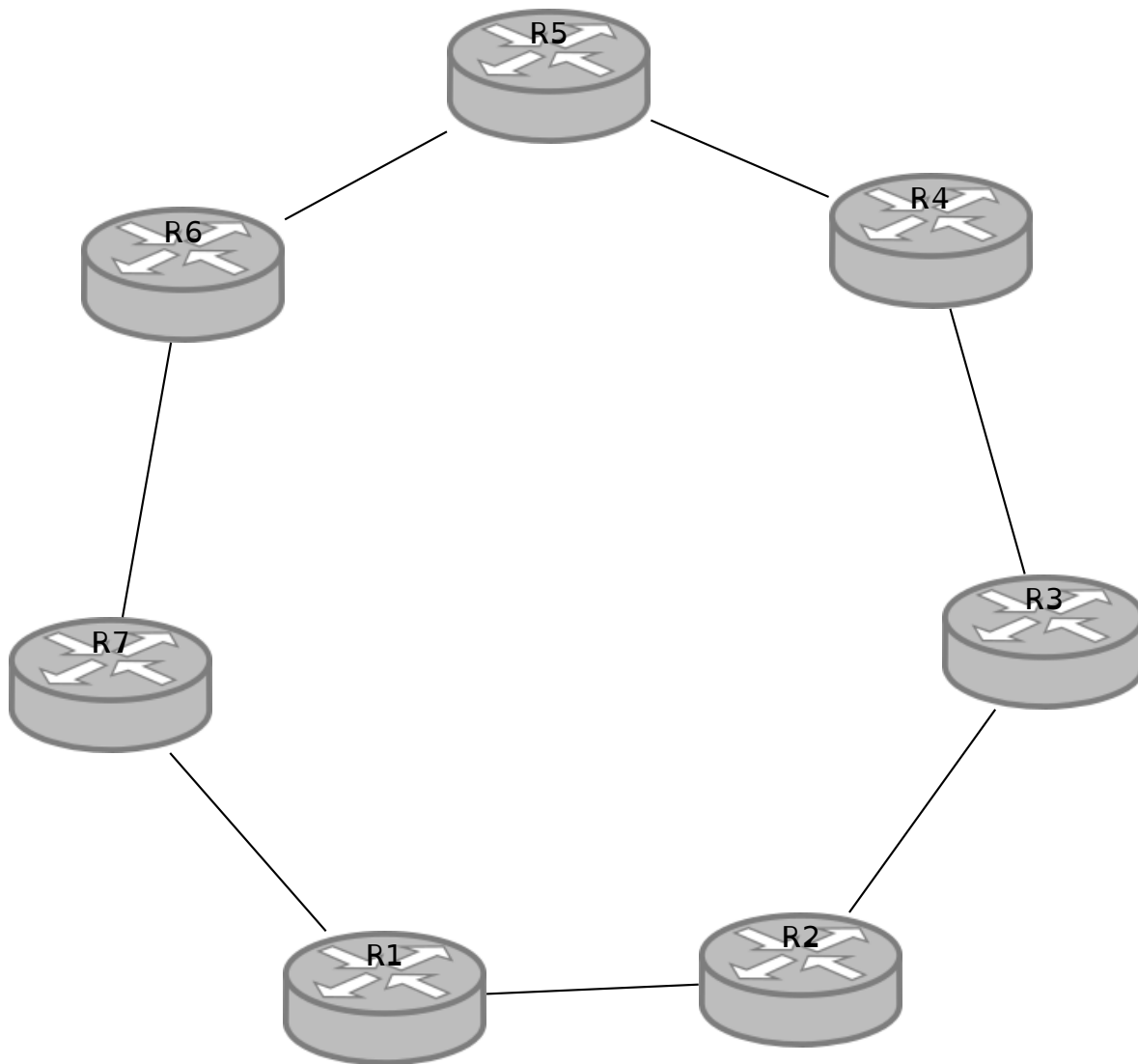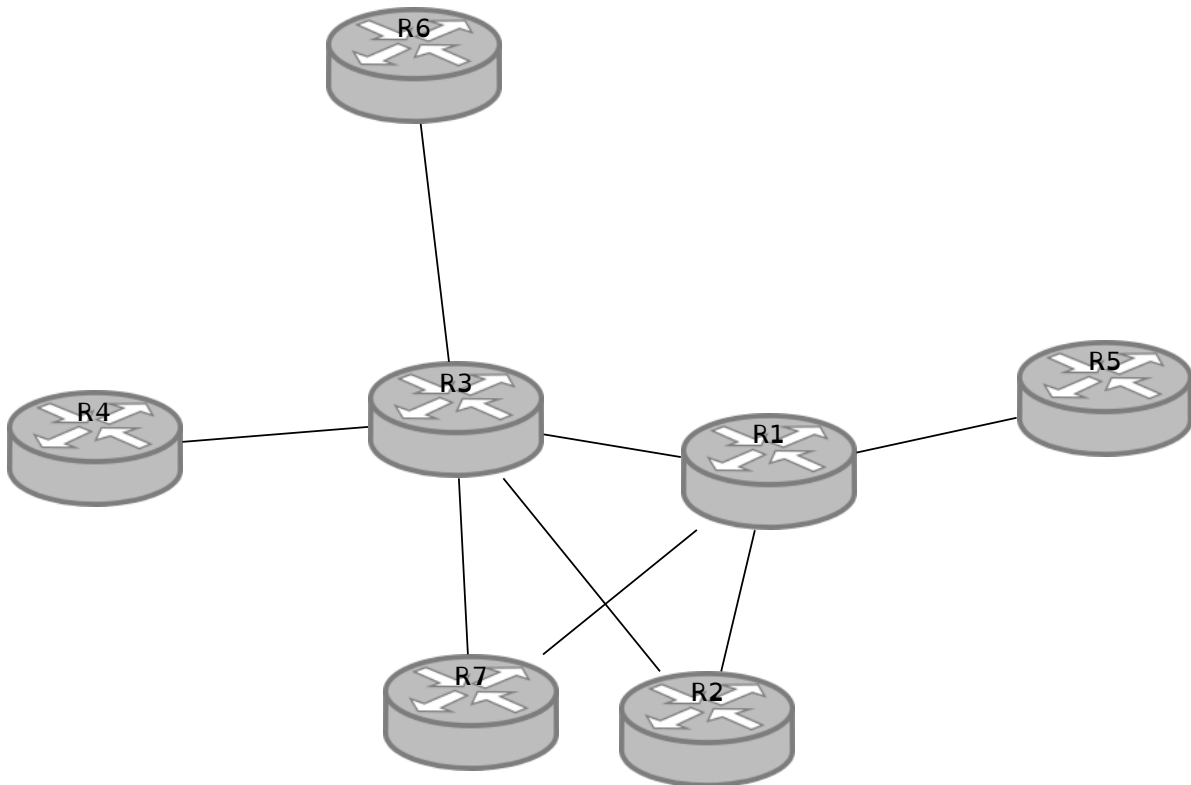

100BaseT Ethernet

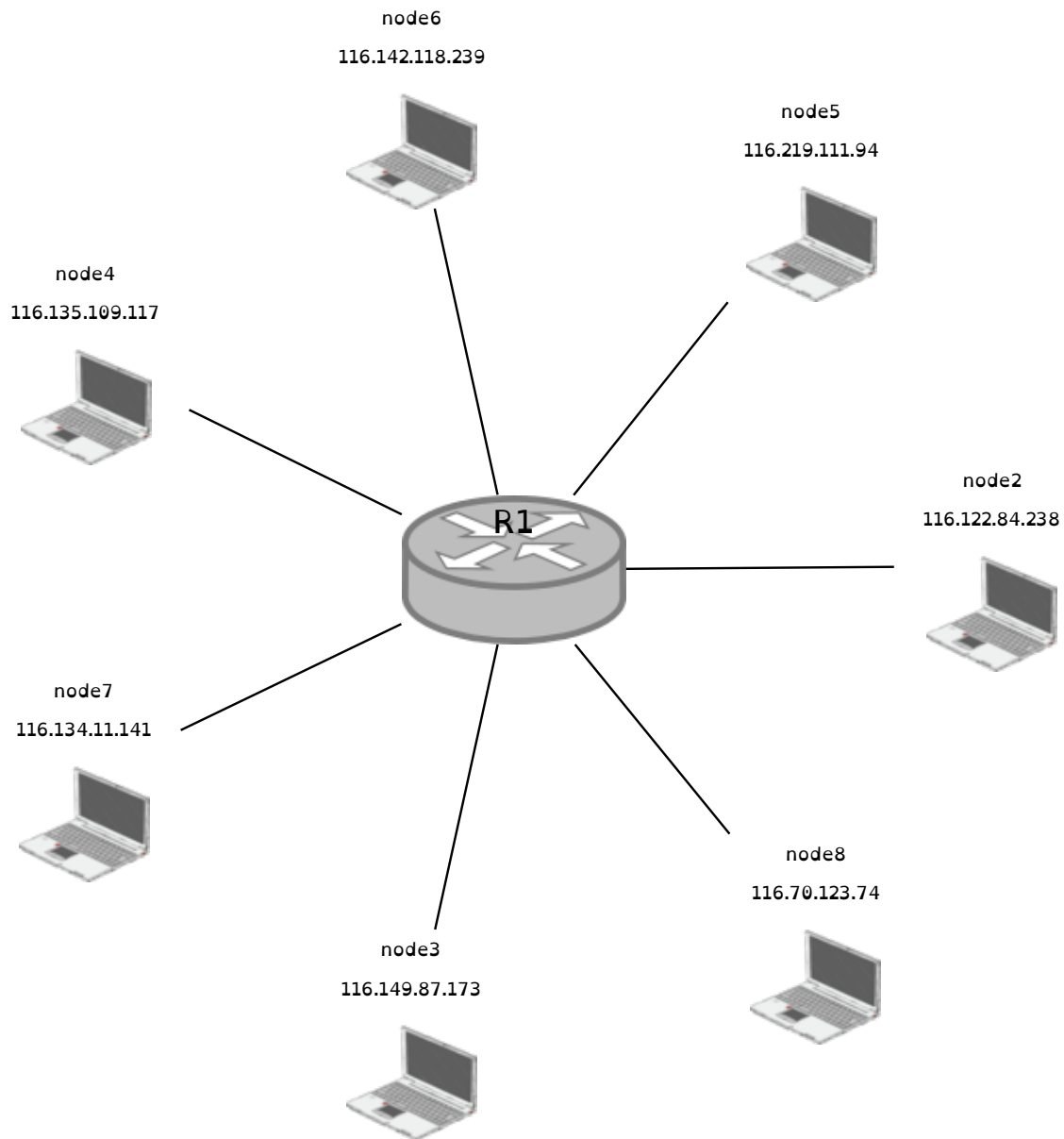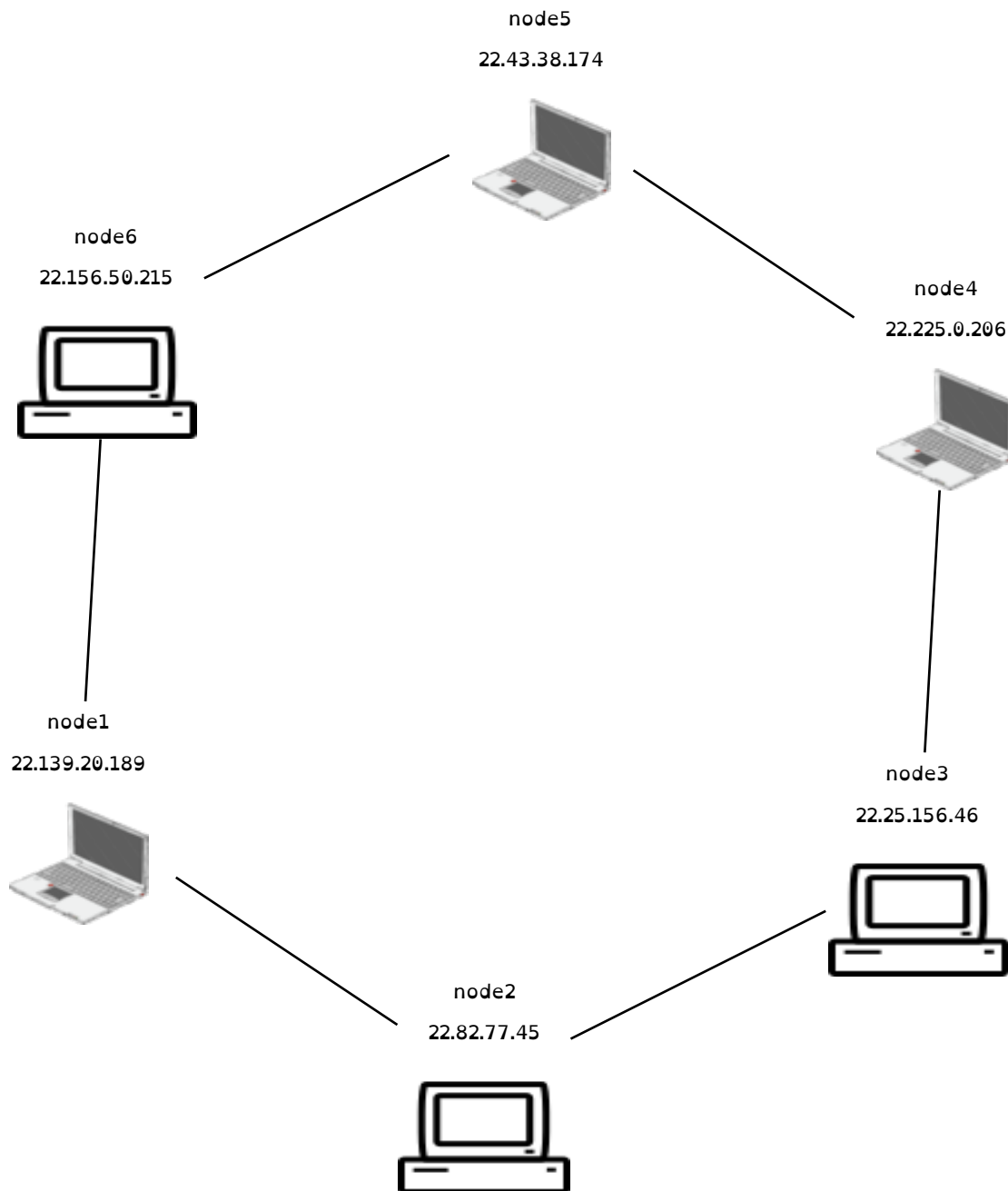## 1.17   ar: Does the following network represent a full mesh topology?

1.18 as: Does the following network represent a ring topology?

1.19   at: Does the following network represent a star topology?

node6
116.142.118.239

node5
116.219.111.94

node4
116.135.109.117

R1

node2
116.122.84.238

node7
116.134.11.141

node8
116.70.123.74

node3
116.149.87.173

1.20 au: Does the following network represent a ring topology?

node5

22.43.38.174

node6

22.156.50.215

node4

22.225.0.206

node1

22.139.20.189

node3

22.25.156.46

node2

22.82.77.45

2   Understand Computer Network Topologies #2

For each question, you must record your answer in the unit3-answers.txt file in your git repos-

itory. Each statement is either true or false. You must record 't' if you think the statement

is true, or 'f', if you think that the statement is false. Your answer must be lower case. Up-

percase answers will be marked incorrect. For example, if you believed that the answer to the

following question was potato, you would put the word potato at the end of the `rj=` line in the file `unit3-answers.txt`.

Question#	Description
rj	The potato is a white-flesh starchy vegetables from which hot chips are made

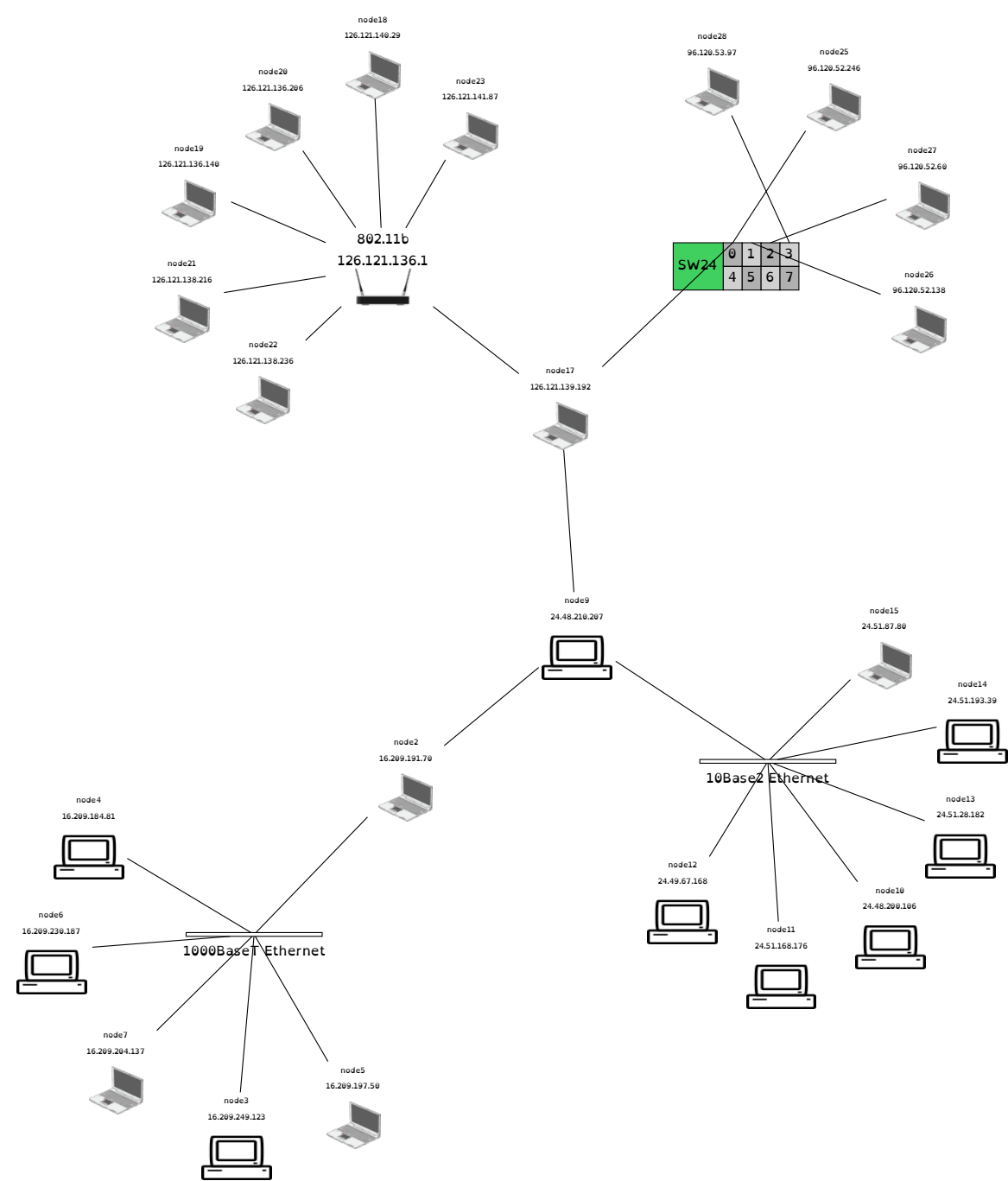The entry in `unit3-answers.txt` would thus look like:

```
# Question 'rj': The potato is a white-flesh starchy vegetables from which hot chips are made
rj=t
```

Templates for each answer are provided in `unit3-answers.txt` for your convenience.
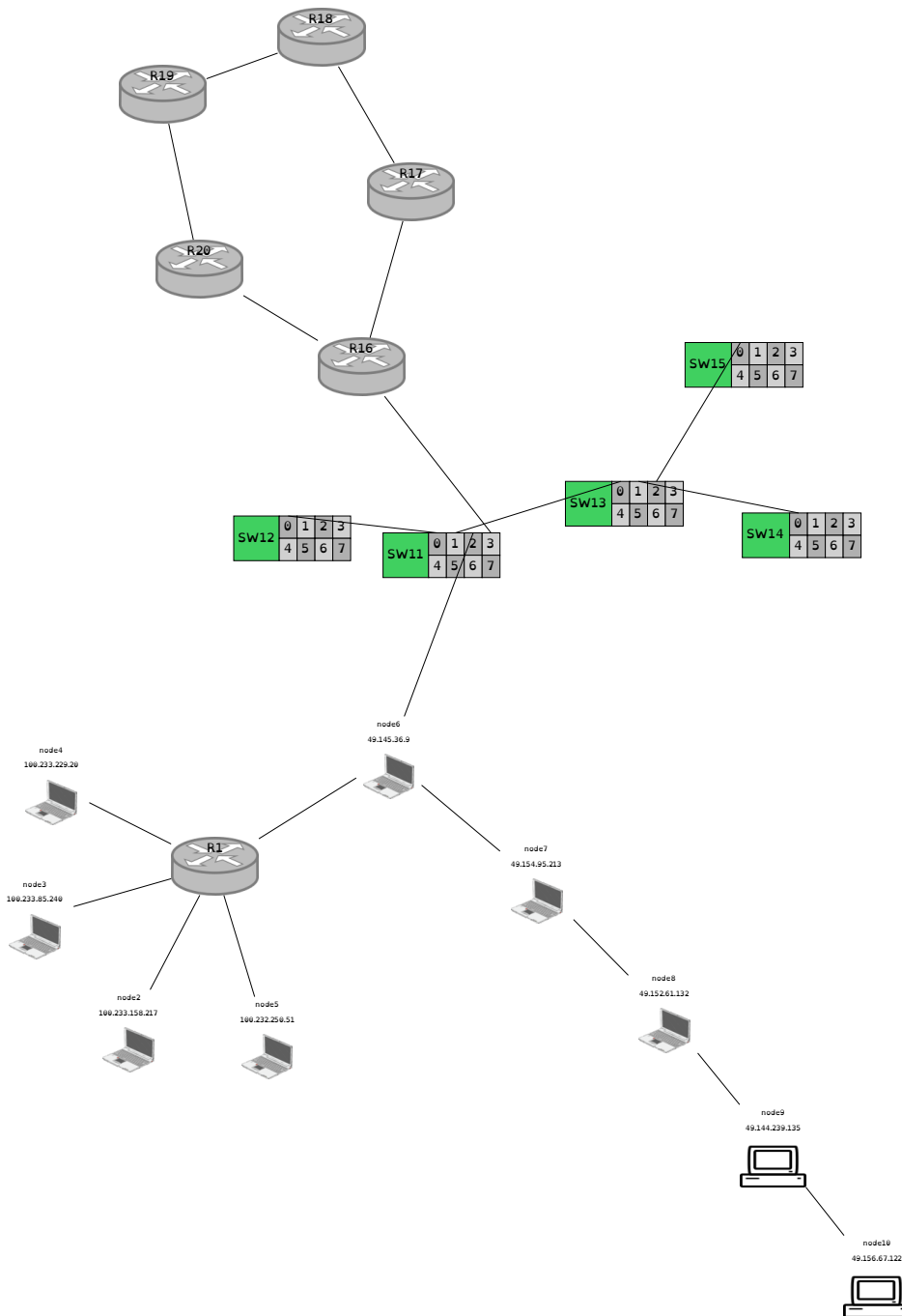
Are the following statements true or false?

2.1 av: Does the following hybrid network topology contain an ad-hoc sub-network?

2.2 aw: Does the following hybrid network topology contain an line sub-network?

2.3   ax: Does the following hybrid network topology contain an star sub-network?

2.4 ay: Does the following hybrid network topology contain an ad-hoc sub-network?

2.5 az: Does the following hybrid network topology contain an bus sub-network?

2.8 bc: Does the following hybrid network topology contain an ring sub-network?

2.9 bd: Does the following hybrid network topology contain an tree sub-network?

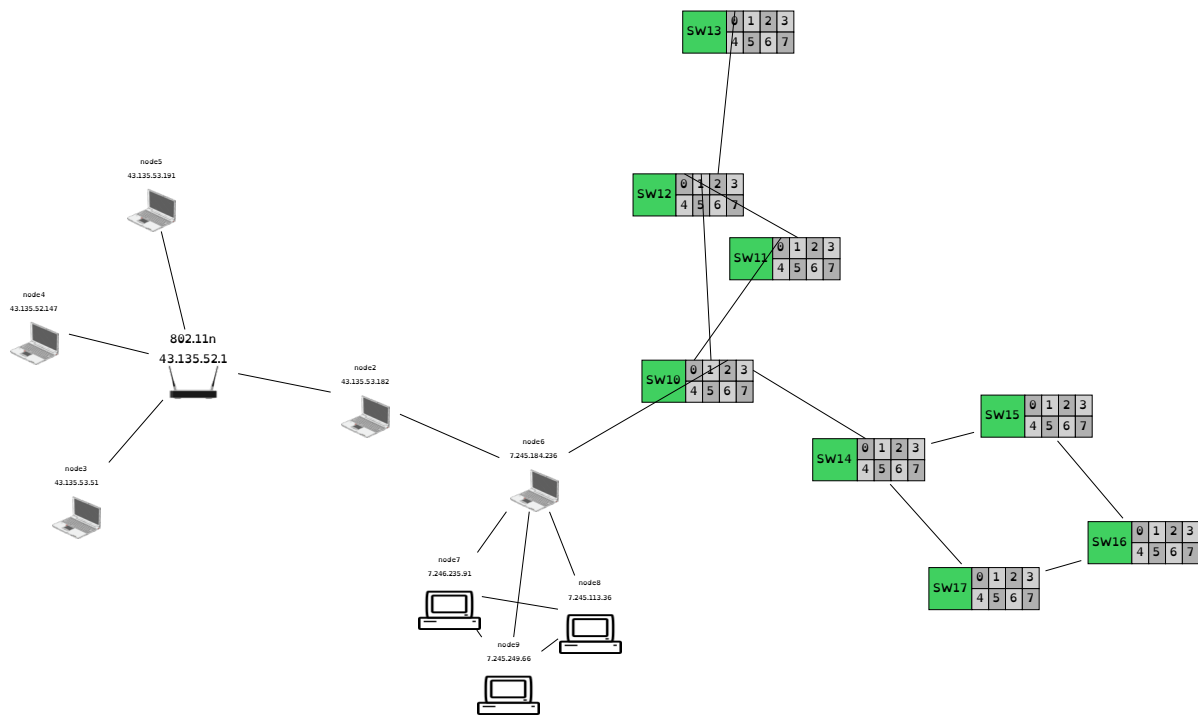## 2.10 be: Does the following hybrid network topology contain an ad-hoc sub-network?
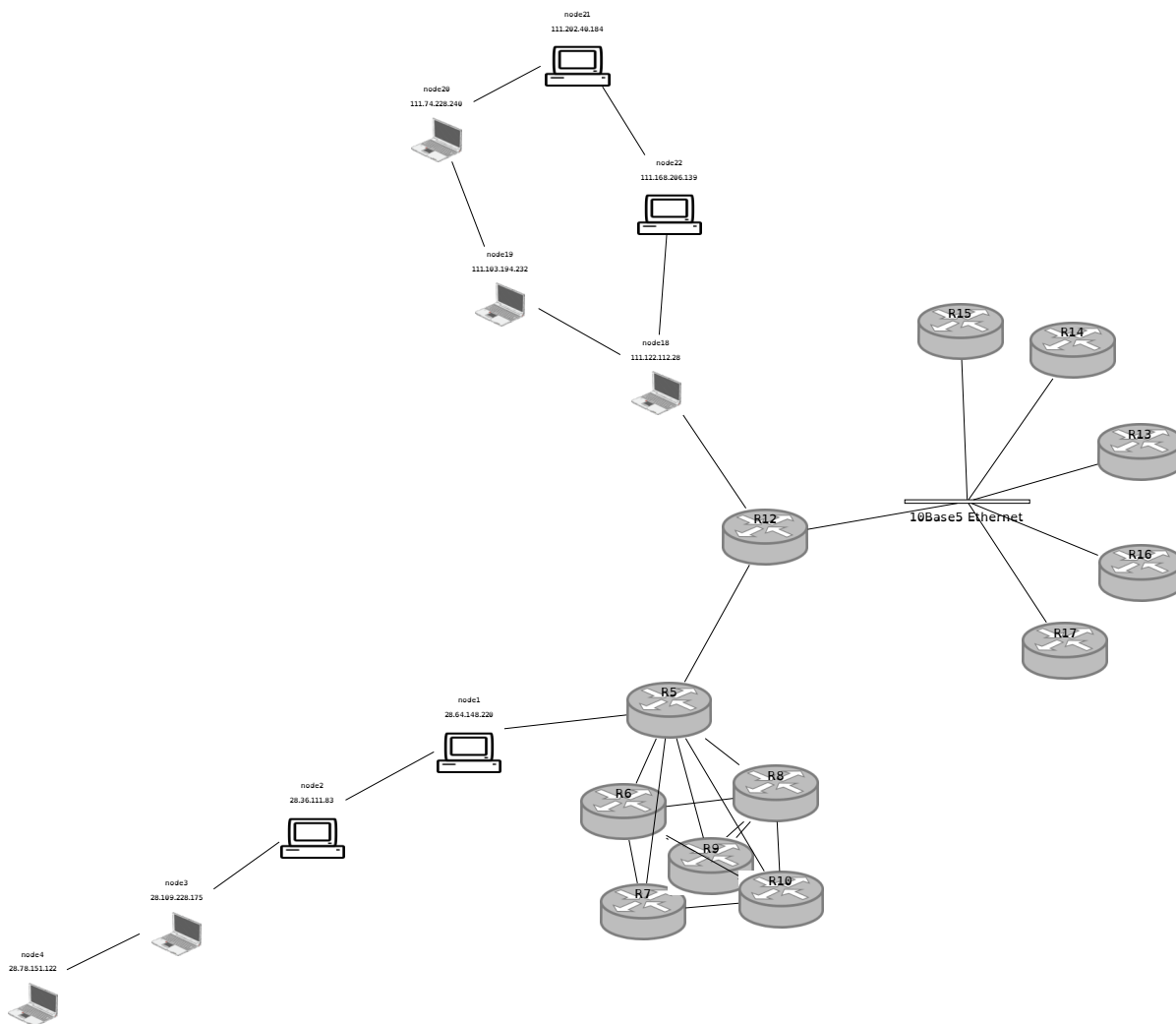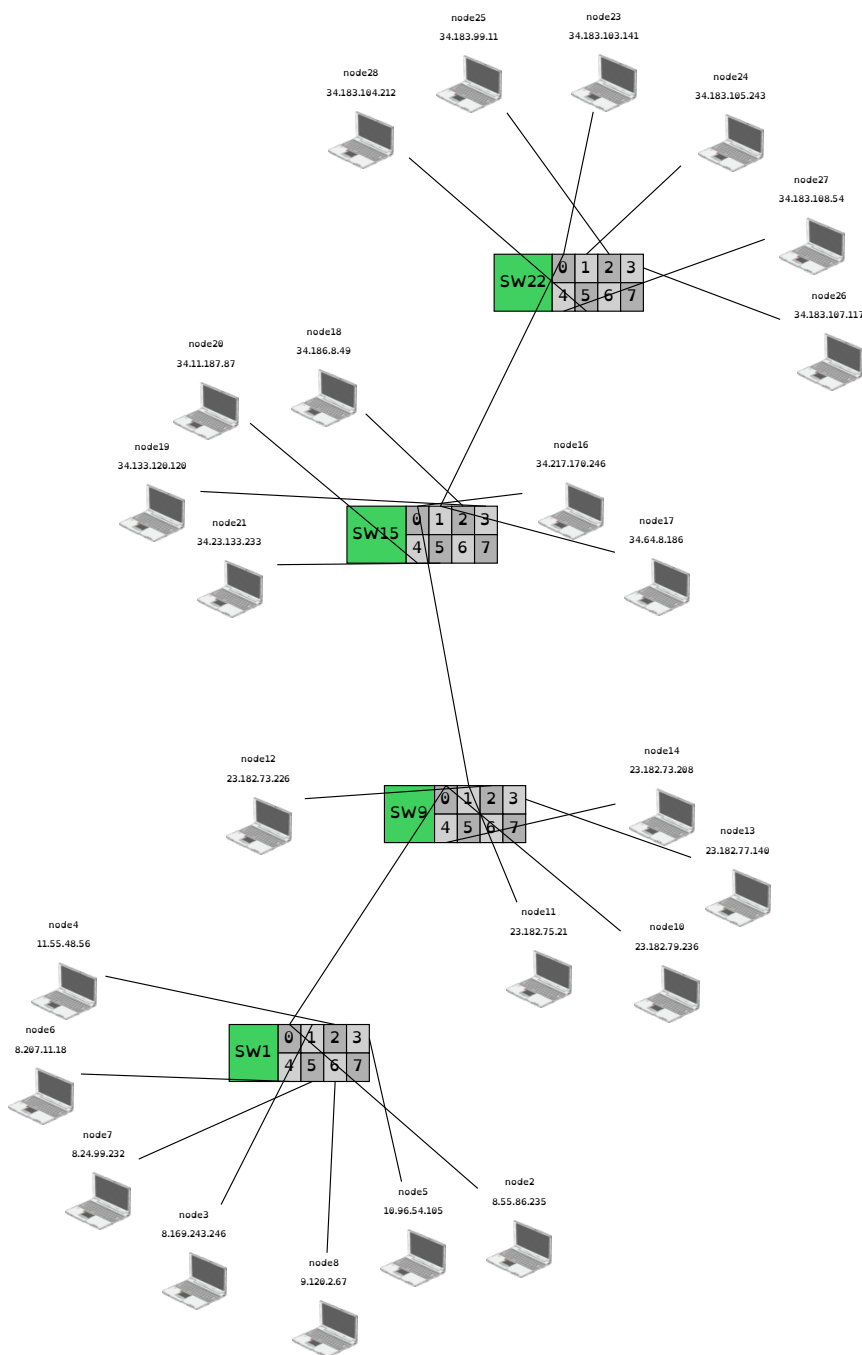
2.11 bf: Does the following hybrid network topology contain an bus sub-network?
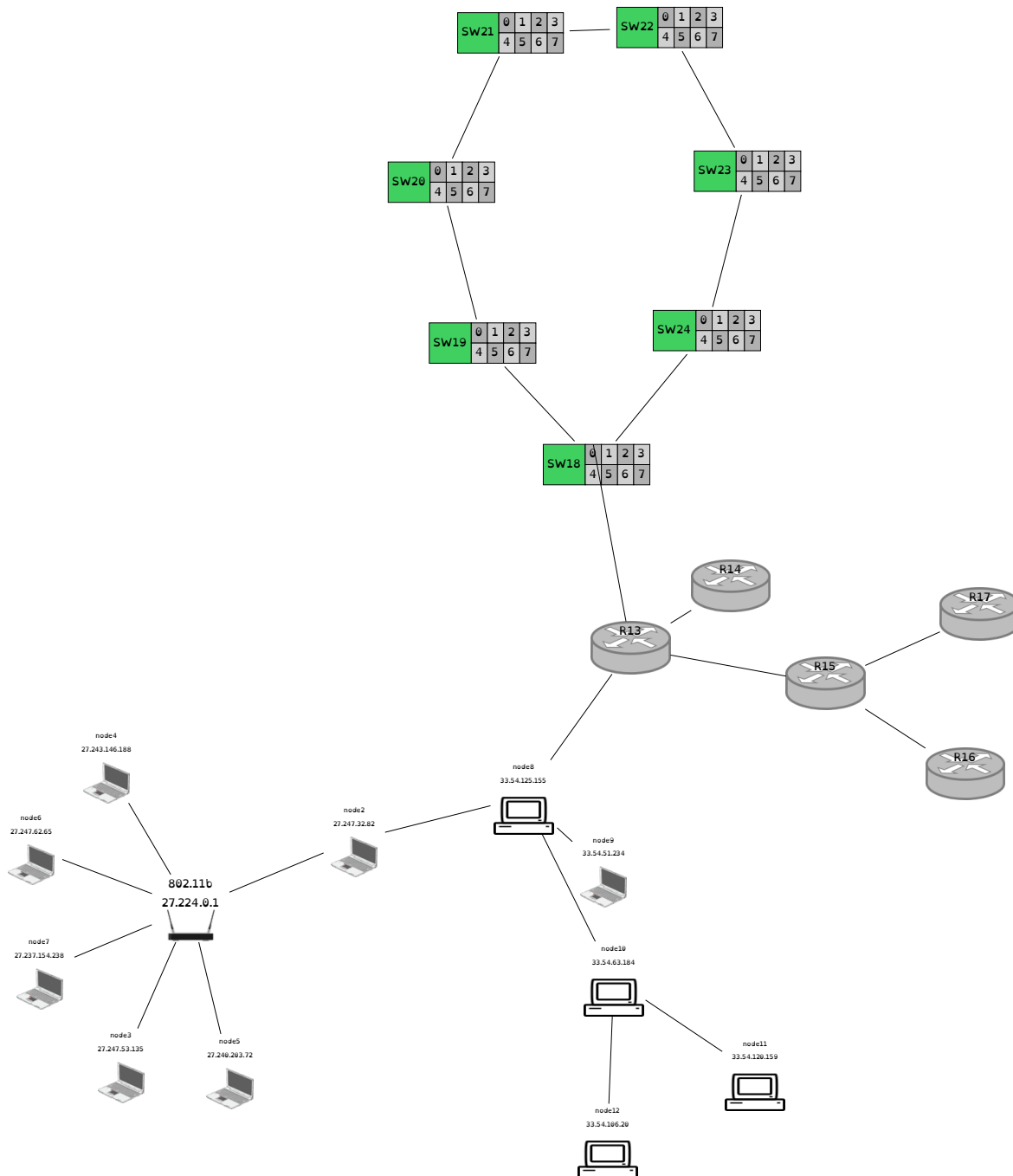
2.12 bg: Does the following hybrid network topology contain an ad-hoc sub-network?
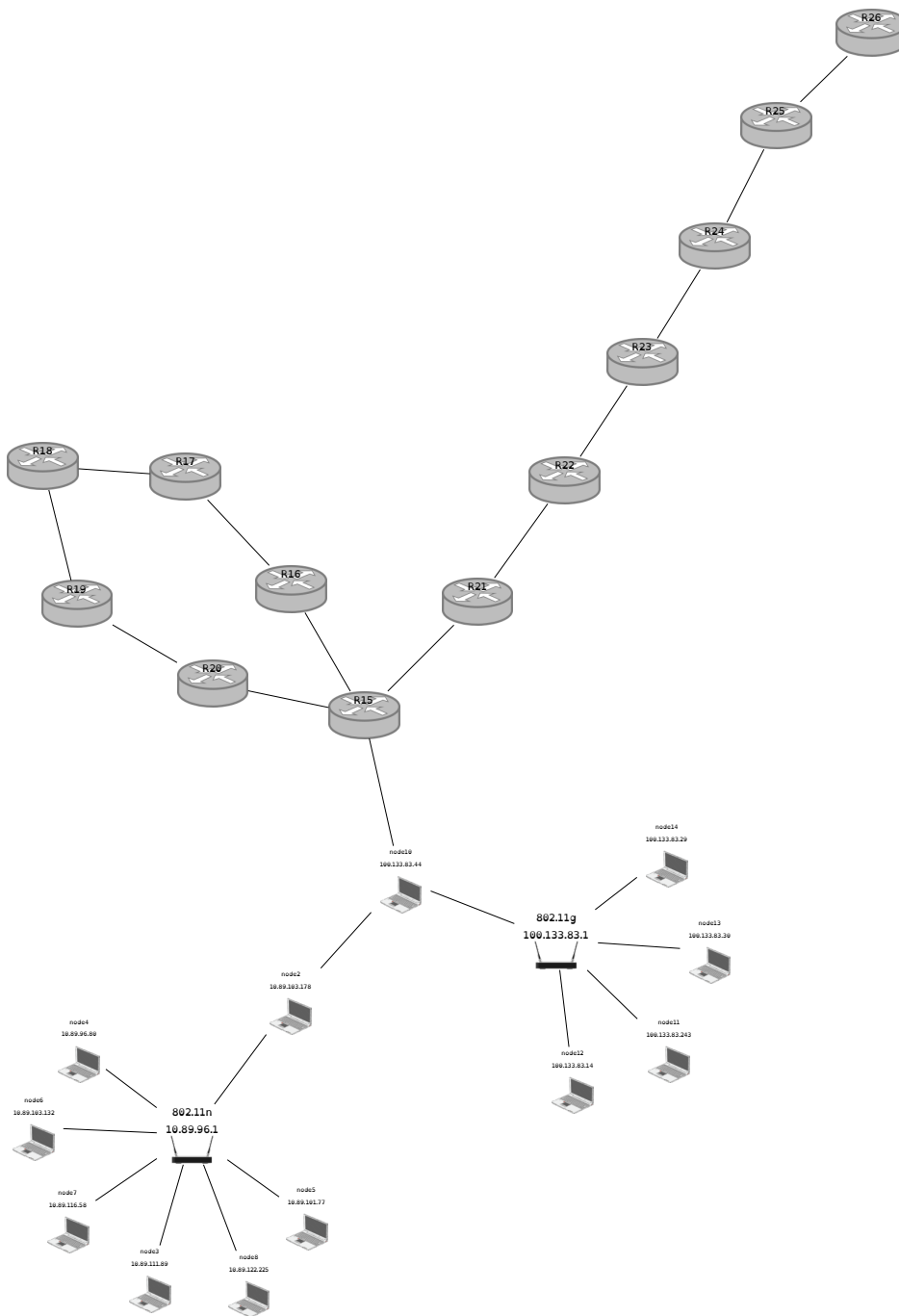
2.13 bh: Does the following hybrid network topology contain an tree sub-network?
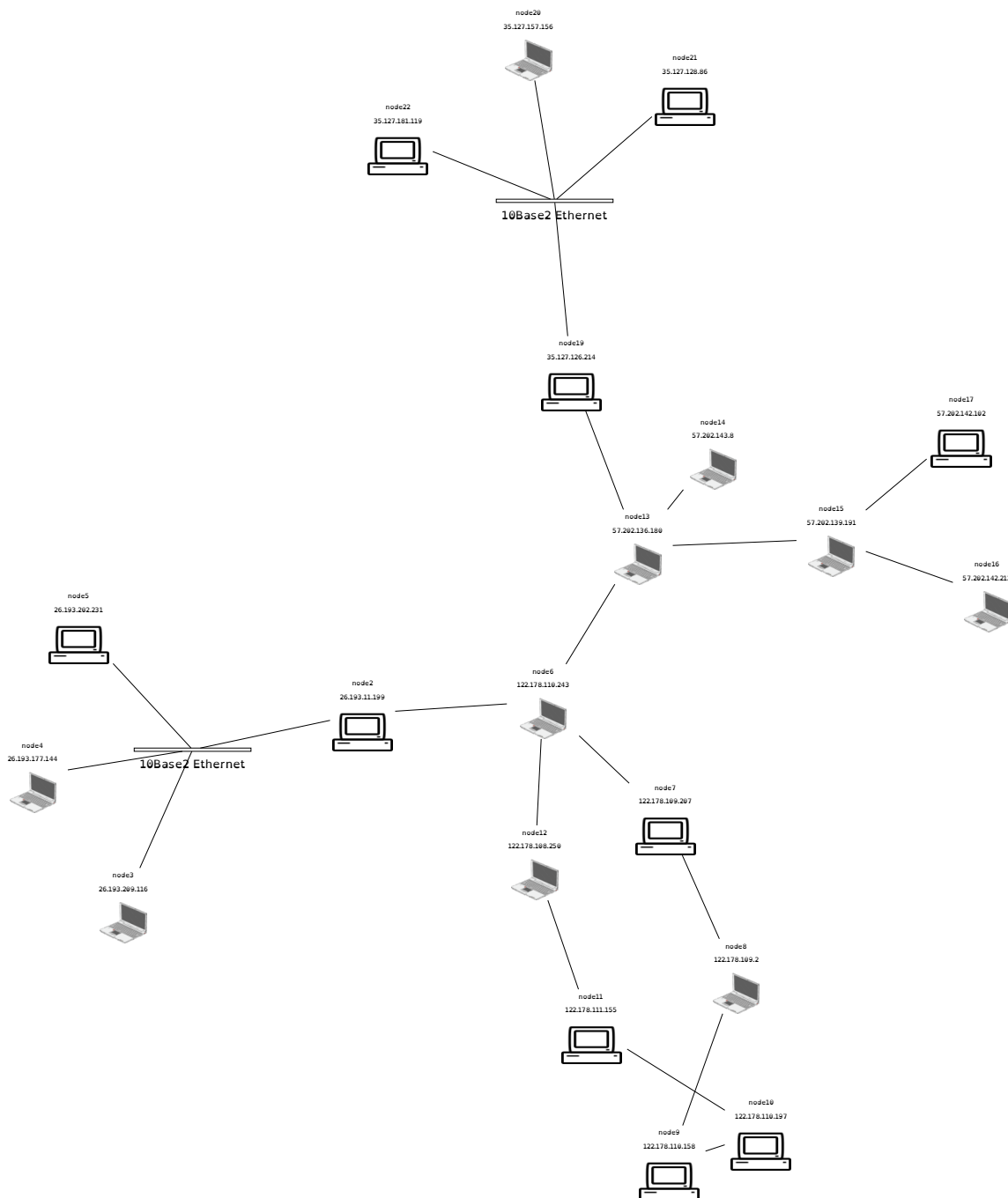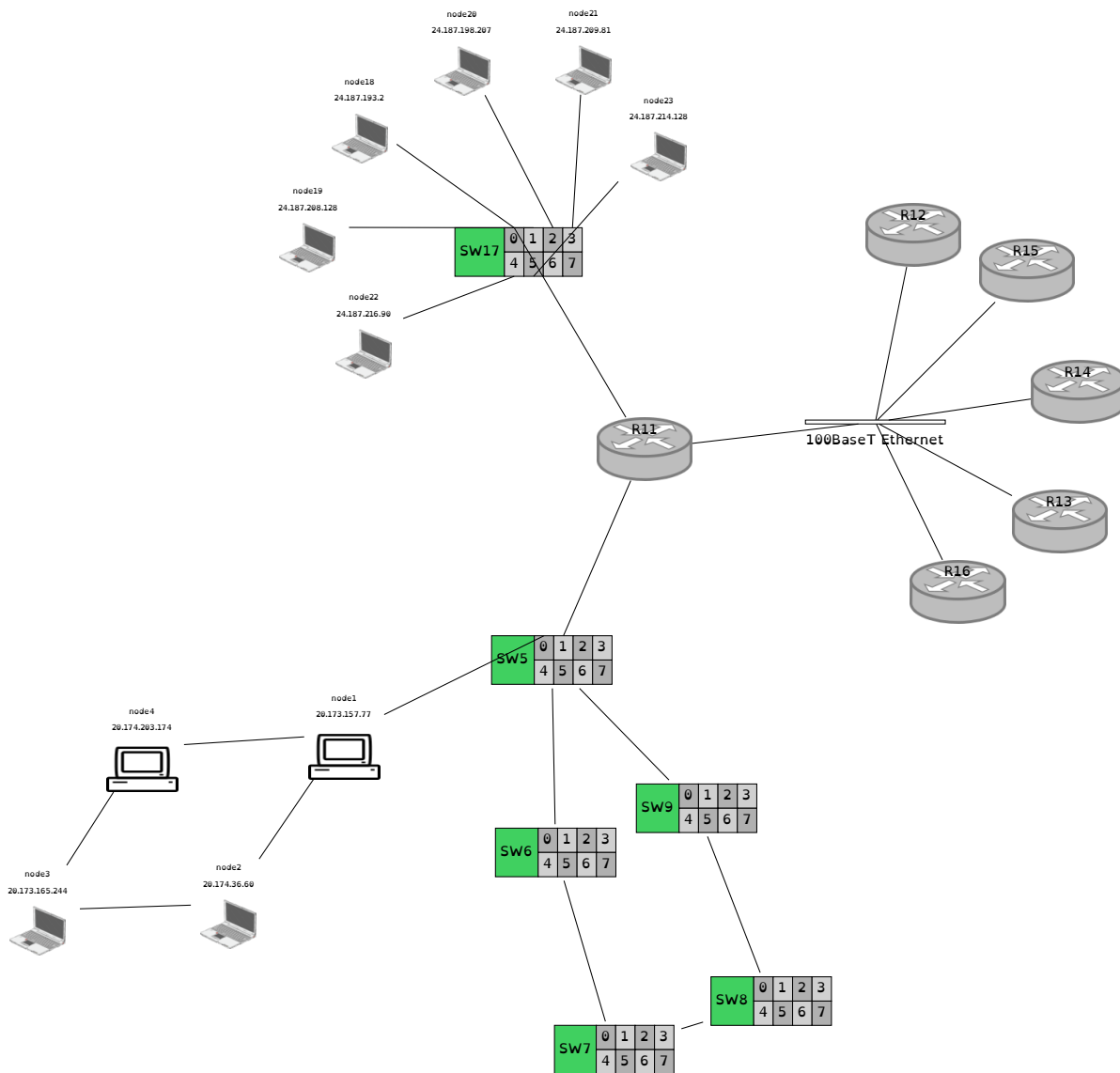
2.14 bi: Does the following hybrid network topology contain an tree subnetwork?
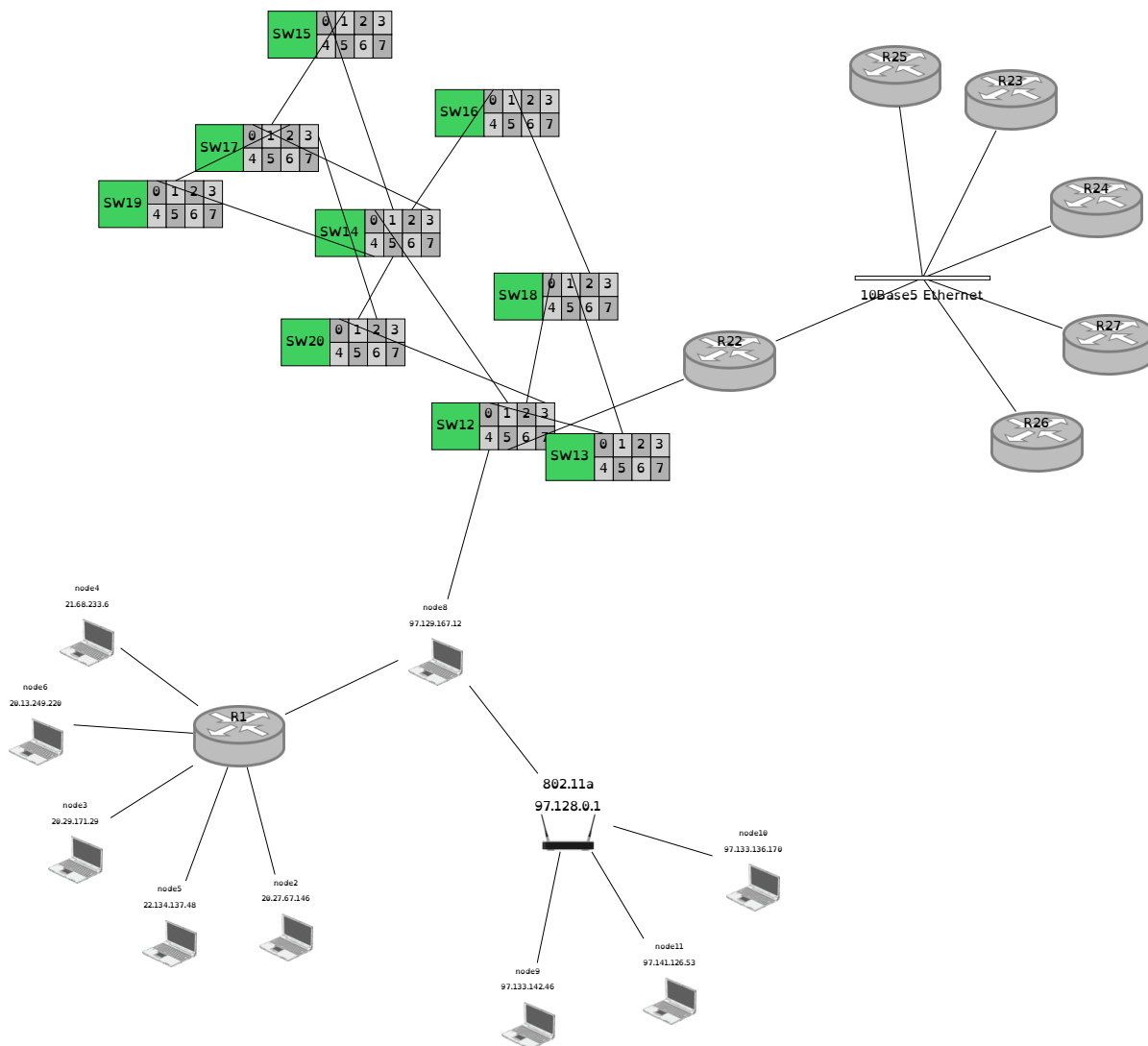
2.15 bj: Does the following hybrid network topology contain an full mesh sub-network?
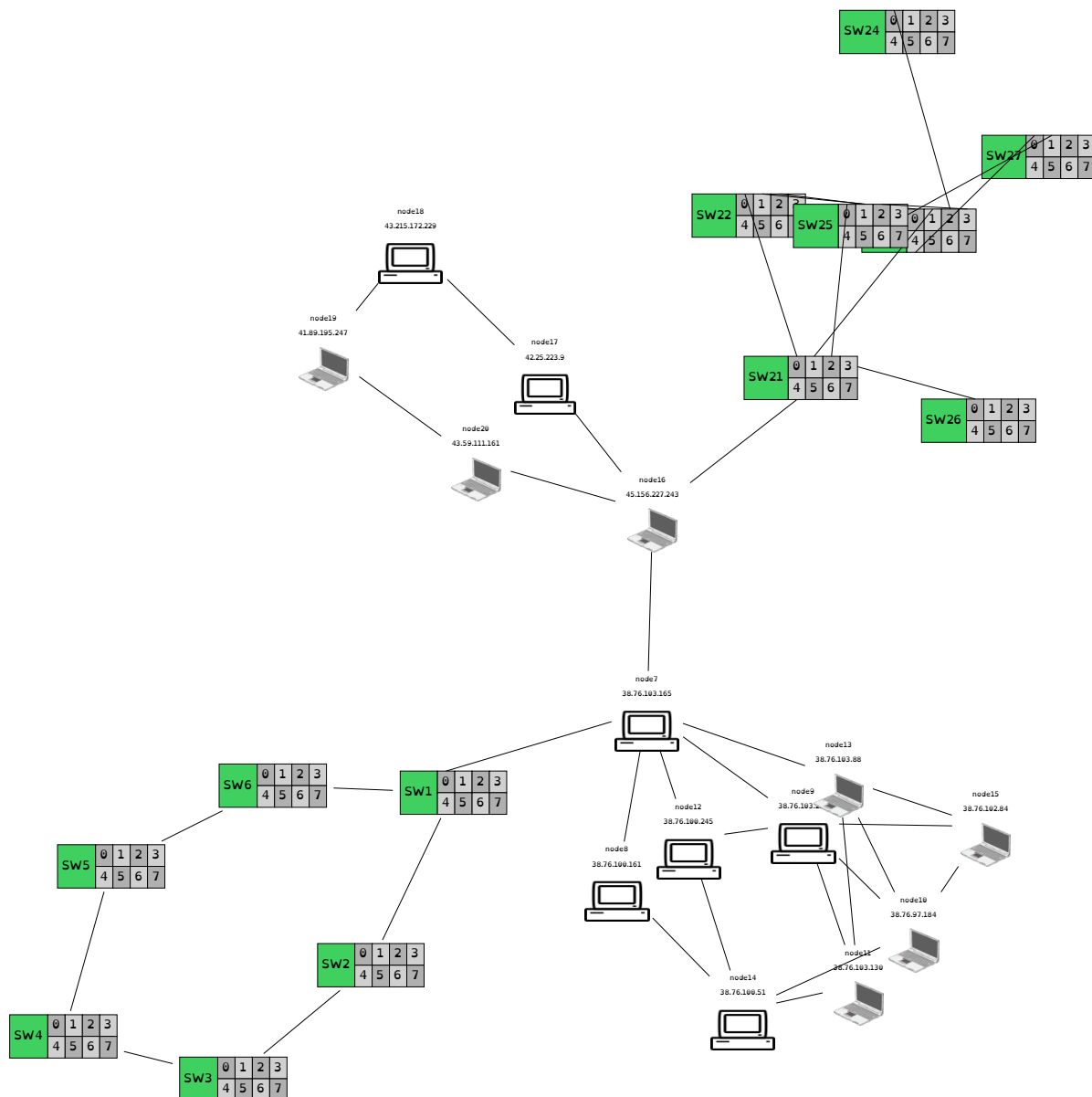
2.16 bk: Does the following hybrid network topology contain an tree sub-network?
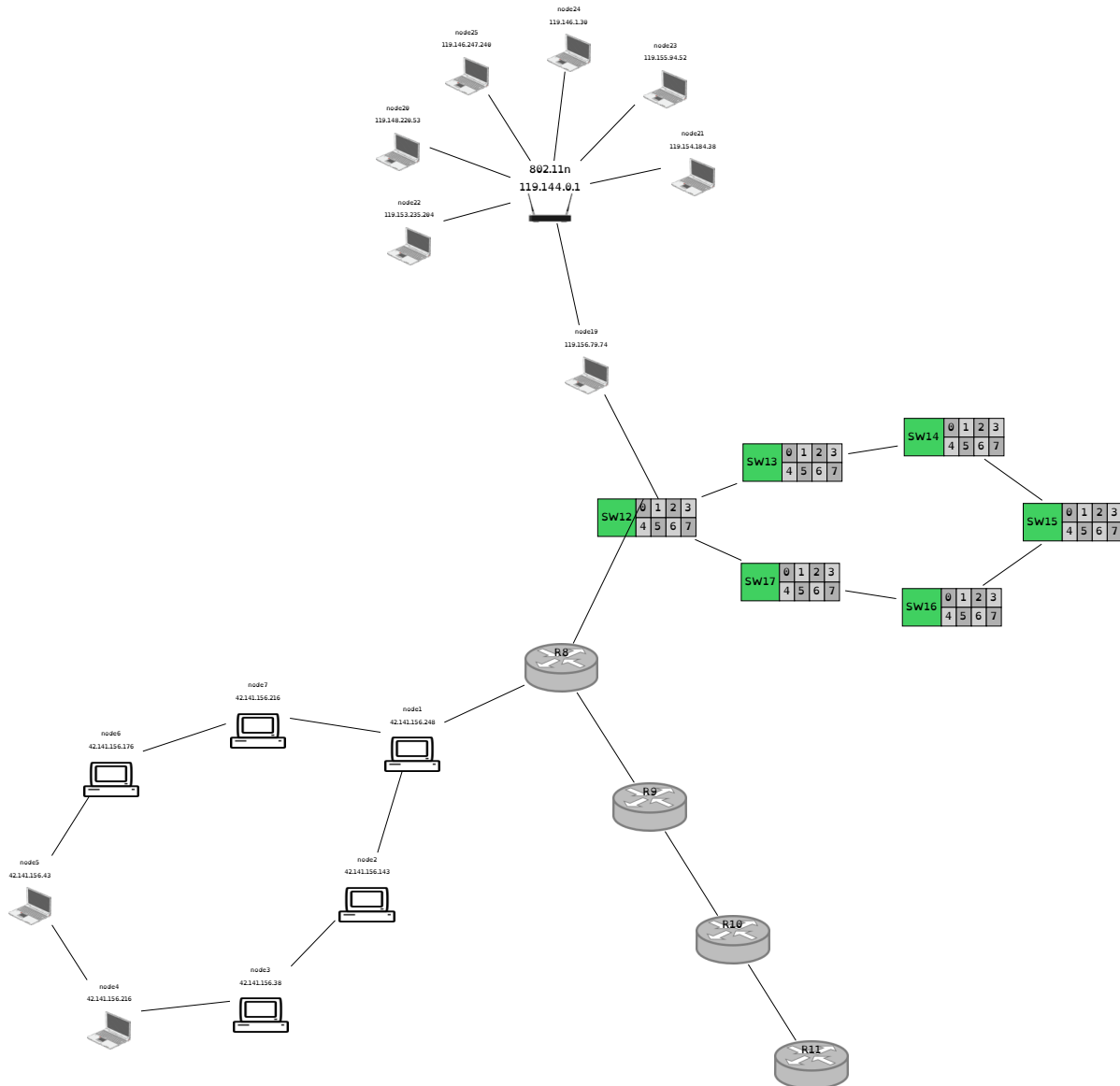
2.17 bl: Does the following hybrid network topology contain an full mesh sub-network?
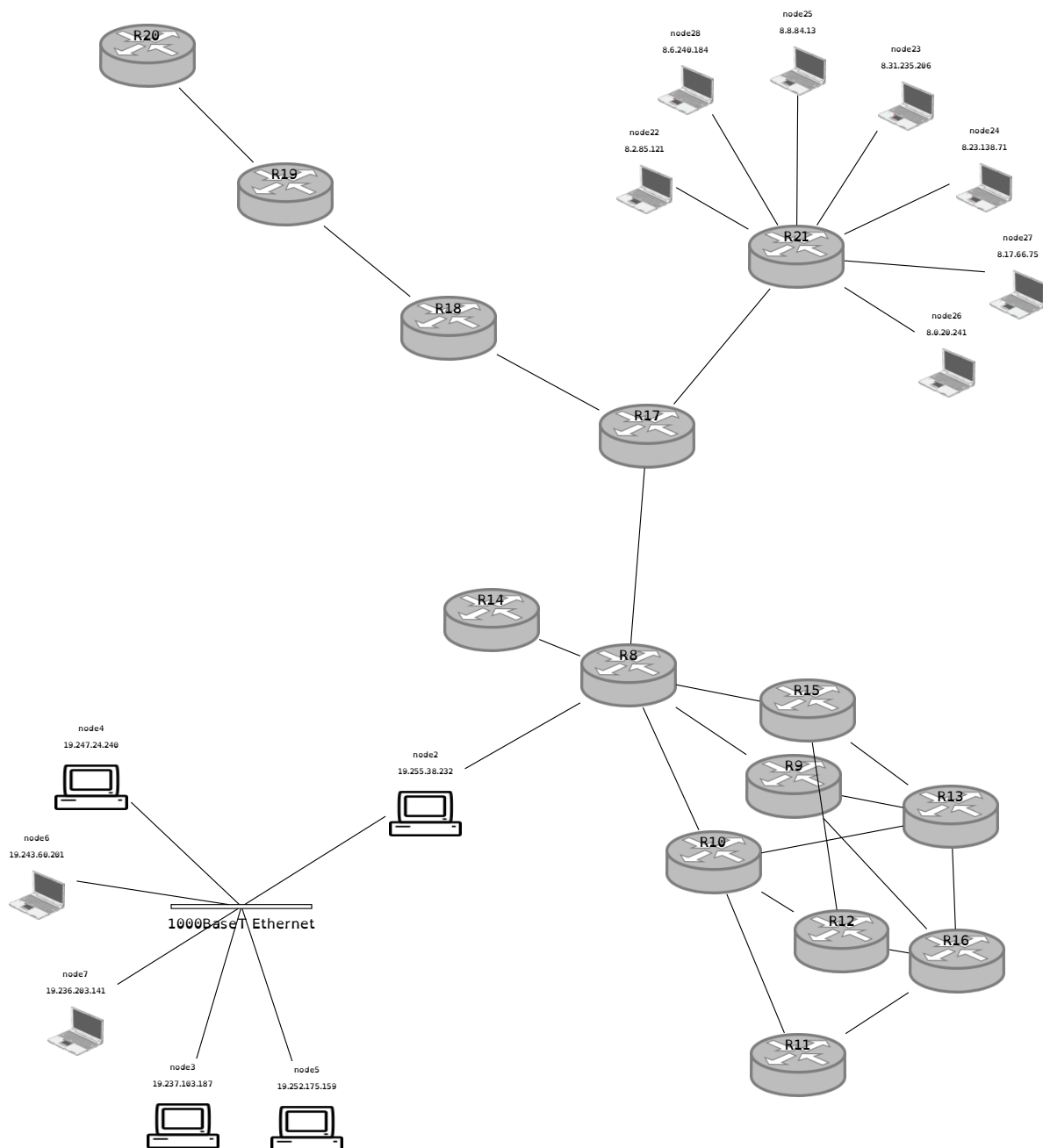
2.18 bm: Does the following hybrid network topology contain an line sub-network?
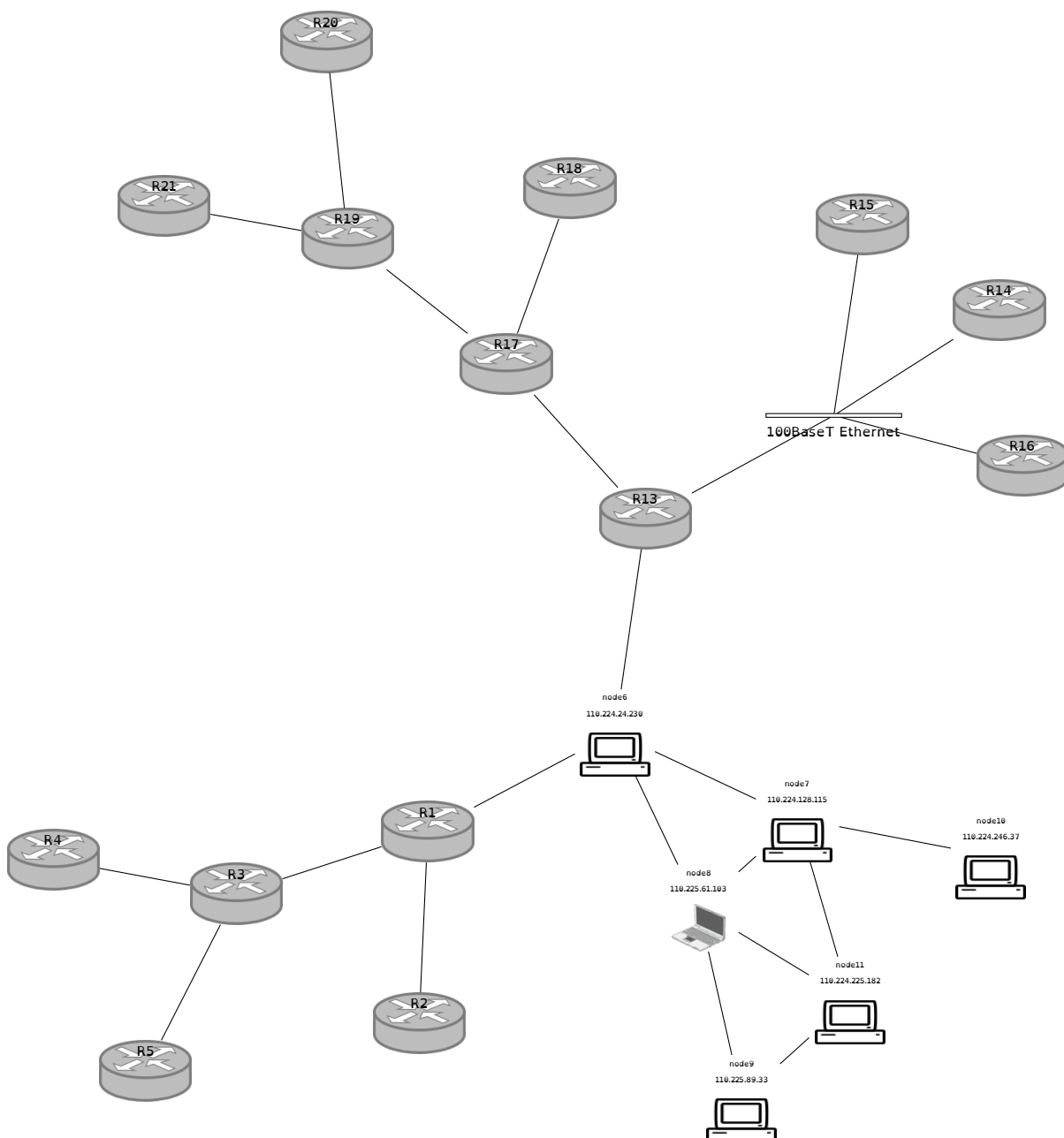
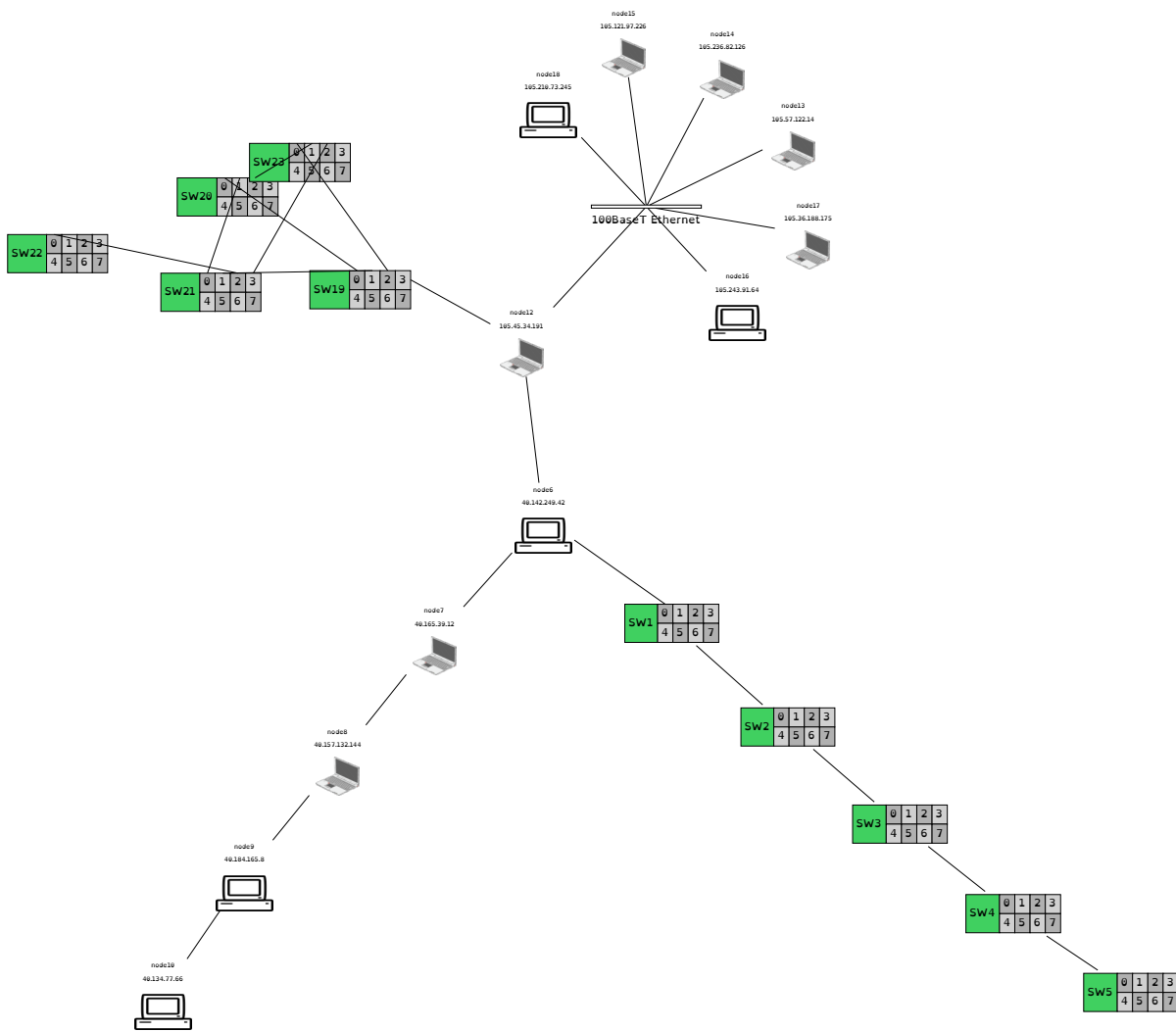## 2.19 bn: Does the following hybrid network topology contain an star sub-network?

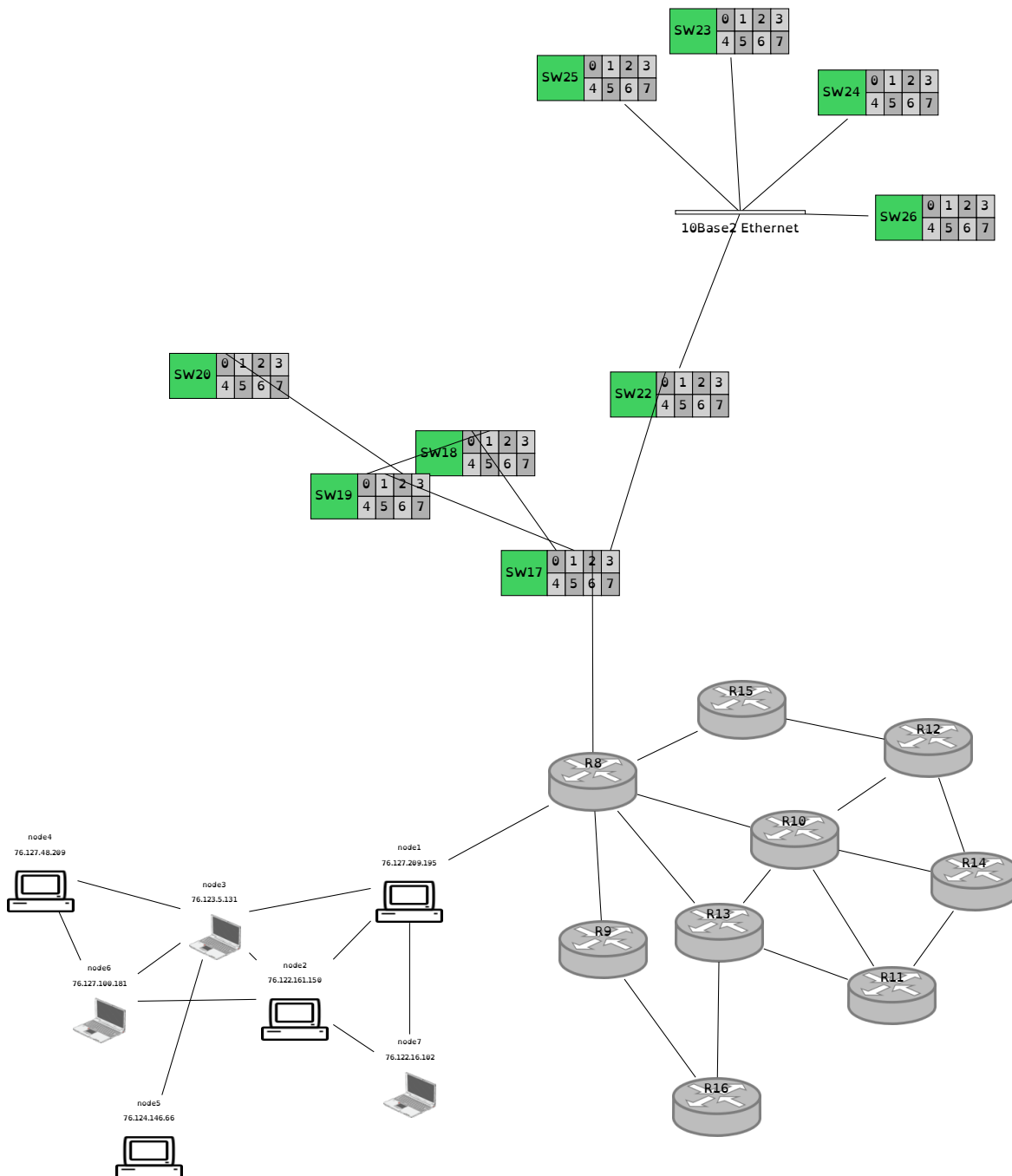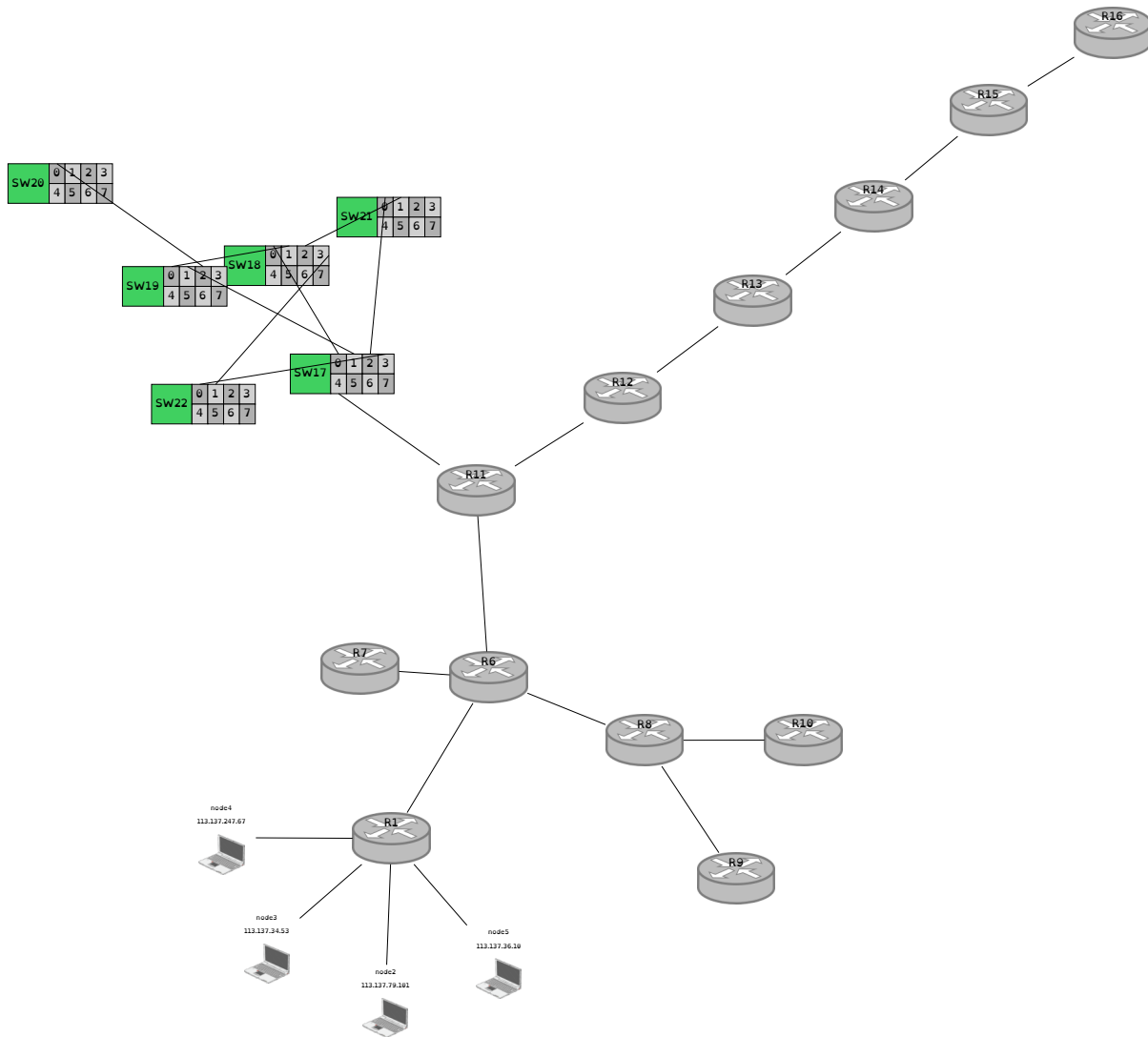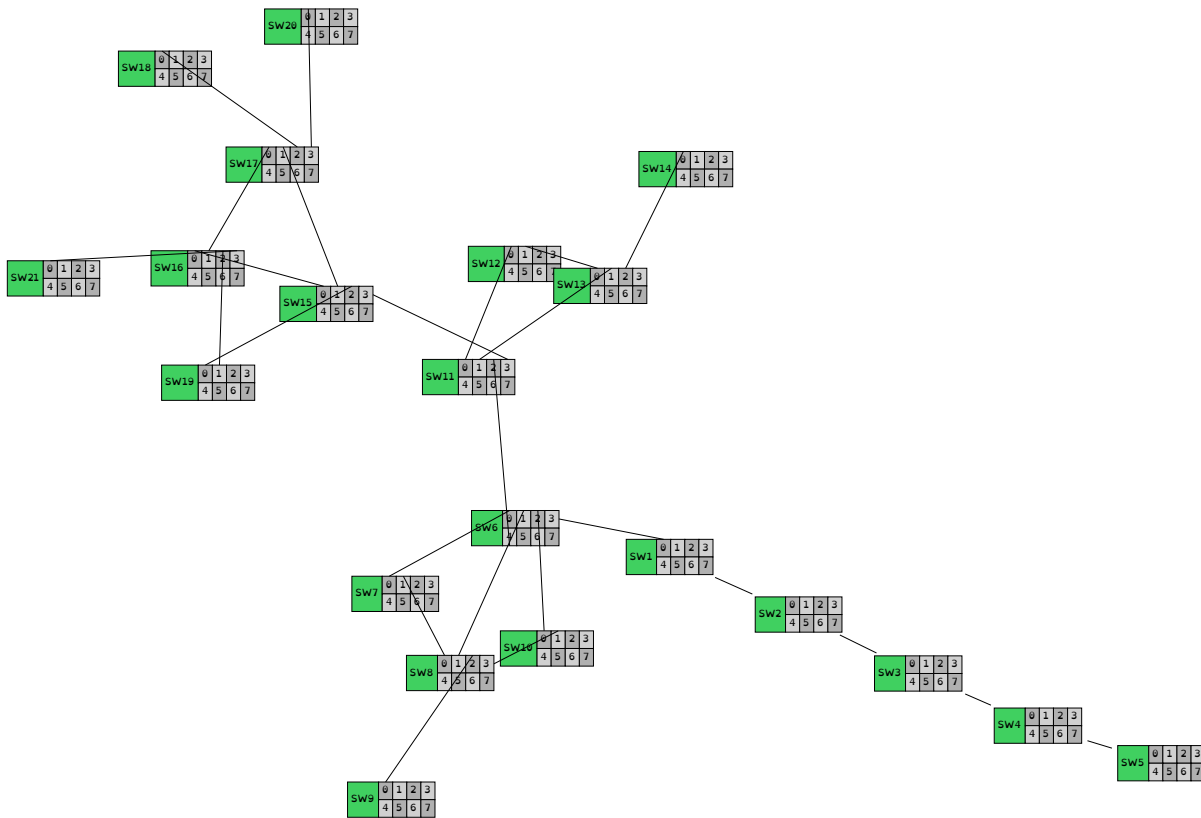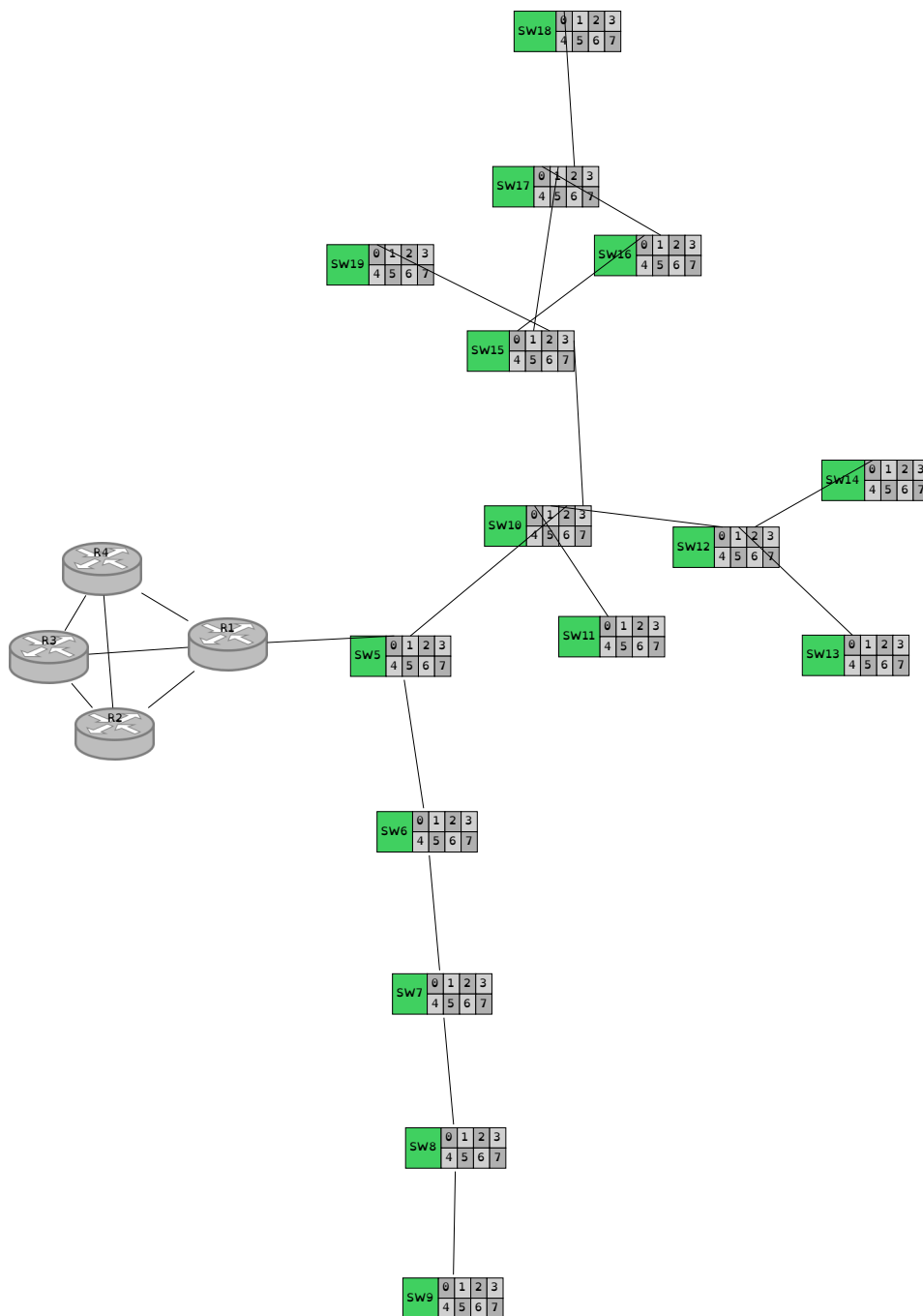## 2.20 bo: Does the following hybrid network topology contain an ad-hoc sub-network?
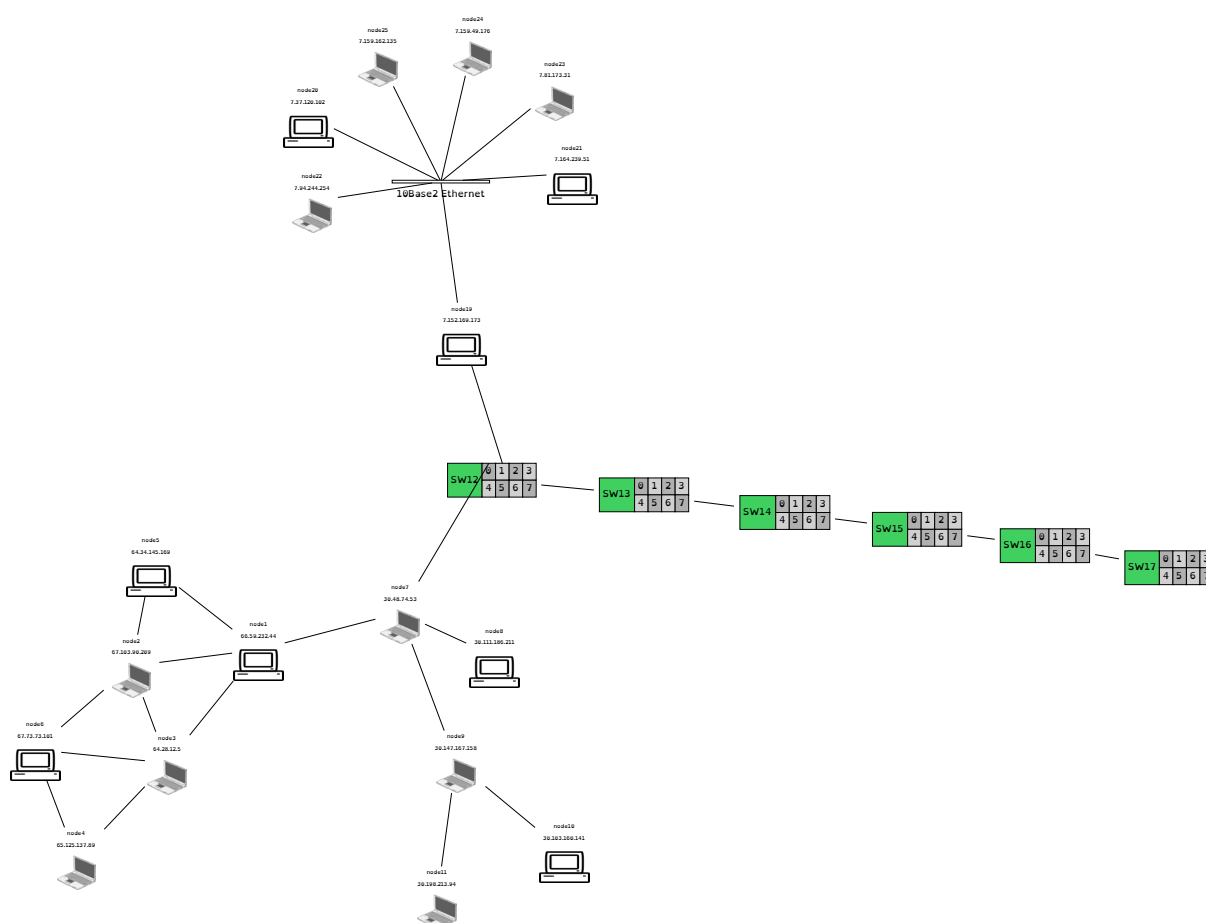
3 Understand Computer Network Topologies #3

For each question, you must record your answer in the unit3-answers.txt file in your git repository. Each question will require a multi-line answer that defines a network topology that satisfies the requirements. You define the network by listing the nodes and the links between them. You can use any of the following node types:

Description	Symbol
node	A computer 129.69.44.171
laptop	A laptop 10.0.0.14

Description	Symbol
ap	A Wi-Fi Access Point 10.0.0.1
switch	SW1 0 1 2 3 4 5 6 7
router	A Router
bus	

You do this by placing a unique number after the node type, and listing connected pairs of nodes, one per line. For example, the following answer:

```
# Question 'xw': Define a network that consists of a switch, a bus and a Wi-Fi access point,
#  each with at least one end device, joined by a router
BEGIN:xw
router1 switch2:0
router1 ap5
router1 bus6
ap5 laptop4
node3 switch2:1
node7 bus6
node8 bus6
END:xw:
```

Would define a network like this (ignore the IP addresses on some nodes. They are added in by the automatic network visualiser, but are meaningless for these questions):

laptop4
0.0.0.0

ap5

router1

switch2 | 0 | 1 | 2 | 3 |
| 4 | 5 | 6 | 7 |

node3
0.0.0.0

node7
0.0.0.0

bus6

node8
0.0.0.0

Note that the order of the links doesn't matter. Also note that if you wish a link to target a specific port on a switch, this is done by the $:n$ notation, as shown in this example.

For your convenience, when the marking script is run, it will also generate files called `unit3-net-graph-xx.p` that will contain a visualisation of the network, so that you can check the topology. But note that this will only be updated when I run the marking the script.

3.1 bp: Define a network that consists of a star network and a tree network connected by a laptop

You must write your answer in the unit3-answers.txt *text file in your github repository between the lines* BEGIN:bp *and* END:bp.

3.2 bq: Define a network that consists of a ring network and a ring network connected by a bus

You must write your answer in the unit3-answers.txt *text file in your github repository between the lines* BEGIN:bq *and* END:bq.

3.3 br: Define a network that consists of a ring network and a tree network connected by a router

You must write your answer in the unit3-answers.txt *text file in your github repository between the lines* BEGIN:br *and* END:br.

3.4 bs: Define a network that consists of a bus network and a full mesh network connected by a router

You must write your answer in the unit3-answers.txt *text file in your github repository between the lines* BEGIN:bs *and* END:bs.

3.5 bt: Define a network that consists of a full mesh network and a star network connected by a router

You must write your answer in the unit3-answers.txt *text file in your github repository between the lines* BEGIN:bt *and* END:bt.

3.6 bu: Define a network that consists of a ring network and a full mesh network connected by a node

You must write your answer in the `unit3-answers.txt` *text file in your github repository between the lines* `BEGIN:bu` *and* `END:bu`.

3.7 bv: Define a network that consists of a ad-hoc network and a ring network connected by a node

You must write your answer in the `unit3-answers.txt` *text file in your github repository between the lines* `BEGIN:bv` *and* `END:bv`.

3.8 bw: Define a network that consists of a ring network and a star network connected by a switch

You must write your answer in the `unit3-answers.txt` *text file in your github repository between the lines* `BEGIN:bw` *and* `END:bw`.

3.9 bx: Define a network that consists of a bus network and a ad-hoc network connected by a laptop

You must write your answer in the `unit3-answers.txt` *text file in your github repository between the lines* `BEGIN:bx` *and* `END:bx`.

3.10 by: Define a network that consists of a ring network and a line network connected by a bus

You must write your answer in the `unit3-answers.txt` *text file in your github repository between the lines* `BEGIN:by` *and* `END:by`.

3.11 bz: Define a network that consists of a line network and a full mesh network connected by a router

You must write your answer in the unit3-answers.txt *text file in your github repository between the lines* BEGIN:bz *and* END:bz.

3.12 ca: Define a network that consists of a line network and a ring network connected by a laptop

You must write your answer in the unit3-answers.txt *text file in your github repository between the lines* BEGIN:ca *and* END:ca.

3.13 cb: Define a network that consists of a star network and a full mesh network connected by a switch

You must write your answer in the unit3-answers.txt *text file in your github repository between the lines* BEGIN:cb *and* END:cb.

3.14 cc: Define a network that consists of a line network and a wireless network connected by a bus

You must write your answer in the unit3-answers.txt *text file in your github repository between the lines* BEGIN:cc *and* END:cc.

3.15 cd: Define a network that consists of a bus network and a wireless network connected by a laptop

You must write your answer in the unit3-answers.txt *text file in your github repository between the lines* BEGIN:cd *and* END:cd.

3.16 ce: Define a network that consists of a bus network and a ad-hoc network connected by a laptop

You must write your answer in the `unit3-answers.txt` *text file in your github repository between the lines* `BEGIN:ce` *and* `END:ce`.

3.17 cf: Define a network that consists of a wireless network and a star network connected by a laptop

You must write your answer in the `unit3-answers.txt` *text file in your github repository between the lines* `BEGIN:cf` *and* `END:cf`.

3.18 cg: Define a network that consists of a line network and a tree network connected by a switch

You must write your answer in the `unit3-answers.txt` *text file in your github repository between the lines* `BEGIN:cg` *and* `END:cg`.

3.19 ch: Define a network that consists of a star network and a bus network connected by a node

You must write your answer in the `unit3-answers.txt` *text file in your github repository between the lines* `BEGIN:ch` *and* `END:ch`.

3.20 ci: Define a network that consists of a tree network and a star network connected by a node

You must write your answer in the `unit3-answers.txt` *text file in your github repository between the lines* `BEGIN:ci` *and* `END:ci`.

3.21 cj: Define a network that would be suitable for a Client-Server architecture

Your network should connect client devices node1, node2, node3, laptop4, laptop5 and laptop6 to one or more servers over an internet-network. You can add as many other devices (switches, routers, nodes, access points, busses etc) to the network as you wish, using the same naming scheme as in the previous section.

You must write your answer in the unit3-answers.txt *text file in your github repository between the lines* BEGIN:cj *and* END:cj.

Question#	Description
cj	Define a network that would be suitable for a client-server architecture.
ck	Describe the network from question cj, and explain the features of it that make it suitable for a client-server architecture..

3.22 cl: Define a network that would be suitable for a Peer-to-Peer architecture

You can add as many other devices (switches, routers, nodes, access points, busses etc) to the network as you wish, using the same naming scheme as in the previous section.

You must write your answer in the unit3-answers.txt *text file in your github repository between the lines* BEGIN:cl *and* END:cl.

Question#	Description
cl	Define a network that would be suitable for a peer-to-peer architecture.
cm	Describe the network from question cl, and explain the features of it that make it suitable for a peer-to-peer architecture..

4 Lecture Material Comprehension

The following questions are designed with two purposes in mind:

1. To help you engage with the lecture materials; and

2. To help generate a wide range of questions for the quizzes in this topic.

The second goal is not mandatory for you. However, if you are willing for the answers you provide to the questions in this section to be used in future quizzes in this topic, you are requested to answer the following question as follows you will not be penalised if you do not give this permission

Question#	Description
cn	Are you willing to release your following answers in this section from all copyrights, i.e., release them into the public domain, including so that they can be included in quizzes in this topic? you will not be penalised or treated any differently if you do not choose to give this permission

It is important that you answer this question with 'y', if you do decide that you would like to do this (but again, you have no obligation to do so, and you will not be treated differently whether or not you give permission).

The entry in `unit3-answers.txt` would thus look like:

```
# Question 'cn': Do you commit the following answers to the public domain
#  and disclaim all copyrights in them?
cn=y
```

For each question, you must record your answer in the unit3-answers.txt file in your git repository. For each question, you are required to write a statement that is either true or false about the material in the indicated lecture slide.

For example, if you were asked 'write a **true** statement about the content of Slide 2 of Chapter 1', you would put the statement at the end of the `rj=` line in the file `unit3-answers.txt`. For example, if your statement was 'One of the problems addressed in this chapter is how to build scalable

networks', you would write:

Question#	Description
pz	Write a **true** statement about the content of Slide 2 of Chapter 1

The entry in `unit3-answers.txt` would thus look like:

```
# Question 'pz': Write a true statement about the content of Slide 2 of Chapter 1

pz=One of the problems addressed in this chapter is how to build scalable networks
```

Templates for each answer are provided in `unit3-answers.txt` *for your convenience.*

If you are asked to write a statement that is false, i.e., untrue, think about statements that someone who has not worked through the material might think would be true. Be creative! Be devious!

Question#	Description
co	*Write a* **false** *statement about the content of Slide 8 of Chapter 3*
cp	*Write a* **false** *statement about the content of Slide 37 of Chapter 1*
cq	*Write a* **true** *statement about the content of Slide 44 of Chapter 1*
cr	*Write a* **false** *statement about the content of Slide 81 of Chapter 3*
cs	*Write a* **true** *statement about the content of Slide 85 of Chapter 2*
ct	*Write a* **false** *statement about the content of Slide 113 of Chapter 2*
cu	*Write a* **true** *statement about the content of Slide 62 of Chapter 2*
cv	*Write a* **false** *statement about the content of Slide 27 of Chapter 3*
cw	*Write a* **false** *statement about the content of Slide 139 of Chapter 2*
cx	*Write a* **false** *statement about the content of Slide 29 of Chapter 3*