Getting wireless to work in Linux

by

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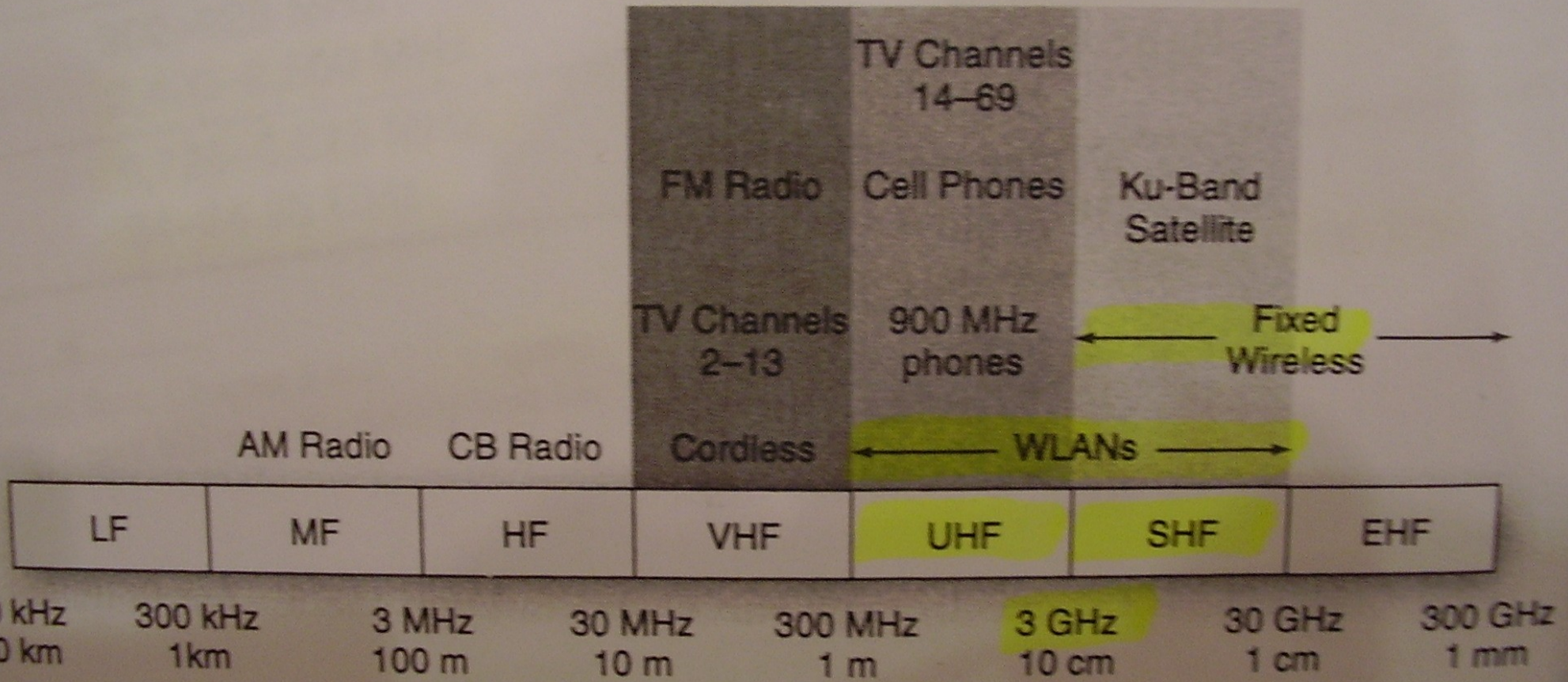
What is the Wireless Spectrum?

bands of spectrum, starting [illegible] called low frequency (LF), medium frequency (MF), high frequency (HF), very frequency (VHF), ultra high frequency (UHF), super high frequency (SHF), and mely high frequency (EHF). An overview of the current spectrum allocation in the ed States is given in Figure 8.1.



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the time this was written, the latest revision was dated December 8, 2003. The current version can be wnloaded at *http://www.fcc.gov/oet/spectrum/*.

BLE 8.2

e Industrial, Scientific, and Medical Bands

Frequency range	Band
13.553–13.567 MHz 26.957–27.283 MHz	HF
40.66–40.70 MHz	VHF
902–928 MHz 2,400–2,500 MHz	UHF
5,725–5,875 MHz 24–24.25 GHz	SHF

all from Chapter 3 that the frequency of visible light ranges from about 430 to 750 TH
0 times higher in frequency than the 300-GHz cutoff.

specification contains the following disclaimer:

ER 8

TABLE 8.5

Varieties of IEEE 802.11 WLAN

Spec.	Max data rate (Mb/s)	Freq. band	Modulation	Max. power[A] (mW)	Wi dep
802.11	2	2.4-GHz ISM	FHSS, DSSS	1,000	
	2	IR	PPM	2,000	
802.11a	54	5-GHz U-NII	OFDM	40–800[B]	
802.11b	11	2.4-GHz ISM	DSSS	1,000	
802.11g	54	2.4-GHz ISM	DSSS, OFDM	1,000	

A. Maximum power levels differ in countries other than the United States.

B. Maximum power depends on the exact frequencies being used.

What is Wireless (Mobile)?

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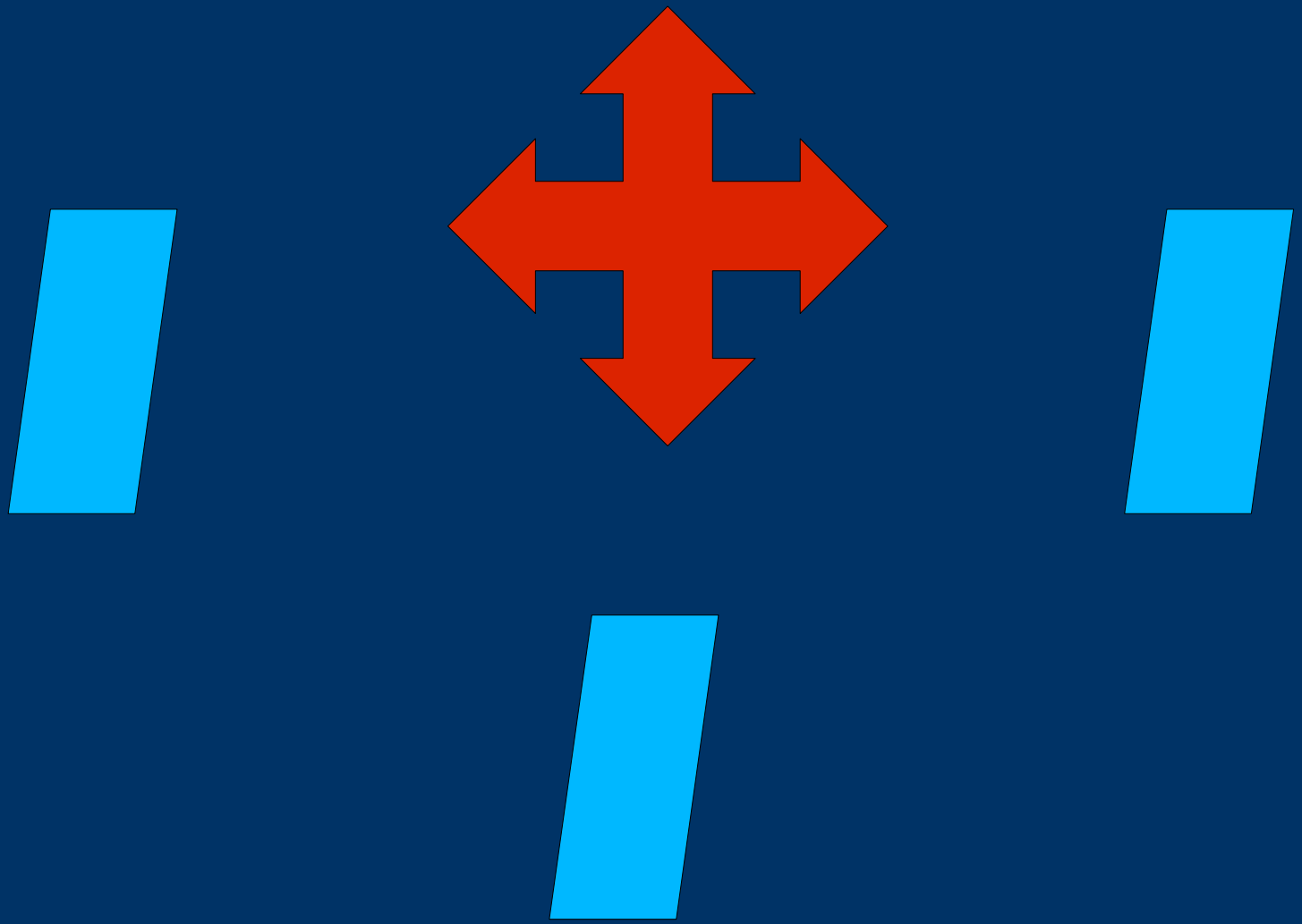

What is Wired (Fixed)?

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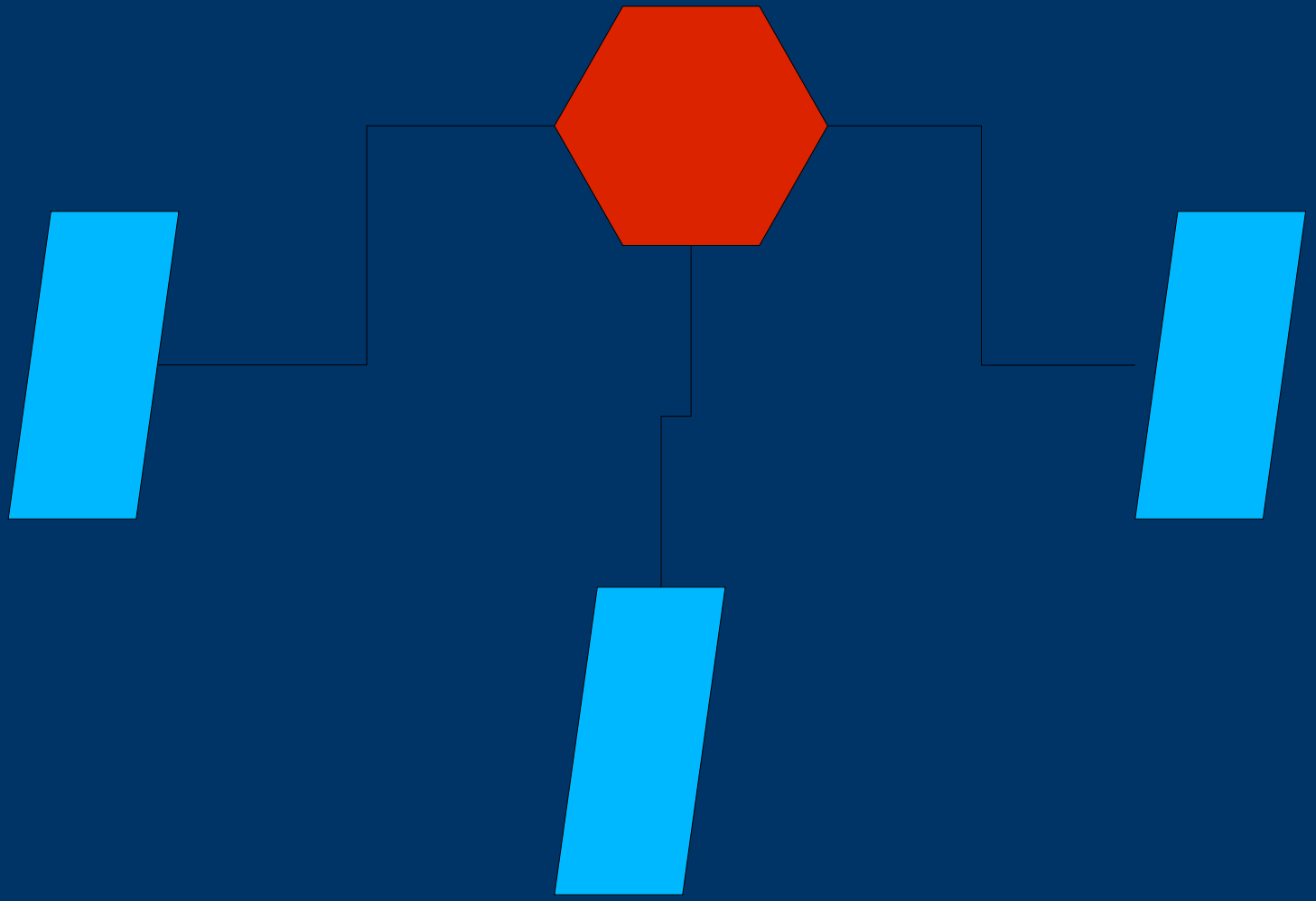

How is Wireless different?

How is Wireless different?

medium has no boundaries

unprotected from other signals

significantly less reliable than wire

lack full connectivity (all stations)

interference from other networks

802.11 Basic Service Set BSS

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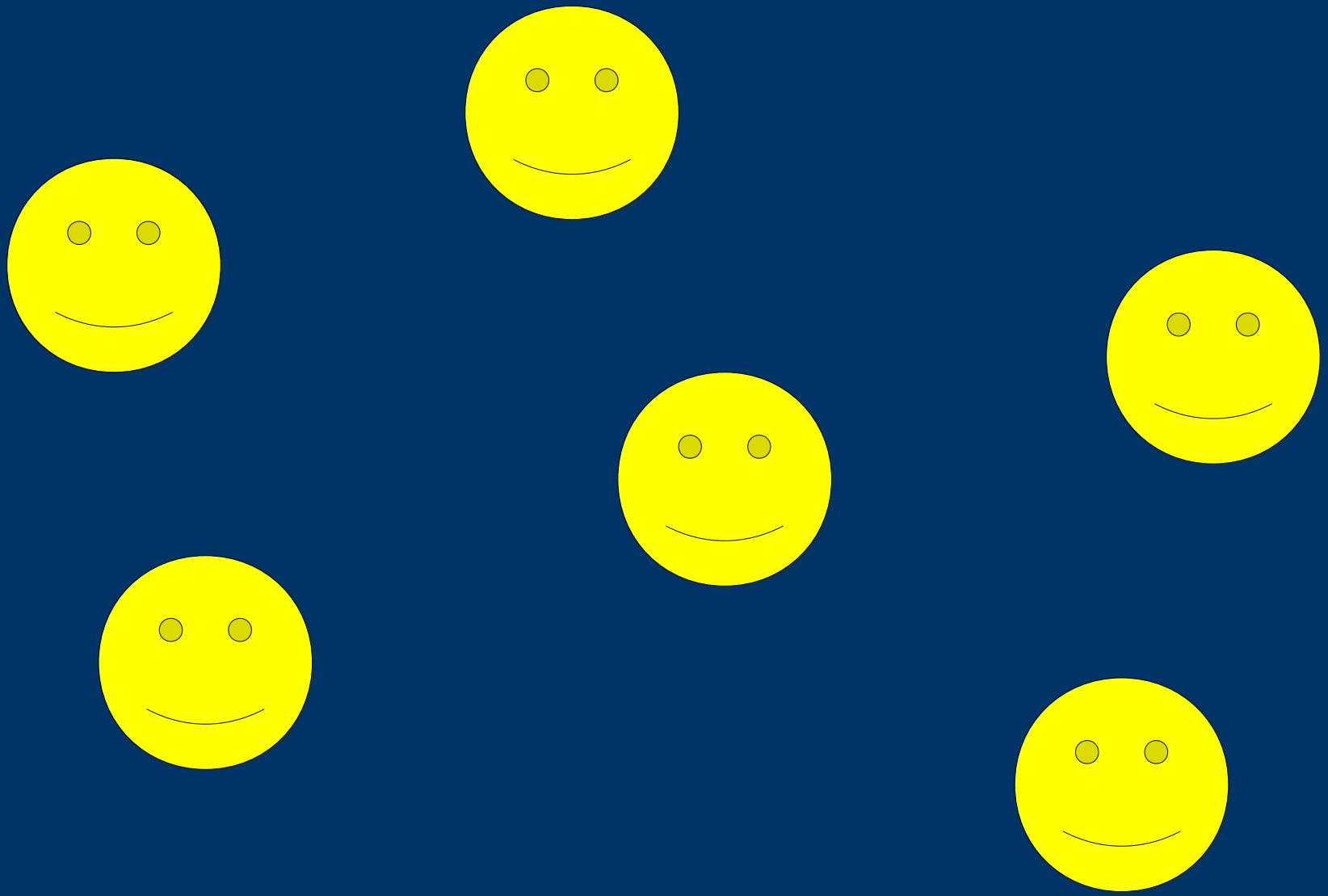
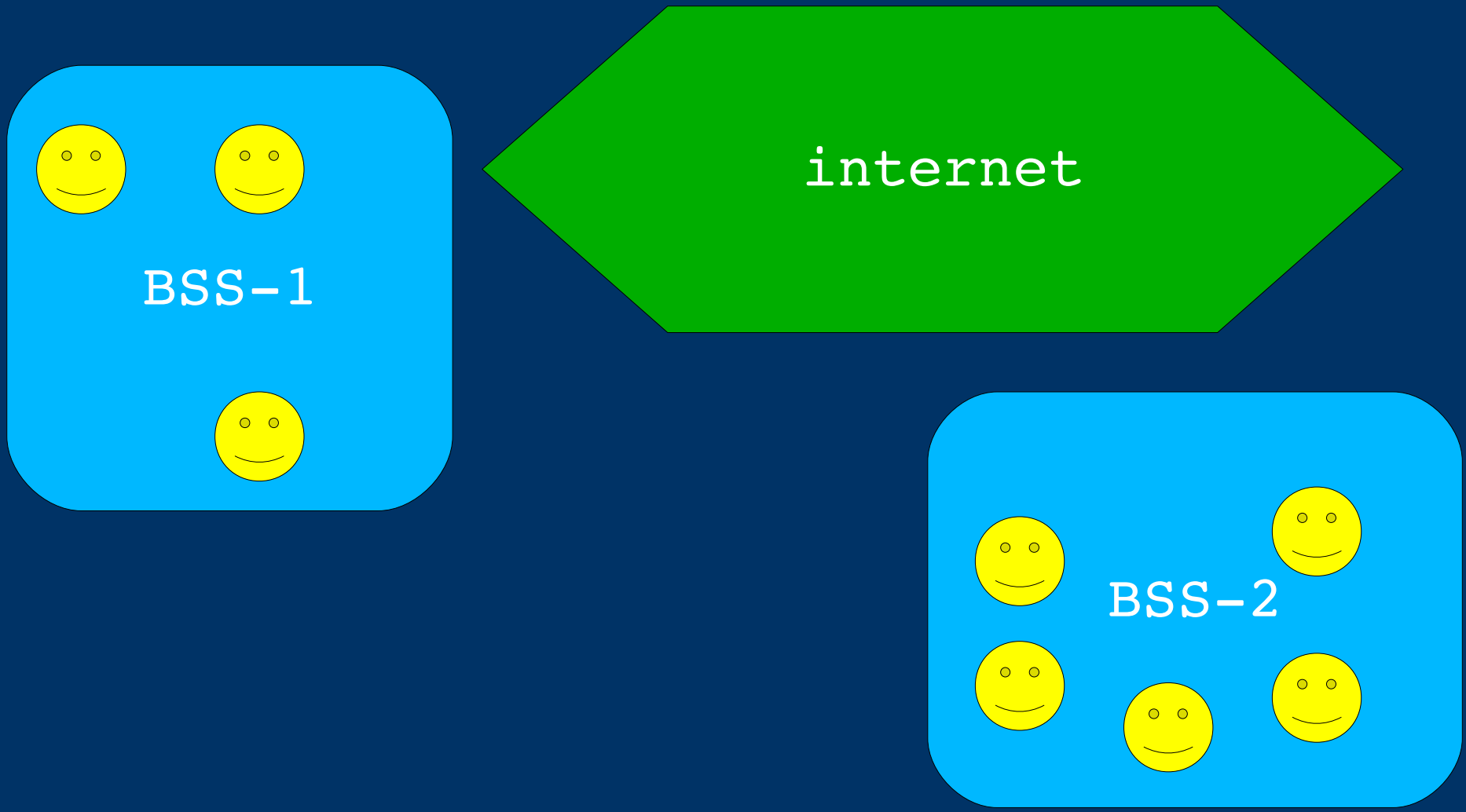
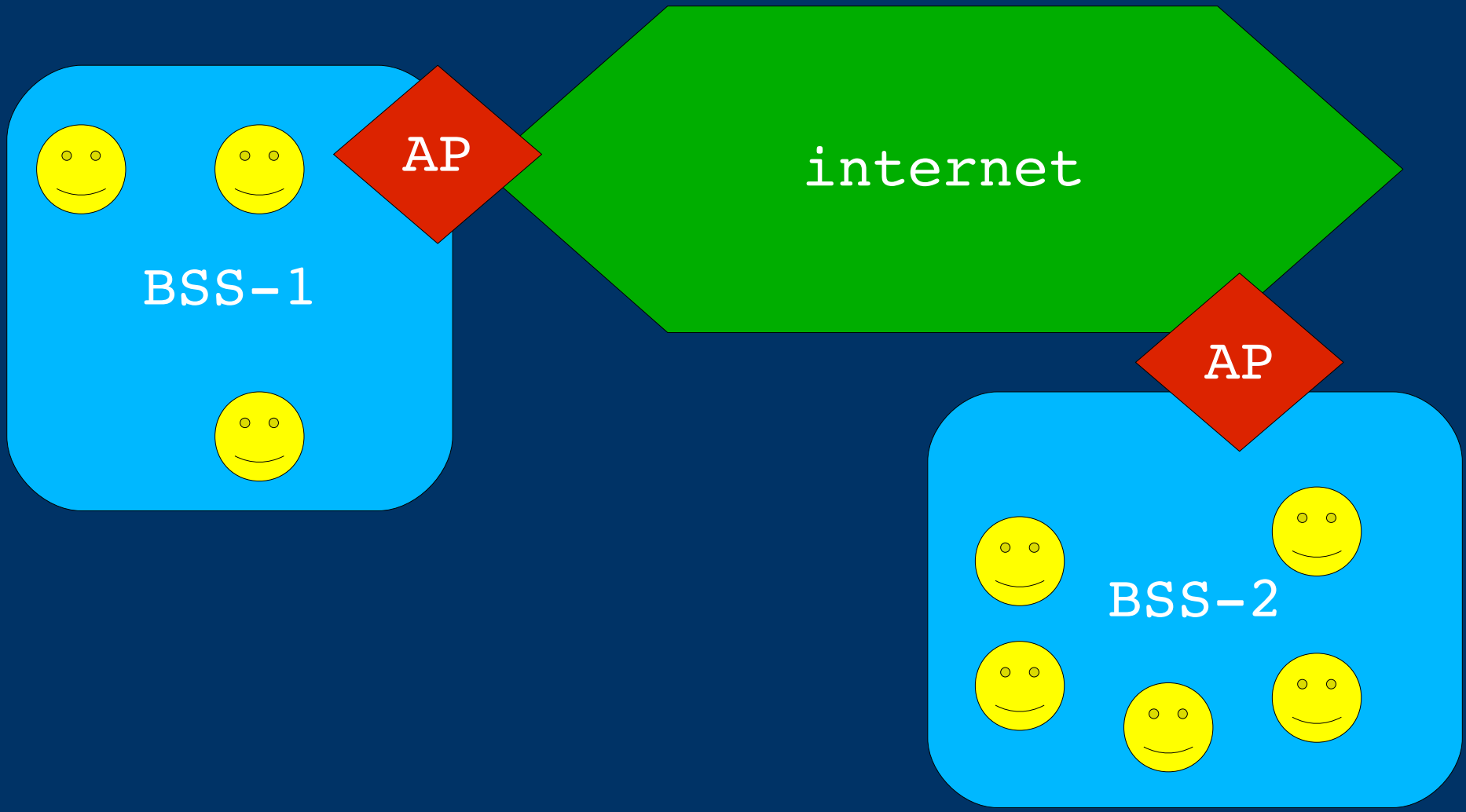


802.11 Extended Service Set ESS



802.11 Extended Service Set ESS



Use Mobile for:

factories

ad-hoc networks

hospitals

robots

Types of Network

Managed (Infrastructure)

Ad-Hoc (Peer-to-peer)

Aim of this Talk

To get you familiar with

wireless basics so you can

move on to use the high-order

GUI tools because you understand

what they are trying to do.

Demo. Of Wireless Activation

See how a card comes up in
managed and then in adhoc mode

Show how can configure it to be in
    adhoc mode
and then be assigned an ESSID
    lsgnet
but only when it is brought UP
does it create (2-3 seconds) a BSSID
    like   34:90:AF:23:06:3B

Let's do some Wireless Networking

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Follow the physical processes

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No recipes; work things out

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No recipes; work things out

Step by step; know where we are

Let's do some Wireless Networking

Follow the physical processes

No recipes; work things out

Step by step; know where we are

Identify and fix any problems

Example: Ad-Hoc Basic Service Set

No discussion of how to get card working

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No discussion of how to get card working

No discussion of various control methods

Example: Ad-Hoc Basic Service Set

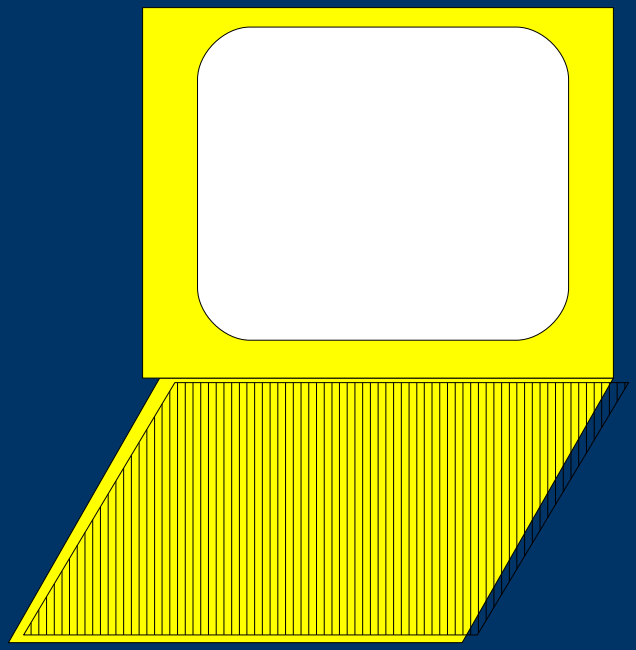
No discussion of how to get card working

No discussion of various control methods

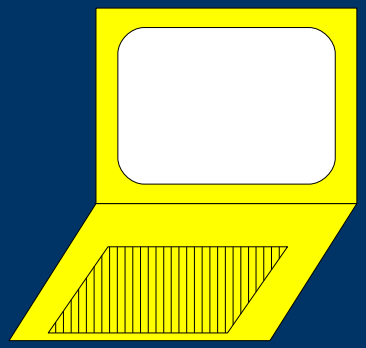
That shall be covered in the LSG Workshops

Your laptop does not have OOO

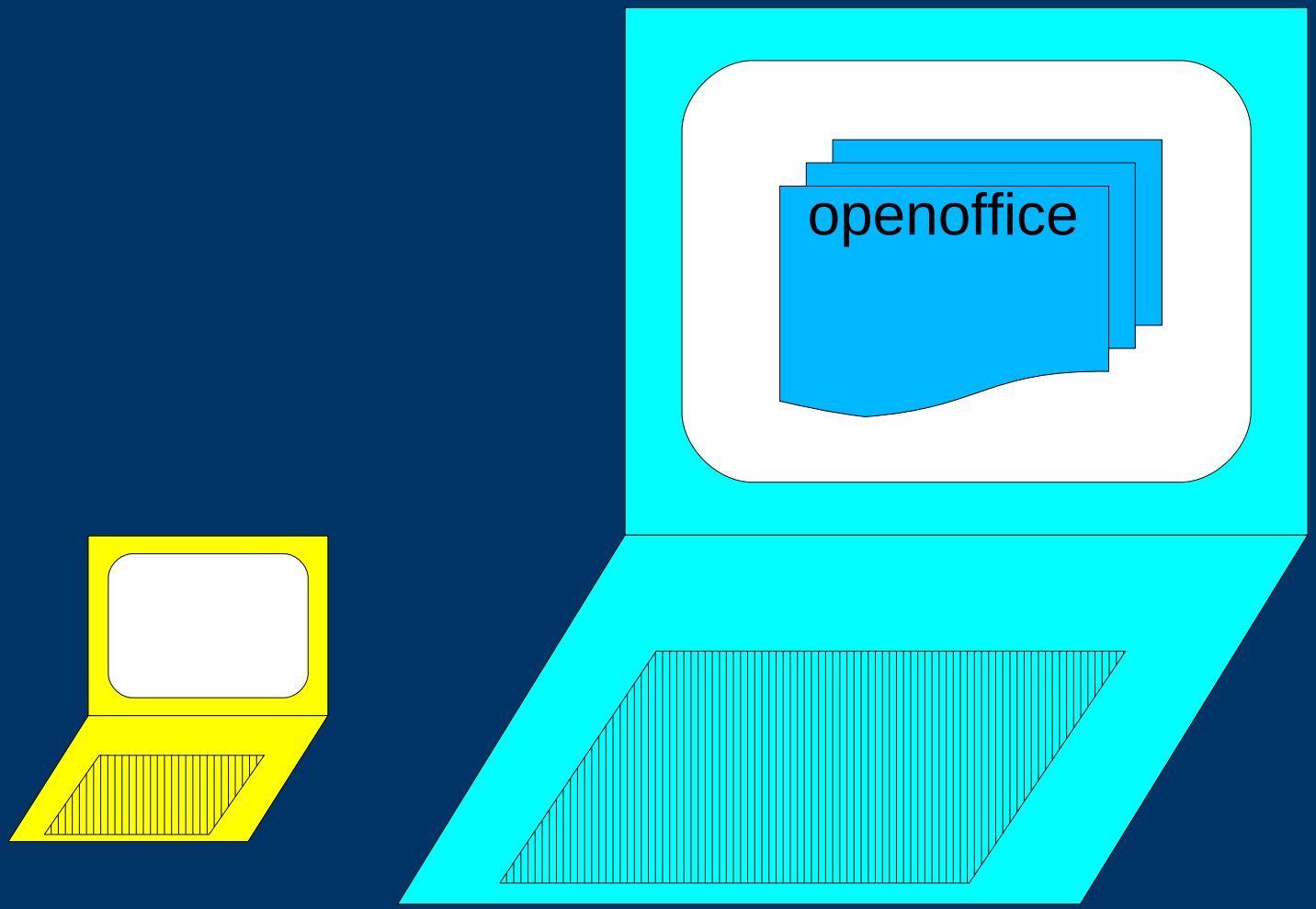
Your laptop does not have OOO



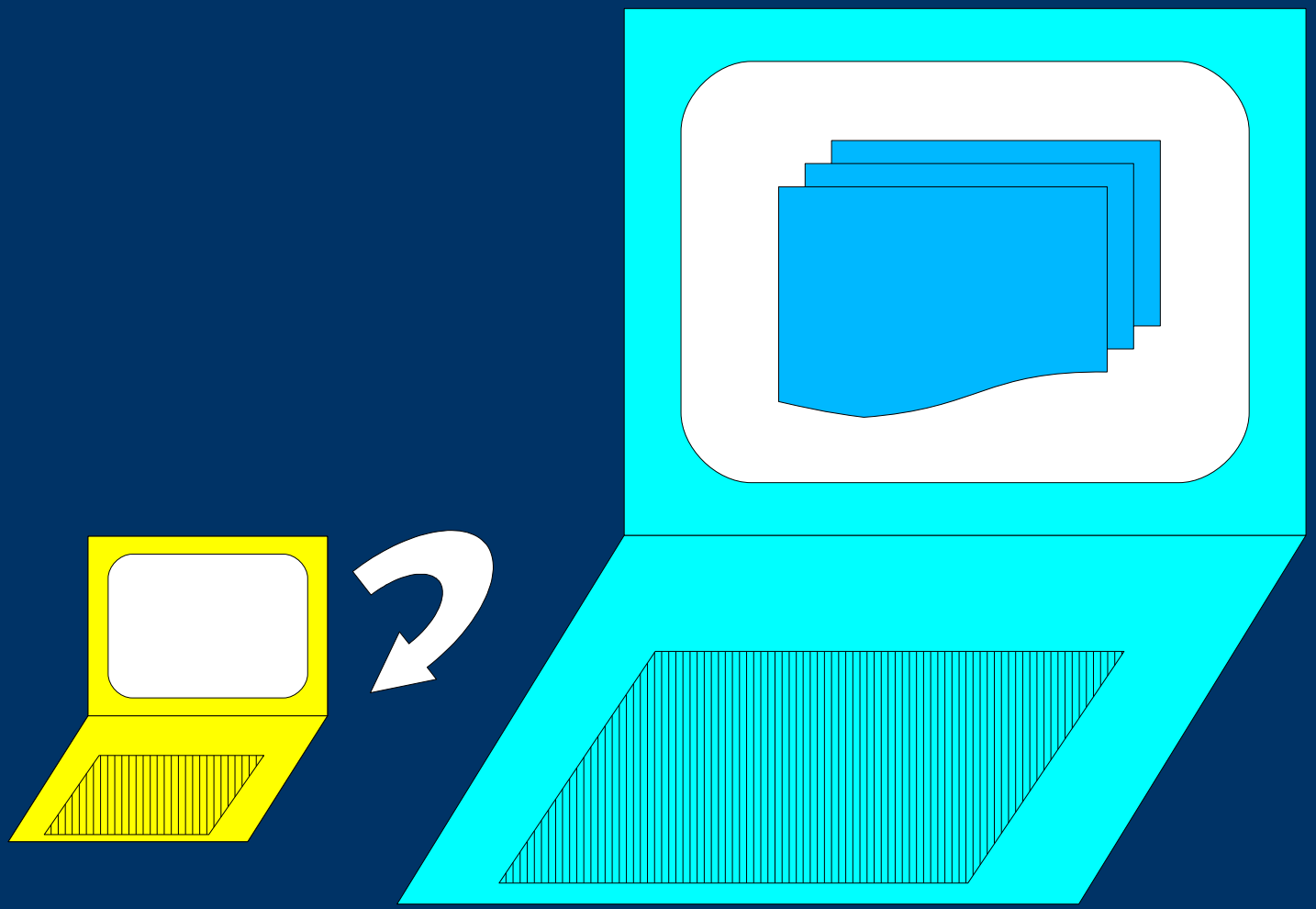
Your laptop does not have OOO



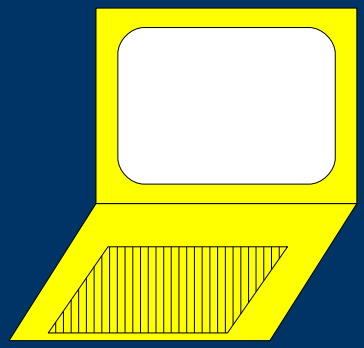
BigBlue has OOO installed

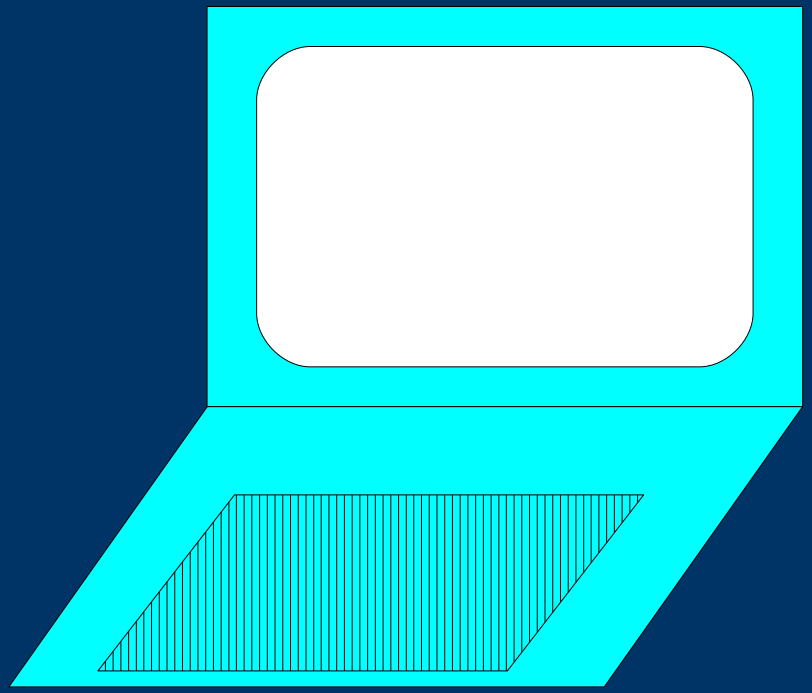


But you cannot log in to BigBlue

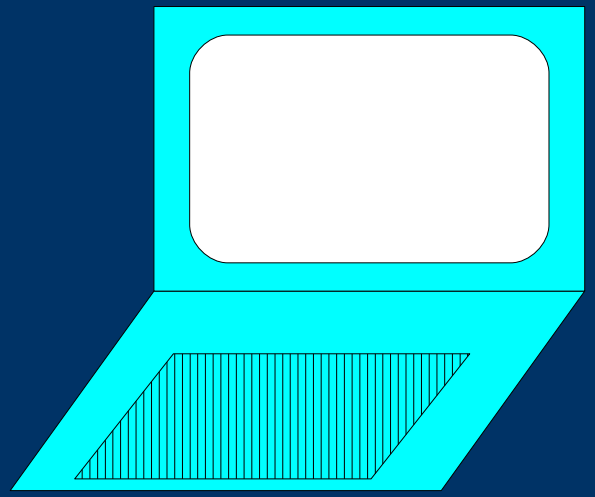


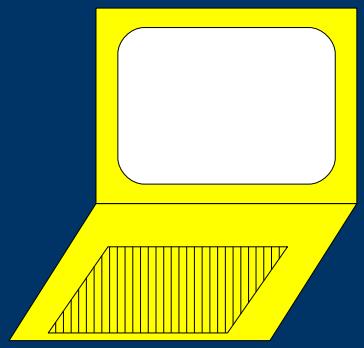
GreenMachine can login to BigBlue





So we shall form an Ad-Hoc network





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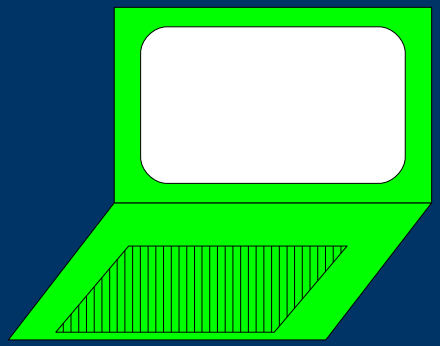
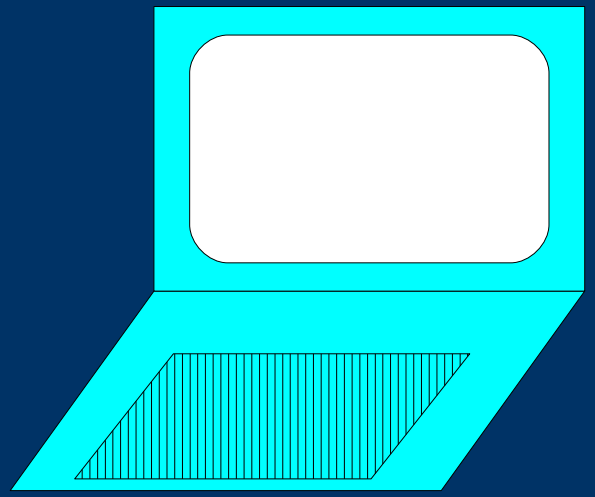
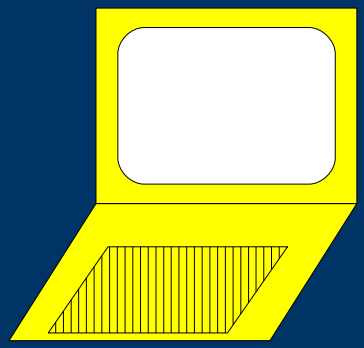
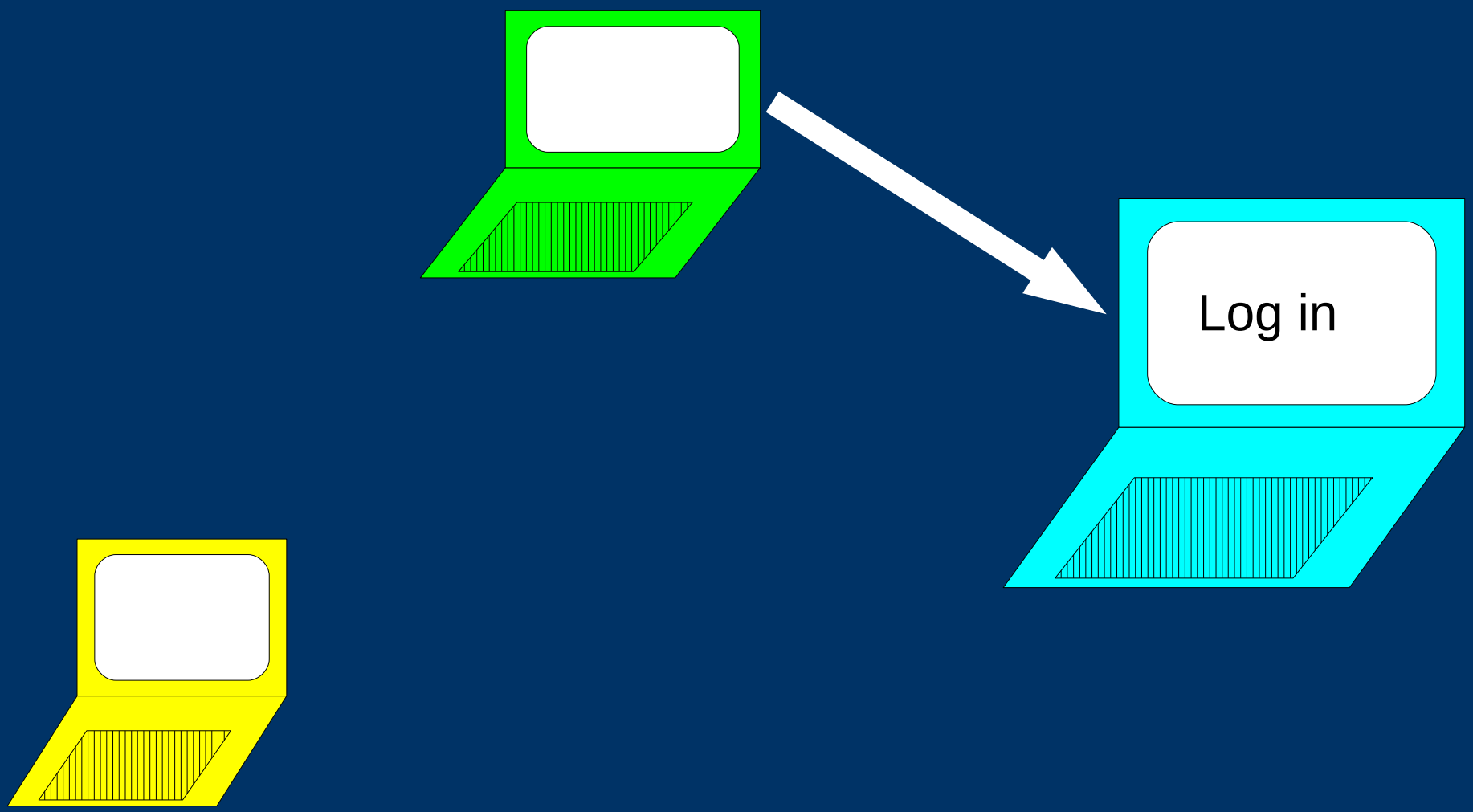


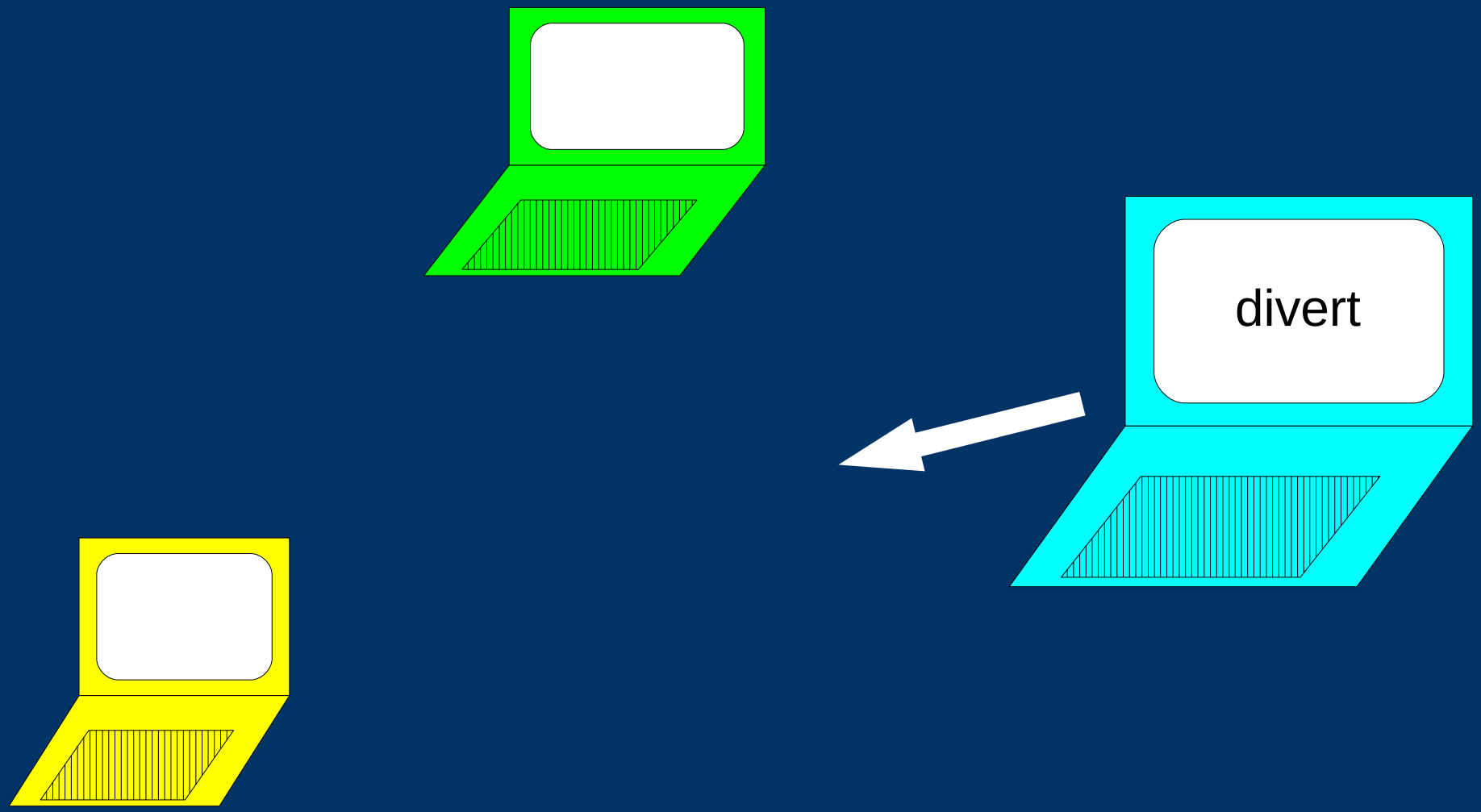




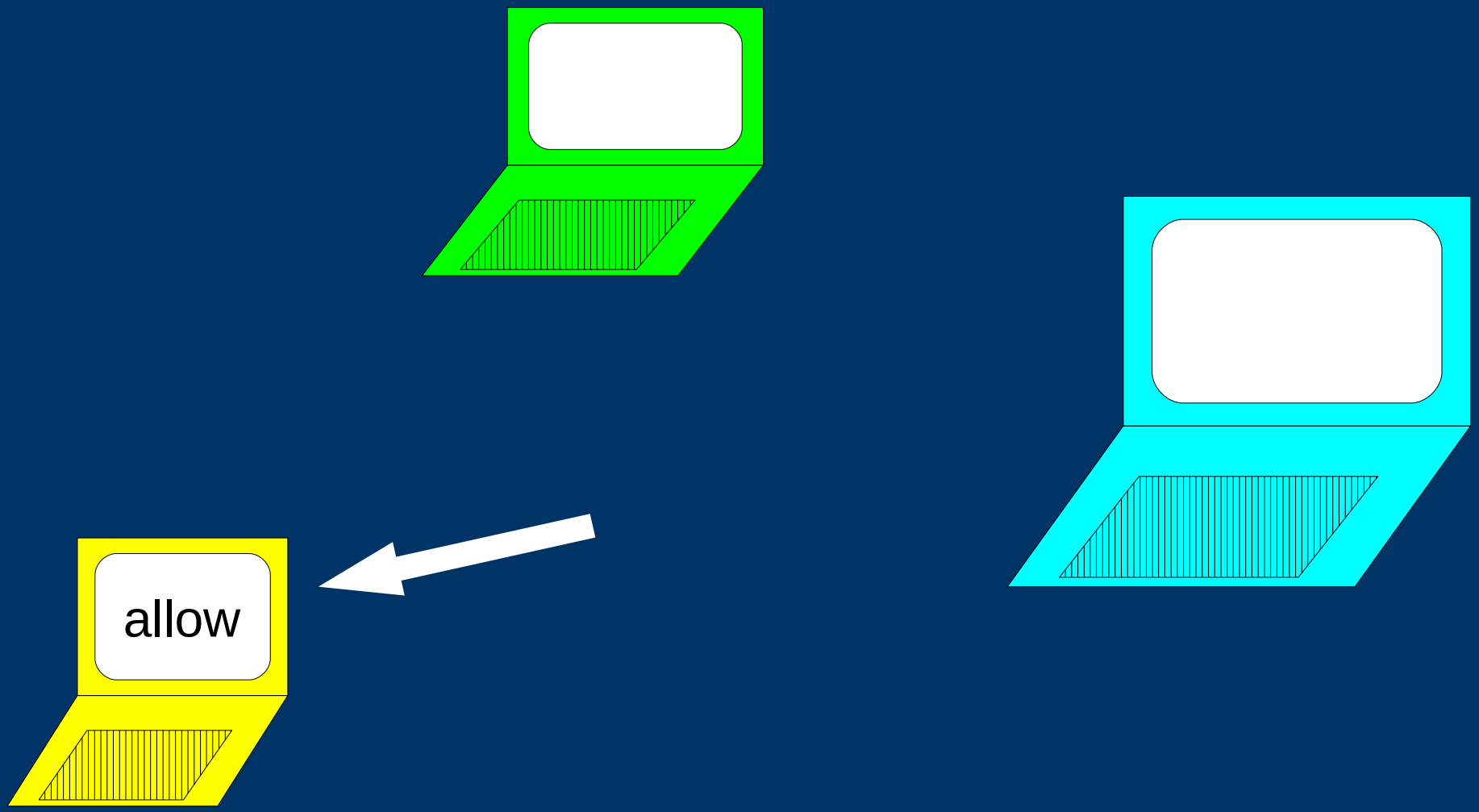
GreenMachine logs in to BigBlue



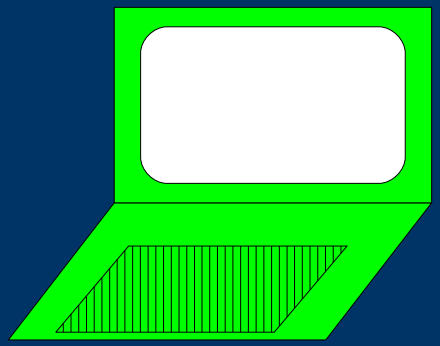
BigBlue diverts display to you

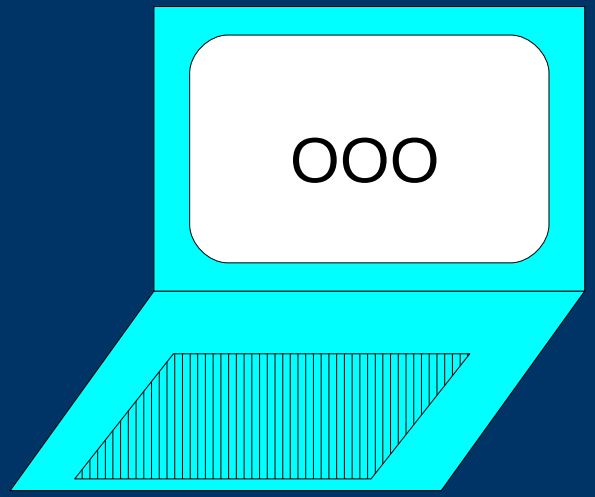


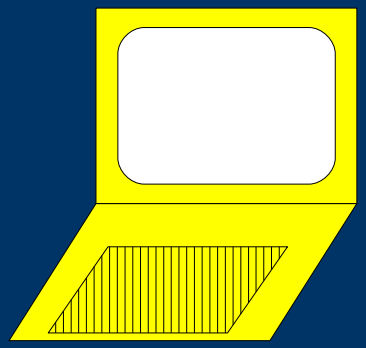
You allow X-requests from BigBlue



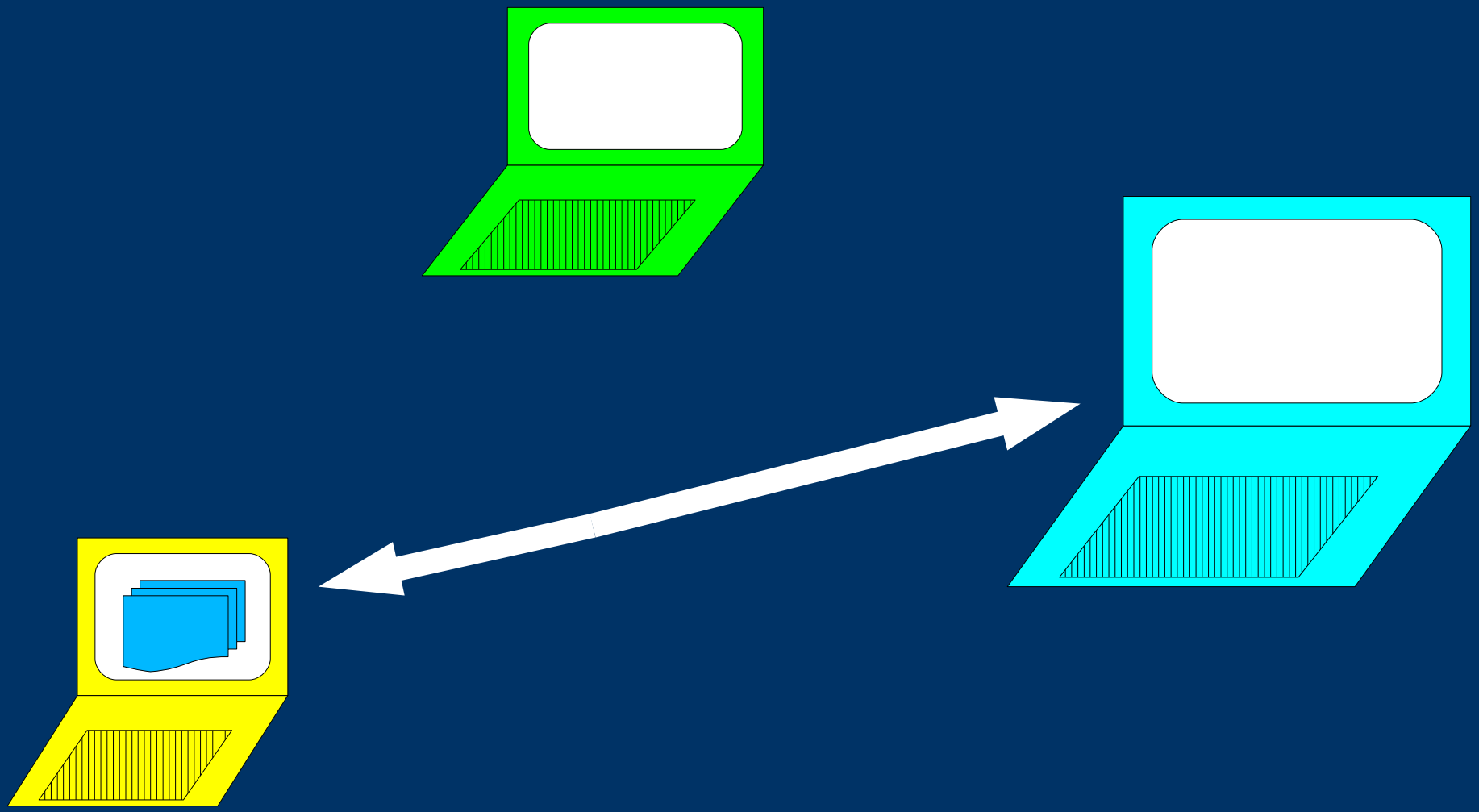
BigBlue starts OOO





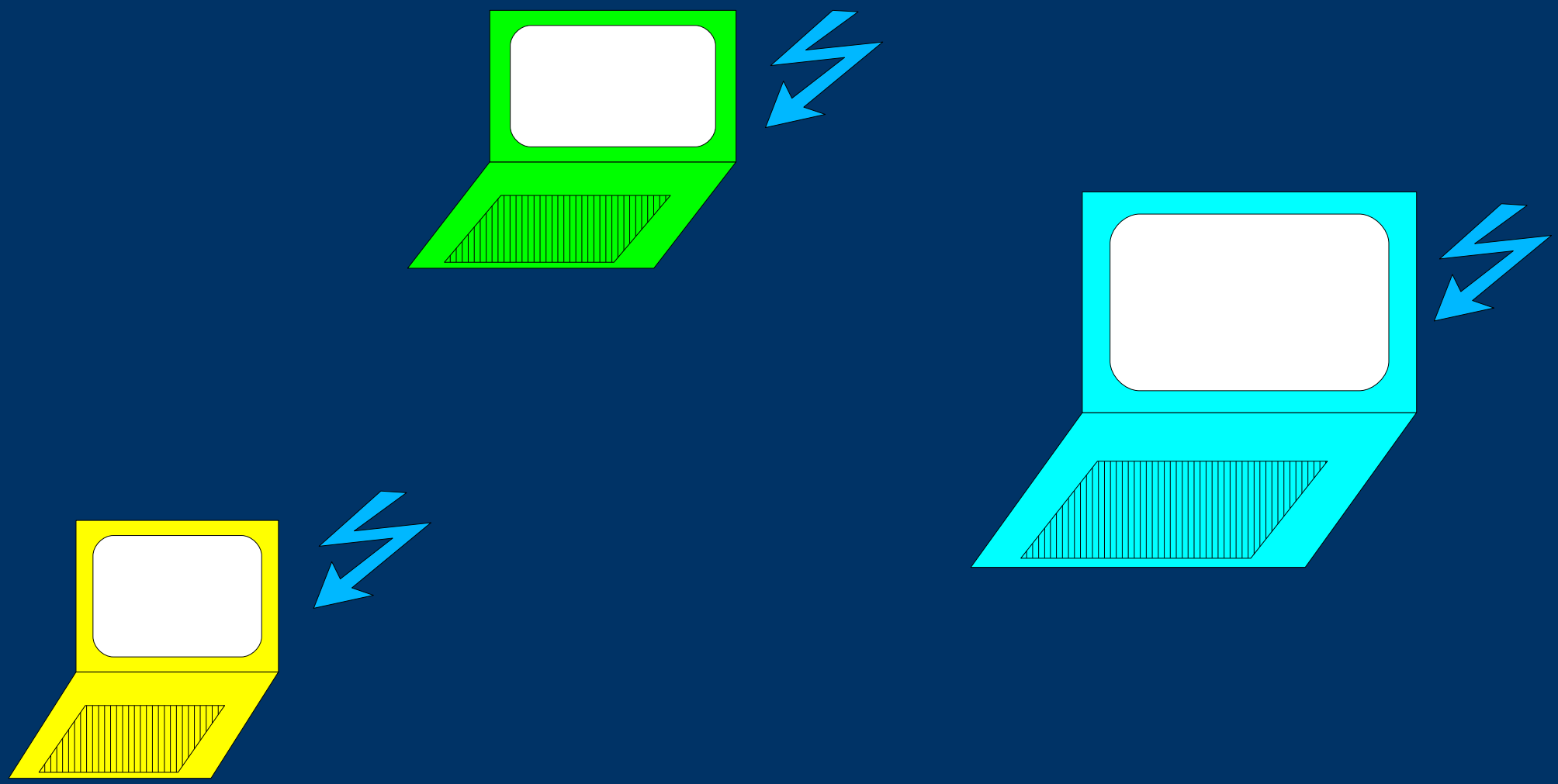


And you now control OOO



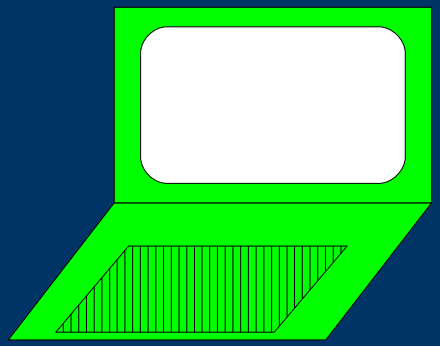
How create an Ad-Hoc network?

Set each NIC in 'ad-hoc' mode

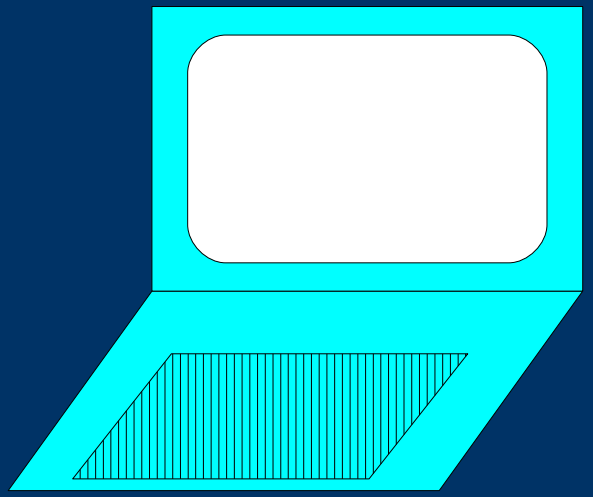


Each laptop 'associates'

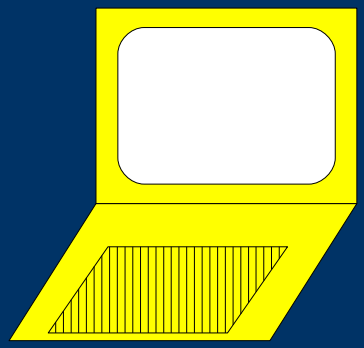
Each laptop defines IP address



10.0.0.11

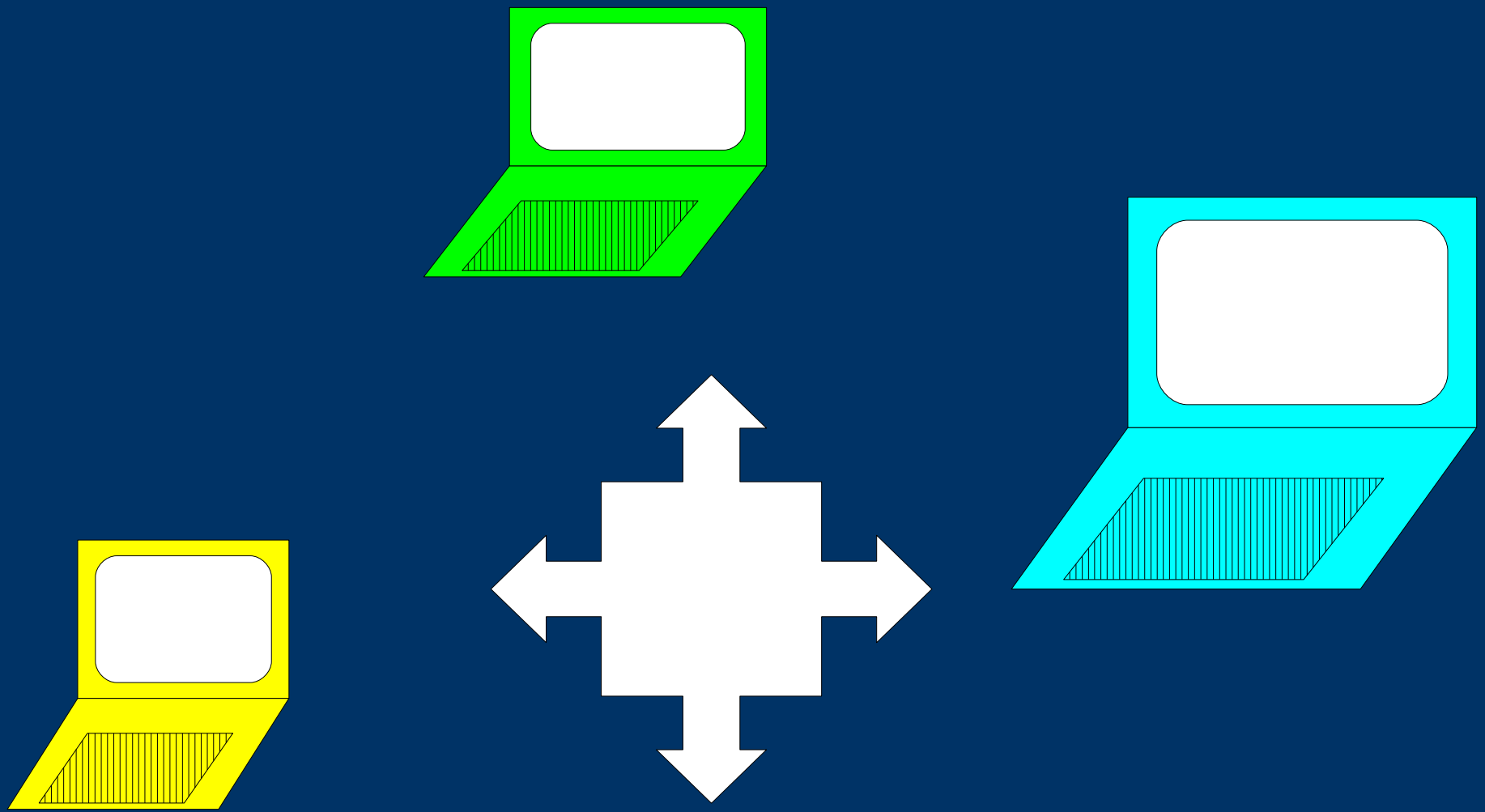


10.0.0.22

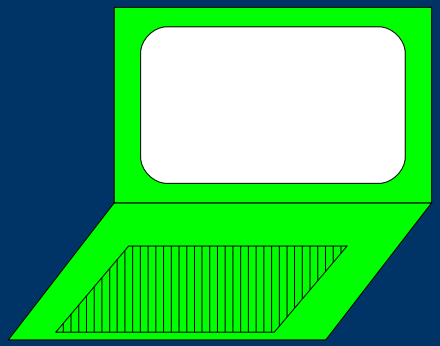


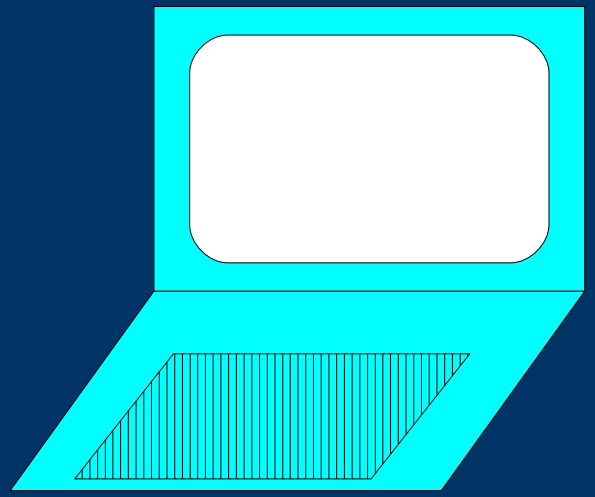
10.0.0.33

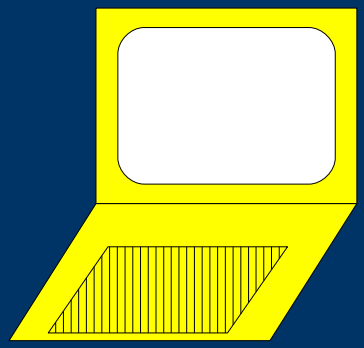
A network has now been created



You use TCP/IP commands



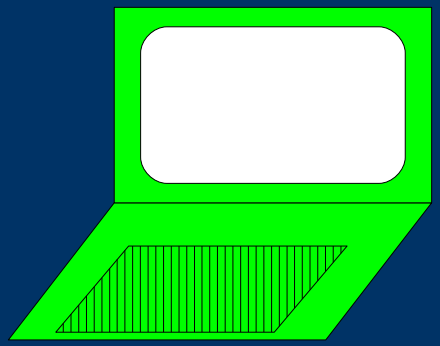


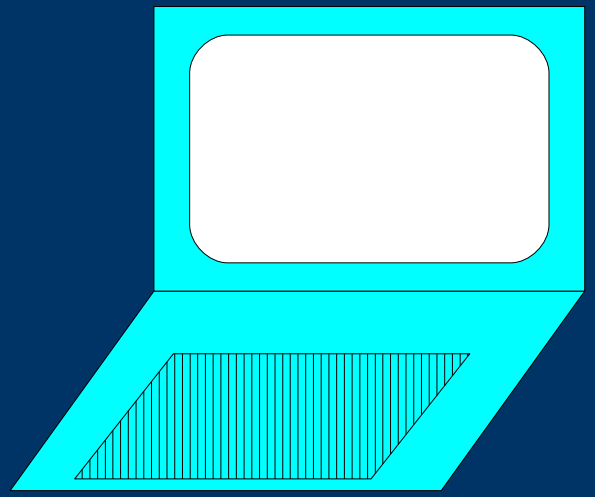


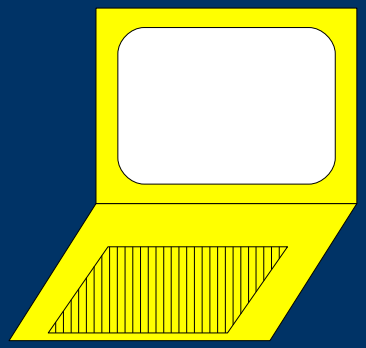
ping
ssh
scp
sftp
xhost

How do you do all this?

1. Form an Ad-Hoc network







Check that NIC is recognised

```
> dmesg
```

Check that NIC is recognised

```
> dmesg
pccard: cardbus card inserted
PCI: enabling device 0000:03
```

Check that NIC is on the bus

```
> lspci
```

Check that NIC is on the bus

```
> lspci
0000:03 Network Controller
RaLink RT2561/RT61 B 802.11g
```

Check that NIC modules loaded

```
> lsmod|grep rt61
```

Check that NIC modules loaded

```
> lsmod|grep rt61
rt61pci
rt2x00pci
rt2x00lib
mac80211
eeprom_93ex6      rt61pci
```

What is NIC interface called?

```
> /sbin/ifconfig -a
```

What is NIC interface called?

```
> /sbin/ifconfig -a
ra0
ethernet 00:1B:11:CA:03:A9
BROADCAST MULTICAST mtu 1500
```

Take interface down to configure

```
# ifconfig ra0 down
```

Put NIC into Ad-Hoc mode

```
# iwconfig ra0 mode ad-hoc
```

Put NIC into Ad-Hoc mode

```
# iwconfig ra0 mode ad-hoc
ra0
IEEE 802.11g  ESSID “”
Mode Ad-Hoc Frequency 2.412G
Access-Point: Not-Associated
```

Make NIC interface active

```
# ifconfig ra0 up
```

Make NIC interface active

```
# ifconfig ra0 up
ra0
ethernet 00:1B:11:CA:03:A9
UP BROADCAST MULTICAST
interrupt 11
```

Conduct a scan of area

```
# iwlist ra0 scan
```

Conduct a scan of area

```
# iwlist ra0 scan
ra0   scan completed
cell 01 Adr 00:15:E0:32:99:27
mode: Ad-Hoc
ESSID: “LSG-NET”
encryption key: off
```

Take down interface

```
# ifconfig ra0 down
ra0
ethernet 00:1B:11:CA:03:A9
BROADCAST MULTICAST
interrupt 11
```

Associate to network ESSID

```
# iwconfig ra0 essid “LSG-NET”
```

Activate: bring up interface

```
# ifconfig ra0 up; sleep 2
```

Define your IP address

```
# ifconfig ra0 $green
```

Define your IP address

```
ra0
ethernet 00:1B:11:CA:03:A9
inet adr:  10.0.0.11
Broadcast: 10.0.0.255
NetMask:   255.255.255.0
UP BROADCAST MULTICAST
```

Define all IP addresses as text

```
> green=10.0.0.11
> blue=10.0.0.22
> yellow=10.0.0.33
```

Ensure you can contact others

```
> ping $blue
```

Ensure you can contact others

```
> ping $blue
ping 10.0.0.22
64 bytes    time = 3.01 ms
64 bytes    time = 1.23 ms
64 bytes    time = 0.34 ms
```

2. Set up your X display

Got to a spare text terminal

```
CTRL-ALT-F2
```

Start an X-Server on display #1

```
> X :1 &
```

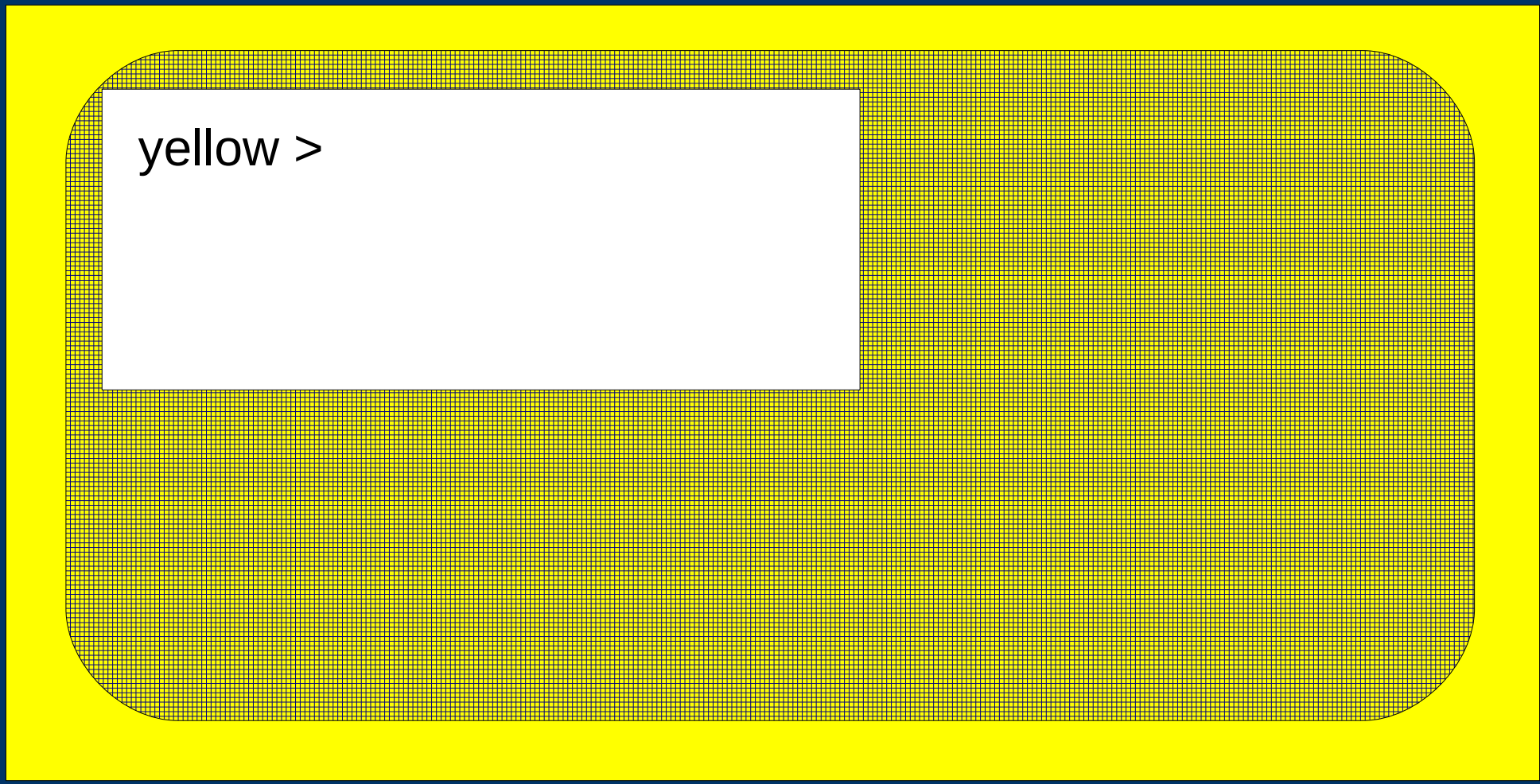
Get an xterminal on that display

```
> xterm -display :1.0 &
```

Go to that display

CTRL-ALT-F8

Focus in the xterminal



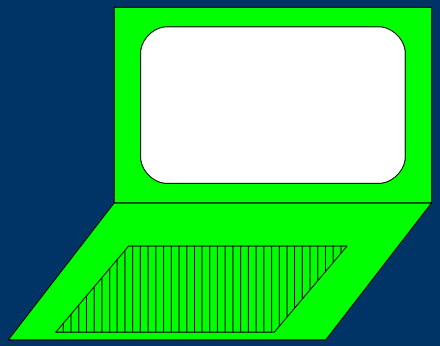
Allow X requests from BigBlue

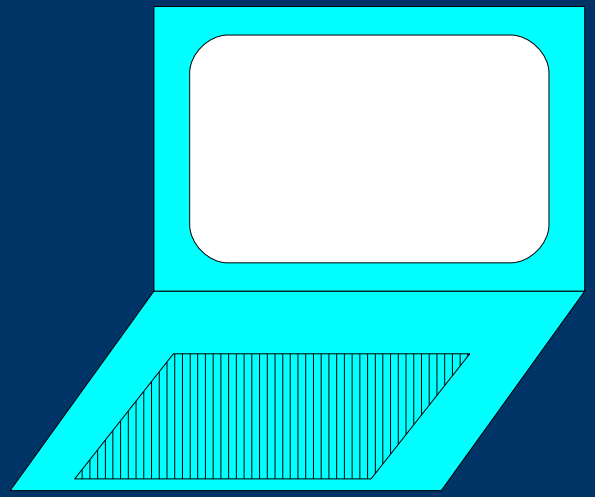
yellow > xhost +10.0.0.22

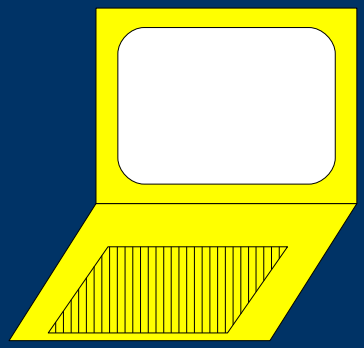
10.0.0.22 being added to access control list

3. Establish the OOO program

You use TCP/IP commands







ping
ssh
scp
sftp

GreenMachine logs in to BigBlue

```
> ssh green@$bigblue
```

GreenMachine logs in to BigBlue

```
> ssh green@$bigblue
password: ******
green@bigblue >
```

And diverts BigBlue display to you

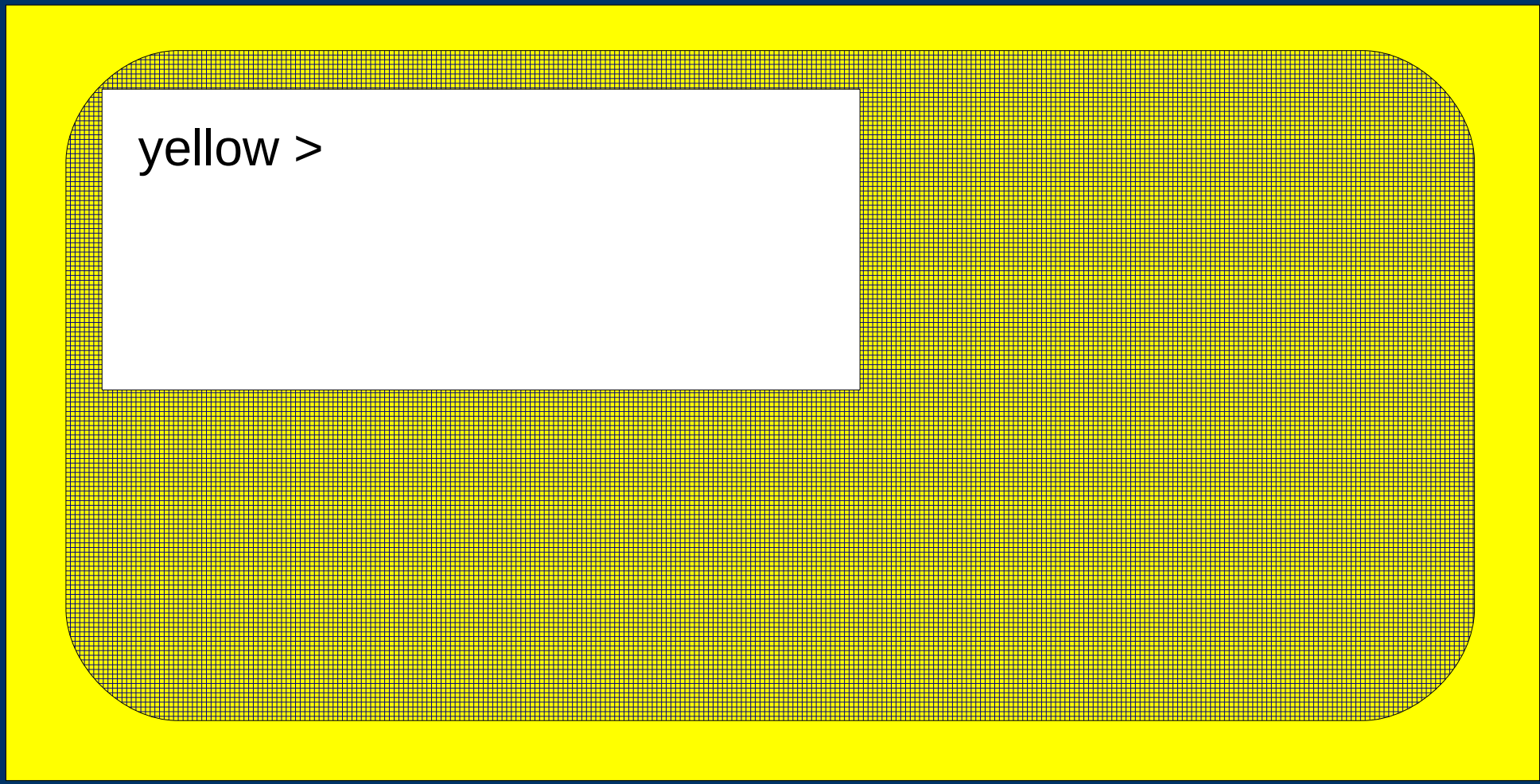
```
> export DISPLAY=$yellow:1
```

Then starts OpenOffice on BigBlue

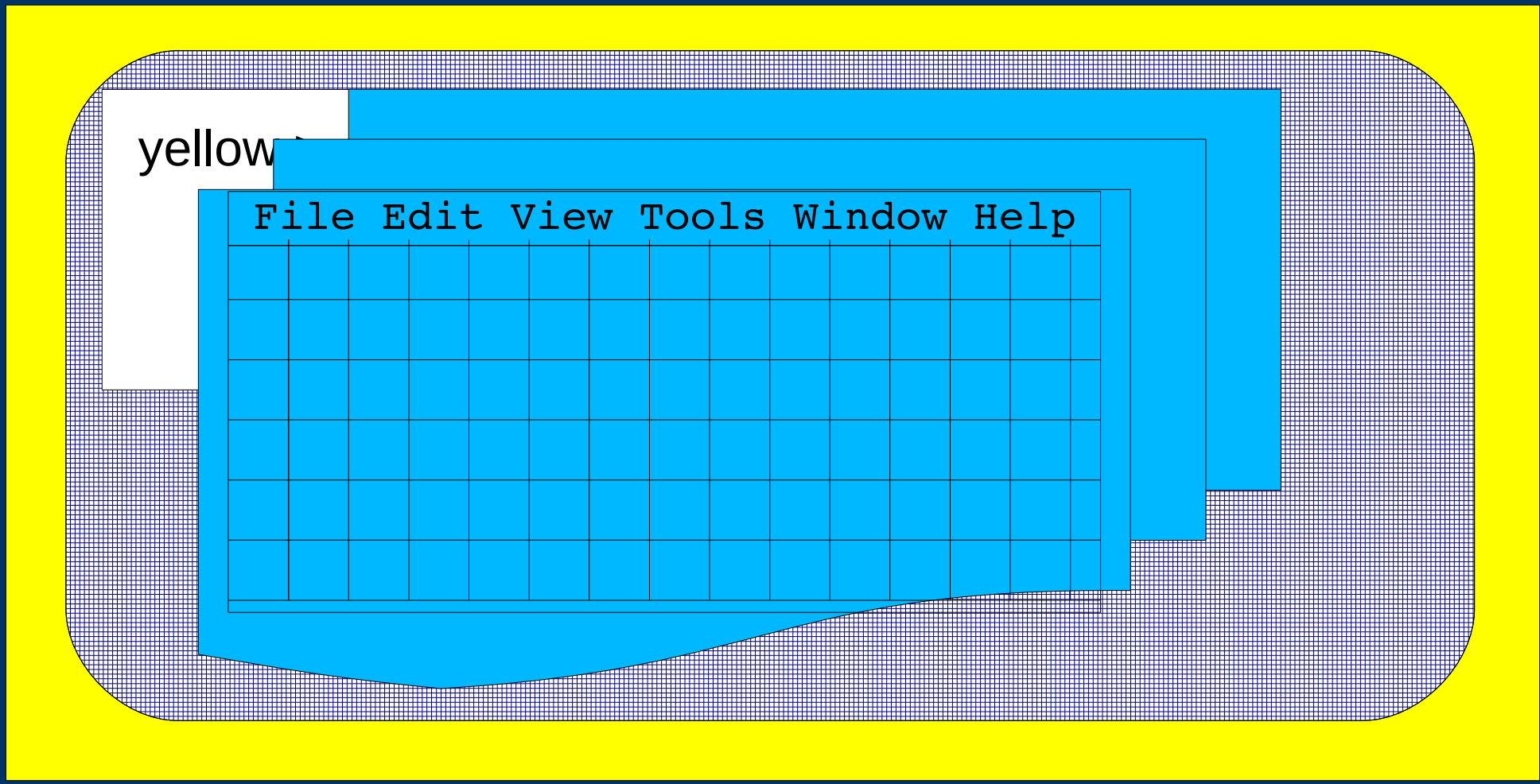
```
> openoffice

[you shall see nothing here]
```

Allow X requests from BigBlue



OpenOffice displays on Yellow



OpenOffice is controlled by Yellow