

# LIS-3353

## The Internet



# What made the Internet unique?

*(Why didn't the American Telegraph and Telephone company invent the Internet?)*



# Our L'il Internet

- 1) Pass this note to the person waving their hand.
- 2) If you can't, then pass it to someone who is closer to them. than you are.



# Our L'il Internet

C

D

B

(1/4)



# Our L'il Internet

A

E

E

(2/4)



# Our L'il Internet

F

A

E

(3/4)



# Our L'il Internet

E

D

F

(4/4)



# What was sent?

A huge number

- (technically, this is DEFINITELY a right answer)

Hex: CDBAEEFAEEDF =

226,202,757,033,695



# What was sent?

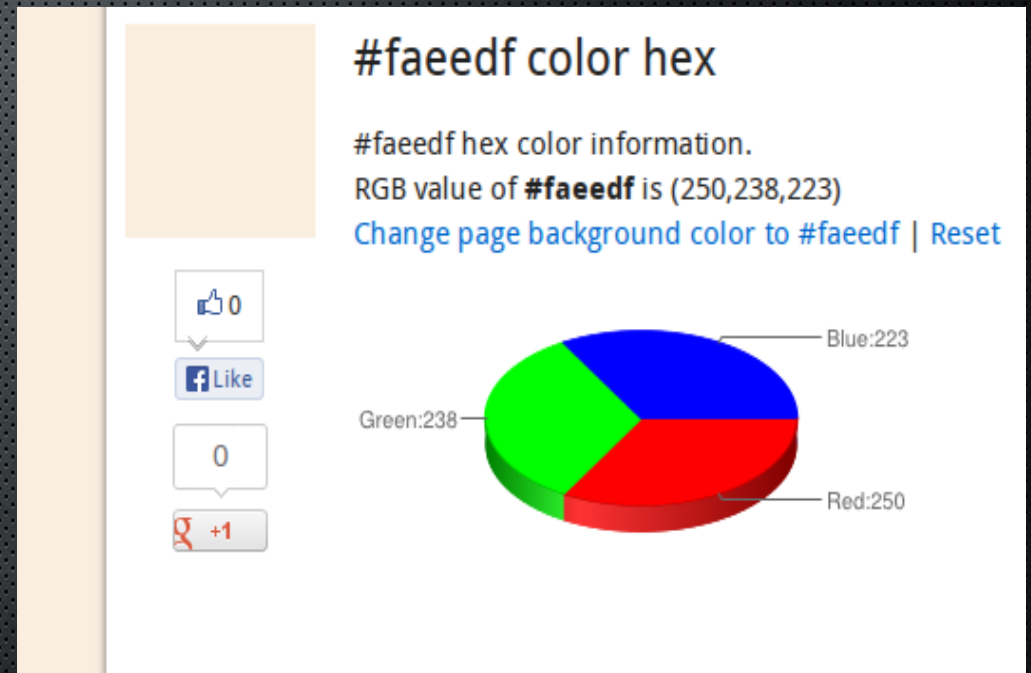
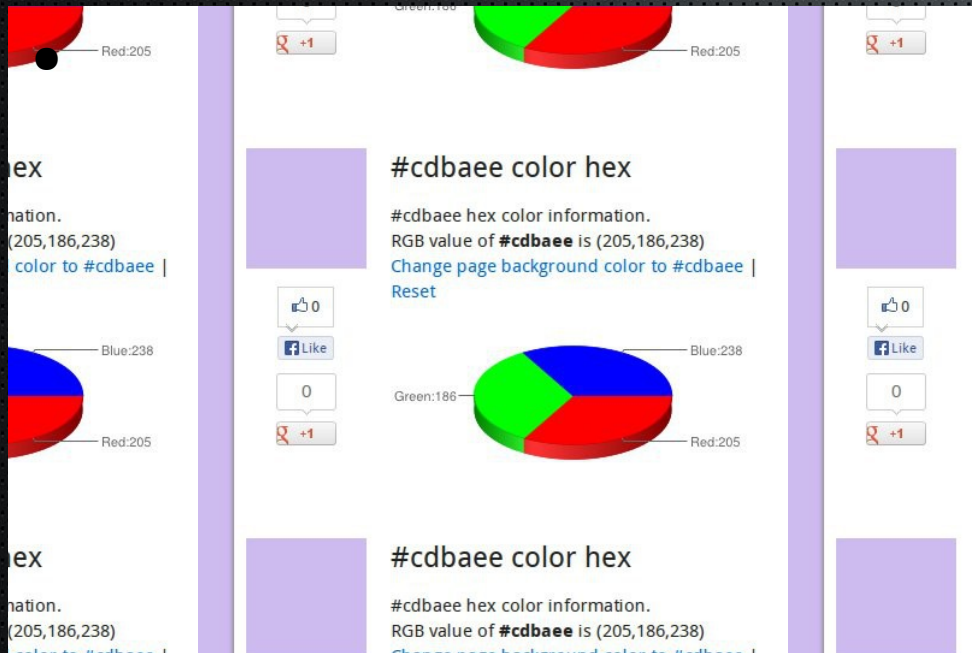
- MAC Address?
- Perhaps a computer was identifying itself.

CD:BA:EE:FA:EE:DF



# What was sent?

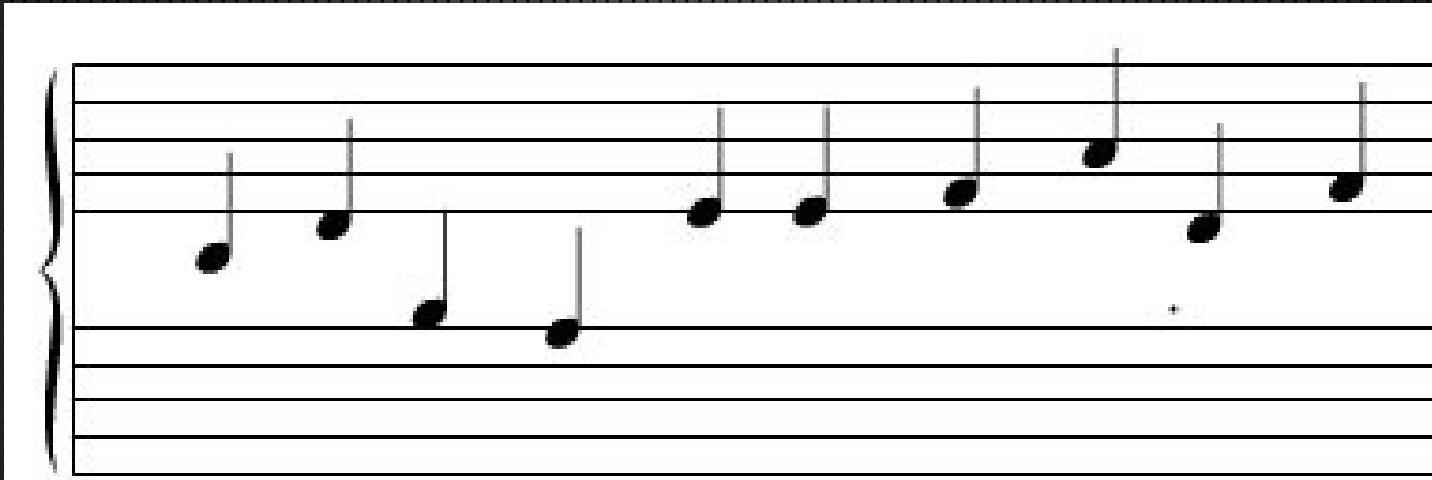
## Perhaps, a lovely color scheme...





# What was sent?

## Music?





# What was sent?

Something else?

- 1100110110111010111011101111010111011101101111



# What was sent?

Wait – maybe encrypted?

(badly)



Tricky...

C	A	F	E
D	E	A	D
B	E	E	F



Obviously, a restaurant recommendation. (Or not.)

## Cafe Dead Beef





# Top 3 things about the net:

## 3) DIGITIZATION

(literally, turning any “data” into a number)

*this may feel like the most important part..but..*



# Top 3 things about the net:

## 3) DIGITIZATION

(literally, turning any “data” into a number)

### NOTE:

The nodes need not **know** or **care** what the data “is”

(in fact, **encryption** can prevent them from knowing)



But: Phones (sort of) had this:

- Fax Machines (documents)
- Party Lines (group chat)
- Info Hotlines (websites)



But: Phones (sort of) had this:

:



...until they didn't?



# Who owns the network?



Models for Hand-set Phone



Models for  
Pedestal Phone

## **A Telephone Silencer – the HUSH-A-PHONE**

*A solution of three phone problems of subscribers*

**Safeguarding Privacy:** So others cannot hear confidential matters

**Eliminating Phone Talk Annoyance:** Quieting the office for personnel efficiency

**Improving Hearing in Noisy Places:** By keeping surrounding noises out of the transmitter

*Write for Booklet T-E.*

**Hush-A-Phone Corporation, 43 W. 16th St., N. Y. City**



# Top 3 things about the net:

## 3) DIGITIZATION

(literally, turning any “data” into a number)

*PLUS-- what else.*

*Not so much the “what”  
but the “how”*

*HOW did that data move?*



# Smart Network (circuit switching)

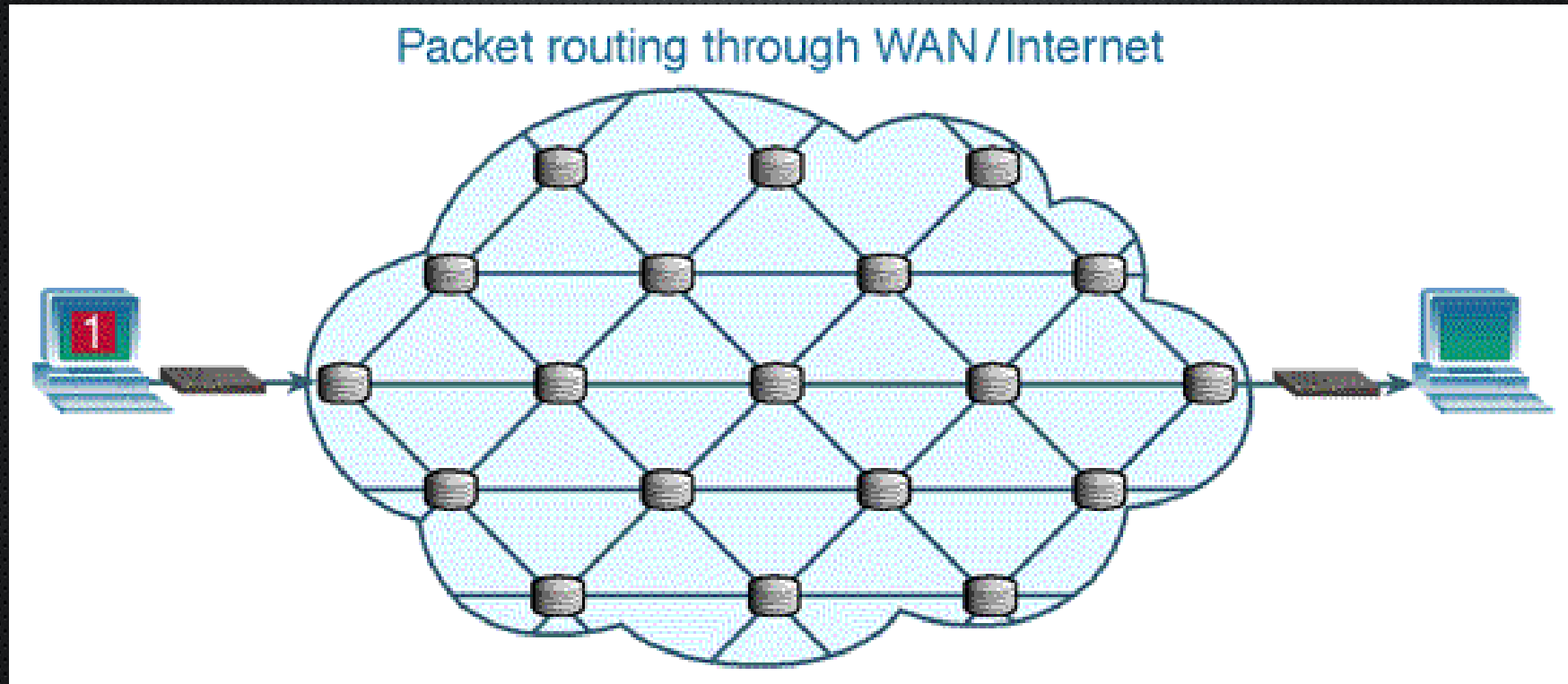
direct “single-wire” connections





# Dumb Network (packet switching)

indirect, node based “post-office” connections





# Top 3 things about the 'net...

## 3) DIGITIZATION

(literally, turning any “data” into a number)

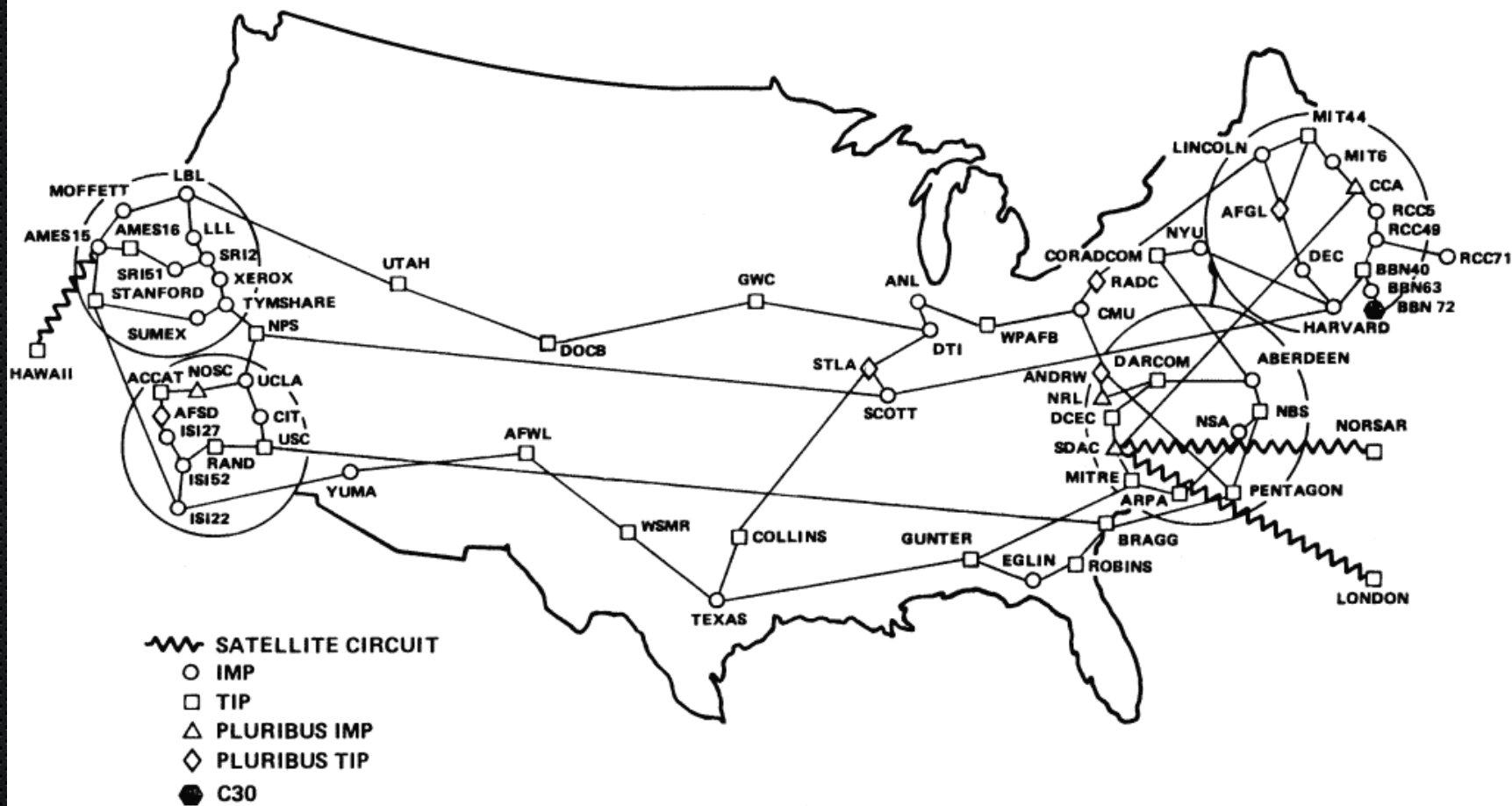
## 2) PACKET SWITCHING

as opposed to “circuit switched”



# ARPANET

ARPANET GEOGRAPHIC MAP, OCTOBER 1980



(NOTE: THIS MAP DOES NOT SHOW ARPA'S EXPERIMENTAL SATELLITE CONNECTIONS)  
 NAMES SHOWN ARE IMP NAMES, NOT (NECESSARILY) HOST NAMES



# Top 3 things about the 'net...

## 3) DIGITIZATION

(literally, turning any “data” into a number)

## 2) PACKET SWITCHING

as opposed to “circuit switched”

## 1) PUBLICLY CREATED UTILITY

(not privately owned)



# 3 things about the 'net...

DIGITIZATION

+

PACKET SWITCHING

+

PUBLICLY CREATED UTILITY

=

Peer to peer node based network



# (somewhat controversial) thoughts on innovation

The public sector (schools, defense, NASA, government) etc. is as inventive and as innovative as private companies...

..eh, probably more.

(the internet, GPS, touchscreens, digital photography, water filters, invisible braces etc.)



Why didn't the American Telegraph and Telephone company invent the Internet?





Nobody owns the Internet.

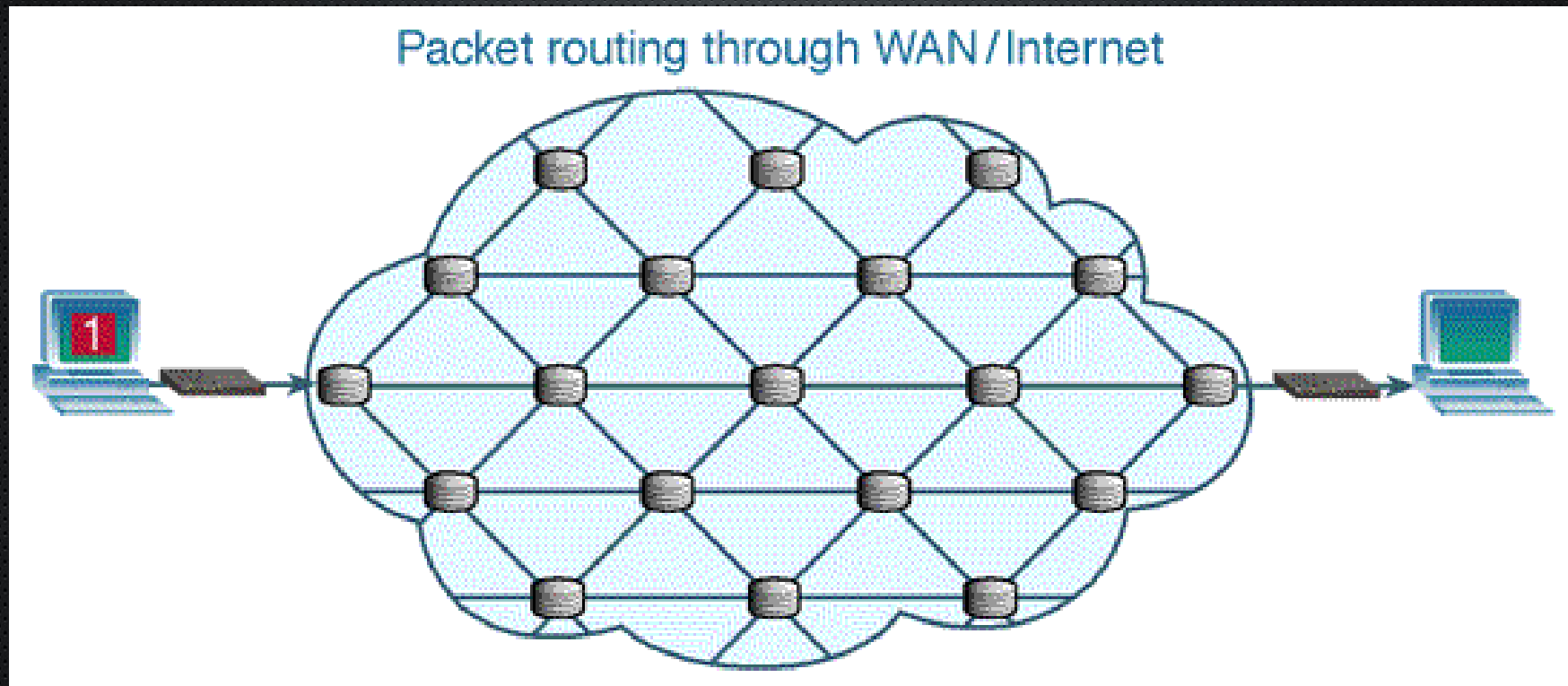


Nobody owns the Internet.

Consider: “Cable” v. “Telephones”  
etc., vs.  
“The Internet”

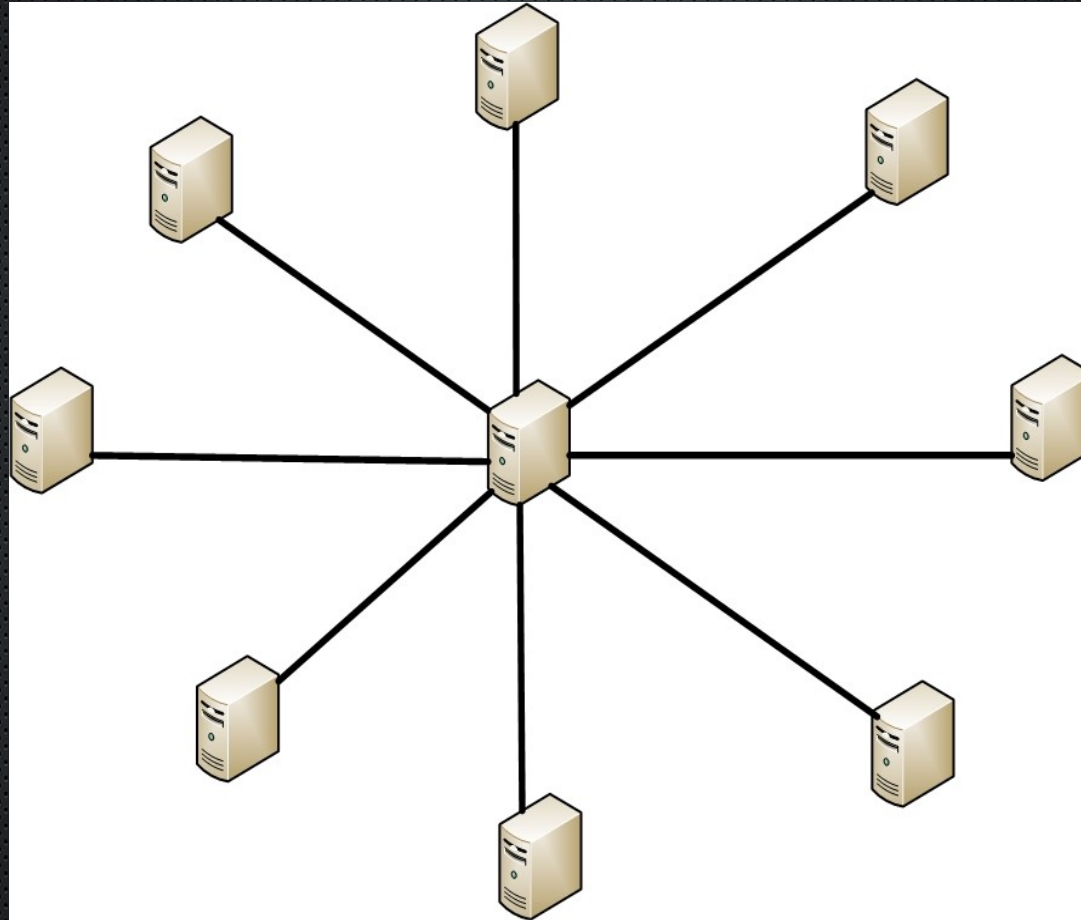


# What services/protocols ACTUALLY look like this?



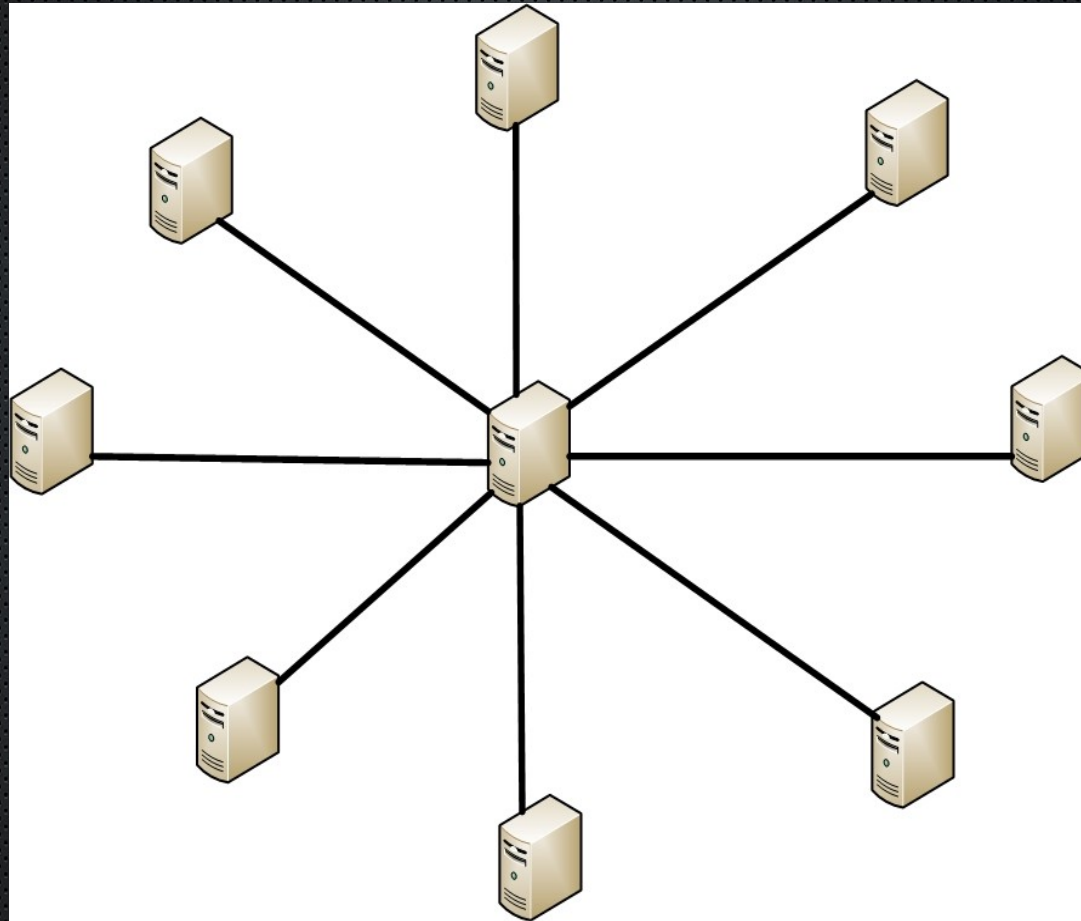


vs. this?



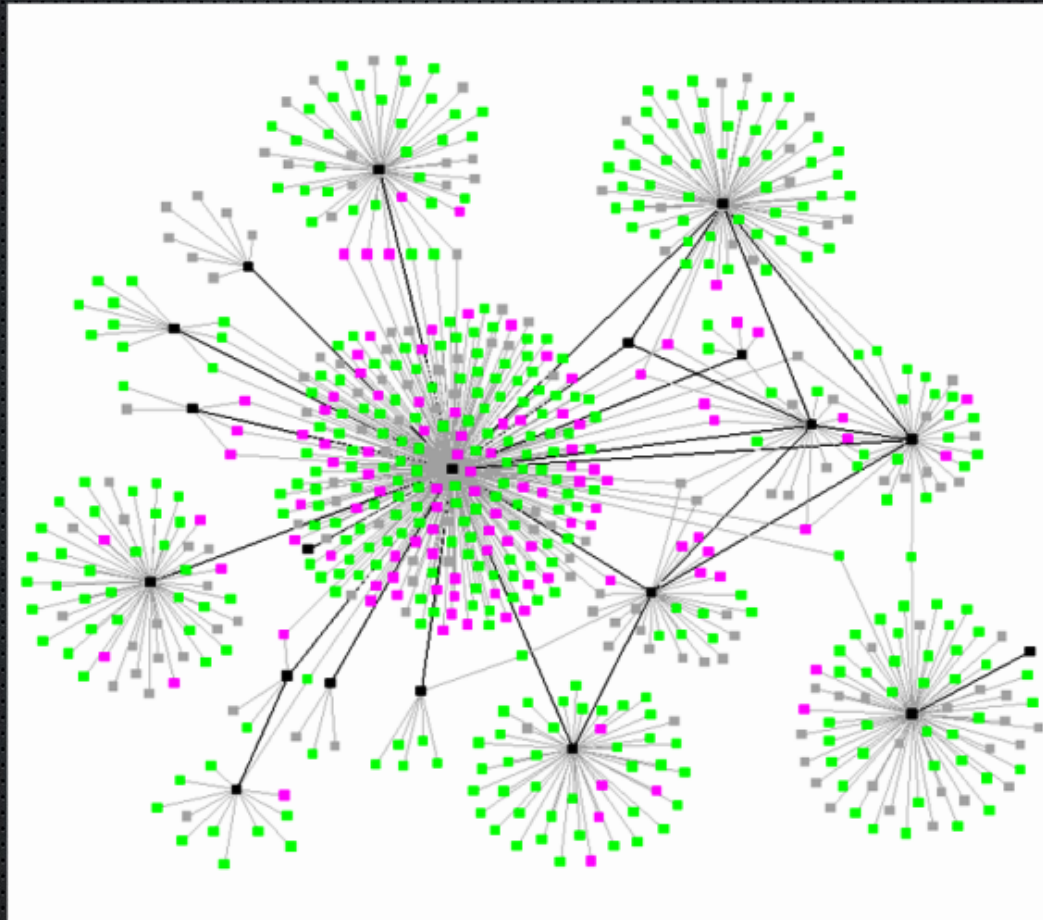


# “Hub and Spoke”





...ish





# Diversity of layers (OSI)

- Application (HTTP, telnet, etc)
- Presentation (framework MIME)
- Session (pipe,SOCKS)
- Transport (reliable packet delivery, TCP)
- Network (nodes and address, IP)
- Data (PPP)
- Physical (wires, radio, USB)



# Diversity of transmission media:

- telephone lines (modem/DSL)
- - tv cable
- - wireless (802.11)
- - satellites
- - radio
- - lasers (pointless, but true)
- - fiber



# The “Usual Path”

- Your computer
- Your router
- ISP “station”
- Bigger ISP Station/Backbone
- .... etc.



# But wait, what does internet?

- Laptops
- Tablets
- Phones
- Routers
- Cars
- Ovens?

wardrive, and find out yourself – :)



# Lampposts?





# All running you know what...

```
[root@treasure ~]# iptables -L -n
Chain FORWARD (policy ACCEPT)
target     prot opt source                destination
MAC-STOP   all  --  0.0.0.0/0              0.0.0.0/0
RH-Firewall-1-INPUT  all  --  0.0.0.0/0              0.0.0.0/0

Chain INPUT (policy ACCEPT)
target     prot opt source                destination
MAC-STOP   all  --  0.0.0.0/0              0.0.0.0/0
RH-Firewall-1-INPUT  all  --  0.0.0.0/0              0.0.0.0/0

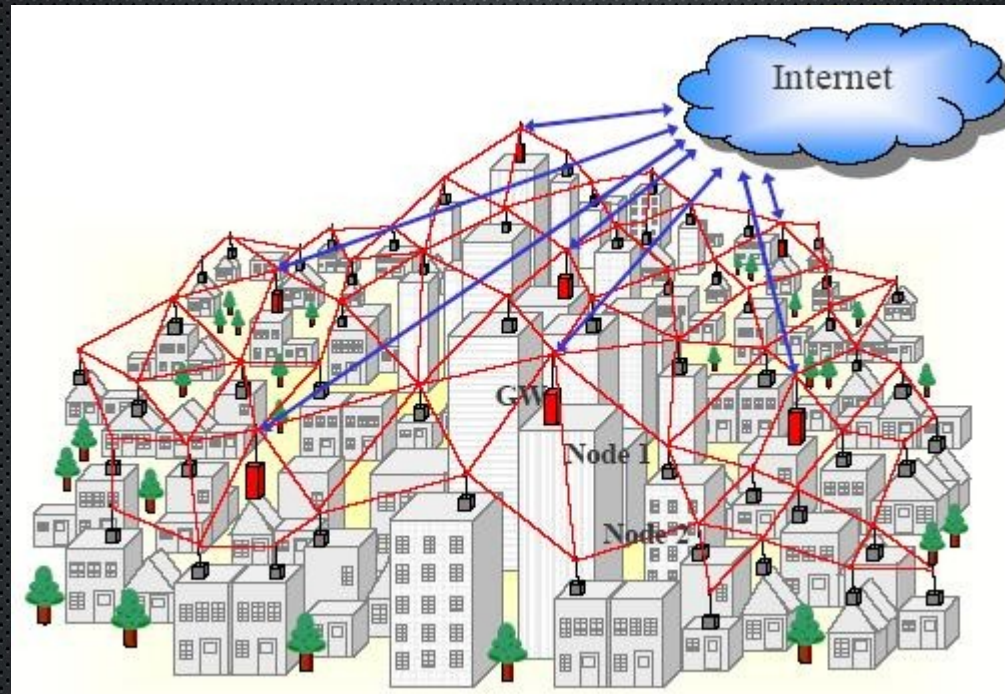
Chain MAC-STOP (2 references)
target     prot opt source                destination
RETURN     all  --  0.0.0.0/0              0.0.0.0/0

Chain OUTPUT (policy ACCEPT)
target     prot opt source                destination

Chain RH-Firewall-1-INPUT (2 references)
target     prot opt source                destination
ACCEPT     all  --  0.0.0.0/0              0.0.0.0/0
ACCEPT     icmp --  0.0.0.0/0              0.0.0.0/0          icmp type 255
ACCEPT     all  --  0.0.0.0/0              0.0.0.0/0          state RELATED,ESTABLISHED
ACCEPT     tcp  --  0.0.0.0/0              0.0.0.0/0          state NEW tcp dpt:928
ACCEPT     tcp  --  0.0.0.0/0              0.0.0.0/0          state NEW tcp dpt:139
ACCEPT     tcp  --  0.0.0.0/0              0.0.0.0/0          state NEW tcp dpt:22
ACCEPT     tcp  --  0.0.0.0/0              0.0.0.0/0          state NEW tcp dpt:80
ACCEPT     tcp  --  0.0.0.0/0              0.0.0.0/0          state NEW tcp dpt:21
REJECT     all  --  0.0.0.0/0              0.0.0.0/0          reject-with icmp-host-prohibited
[root@treasure ~]#
```

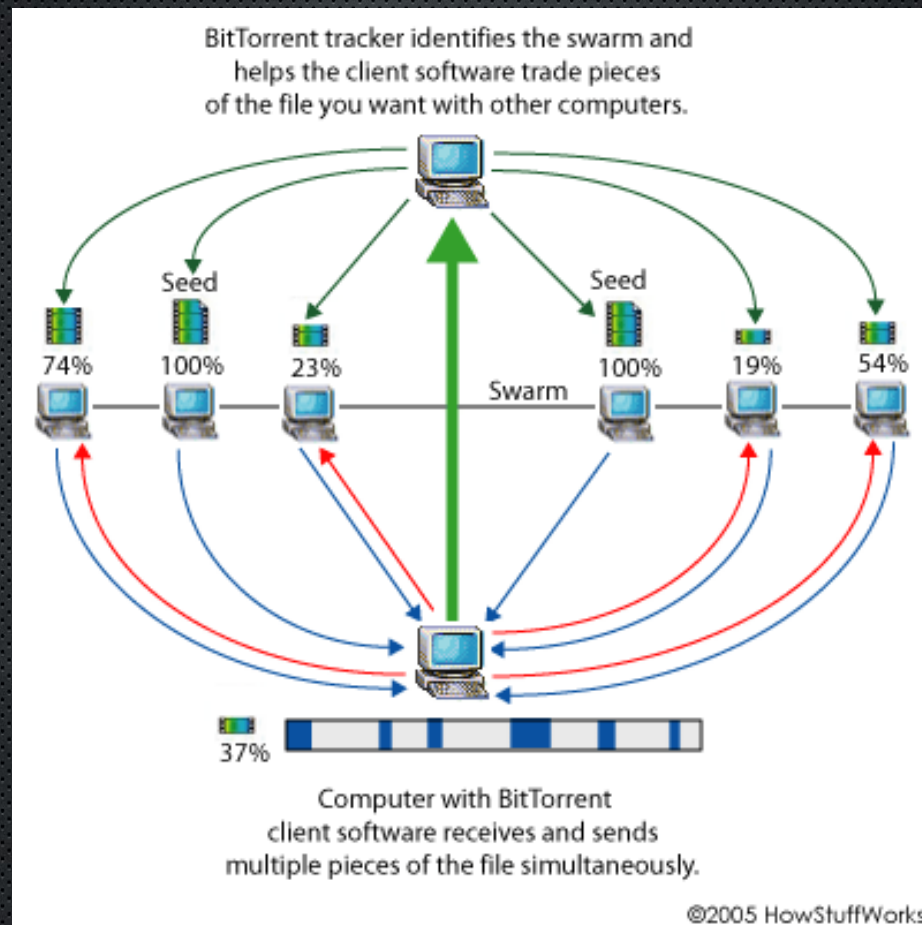


# Mesh Networking





# Look familiar?





# No Cell or Wi-Fi....

