

<iLaw>

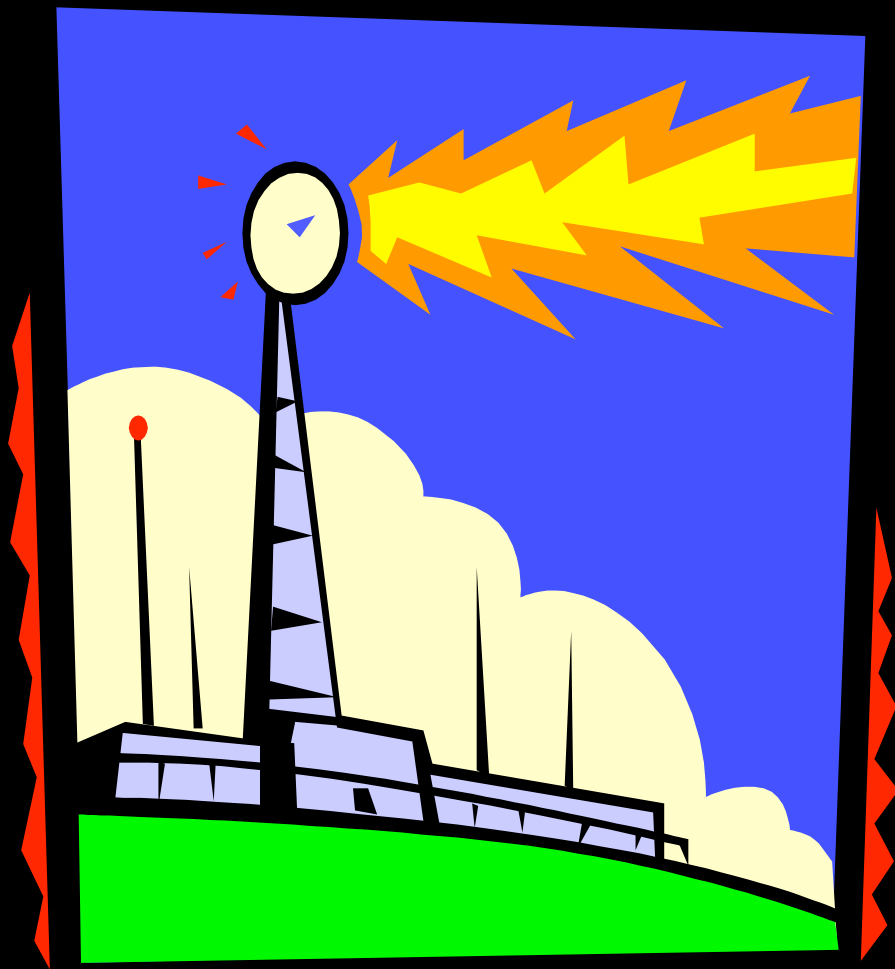
Spectrum

Rio, Brazil

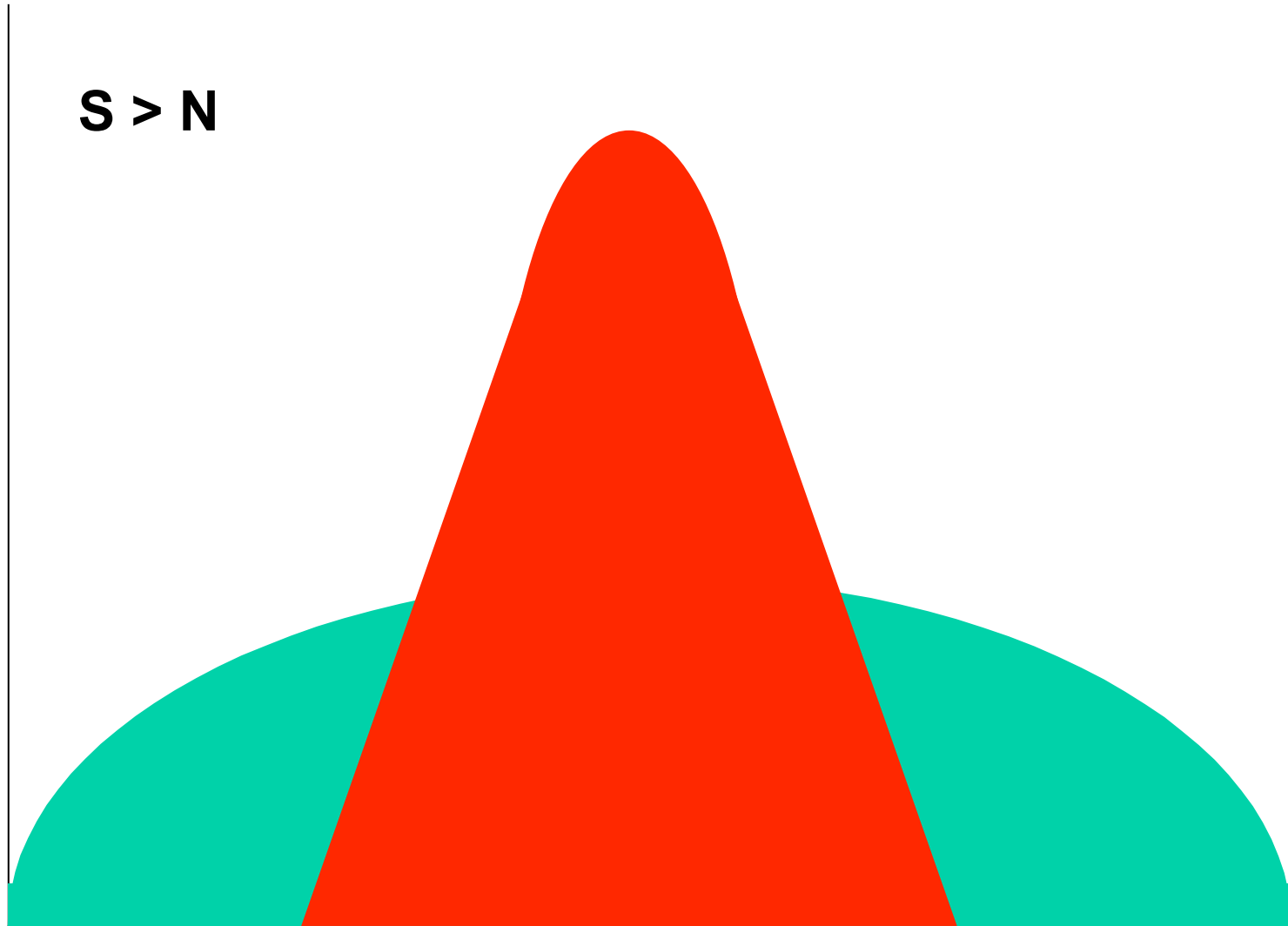
March 25, 2003

today

the world of
dumb radios



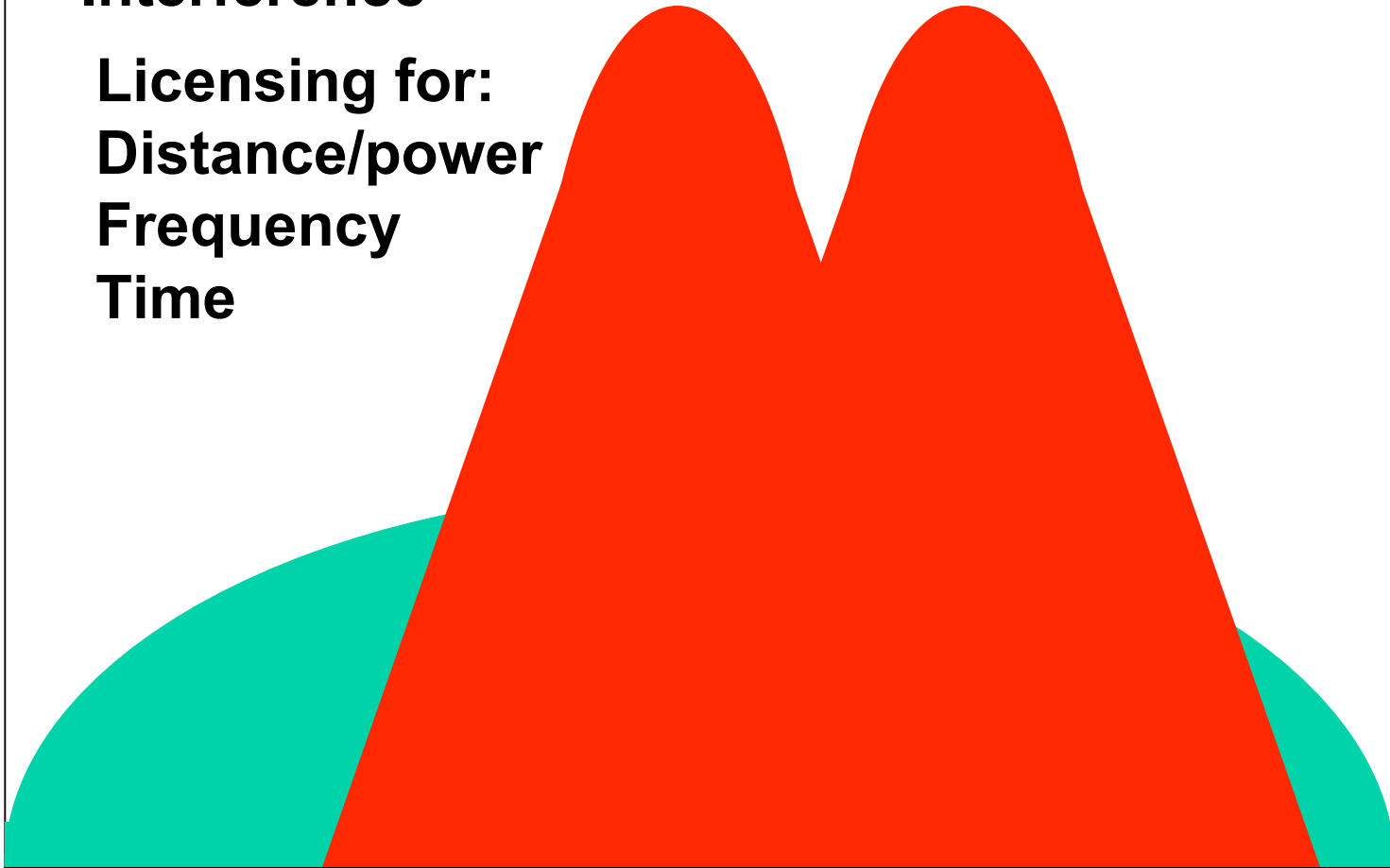
Traditional Approach to Wireless Communications



Traditional Approach to Wireless Communications

Interference

**Licensing for:
Distance/power
Frequency
Time**



UNITED STATES FREQUENCY ALLOCATIONS

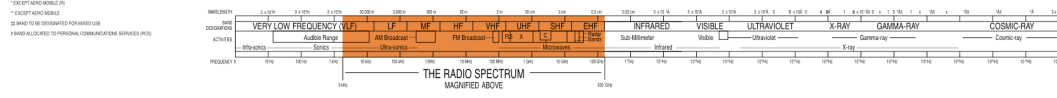
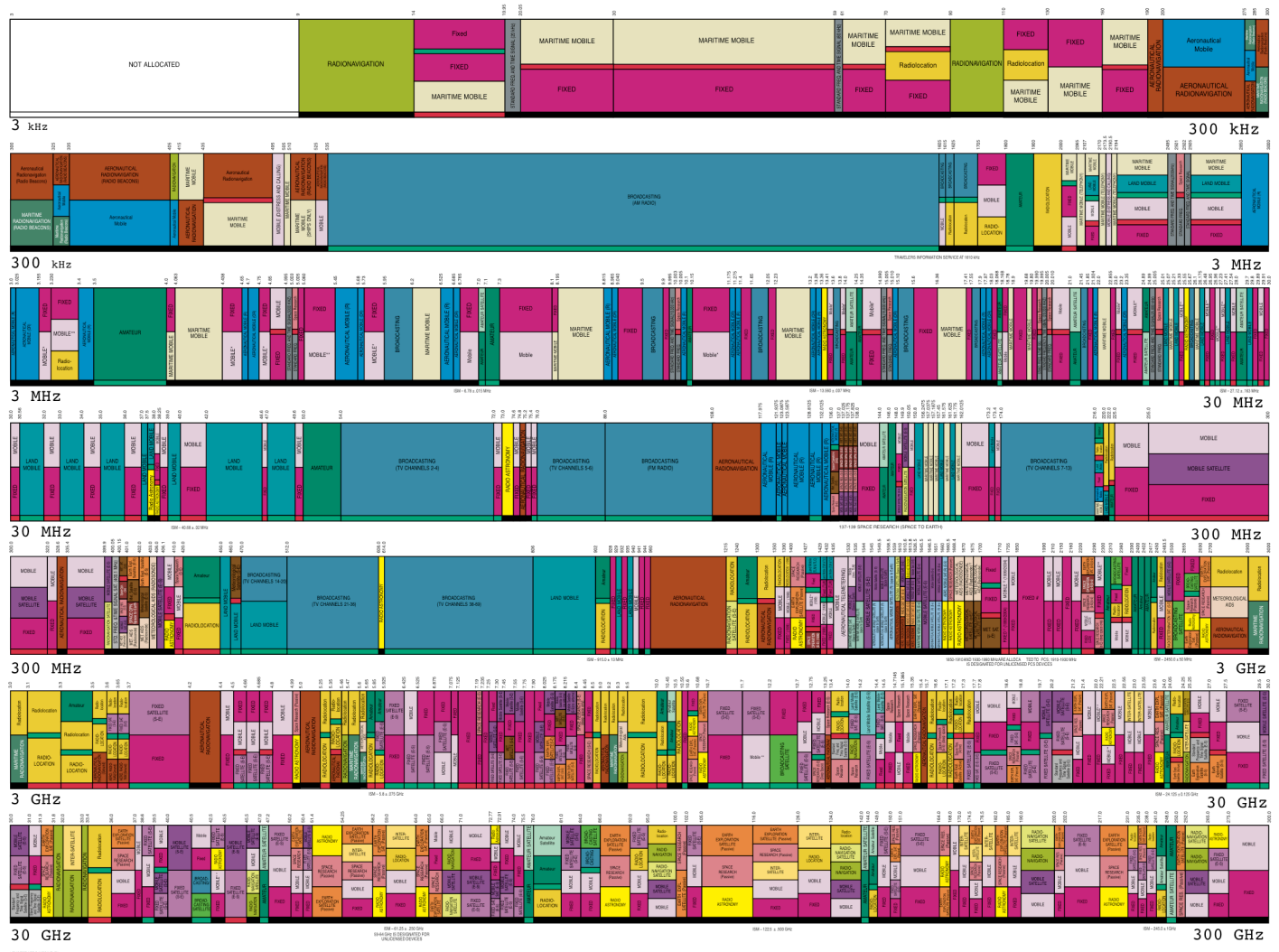
THE RADIO SPECTRUM

RADIO SERVICES COLOR LEGEND

ACTIVITY CODE

ALLOCATION USAGE DESIGNATION

SERVICE	EXAMPLE	DESCRIPTION
Primary	FIXED	Capital Letters
Secondary	MOBILE	First Capital with lower case letters
Permitted	BROADCASTING	Capital Letters between oblique strokes



NOTE: THE SHARED ALLOCATIONS ARE THE ACTUAL MANAGEMENT OF SPECTRUM IS THE RESPONSIBILITY OF THE USER.

interference?

dumb receivers



smart receivers



the possible

Shannon

“gain”

“antenna gain”

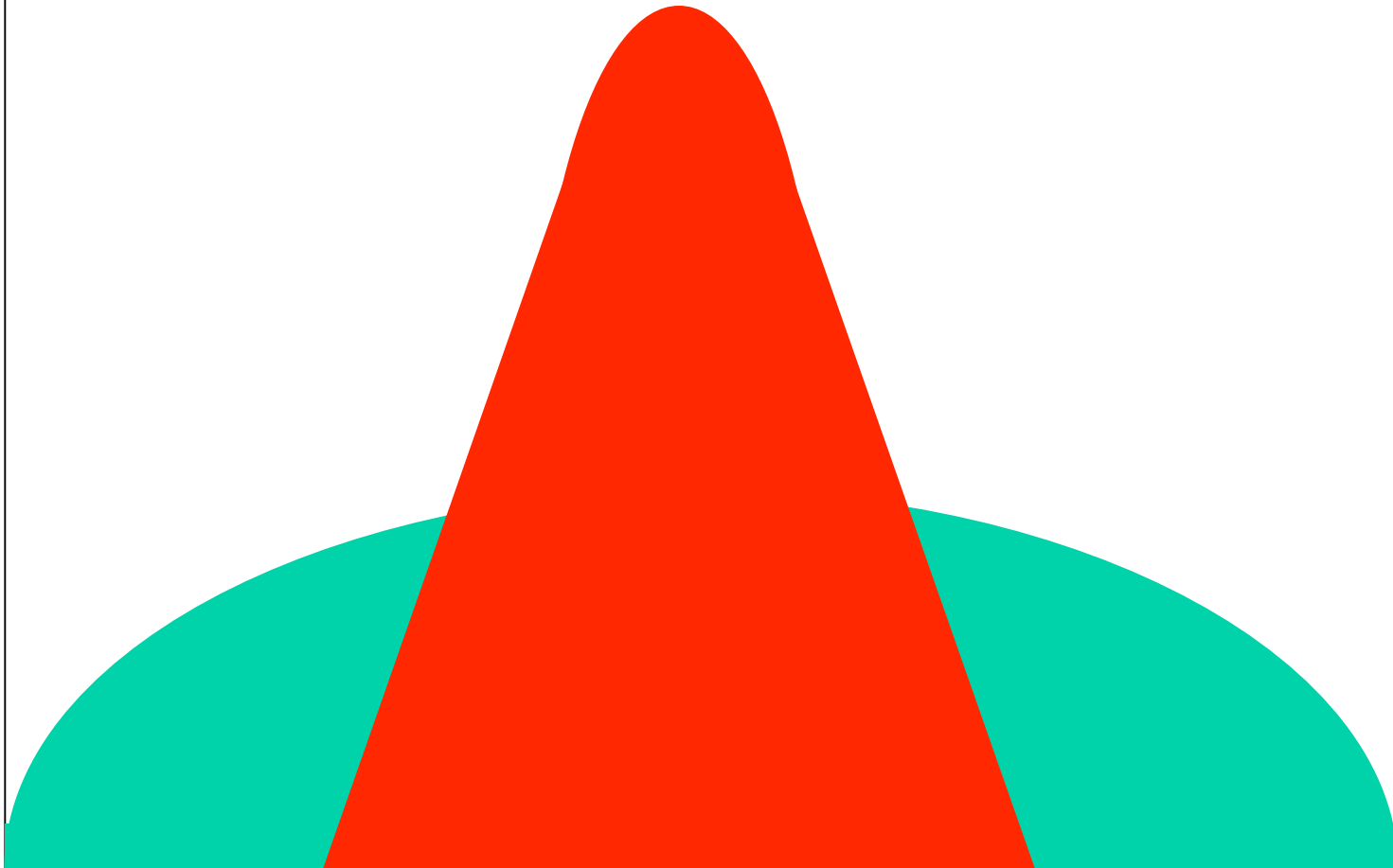




“processing gain”

Spread Spectrum Approaches

Mary had a little lamb

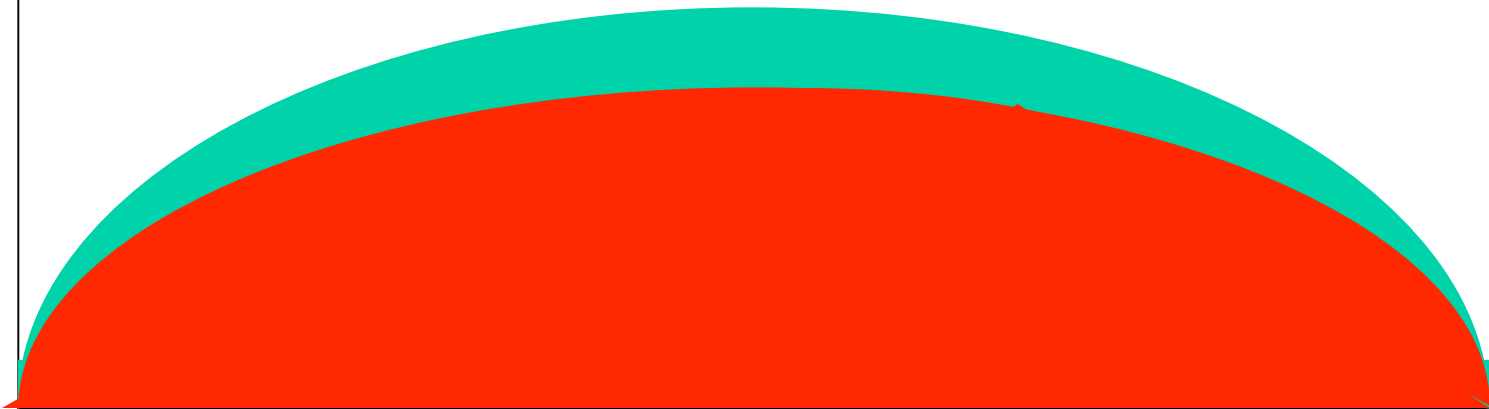


Spread Spectrum Approaches

Mary had a little lamb xyz12378965401
20948345987weoirh0120398

Receiver separates S from N by code

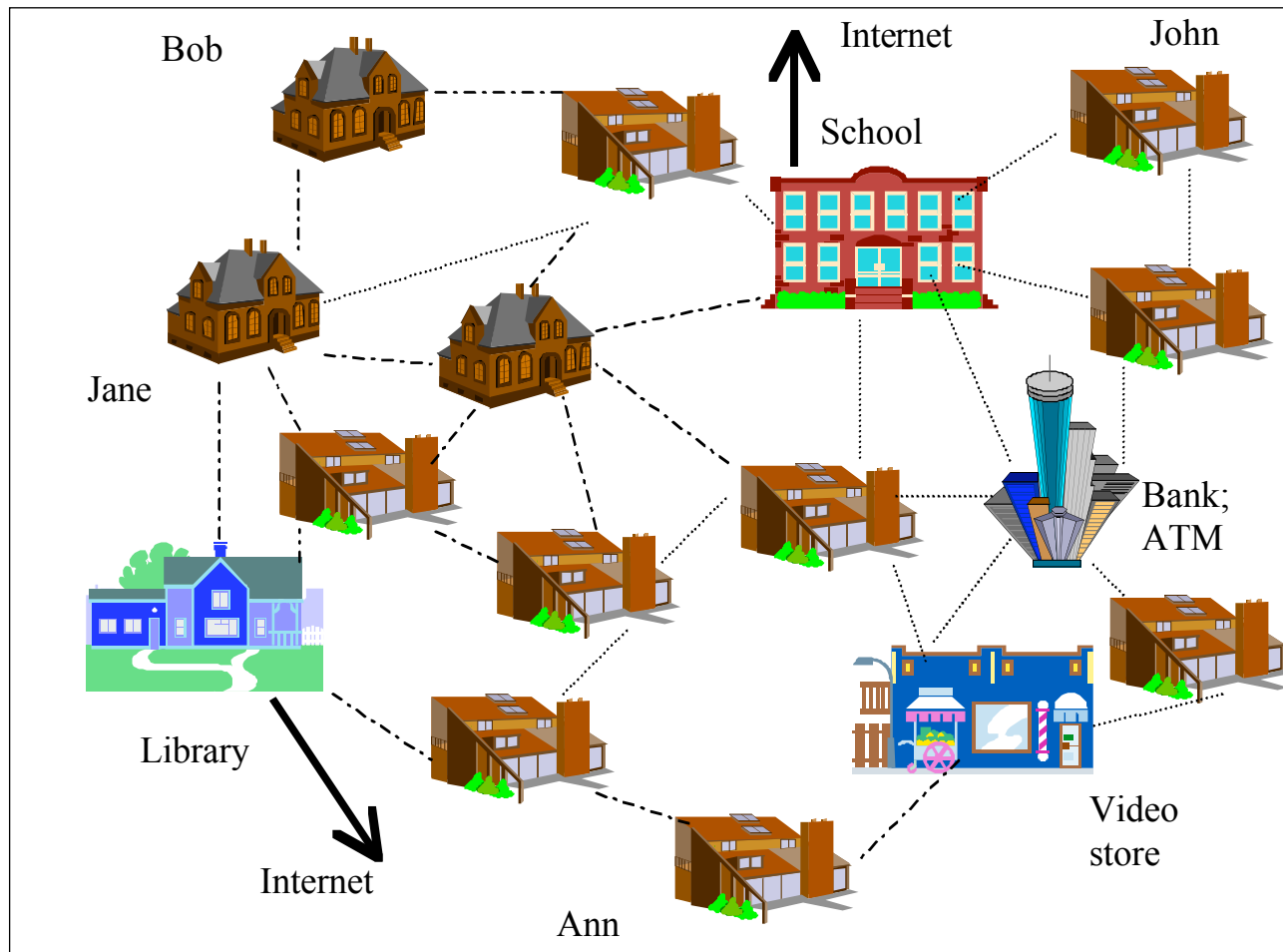
The broader the bandwidth the greater the
processing gain



“cooperation gain”



Decentralized network over open spectrum



users ↑

users ↑

capacity ↑

how get there?

3 models

command & control

command & control
property

command & control
property
commons

1.

command & control:

command & control:
government decides

worst

slow

b/c

conservative

sLOW

b/c

political

2.

property:

property:
“sell spectrum”

better

benefits:

coordination

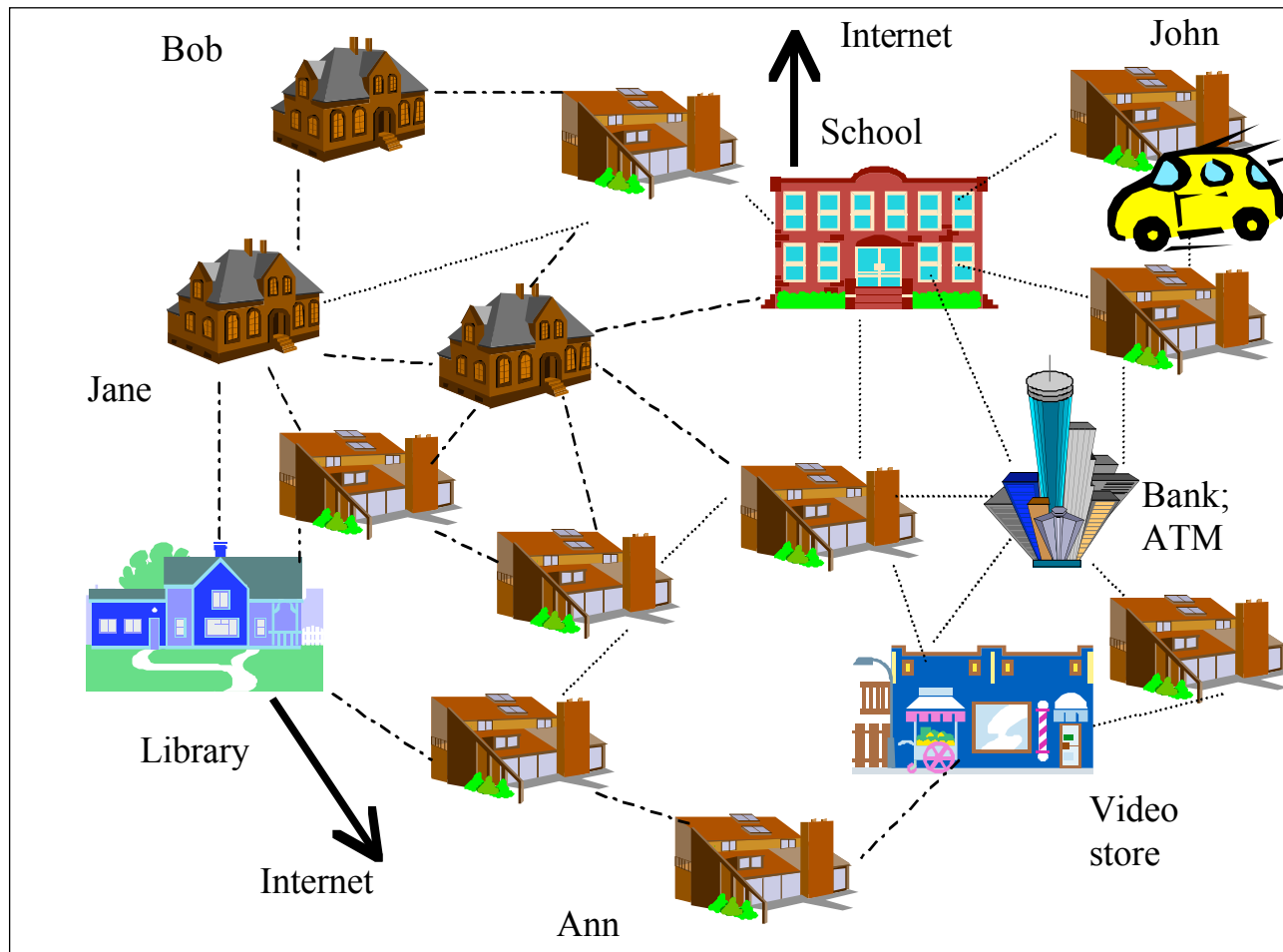
allocation

more flexible

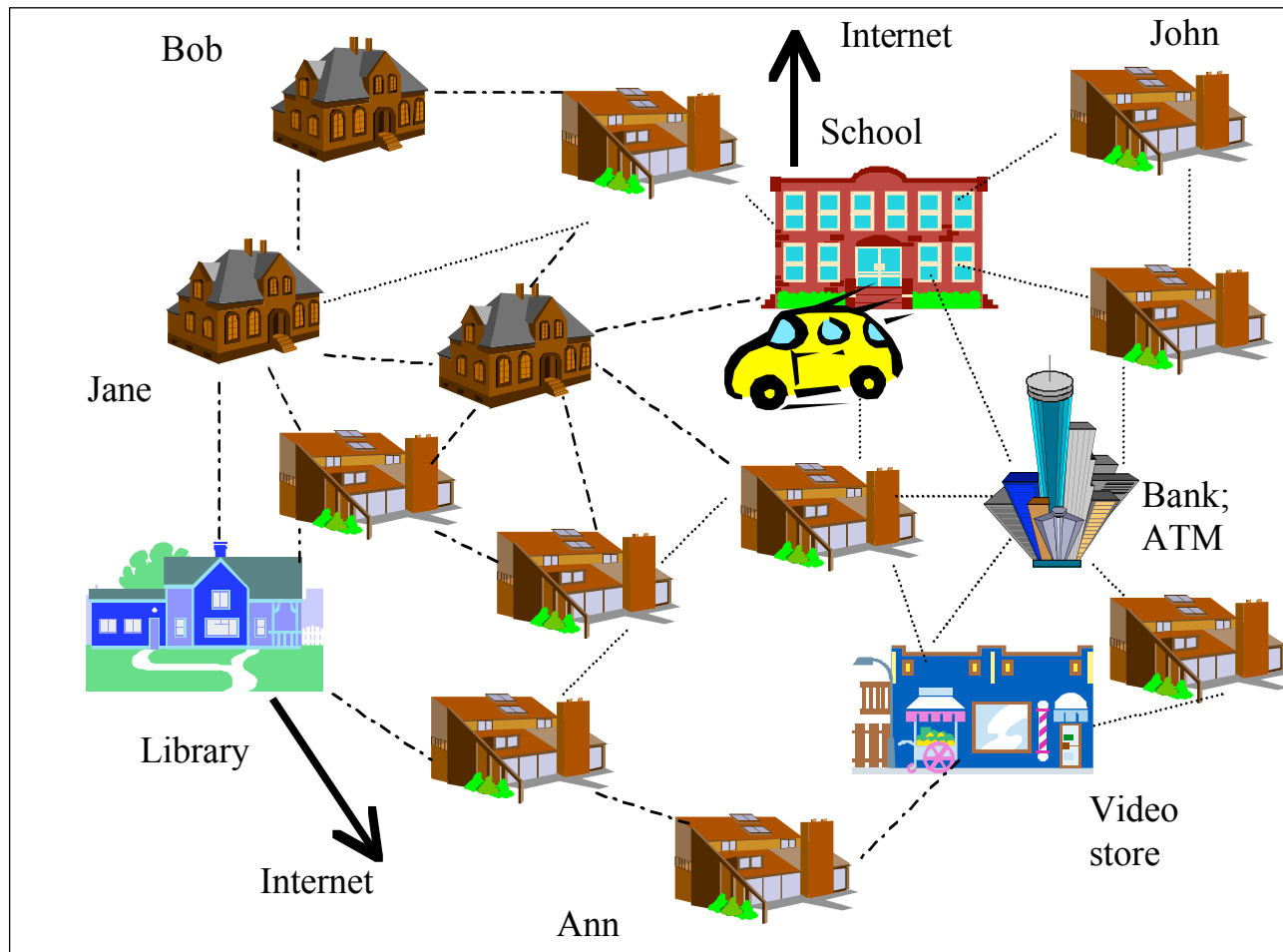
costs:

transaction costs

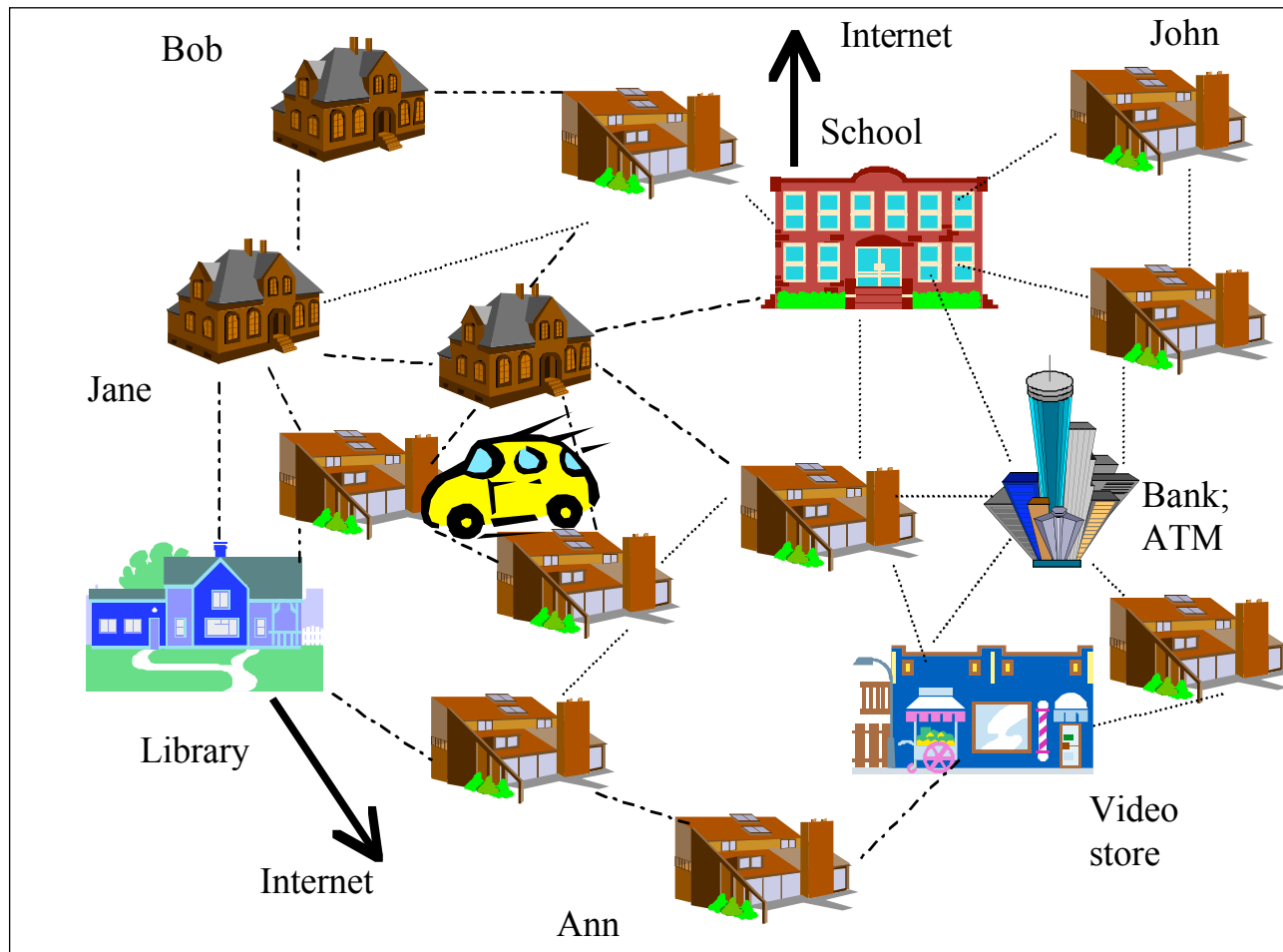
Decentralized network over open spectrum



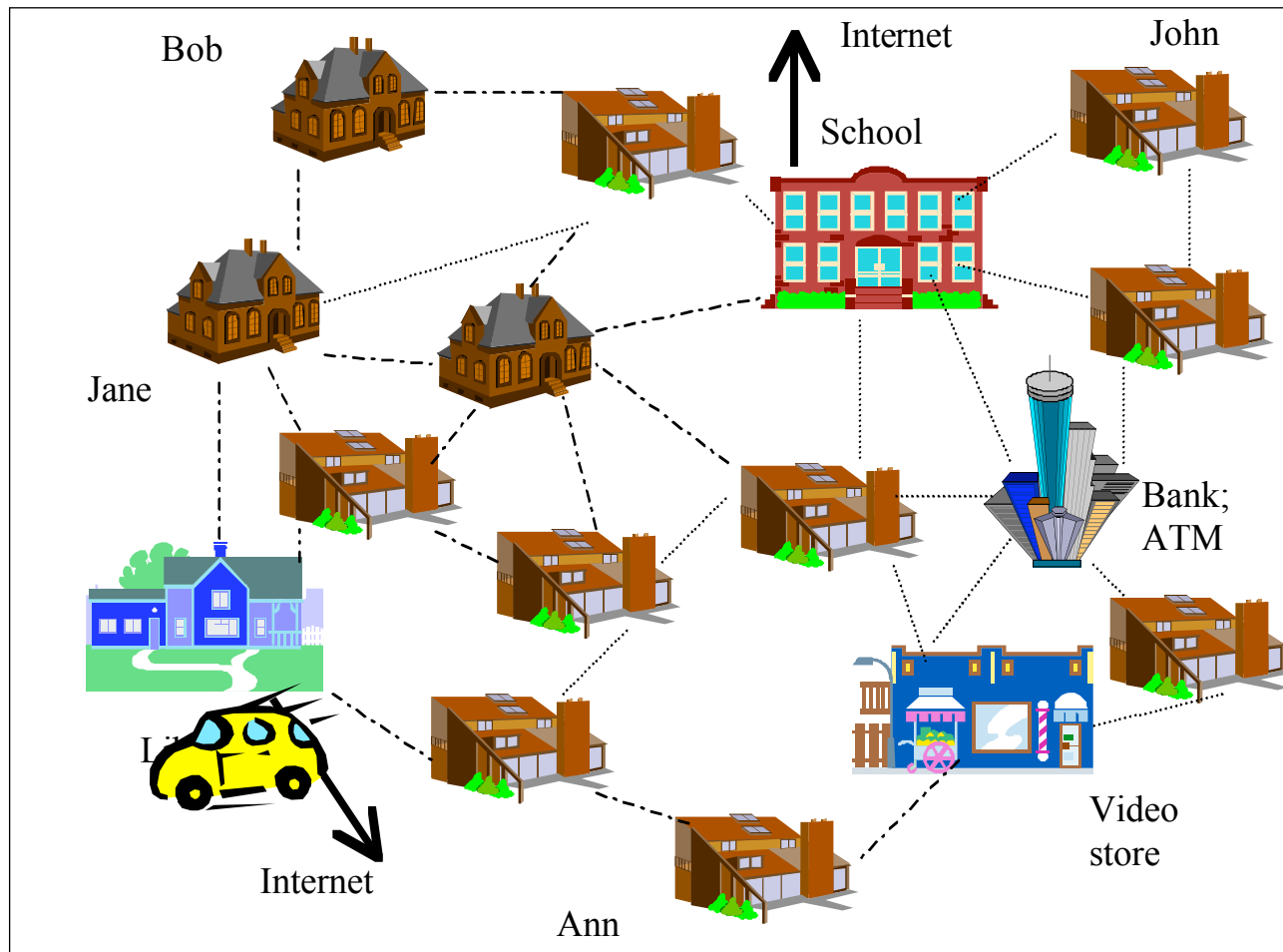
Decentralized network over open spectrum



Decentralized network over open spectrum



Decentralized network over open spectrum



capacity reduced

3.

commons:
“share spectrum”

commons:
“share spectrum”

best

benefits:

technology allocates

lower transactions
costs

costs:

quality of service

compare:
internet

could property be
better?

but...

Is this

Is this
communism?