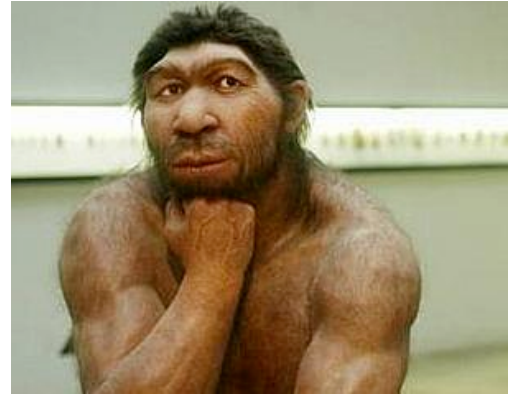


1. **Analog vs. Digital Signals** - why do we human beings have to make signals, anyway?

- i. To communicate – yelling, shouting, flags
- ii. To communicate even farther – beacon tower, reflecting the sunlight to make signals



- iii. To communicate as far as we can – How???



**Telegraphs**

Invented some time around 1750 – 1850 by numerous inventors with a variety of different devices. An electrical telegraph was independently developed and patented in the United States in 1837 by Samuel Morse.

<Pros>uses only dots and dashes (can be viewed as 0's and 1's), reliable after transmitting for a long distance



**INTERNATIONAL MORSE CODE**

- 1. A dash is equal to three dots.
- 2. The space between parts of the same letter is equal to one dot.
- 3. The space between two letters is equal to three dots.
- 4. The space between two words is equal to five dots.

A • —	U • • —
B — • • •	V • • • —
C — • • • •	W • — —
D — • •	X — • • —
E •	Y — • — —
F • • — •	Z — — • •
G — — •	
H • • • •	
I • •	
J • — — —	
K — • —	1 • — — — —
L — • • •	2 • • — — —
M — — —	3 • • • — —
N — •	4 • • • • —
O — — — —	5 • • • • •
P • — — •	6 — • • • •
Q — — • •	7 — — • • •
R • — •	8 — — • • • •
S • • •	9 — — — • •
T —	0 — — — — —

## Telephones

Invented some time between 1850 and 1900, uses a receiver which transforms acoustic pressures into electric signals (analog signals), and transforms it back to different loudness and frequencies of sound by the strength of the electric current.



<Pros> Straight forward way to transmit sound by electronic current, which is easier to implement.

<Cons> Sensitive to all sorts of noise, which could easily decrease the sound quality transmitted through the telephone.

## Some Interesting Links

How Analog and Digital Recording Works

<<http://communication.howstuffworks.com/analog-digital1.htm>>

## 2. Advantages of Digital Circuits

Replication, Error

Correction/Detection, Miniaturization of Circuits, Programmability, Robust to Noise!!! No need to worry about the recording media wearing out!!! Think of your dad's old gramophone records or cassettes; compare it with your CD, DVD, or MP3s.



## 3. The bit, bits, Bytes, and Words

- Ethernet Network in our Dorms? 10M, 100M, 1000M? → Mb/sec, mega bits per sec
- CDs, DVDs? → 700MB (mega Bytes), 4.7 GB (Giga Bytes)
- One Word → 32 bits = 4 Bytes, does anyone know why they are 32 bits?

## 4. Binary ↔ Decimal Conversion, Signed Binary Numbers, and Floating Points