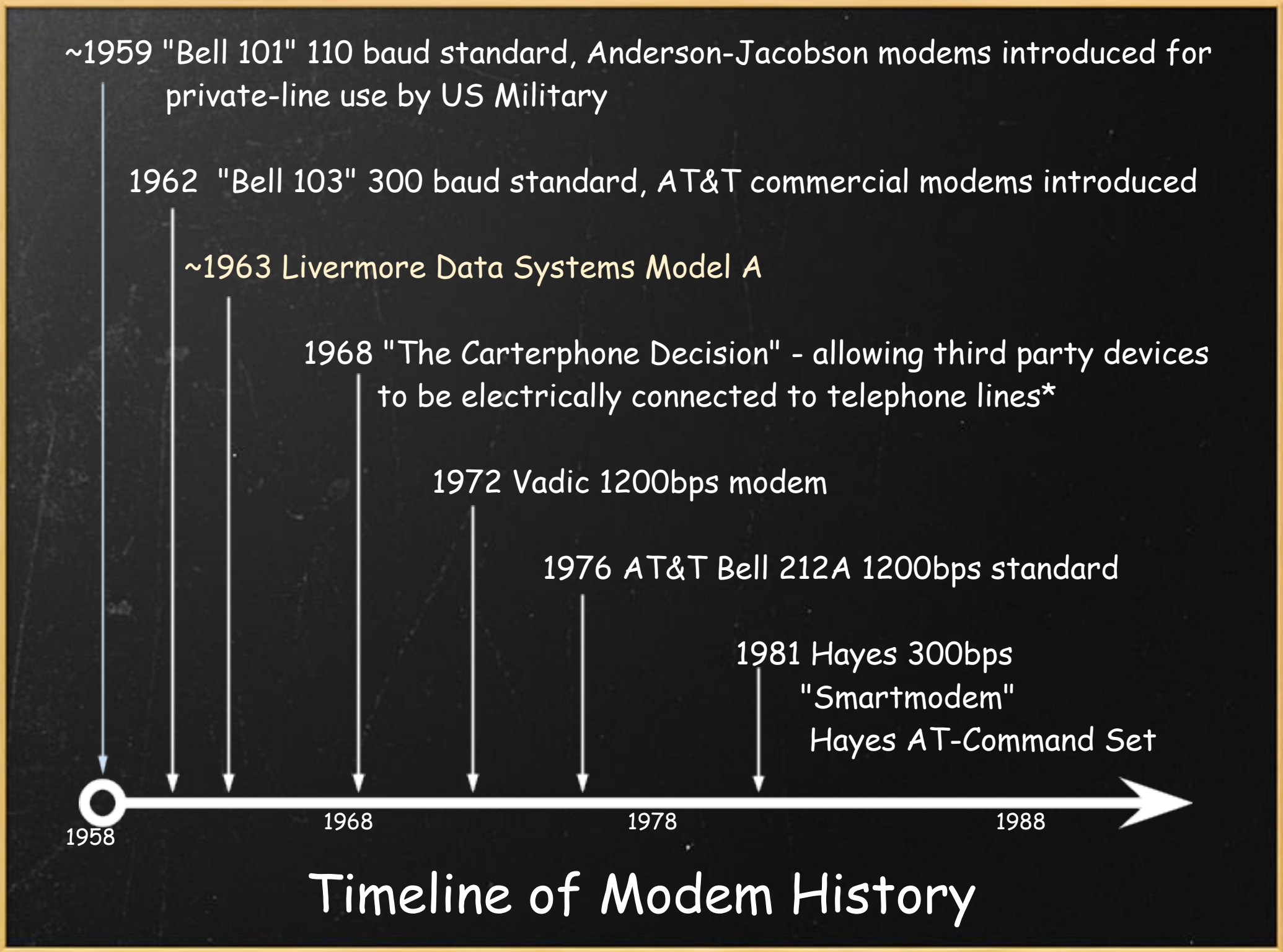
Old-Skool Brought Back

A 1964 Modem Demo

K.C. Budd "phreakmonkey"
Taylor Banks "dr. kaos"

Modems, explained

- Modulator / Demodulator
- Modulator: Encodes a digital signal over an analog representation
- Demodulator: Reconstructs the digital signal from the analog representation
- Digital signal rate = bits per second (bps)
- Analog "symbol" rate = baud
- In many cases, bps != baud


~1959 "Bell 101" 110 baud standard, Anderson-Jacobson modems introduced for private-line use by US Military
1962 "Bell 103" 300 baud standard, AT&T commercial modems introduced
~1963 Livermore Data Systems Model A
1968 "The Carterphone Decision" - allowing third party devices to be electrically connected to telephone lines*
1972 Vadic 1200bps modem
1976 AT&T Bell 212A 1200bps standard
1981 Hayes 300bps "Smartmodem" Hayes AT-Command Set
1958
1968
1978
1988
Timeline of Modem History

Ladies and Gentlemen:
A circa 1964
Livermore Data Systems
Model A Modem

Serial # 0279

So, wait. 1964?
Isn't that older than you are?

Comment on gizmodo.com :

By: 92BuickLeSabre 10:12 PM on Thu May 28 2009

That was surprisingly bad-ass.

(Especially the part at the beginning where he ripped off the poor grieving little old lady.)

Model A: Physical Characteristics

- Hand Crafted Wood Box
- Dovetail Joints
- Brass Hardware
- Notch-cutout for Phone Handset Cord
- Labels

Model A: Technical Characteristics

- Modulation: Bell 103
  - 300 baud / 300 bps
  - Originate Mode Only
  - Frequency Shift Keying
  - No error correction
- Directly Modulates RS232 TX line
  - No internal clock
  - No handshaking / synchronization
- Requires +/- 12V RS232 levels
  - 5V TTL levels will not work

Bell 103 Modulation FSK:

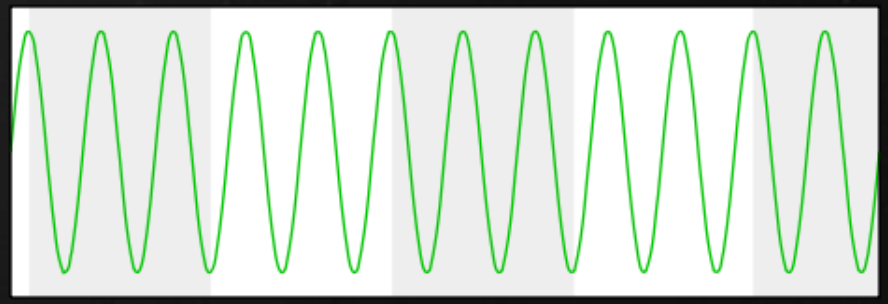
Originate Mode:
Mark = 1270 Hz
Space = 1070 Hz

Answer Mode:
Mark = 2225 Hz
Space = 2025 Hz

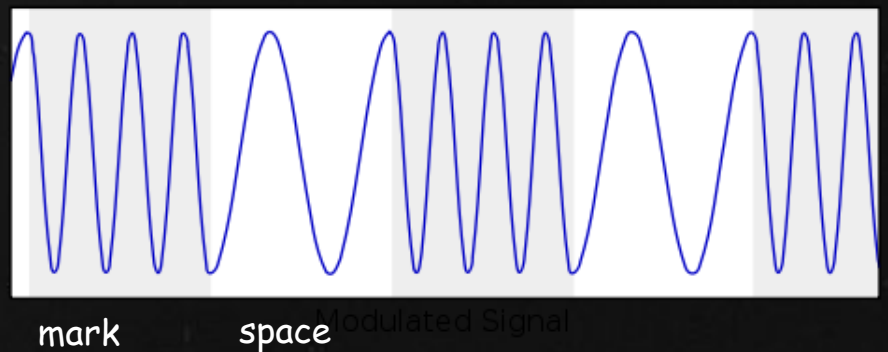
RS232 TX Line:



Carrier:



Modulated Signal:



What Use is 300 baud?

- Terminal Sessions
  - Troubleshooting
  - Data Entry
- Data Transfers
  - Program Submission
  - Text files
- Reporting
  - Business reports (ledgers, inventory, &etc)
- Status Monitoring
  - Remote Sensing

One Personal Account

From: winnall@[deleted]
To: phreakmonkey@gmail.com
Subject: Modem

Hi,
I stumbled on your youtube video. It brought back some interesting memories.

We used that model in about 64 as you surmised. The big problem was dirty lines. If you got a line that had any noise on it, the modem used to return all sorts of Junk. As we used it to transfer data for computation between computers, we often did not know the dirty line existed until results started to come out all gobbledygook. The worst case was when we some how got an infinity loop happening in the mainframe and all terminals froze. Took some time to diagnose and rectify!!! :-[

Bob in Oz

Other pre-1970 Modems





Livermore Data Systems Model B circa 1965
University of California, Davis

Other pre-1970 Modems





Livermore Data Systems Model C circa 1968
Stanford Computer History Museum

Other pre-1970 Modems



Livermore Data Systems Model B
Emailed by Rob / "gambit32"

Other pre-1970 Modems





Livermore Data Systems Model AH (Interim A/B?)
Emailed by Shaun from SFU.CA

Cool Acoustic Coupler Hack





Emailed by "toresbe" from Norway

DEMO TIME

or "Shut the hell up
and show us the modem!"

Demonstrating the Model A Modem

Demo 1: Connecting the modem, modulation, and noise

Demo 2: Dialing into a system at 300 baud

Demo 3: Replaying a previously recorded Bell 103 session into the modem.

Demo 4: (Hopefully!) Making the modem talk / listen through unusual mediums

- Cellular phone
- PVC Pipe
- Other?
- Walkie Talkies
- Room P.A. system?

Thanks for coming!

Thanks to:

DEFCON Organizers, Volunteers, and Goons
DC404 (dc404.org)
Livermore Data Systems
Everyone who emailed or commented
The old lady who gave me the modem
All of you for coming to my talk.