CackalackyCon

May 17, 2024

Social Engineering Timeline

Pre-1940's +

1950's +

1970's +

1990's +

2000's +

Lies, Telephony, & Hacking History

- Matt Scheurer

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About Me

I work for a big well-known organization...

As Vice President (VP) of Computer Security and Incident Response (IR). However, I have many years of hands-on technical experience, including Digital Forensics & Incident Response (DFIR).

I am also a Podcast Host for

ThreatReel

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Where I volunteer...

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WARREN COUNTY CAREER CENTER

Advisory Board: Information Technology and Cybersecurity
https://www.mywccc.org/

WOMSA
Empowering Women in Cybersecurity

Women's Security Alliance (WomSA) Technical Mentor
https://www.womsa.org

Disclaimer!

Yes, I have a day job. However…

Opinions expressed are based solely on my own independent security research and do not express or reflect the views or opinions of my employer.

Origins of Social Engineering

Some believe that Social Engineering dates all the way back to the “Garden of Eden”.

Whatever you believe...

Deception and trickery have likely been with us for a very, very long time!

Social Engineering & Technology

- Social Engineering intertwined with Technology by telephony inspiring “Phone Phreaking”
  - The telephone system blossomed into the World’s first inter-connectable global network
    - Built by Telephone Companies (a.k.a., “Telcos” for short)
  - Phone Phreaking
    - We’ll dive into this topic momentarily...

A note about Telecom History

- These may be somewhat fluid timelines...
  - Telcos were often slow to replace or upgrade otherwise adequately functioning equipment
    - Especially when systems exceeded utilization needs
    - Geo’s, metros, demographics and their respective local branch equipment often happened on different timetables
  - A local community’s telecommunication stack varied greatly at any given time based on a variety of market and other conditions

19th Century and Onward

- Telephone companies hired Switchboard Operators to assist customers and route calls
  - These individuals handled call routing by plugging physical cables into switchboard jacks
  - Many early phone subscribers communicated over shared “party lines”, with no real assurance of privacy

Late 19th and Early 20th Centuries

- Electromechanical switches
  - The late 19th Century introduced Strowger "Step By Step" (SXS) switches
  - These SXS switches continued growing in footprint during the early 20th century
  - This was the beginning of automation in the burgeoning telecommunications industry

1940's to the 1950's

- AT&T developed automation using audible tones for long-distance call routing
  - Multi-Frequency (MF) signals were assigned to telephone number digits
  - Single-Frequency (SF) tones were used for line status signaling
- These advancements paved the way for Phone Phreaking “Blue Boxes” in the future

1950's and 1960's

- Beginning around the mid-20th Century
  - Telephone companies began more widely deploying advanced circuit switching technologies such as “Panel" and "Crossbar"
  - These switches along with reliable transistors paved the way for viable dual-tone and multi-frequency (DTMF) support, often referred to as “touch tones”, on phones

1970's to Present

- Electromechanical switches were slowly being phased out in favor of newer Digital Switches (i.e., Electronic Switching Systems / ESS)
  - The migration to digital switching was the beginning of phasing out analog telephony in favor of digital telephony
- Voice-over-Internet Protocol (VoIP) technology is now largely displacing electronic switches

Phone Phreakers

- Who are/were the Phone Phreaks?
  - People who enjoy exploring phone systems
  - Those who enjoy experimenting with technology
  - Some were obsessed with learning the science and technology behind telephones and phone networks
  - Phone Phreaking often became a gateway or bridge towards becoming a computer hacker, or vice-versa; and "War Dialing"

Objectives of Phone Phreaking

- Some Phone Phreaker motivations include
  - Learning (Thirst for knowledge)
  - Meeting and talking with other Phone Phreaks
  - Pranks and mischief
  - Making free phone calls to anyone, anywhere

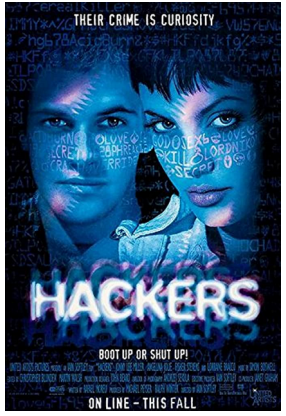
Phone Phreaking in Film

Three Days of the Condor

Released: 1975

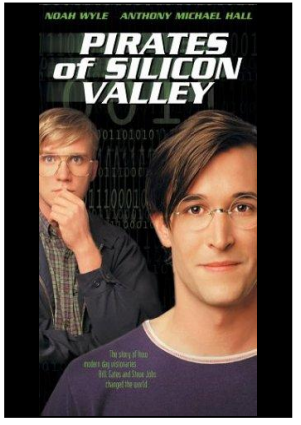
WarGames

Released: 1983



Hackers

Released: 1995



Pirates of Silicon Valley

Released: 1999

Classic “Phone Phreak” Tools

- Musical Instruments & Whistles
- Phreaker Boxes
  - Blue boxes, Beige boxes, Red boxes, etc.
- Payphones
- Tape Recorders
- Scanners and Radios

Phone Switching and Tones

- Early phone systems used audible control tones
  - Some musical instrument notes could pass as recognizable telephone switch signal tones
- Whistles / whistling
  - Cap'n Crunch breakfast cereal once included a free whistle as an in-box toy giveaway, capable of producing a perfect 2600Hz tone
  - Some people could whistle the tones by themselves

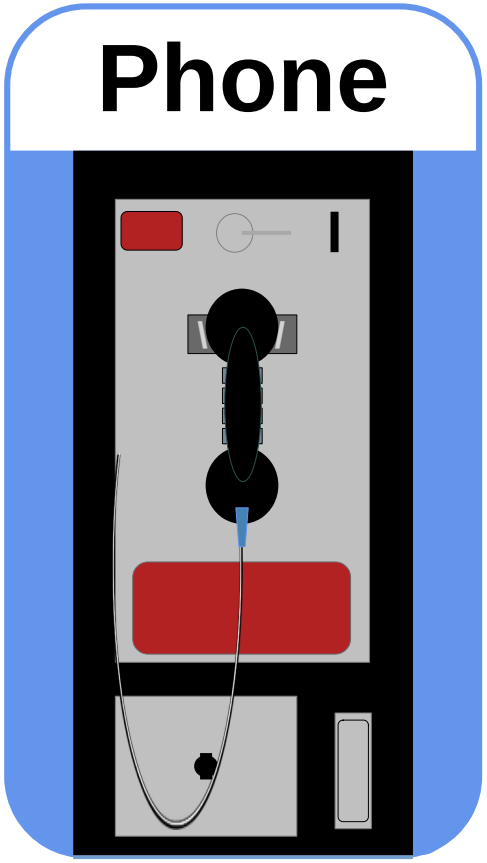
Blue Boxes

- Generated 2600Hz tones among others
- Used for controlling phone switches
- Gave users the ability to place free phone calls

Beige Boxes

- Beige box
  - A lineman’s handset
  - Or a homemade variety thereof
- Connects to a phone wiring block
- Used to “tap” into a phone line or connect a new extension onto a discovered phone block

Payphones



- Once very commonplace
- Provides a physical layer of separation from home
- Offered a level of anonymity to their users
- Some level of deniability for callers

Red Boxes

- Red boxing
  - Used by phone phreaks to load fake money into payphones by playing tones into the handset’s mouthpiece
  - Thus enabling users to place free phone calls from Telco owned and operated payphones

Tape Recorders

- For those not adept at building electronic tone generators and circuits, using a tape recorder and playback was a viable alternative
  - Often combined with a telephone recording device adapter
  - Or by using universal telephone pick-up coils
    - Useful when no modular jacks are present

Scanners and Radios

- Scanners and radios were capable of listening into wireless communications and eavesdropping on conversations
  - Many people unwittingly “bugged” themselves
    - Cordless Phones (43–50 MHz and 900 MHz)
    - Early Cellular Phones (800 MHz)
    - Baby Monitors

Private Branch eXchange (PBX)

- A Private Branch eXchange (PBX) system is a comparatively smaller (to Telco exchanges) telephone exchange and switching system
- Typically owned and operated by organizations and private businesses
  - Providing interconnected phone services to them

PBX Abuse and Hacking

- Enumerating company employee phone directory abuse
- Compromising voice mailboxes and listening to saved messages
- Setting up unauthorized voice mail boxes
- Transfers to extension 91 and other 9 + Country Codes (socially engineered people or switched methods)
- Call-Forwarding, Diverters, and other routing tricks

Phone Phreak Tradecraft

- Dumpster Diving (a.k.a. “Trashing”)
- Call routing loops and 3-way calling used for eavesdropping and/or pranks, what we now often think of as “Man-in-the-Middle” or “Adversary-in-the-Middle” (MitM or AitM)
- Socially engineering phone operators and other Telco employees
- Calling card fraud and abuse

Telco Countermeasures

- Telcos implemented various fraud controls to detect and flag, or block phone phreaking efforts by the early 1980's
  - Old phone phreaking methods and the various color boxes became obsolete and unusable
  - These countermeasures forced Phone Phreaks to continually adjust their tactics midst the changing times

Ch-ch-ch-ch-changes

- Switchboard operator career opportunities were mostly displaced by technology in recent decades
- The market saturation of mobile phones made deploying and maintaining payphones financially infeasible for Telcos in North America
  - Consequently, payphones have largely disappeared from the landscape in most first-world countries

Nowadays

- The proliferation of “unlimited” and “flat-rate” cellular calling plans eliminated the incentive to steal phone service for the purpose of making free phone calls
- Most new telecommunication deployments favor using Voice over IP (VoIP) technologies, platforms, and services
- Calling Card fraud (once very prevalent) has given way to Credit Card fraud

The New Underground

- Phone Phreak "Bridges" (conference call party lines, and virtual meeting places) have largely been abandoned in favor of newer technologies
  - Web conferencing platforms
  - Encrypted Communication mobile apps
  - Darknets
    - Including the dark web

The New Frontier

- Data dumps and dark marketplace use today is more prevalent than old school dumpster diving
- Mobile malware is an ongoing threat
- Proxy servers, VPN services, and TOR are mostly used to cloak communication source endpoint origins today

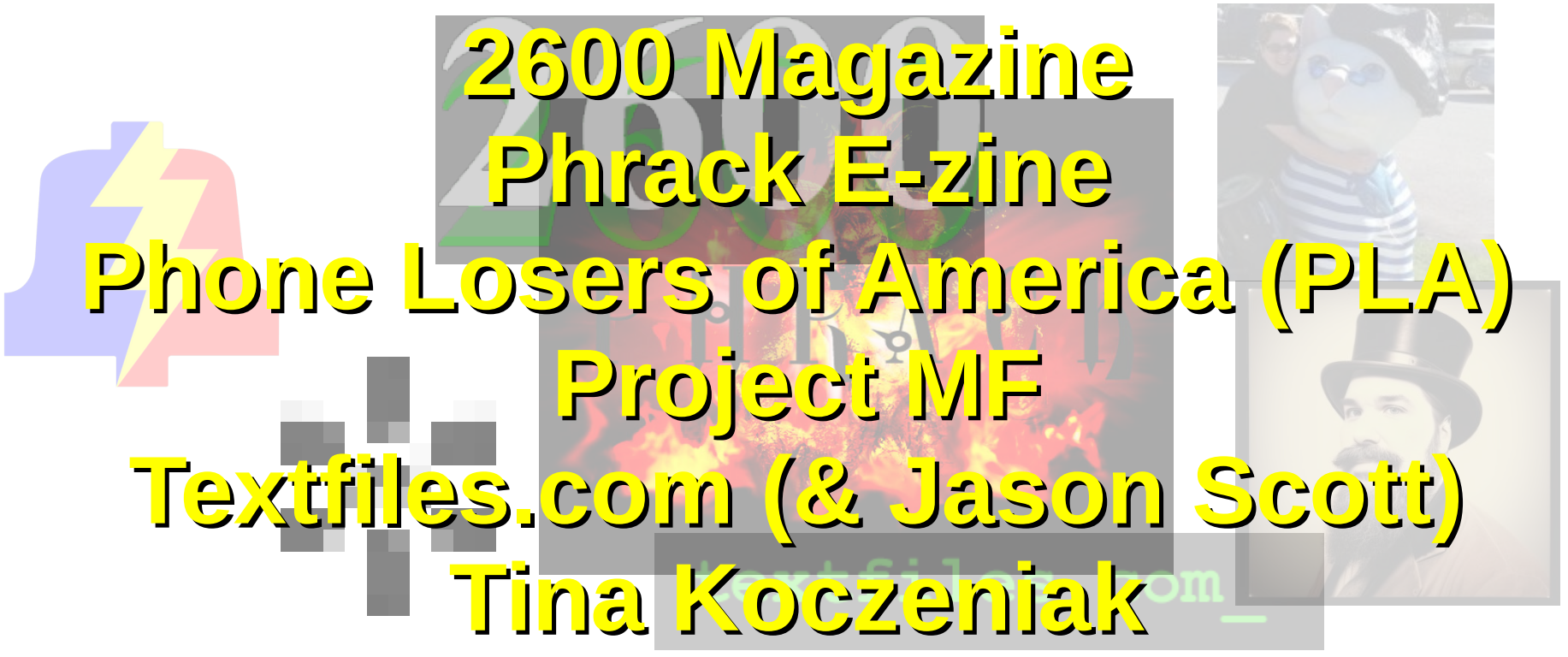
Epilogue

- Technology and telephony abuse is less of a technology hobbyist, enthusiast, and prankster activity now
  - Modern abusers often comprise of...
    - Advanced Persistent Threats (APT's) & Threat Actor (TA) groups, Hacktivists, Financially-motivated actors, Organized Crime, and Nation-states

Modern Phone Phreaking

- Reverse toll-fraud
  - International and other high-toll or pay-per-minute numbers
- Web conference calls
  - Eavesdropping, call bombing, raiding, and hijacking attacks
- Vishing and SMiShing
- Porting (a.k.a. “Port-out”) fraud
  - Migrating a mobile phone number to a different service provider
- Mobile phone SIM swapping

Shout Outs for this talk



2600 Magazine
Phrack E-zine
Phone Losers of America (PLA)
Project MF
Textfiles.com (& Jason Scott)
Tina Koczeniak

Questions

Who?

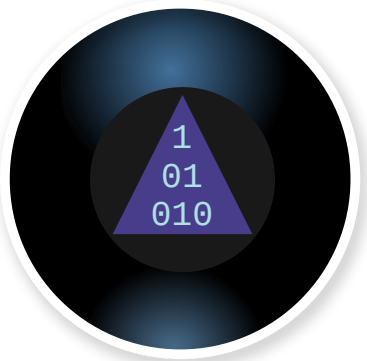
What?

When?

Where?

Why?

How?



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