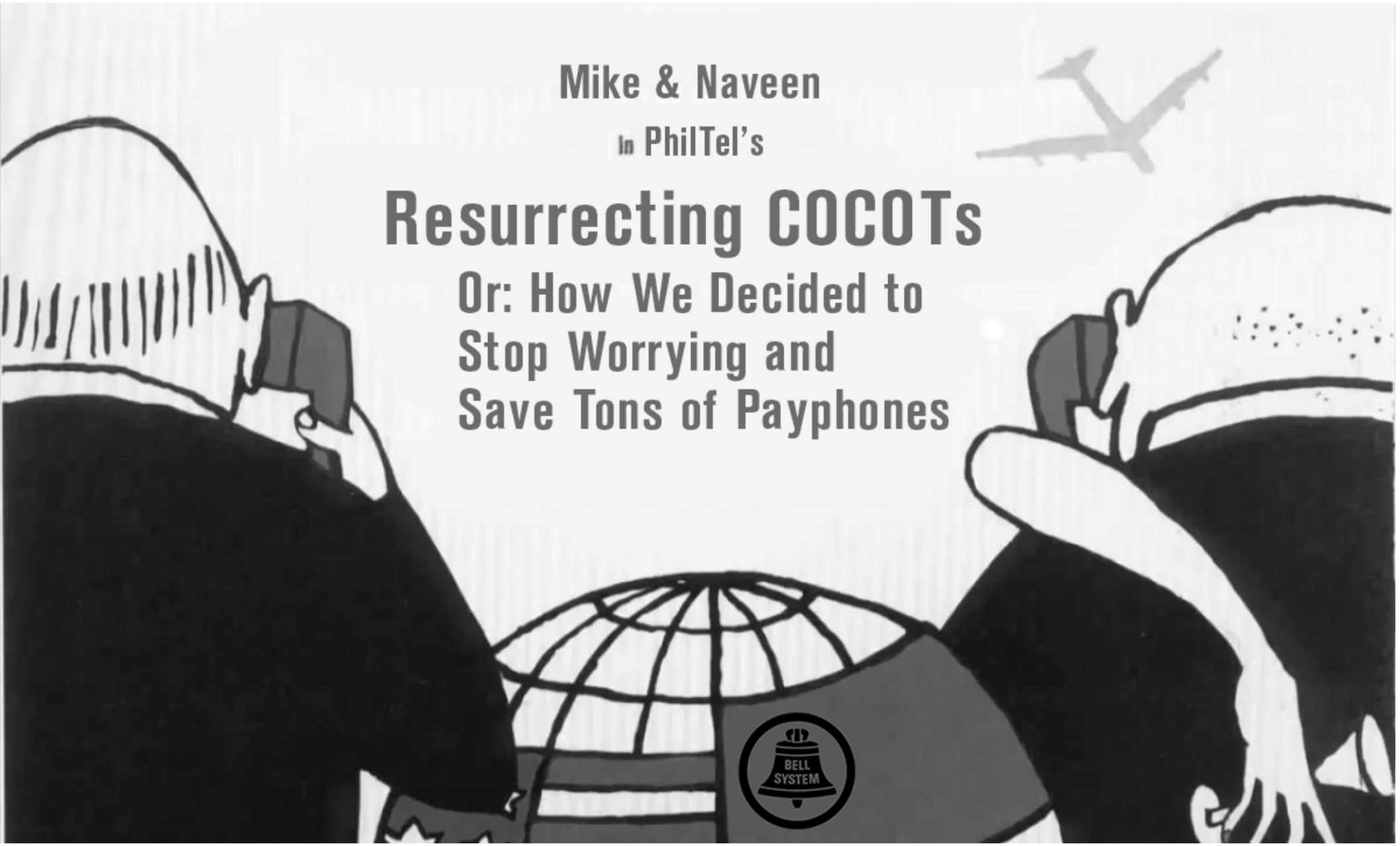

Mike & Naveen
In PhilTel's
Resurrecting COCOTs
Or: How We Decided to
Stop Worrying and
Save Tons of Payphones
BELL SYSTEM

Agenda

- Who are we and what is PhilTel?
- What's a payphone, what's a COCOT?
- NIPCAQ Updates (Mapping and scanning payphones)
  - The state of payphones in 2024
- Let's make a COCOT work
  - Can we create a free-to-use programming line?
  - Future Plans

Who are You?

Mike

- Software engineer by trade, more excited when he can use a soldering iron
- Has been doing weird VoIP stuff for 12 years
- Loves phreak and hacker history
- Isn't afraid to run a half-dozen modems in his basement 24/7 (Dialup.world)

Naveen

- Computer engineer with IT background
- Phone phreak
- "That guy" calling payphones with modems
- Asterisk/DAHDI/C developer
- Environmental activist

PhilTel

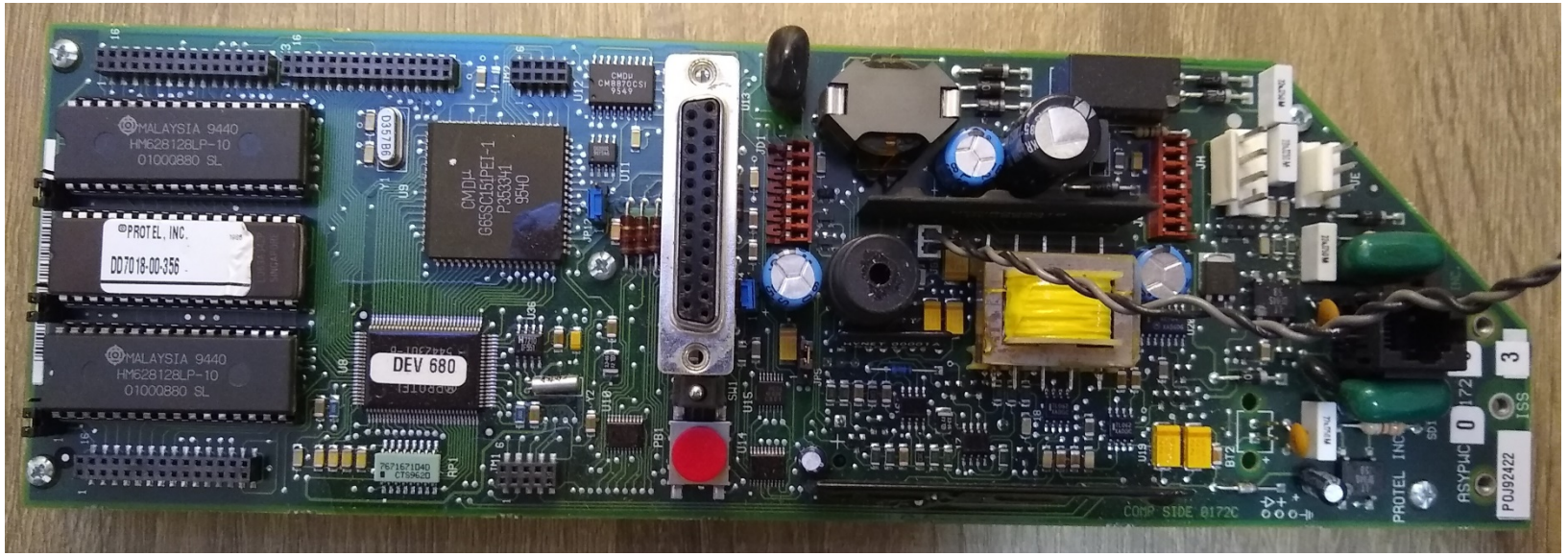
- **PhilTel** is inspired by Futel, based out of Portland, Oregon
- Bring payphones back but make them free-to-use this time (yes, we know it is a misnomer) because payphones are cool
- Also focus on payphone preservation, archelogy, history, exhibition
- Use as much discarded and second-hand stuff as we can, build with COTS hardware and open-source software – nothing goes to waste!

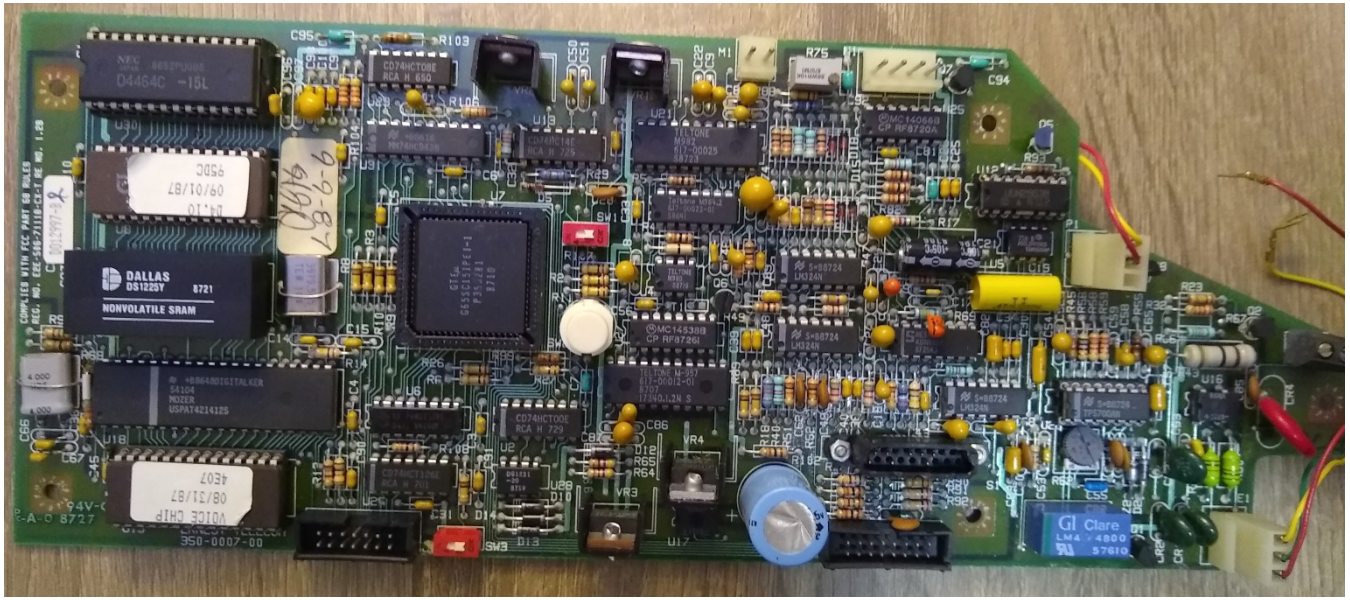
What is a Payphone?

What is a COCOT?

- Customer-Owned Coin-Operated Telephone
  - Typically not owned by a telephone company but instead third-parties or individuals!
  - Starting in the ‘80s, anyone could run their own payphones and collect the tolls for themselves
  - COCOTs use “Smart boards” that rate calls at the phone itself instead of centrally at the telephone company via a coin line
  - If you use a payphone in the wild these days, it is almost certainly a COCOT

What is a COCOT?

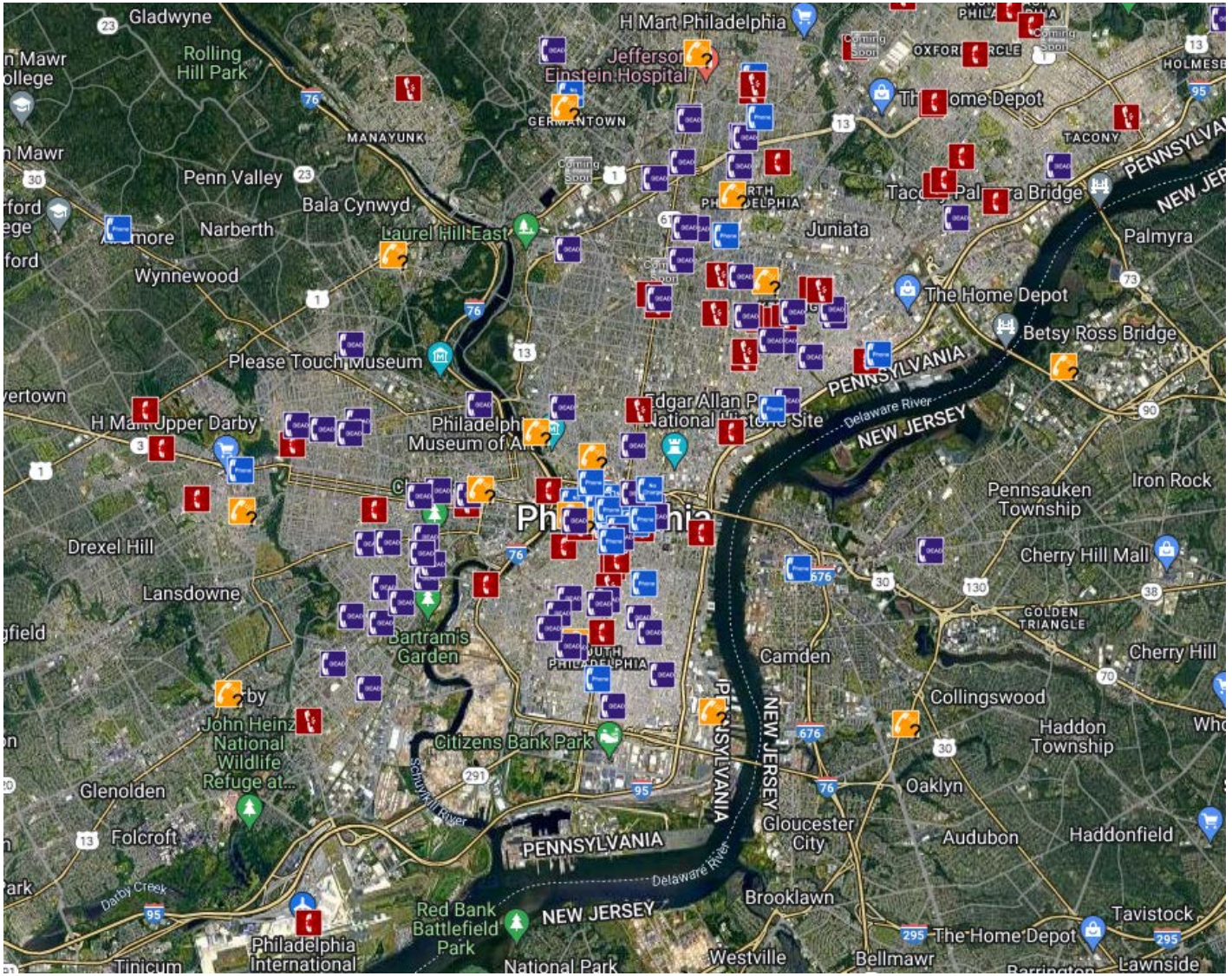




Where Can You Find A Payphone?

https://phreaknet.org/payphones/

Philly Payphones



Local Payphones

What Happens If You Call A Payphone?

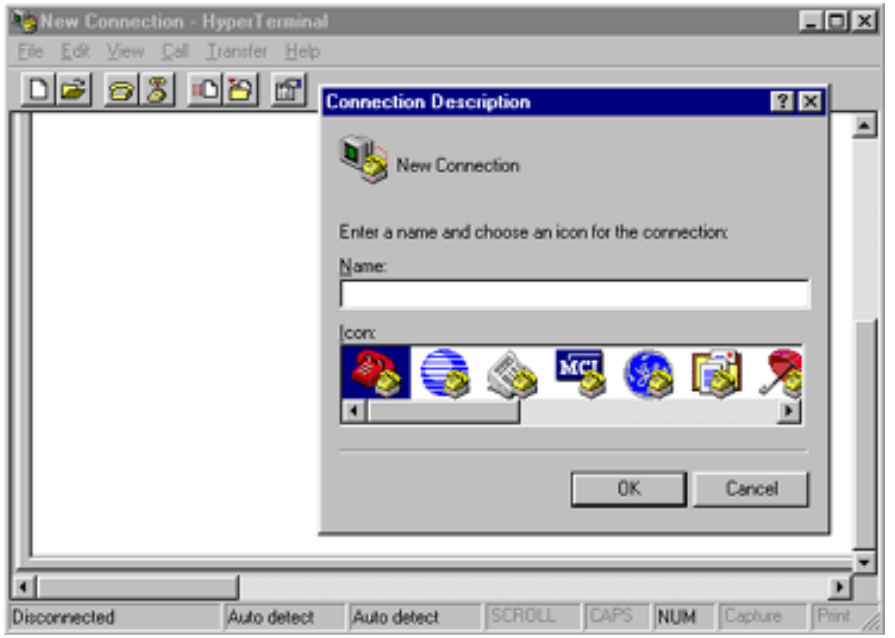
- Historically… what you'd expect
  - No charge for answering incoming calls
  - Bell System had policies to prevent fraud
- COCOTs typically answer with a 300/1200 baud modem
  - Allows for **remote management**
  - Useful for **reporting**…

Protel Printouts

TC!*2152229996*72765*DD8822*4868*025*2210301004552*67805*

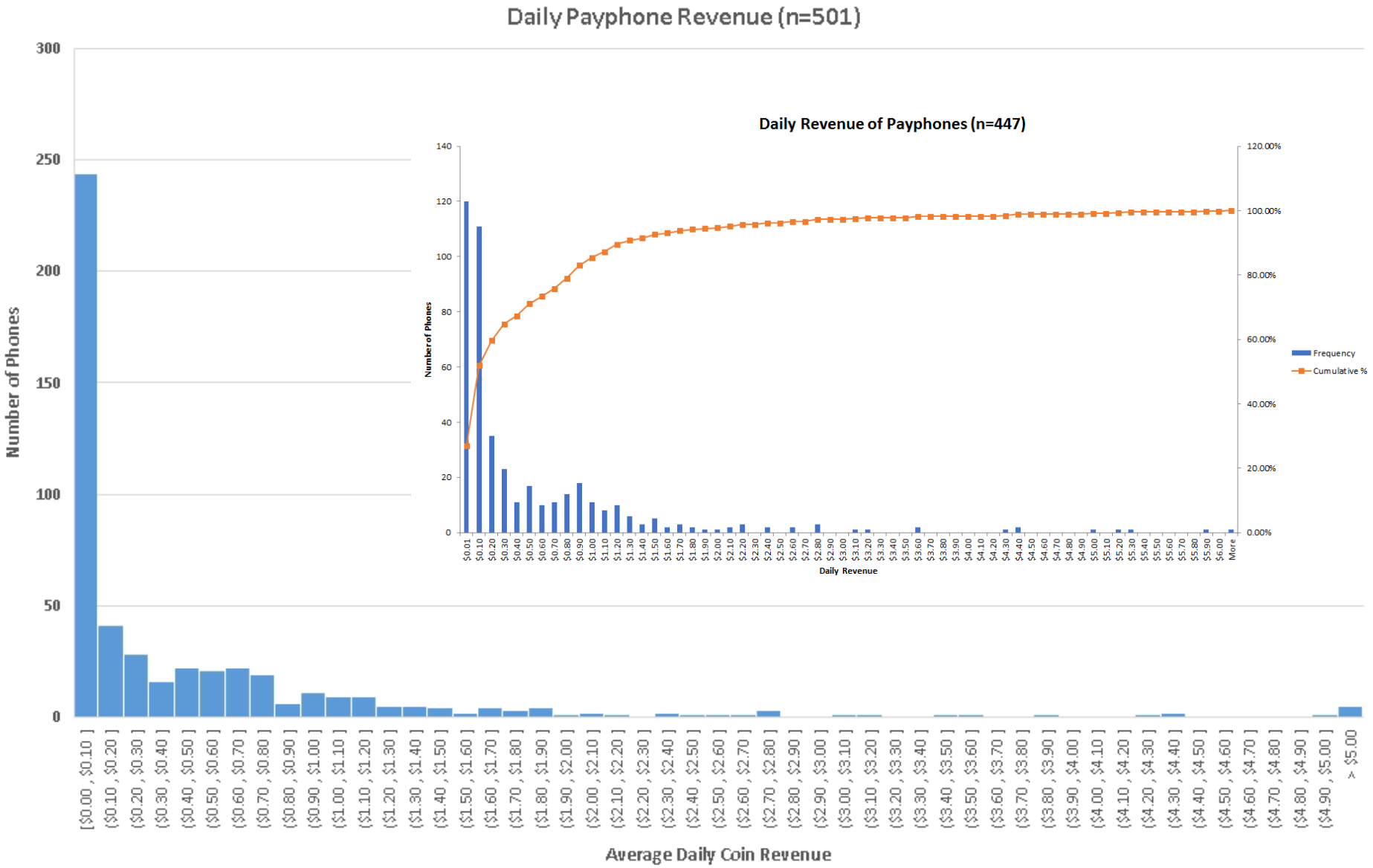
Number	Amount in Coin Box	Model No.	% Full = 25% **Checksum** Only changes when emptied… but not every time	Local Timestamp	Balance When Last Emptied
(215) 222-9996	$727.65 -$678.05 = $49.60			2022 October 30 00:45 local time (12:45 am EDT)	$678.05

Automating It...



Usage summaries posted monthly in the NIPCAQ
https://phreakscan.com

Payphone Revenue



Suburban Station

Location	FW	Avg	Total	To Date	Cur Bal	Last Query	LastChg	HH:MM Ago	Total Queries	Empties
Suburban Station NE	DD8822	$0.46	$729.10	$775.25	$25.85	2024-02-19 00:47	$10.05	535:31	86	11
Suburban Station NW	DD8822	$0.62	$1126.65	$1507.75	$16.00	2024-10-05 07:44	$15.50	141:45	126	18
Suburban Station SE #1	DD8822	$0.73	$1332.65	$2073.10	$35.85	2024-10-05 08:27	$5.50	168:01	132	28
Suburban Station SE #2	DD8432	$1.83	$3326.45	$4126.30	$53.90	2024-10-05 07:55	$10.05	168:00	126	18

Suburban Station... then and now

ANACs

- Identify the calling line
- (800) 444-4444 – MCI
- (800) 437-7950 – MCI
- (844) 700-0431 – Payphone Reporting Line
- Email payphones@phreaknet.org with the number and location

What does this mean for hobbyists?

- Many payphones on the used market these days are COCOTs
- COCOTs are somewhat undesirable to collectors because they are difficult to set up
- Some COCOTs can be hand-programmed via the keypad but others require the phone to be interfaced with a PC running proprietary software
- There are many COCOT manufacturers, but the “big four” are **Protel, ElcoTel, Intellicall, and Ernest**, with Protel arguably being the most common/popular

My Protel payphone, let's program it!

- Purchased when I was a teenager
- Removed the Protel board to replace with a coinless board, but the original intention was to always use the Protel

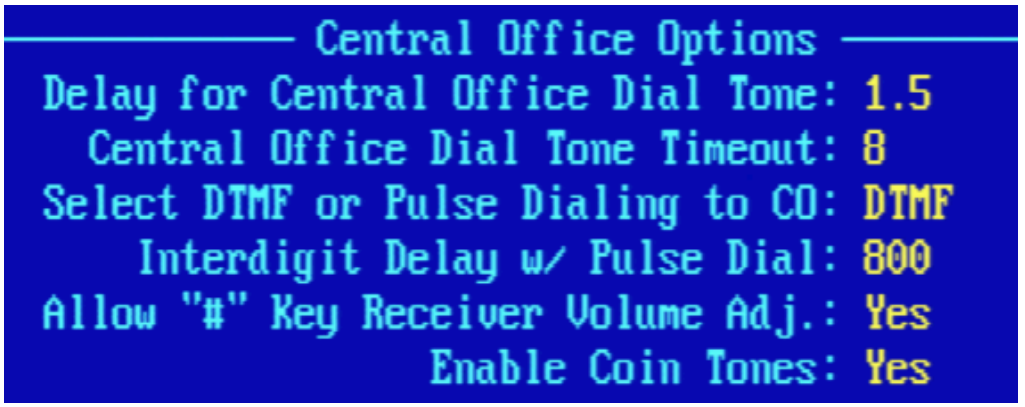
Protel Considerations

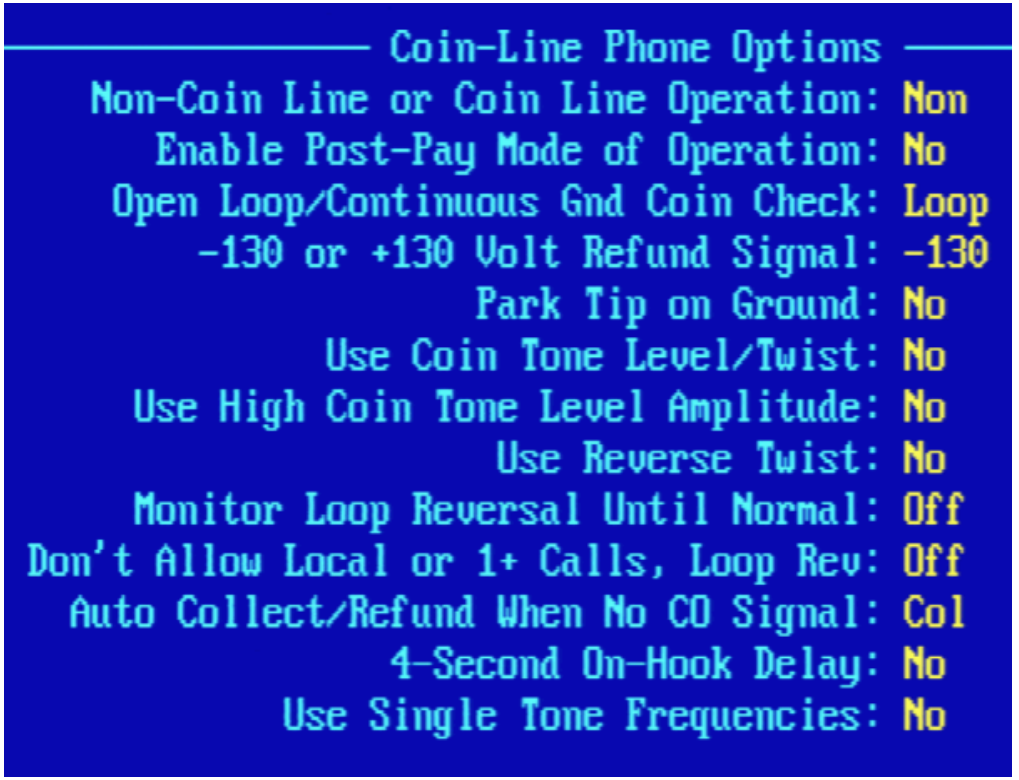
- Uses NiCd battery for board power and 1/2AA Lithium battery for saving programming
- Has socketed ROM (nice)
- Connectors for keypad/handset, relay, coin scanner, telephone line
- Programming Urban Legends:
  - Need a proprietary modem to program some models (what!?)
  - Need copper lines, no VoIP
  - Cannot run programming software in a VM, need bare metal

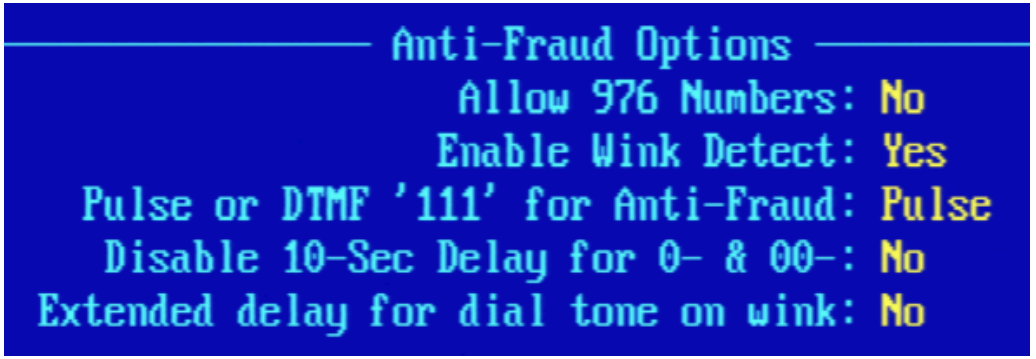
ExpressNet (Xnet)

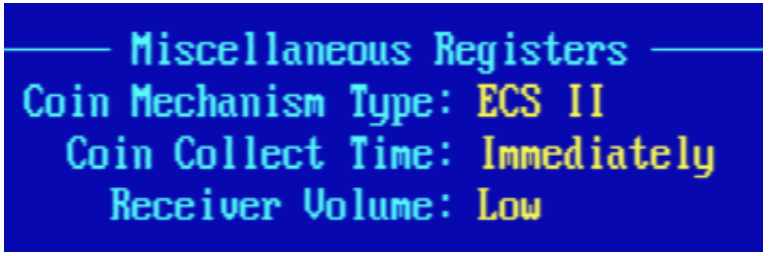
- ‘90s DOS software to program Protel payphones remotely
- Version 1.55 was cracked ages ago when someone found out a freely-downloadable upgrade disk image could become an installer
- We’re going to use Windows 98 SE
  - It’s familiar
  - Windows 98 will be useful for other payphone software
- We need an **Options Record, Costing Record, and Site Record**
- Thanks to Dan C, John Porter, Peter (telesfor.org/payphones/), and El Jefe, wherever you are

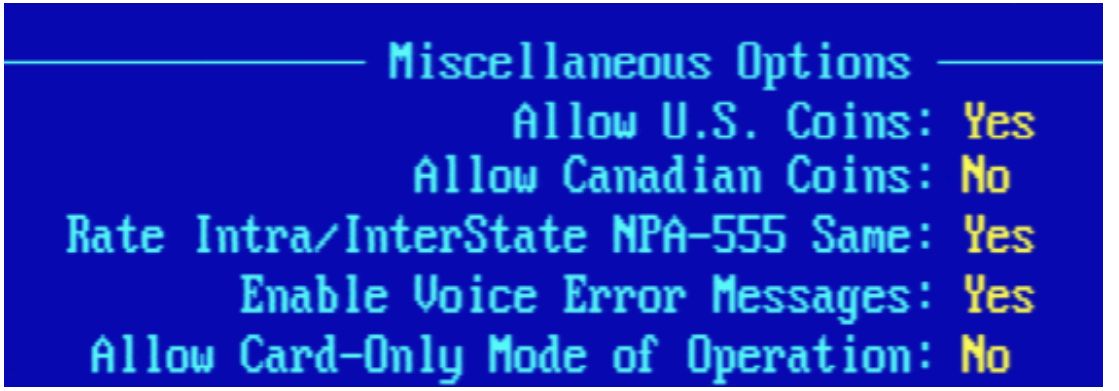
XNet Programming – Options Record



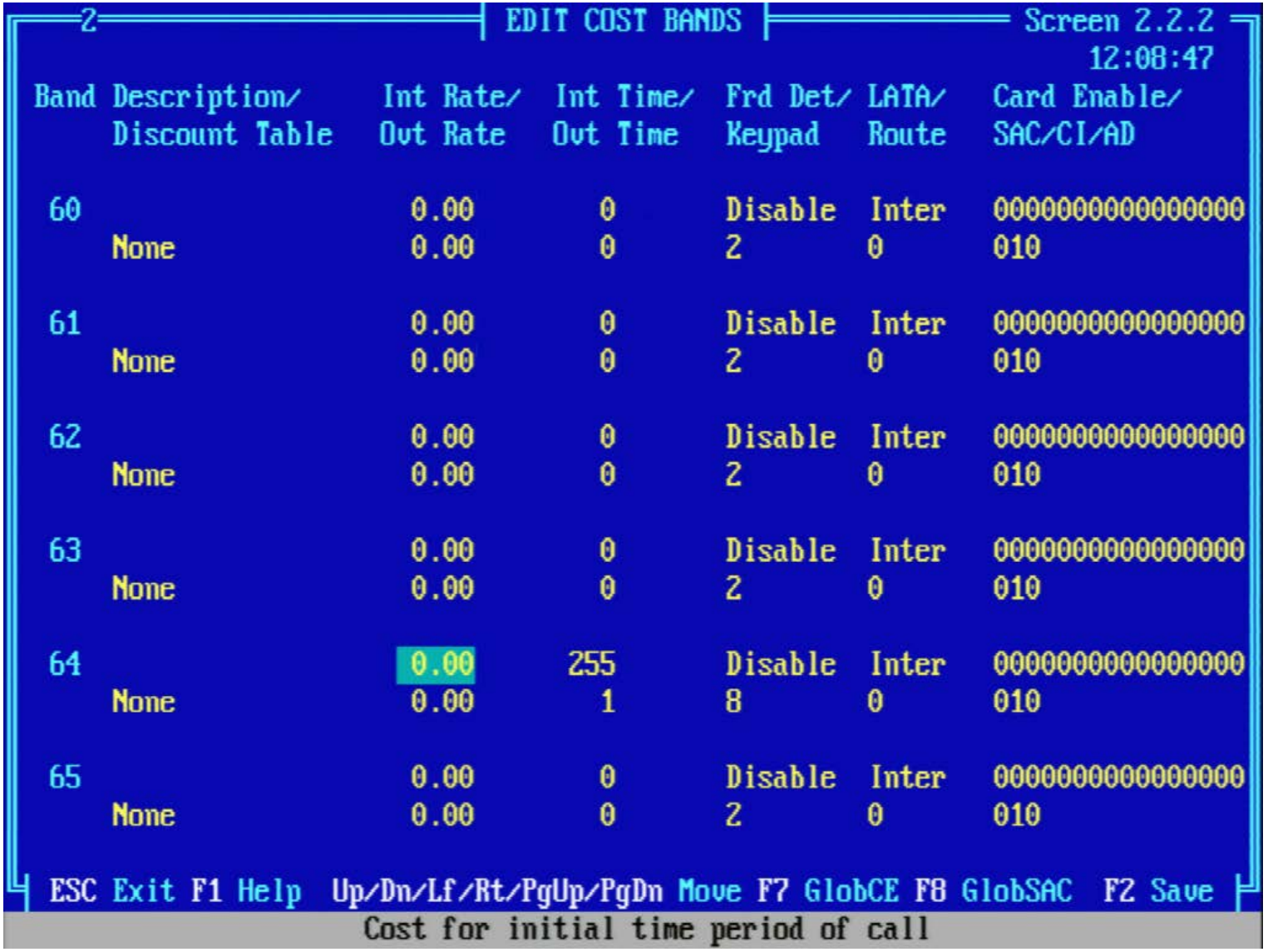






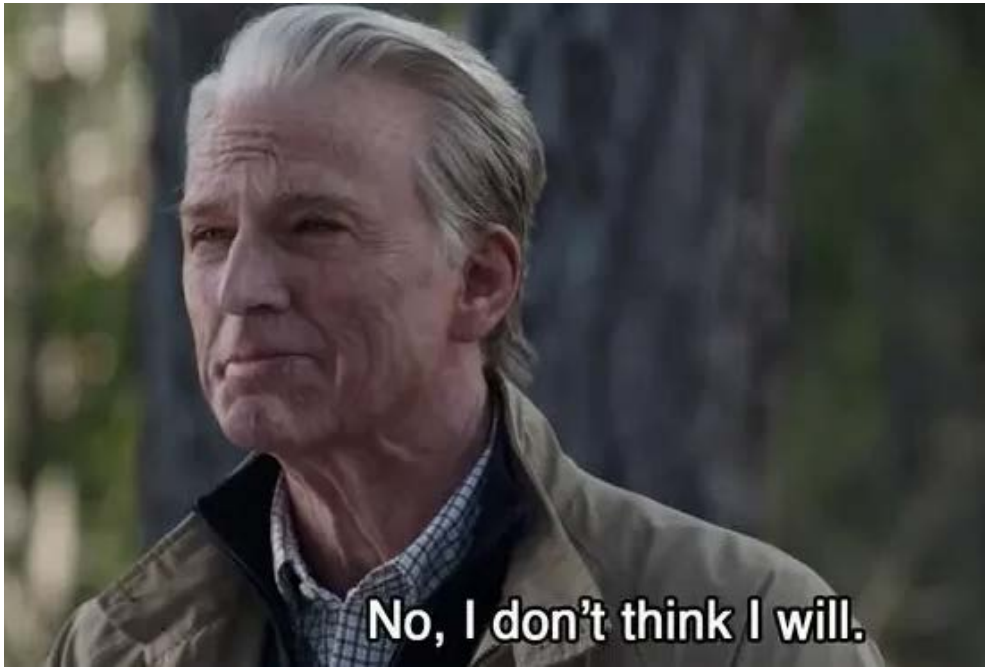


XNet Programming – Costing Record

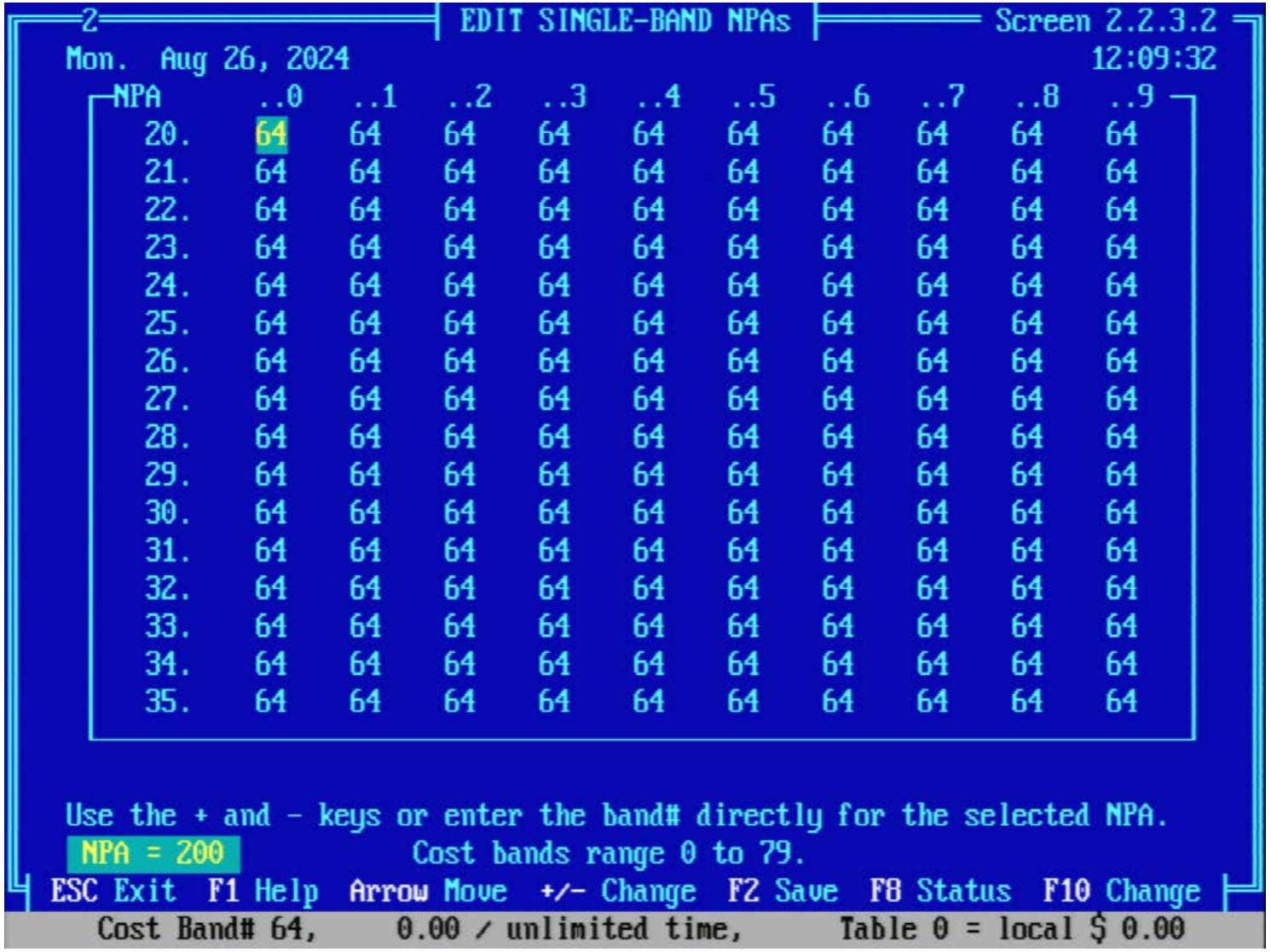


XNet Programming – Costing Record

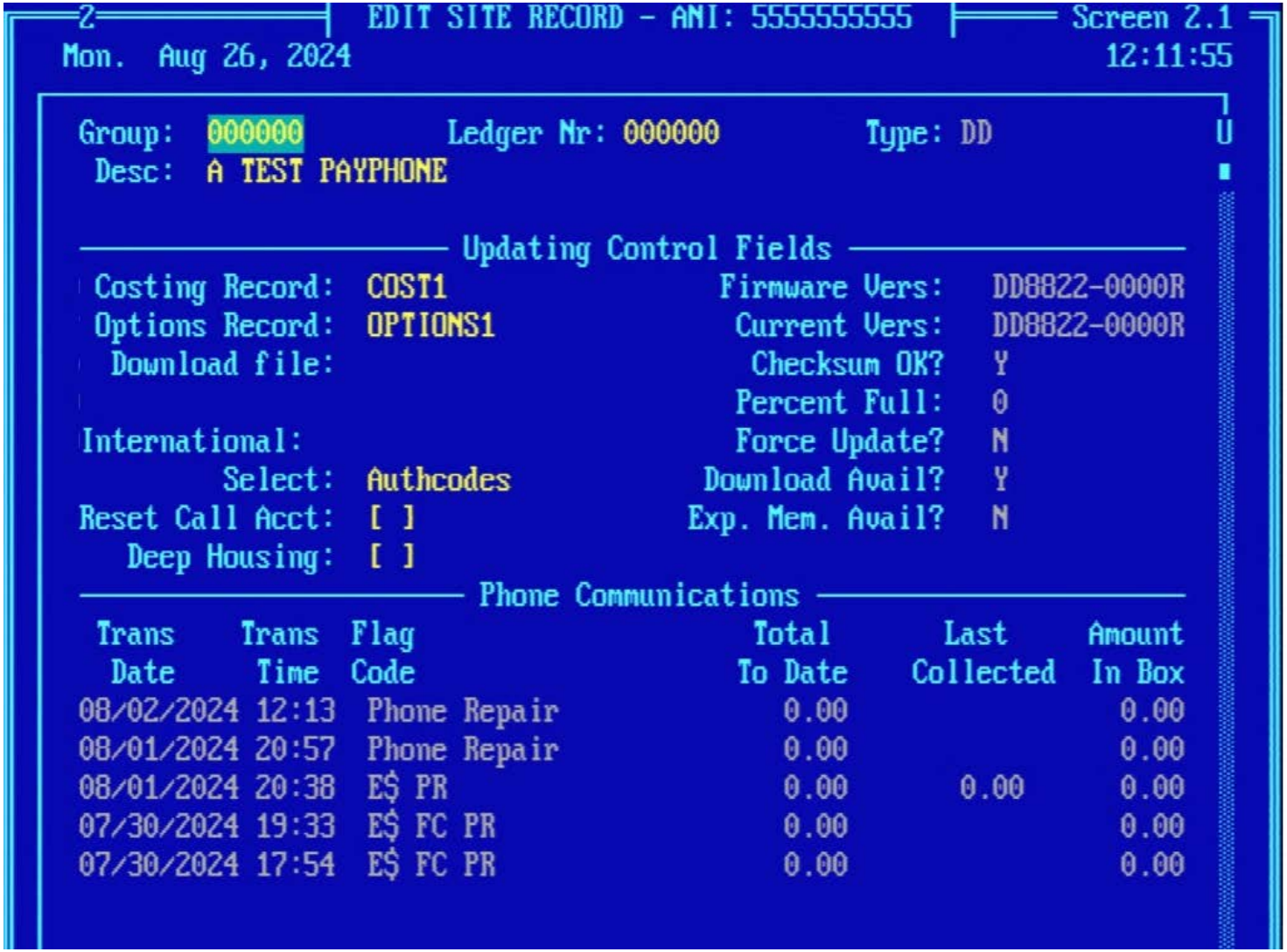
```
88  Incoming Call       0.00        0        Disable  Inter    0000000000000000
    None                0.00        0        1        0        000

ESC Exit F1 Help  Up/Dn/Lf/Rt/PgUp/PgDn Move F7 GlobCE F8 GlobSAC  F2 Save

Do you wish to enable pocket-dialer anti-fraud?
```



XNet Programming – Costing Record (Contd)



XNet Programming – Site Record



Where to run XNet? Let's use a thin client!

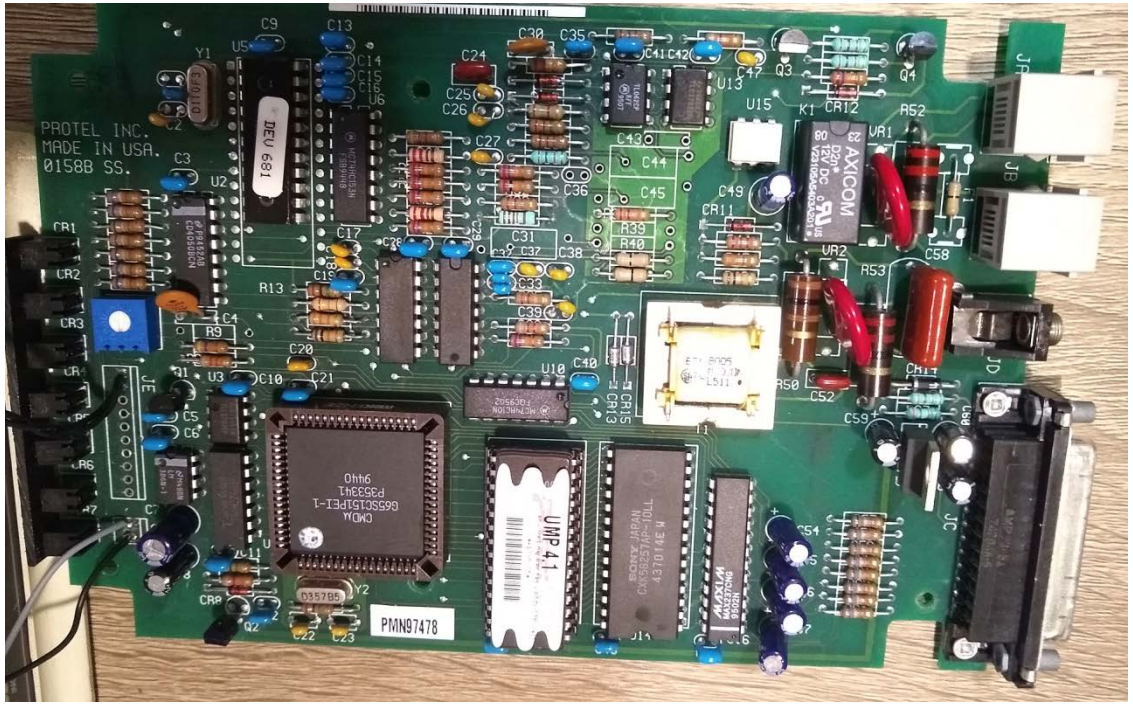
- Virtualization can work, but not reliably (we have more to test!)
- We want bare metal, but vintage hardware might not like running 24/7
- Wyse V90LE!
  - Low power, passive cooling, no moving parts (DOM)
  - VIA C7 Eden CPU, native x86
  - Real Serial port!
  - Supports USB

The UPMS-1200 Modem

- Do we need a proprietary modem?
  - Naveen called Protel, they said “No”
- Protel 7000 boards need a UPMS for 1200 baud programming because they use PSK modulation instead of FSK modulation, but work fine at 300 baud otherwise
- Work has been done recently to test other modems with XNet with varying results (thanks Peter!) but I cannot get them to work myself
  - Your mileage may vary

The UPMS-1200 Modem (Continued)

- Was able to get one on eBay (eventually 2)
- Was DOA ☹
  - Replaced capacitors and relay, now it works great!
  - Also added a speaker on/off switch, couldn't mute in software



How to connect the modem and the phone?

- Analog PBXs and phone line simulators should work just fine, but they're not great for public connecting
- Analog Telephone Adapters won't work (at least on both sides)
  - This isn't a problem for dial-up Internet, I can get reliable V.34 connection with ATAs for dialup.world
- What else is there?

Channel Bank – Adit 600

- A device that muxes/demuxes a group of communications channels
- Many are modular, allowing different cards for different uses
- In this case, analog telephone lines are combined into a DS1 circuit going over one cable (trunk line)
- Provides us a serial port for programming, T1 port, and RJ-21 (25-pair) port for phone lines
- (Analog card should also work)

T1/E1 Card – Sangoma A101(ish)

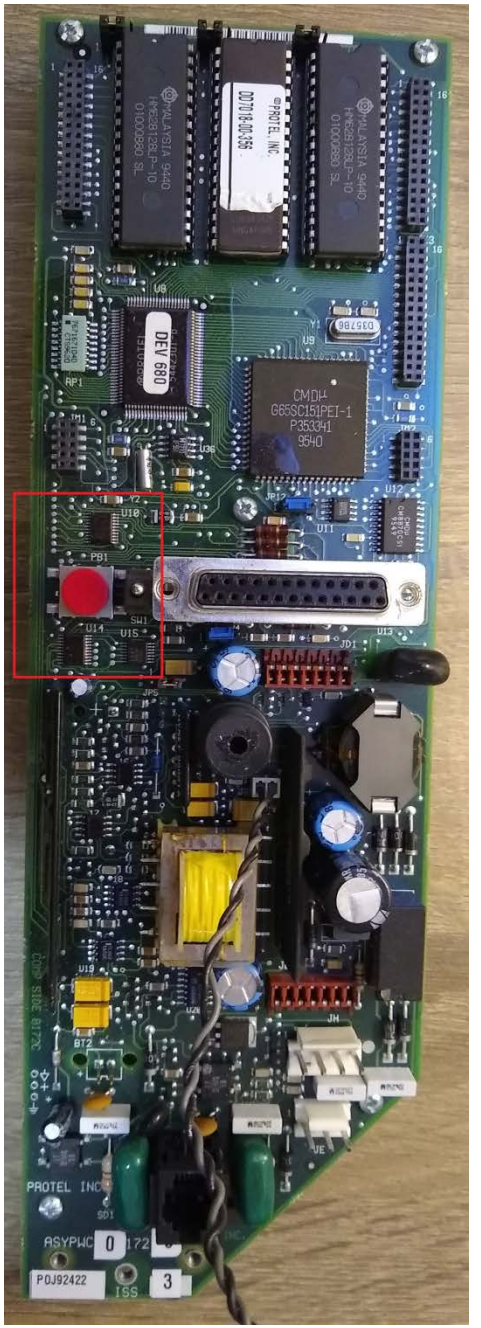
- Adds a T1/E1 interface to your computer
- Integrates with Asterisk using Digium Asterisk Hardware Device Interface (DAHDI)
- Requires compiling Asterisk with DAHDI support
- I have a Sangoma card, which meant using “Wanpipe” software that sits between DAHDI and the card to simulate a Digium card
- If you’re doing this, just find a Digium card

The PBX – Thinkstation E32 with Asterisk

- Cheap SFF PC
- Booting Debian ~~12~~ 11
  - Many issues compiling WanPipe with Debian 12, Sangoma support said use Debian 11 (sure)
  - Still had issues with Debian 11, had issues with Osmocom's alternate installation
  - Found an issue with build script, submitted my fix to Sangoma, eventually it was patched
- Use PhreakScript to install Asterisk, DAHDI, and Wanpipe automatically

How do we program?

- Hold down the program button and take the phone off-hook, hear a single beep, then release the program button
- On the keypad, dial 00555555555*, you should then hear a single beep.
- Next, dial 25<MODEM#>*, you should then hear a single beep.
- Finally, dial *#3



Success!


2
ACTIVITY ON COM 2
Screen 2.5.1.2
Tue. Feb 6, 2024
23:34:20
Site Record Information
Group : 000000
Site Number : 5555555555
Current Vers.: DD7018-0035R
Firm. Version: DD7018-0035R
Old Ph Chksum: 6337
Download File:
Phone Status Information
Phone Number : 5555555555
Software Ver.: DD7018
Phone Chksum : 2887
Cash Box Vol.: 000
Date : 02/06/24
Time : 23:32:18
Flags:
PR SM
Activity
Connection Established at 300 BPS
Phone Status Received
Security Code OK
Status Flags Cleared
Parameters Downloaded
CDR Counts Collected-Bill 0 Aud 0
Call Accounting Reset
Phone Clock Reset
Call Ended OK
Sending End Command
ESC Exit F1 Help F8 Monitor
On-line communication status for activity on this port

Outcome

- We have a free-to-use programming line that will rate all calls free
- How can we access it?
  - Via PSTN, 225-2PROTEL or 225-277-6835
  - Via PhreakNet, 263-0500
  - Via SIP, protel:protel@programming.philtel.org:16556
- We take custom programming requests via hello@philtel.org
- Payphones can be field reprogrammed
  - With permission of course

Next Steps

- Custom programming automation so people can request specific programming and then have it available shortly
- Reverse engineering to eliminate ExpressNet entirely
  - Possible integration into Asterisk softmodem
- Programming lines for ElcoTel Phones and Nortel Millenniums
  - We already have hardware and software for this!
- Full automation of COCOT scanning software

Questions?

Mike

- mike@philtel.org
- Famicoman (Libera IRC)
- https://famicoman.com
- https://github.com/Famicoman

Naveen

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- https://interlinked.us
- https://github.com/InterLinked1