Spam goes VoIP

Number Harvesting for Fun and Profit

Hack in The Box 2007 - Dubai

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Agenda

- VoIP Threads
- Difference between Spam and SPIT
- Use Cases for VoIP numbers
- Number Harvesting
- Attack Examples (the fun part)
- Conclusions

VoIP Threads

VoIP Attacks: What's possible?

Social Threads

- Theft of Services
- Unwanted Contact (i.e. SPIT)

Signalling

- DOS attacks / Blackholing
- Communication Reconstruction
- Call Rerouting

Media

- RTP Injection
- Conversation Degration

VoIP Attack: What's real?

Theft of Services

- Stolen accounts

Misrepresentation

- Faked Caller-ID

ISPs losing money

- Attacker takes over Asterisk box and terminates PSTN calls
- Customer selling subsidized hardware on Ebay
- ''creative'' ways to get around billing

VoIP-Attacks: What's missing?

How about SPIT?

Ask a VoIP Security Vendor to send you some

- Cebit 2007
- NEC Anti-SPIT Project
- Germany Government Project (spit-abwehr.de)

SPIT hardly exists as of now

Spam vs. SPIT

How does Spam work?

Spammers harvest or buy email addresses

- Brute force attempts on mailservers, wild guesses
- Off Usenet, web forums/communities, ...

Spammers send mails through backup MX

- Get around some Spam filtering

Spam attributes

- Mass
- Quality (user actually reads his mails)
- Auxiliary information (name, country)

Spam vs. SPIT

much harder to filter phone conversations

- Greylisting somehow works
- No Spamassassin (yet)
- Filtering has big impact on Quality of Service
- Legal issues have yet to be properly defined

phone number lifetime: several years?

- Constant use
- Less leftovers
  - people tend to port their phone # to their new carrier

Spam goes Voice over IP

Information we crave for

Contact address

- SIP URI == email address

SIP REGISTRAR

- VoIP provider
- like the MX for VoIP

optional

- Realname
- Country (language!)
- email address to relate to

Number Harvesting

Number Harvesting

is

- a prerequisite to Spaming/SPITing
- gathering valid usernames/addresses

might become

- a market for people to sell numbers
- much like currently done for email

should

- not be too easy

Use Cases

Sell numbers like email addresses

Spit

- sell stuff
- polls / surveys
- viral marketing, slander

Why contact people over the phone?

- more intrusive than Spam, hard to filter
- High success rate (as well to being sued)
- format break: you cannot click on a URL in a conversation

Number Harvesting Sources

- Public Directories
  - ENUM
  - Yellow Pages
- ISPs themselves
- Government databases
- Auxiliary services
- Active Probing
- Sniffing
- Social Engineering

Public Directories

ENUM

- DNS based directory
- lookup SIP URI for a phone number

public ENUM

- aka "user ENUM"
- open to everybody
- foundation of the P2P SIP and free VoIP movement

"Number Harvesting Success Rating"

- probably not worth it
- could be used to enrich existing data

not so Public ENUM Directories

also known as

- Carrier ENUM
- Infrastructure ENUM

used in bilateral peerings / Federations

- can only be accessed by partners
- contract may prohibit SPIT

HUGE database

- 8+ mio entries (numbers + blocks) for Germany
- currently under development at DENIC(.de)

ISP as public Source

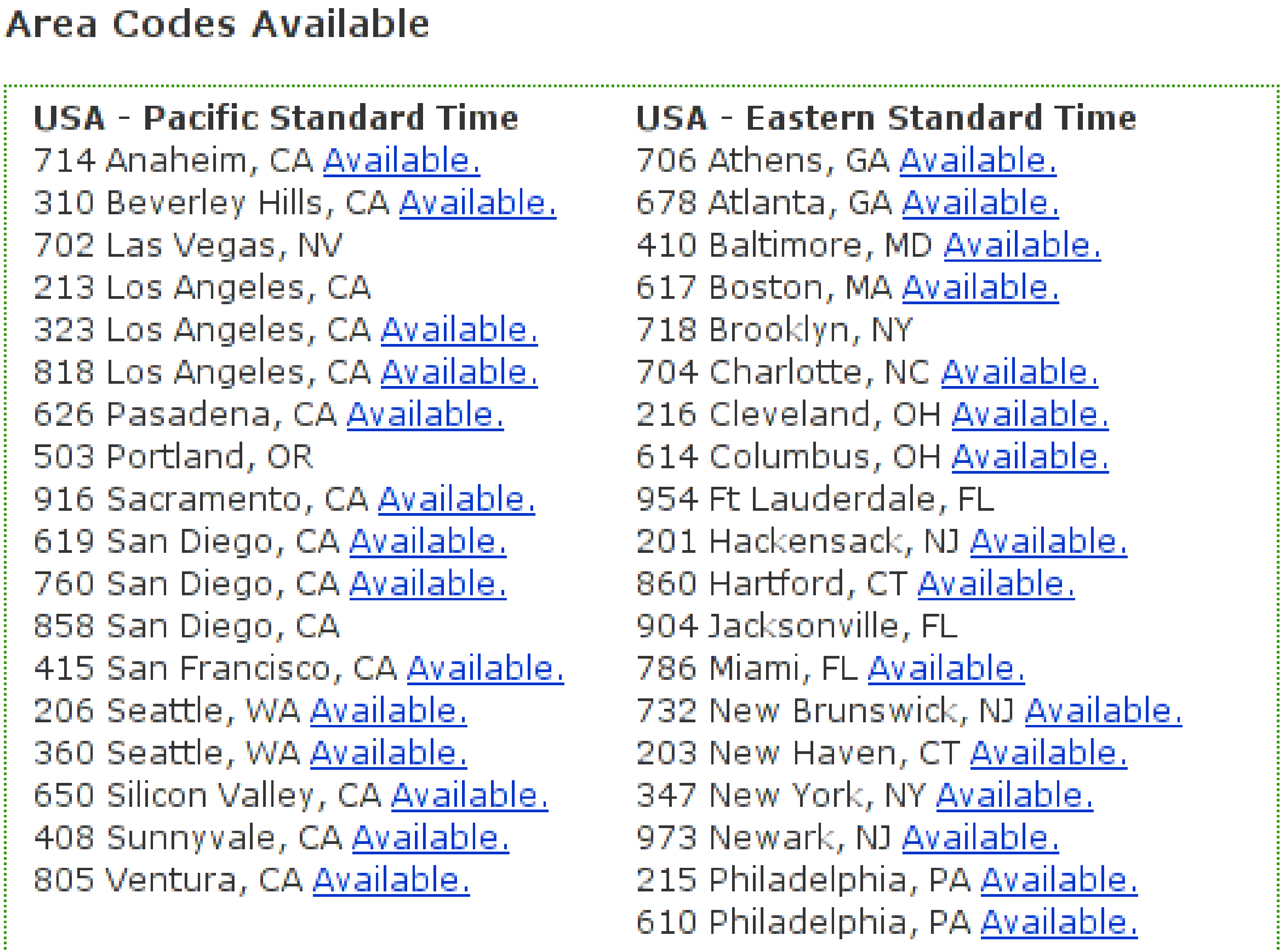
ITSPs usually buy number blocks

- publish blocks
- number length known (guessable)
- iterate through number space to get numbers in service

Sample ITSPs

- freenet(.de)
- sipgate.(de|net|co.uk)
- sipphone / gizmoproject.com
- Vonage(.com)

Public Source: SIPphone



Area Codes Available

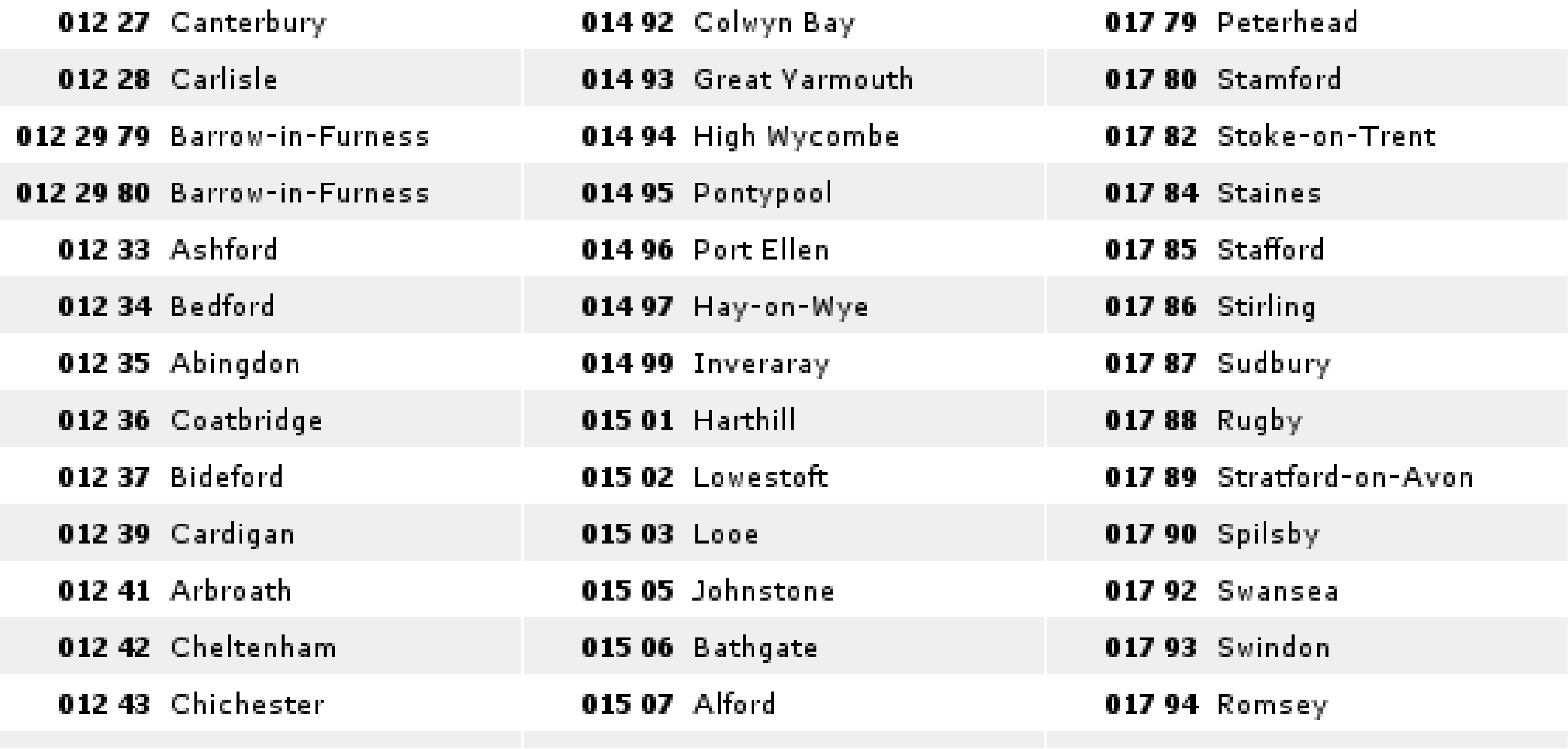
USA - Pacific Standard Time

714 Anaheim, CA Available.
310 Beverley Hills, CA Available.
702 Las Vegas, NV
213 Los Angeles, CA
323 Los Angeles, CA Available.
818 Los Angeles, CA Available.
626 Pasadena, CA Available.
503 Portland, OR
916 Sacramento, CA Available.
619 San Diego, CA Available.
760 San Diego, CA Available.
858 San Diego, CA
415 San Francisco, CA Available.
206 Seattle, WA Available.
360 Seattle, WA Available.
650 Silicon Valley, CA Available.
408 Sunnyvale, CA Available.
805 Ventura, CA Available.

USA - Eastern Standard Time

706 Athens, GA Available.
678 Atlanta, GA Available.
410 Baltimore, MD Available.
617 Boston, MA Available.
718 Brooklyn, NY
704 Charlotte, NC Available.
216 Cleveland, OH Available.
614 Columbus, OH Available.
954 Ft Lauderdale, FL
201 Hackensack, NJ Available.
860 Hartford, CT Available.
904 Jacksonville, FL
786 Miami, FL Available.
732 New Brunswick, NJ Available.
203 New Haven, CT Available.
347 New York, NY Available.
973 Newark, NJ Available.
215 Philadelphia, PA Available.
610 Philadelphia, PA Available.

Public Source: Sipgate



012 27	Canterbury	014 92	Colwyn Bay	017 79	Peterhead
012 28	Carlisle	014 93	Great Yarmouth	017 80	Stamford
012 29 79	Barrow-in-Furness	014 94	High Wycombe	017 82	Stoke-on-Trent
012 29 80	Barrow-in-Furness	014 95	Pontypool	017 84	Staines
012 33	Ashford	014 96	Port Ellen	017 85	Stafford
012 34	Bedford	014 97	Hay-on-Wye	017 86	Stirling
012 35	Abingdon	014 99	Inveraray	017 87	Sudbury
012 36	Coatbridge	015 01	Harthill	017 88	Rugby
012 37	Bideford	015 02	Lowestoft	017 89	Stratford-on-Avon
012 39	Cardigan	015 03	Looe	017 90	Spilsby
012 41	Arbroath	015 05	Johnstone	017 92	Swansea
012 42	Cheltenham	015 06	Bathgate	017 93	Swindon
012 43	Chichester	015 07	Alford	017 94	Romsey

ISP Peering Information

VoIP ISPs need to publish their numbers

- Peering Partner Routing databases

Information available from

- Public ENUM (Sipgate did it)
- Web page
- Email to tech people

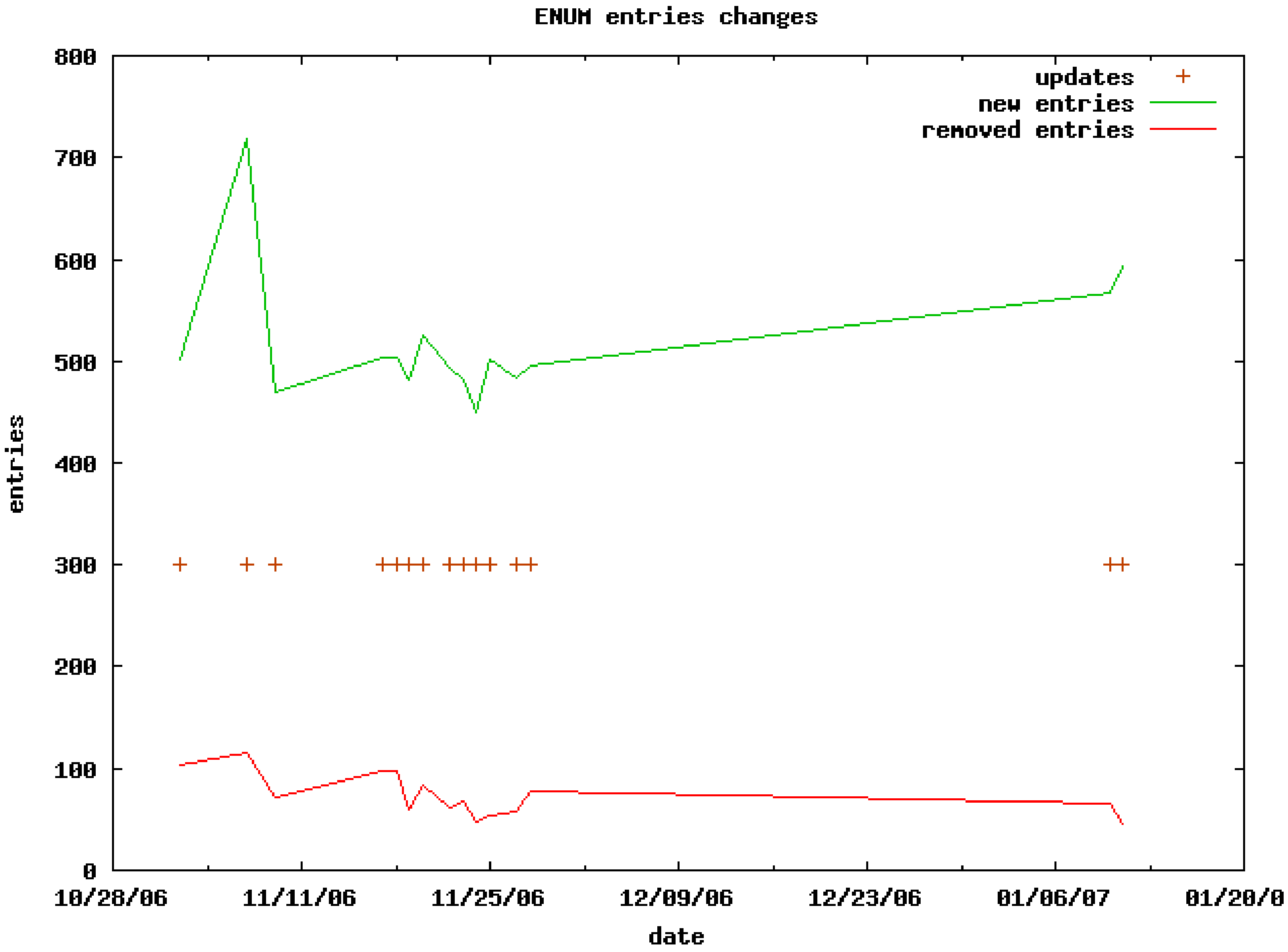
Lists leak information

- User movement per ISP per day

"Number Harvesting Success Rating"

- very valuable but hard to come by

ISP Health Graph



Government Databases

Used For

- PSTN routing at DTAG AG (Deutsche Telekom)
- Law Enforcement
  - where to tap the line?

Official Copies available

- Website (i.e. bnetza.de)
- Lookup # blocks assigned to VoIP ISPs

"Number Harvesting Success Rating"

- best place to start

Active Probing

locate VoIP device and ask for registered #

- hardly works

ask VoIP server about a number

- “100 Trying”, 180, 183, 200, …
  - user exists and is logged on
- “404 Not Found”
  - belongs to ISP but unassigned
- “480 Temporarily Unavailable”
  - hit but currently not registered

"Number Harvesting Success Rating"

- best way to increase quality of information

Demo:
Server Responses

Demo:
Scanning a Number Block

Auxiliary Services

“Sign Up and get a username for email, community ... and VoIP”

- VoIP addresses not limited to numbers

Use email address for VoIP

- or DSL account name
- true for freenet.de

"Number Harvesting Success Rating"

- high hit rate
- false positives: account exists but is unused

Sniffing

Sniff messages off wire

Numbers used in

- Request URI
- To / From
- Diversion
- Caller-ID
- Presence / Instant Messaging

"Number Harvesting Success Rating"

- low density
- redundant information

Enhancing Information

pull more information from public ENUM

- or webpage

subscribe victim in ICQ like Presence service

- track online activity patterns

sniff call patterns

- time of day, length, destination

Social Engineering

Ask ISP

- “I was billed for a call to xxx-xxx-xxx. I thought this was free. Which numbers belong to you in <sometown> or can be reached for free?”
- “What do your numbers in <thattown> start with?”

Ask Someone

- “What's your Vonage number?”
  - obtain number length and common prefix

"Number Harvesting Success Rating"

- anything from worst-case to direct hit

SPIT Examples

Real World Examples

- I have yet to experience large scale real life SPIT

Artifical Examples

- Sure … demos!

Will SPIT work?

- probably not
- due to media discontinuity
- indirect use of SPIT would work
  - viral marketing, slander

SPIT Example: Alert-Info

certain Clients support Alert-Info header

- Thomson
  - www.thomsontelecompartner.com/getfile.php?id=3450
- Snom
- Cisco

Alert-Info header part of INVITE

- Alert-Info: <http://123.org/viagra.wav>

send Alert-Info pointing to SPIT message

- make phone play Viagra SPIT as ring tone

Non-SPIT Abuse of Information

use information gathered to attack networks

- get victims IP by calling him
- break into router, resell services
- send low quality SMS spam

televoting fraud

- Eurovision Song Contest / American Idol
- place fake votes using hijacked equipment

Conclusions

- SPIT will happen
- Increased load due to scanning
  - Likely
  - Likely to be pretty low
- Protection against SPIT
  - Problematic legal situation
  - Projects still in the kindergarten days

Questions and Answers

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