VoIP, current state & future

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The usability of VoIP with regard to the current state of technology
Agenda

- Introduction
- Availability
- Alternatives

- Security
- ADSL issues

- Conclusion
- Questions
Introduction

• Who are we?
  • Antoine Schonewille
  • Bas Eenink

• VoIP
  • History - 1995
  • Current state - 3%
  • SIP
Statistics

“Do you know what VoIP is? If yes, do you use it?”

- No
- Yes, but don’t use it
- Yes, but don’t use VoIP anymore
- Yes, use VoIP for some of my calls
- Yes, use VoIP for nearly all my calls

- Broadband users in the EU-7:
  - 48% No
  - 41% Yes, but don’t use it
  - 5% Yes, but don’t use VoIP anymore
  - 3% Yes, use VoIP for some of my calls
  - 2% Yes, use VoIP for nearly all my calls

- All respondents in the EU-7:
  - 70% No
  - 26% Yes, but don’t use it
  - 1% Yes, but don’t use VoIP anymore
  - 1% Yes, use VoIP for some of my calls
  - 2% Yes, use VoIP for nearly all my calls

Base: All EU-7 consumers
(Percentages may not total 100 because of rounding)

Source: September 23, 2005, Trends “VoIP Is Still In Its Infancy In Europe”

Source: Forrester Research, Inc.

- VoIP usage (US and NL)
Availability

- VoIP versus PSTN
- MTBF: Mean time between failure
- MTTR: Mean time to restore
- Formula:

\[
\text{Availability} = \frac{\text{MTBF}}{\text{MTBF} + \text{MTTR}}
\]
Scalability

- Test runs
- Checklist
- Encryption
- Bandwidth:

<table>
<thead>
<tr>
<th>Internet Connection Speed (in bps)</th>
<th>Dial Up 56K</th>
<th>Broadband Light 128K</th>
<th>ISDN 128K</th>
<th>Satellite 400K</th>
<th>T1 1.5M</th>
<th>1M</th>
<th>2M</th>
<th>3M</th>
<th>4M</th>
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<tbody>
<tr>
<td>Codec</td>
<td>Range of simultaneous VoIP conversations*</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>G.729</td>
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<td>8-15</td>
<td>17-30</td>
<td>25-45</td>
<td>33-60</td>
</tr>
</tbody>
</table>
Emergency services

- Impossible to call 112
  - Routing
  - Proxy/ NAT

- May 2006
  - XS4All did it!
Alternatives

- PSTN
- POTS
- ISDN
- GSM
- Satellite
- Wireless
- Mains
Security!

SIP and its security... very flaky:
• Replay attacks.
• Man in the Middle.
• MD5 hash decryption.

Possible impact:
• ID theft.
• Eavesdropping conversations.
• Calling on some else's costs.
Security!

The MitM

Alice and Bob are SIP users.

Host A and B have evil intentions.
Security!

The MitM

Bob initiates a call to Alice.

Now the 'fun' starts...
We are now able to listen and record the conversation.
Security!

- Counter measures:
  
  *Use encryption!*
  
  - Long term: SIPS and SRTP (ZRTP).
  - Short term: S/MIME and/or SIP improvements.
ADSL issues

Typical to ADSL (and cable) Internet:
The asymmetry.

No issue for:
• browsing / surfing.
• downloading.
• Internet radio.
• Video streaming.

But possibly a problem for VoIP?
ADSL issues

How much does the asymmetry of ADSL influences a bi-directional stream?

Reliability and performance

Tests performed:
- Packet transmission with shifting burst size.
- Different stream sizes in Kb/s.
- 'Many' nodes to assure the results.

Burst \(\equiv\) X-number of frames/packet.
ADSL issues

End node A
Mediparc

End node B
Talitwan.os3.nl

End node C
Bas

End node D
Twan

End node E
Stefan

Internet

ADSL 512/128

ADSL 2048/1024

ADSL 3072/1024

Ethernet 100Mbit

Cable 2880/1500
ADSL issues

Results ADSL link Mediparc.
ADSL issues

The asymmetry of ADSL does not influence VoIP directly.

VoIP client software determines the performance in the end.
Conclusion

- SIP is not mature enough
- Scalable
- Security will improve
- Emergency services
Future research

- H.323 hacks
- Secure SIP MitM
- Further scripts

- Report:
Questions

???????