

VoIP, current state & future



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

Agenda

- **Introduction**
- **Availability**
- **Alternatives**

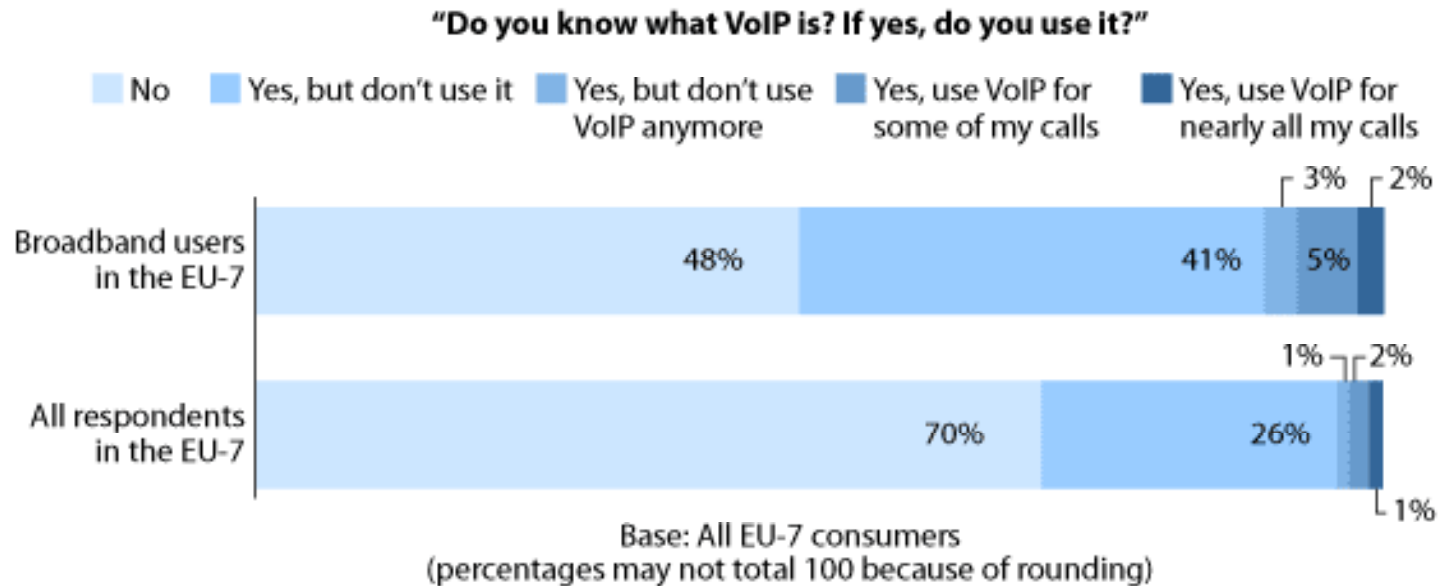
- **Security**
- **ADSL issues**

- **Conclusion**
- **Questions**

Introduction

- **Who are we?**
 - **Antoine Schonewille**
 - **Bas Eenink**
- **VoIP**
 - **History** - **1995**
 - **Current state** - **3%**
 - **SIP**

Statistics



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:

Internet Connection Speed (in bps)

	Dial Up 56K	Broadband Light 128K	ISDN 128K	Satellite 400K	T1 1.5M	1M	DSL		
							2M	3M	4M
Codec	Range of simultaneous VoIP conversations*								
G.711	0	0-1	1	1	3-6	2-4	3-7	5-11	7-15
G.726	0	1	1-2	1-2	5-9	3-6	7-12	10-18	13-24
G.729	1	2-3	3-6	3-6	13-23	8-15	17-30	25-45	33-60

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.**

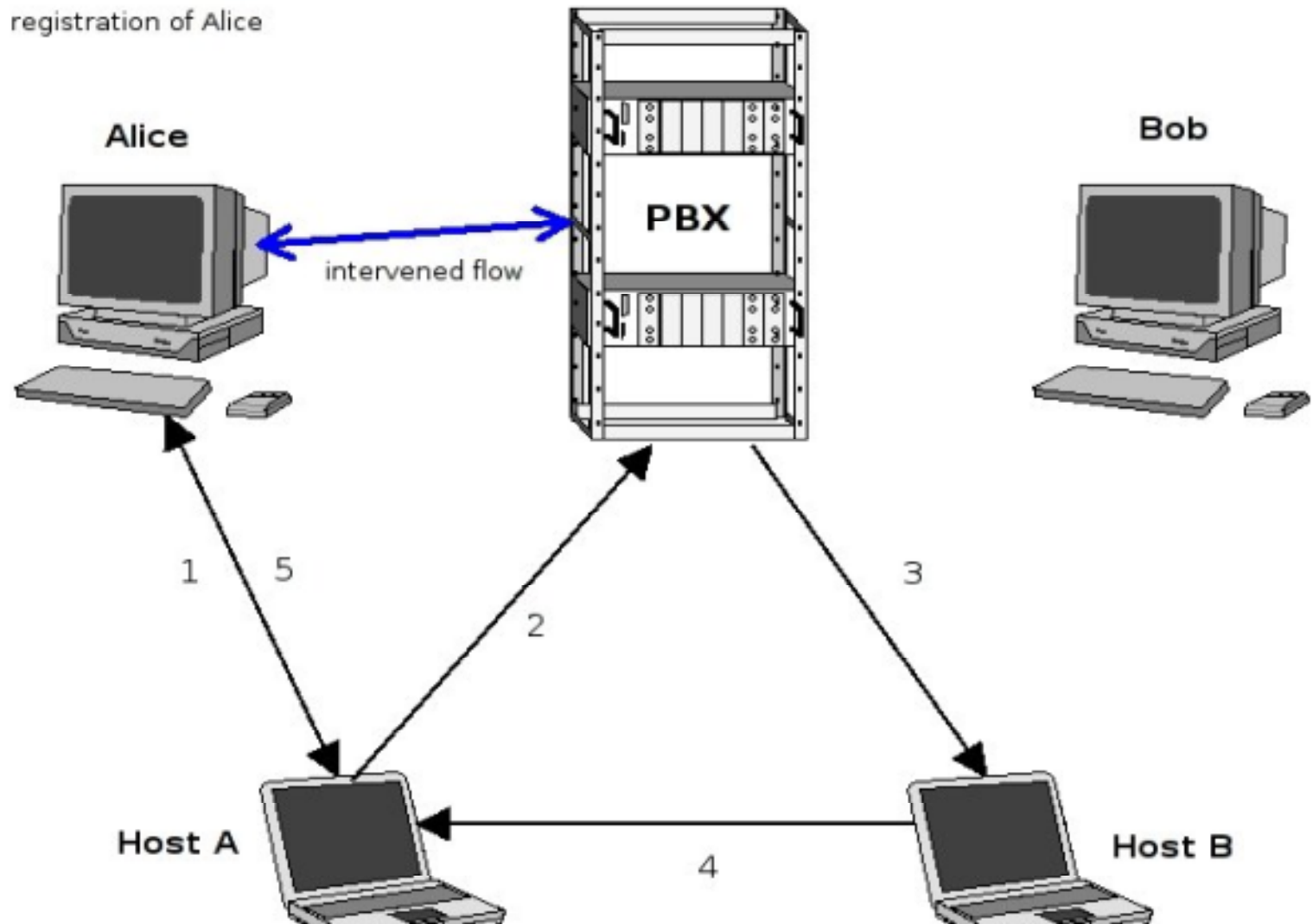
Possible impact:

- **ID theft.**
- **Eavesdropping conversations.**
- **Calling on some else's costs.**

Security!

The MitM

SIP Session
registration of Alice



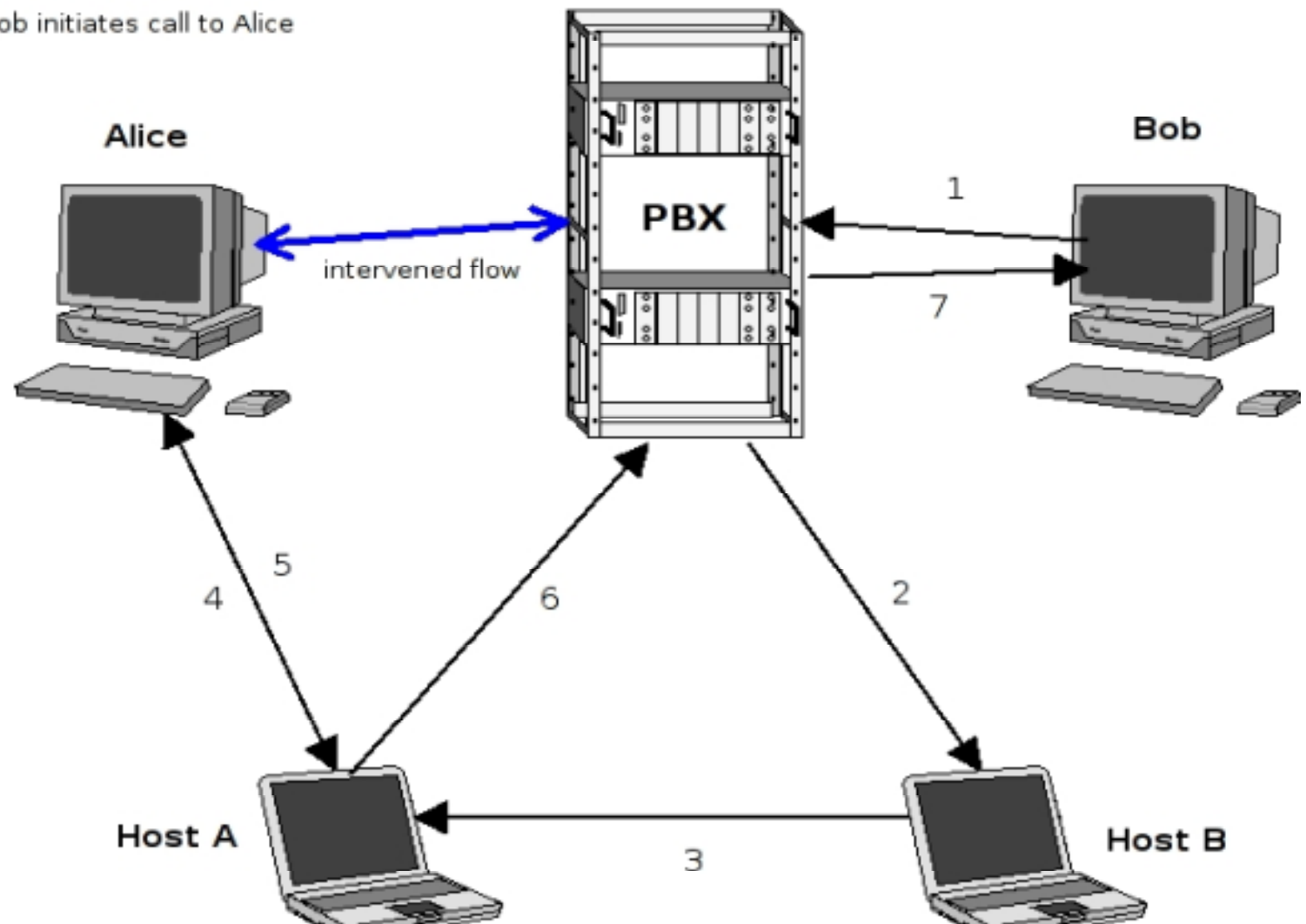
Alice and Bob
are SIP users.

Host A and B
have evil
intentions.

Security!

The MitM

SIP Session
Bob initiates call to Alice

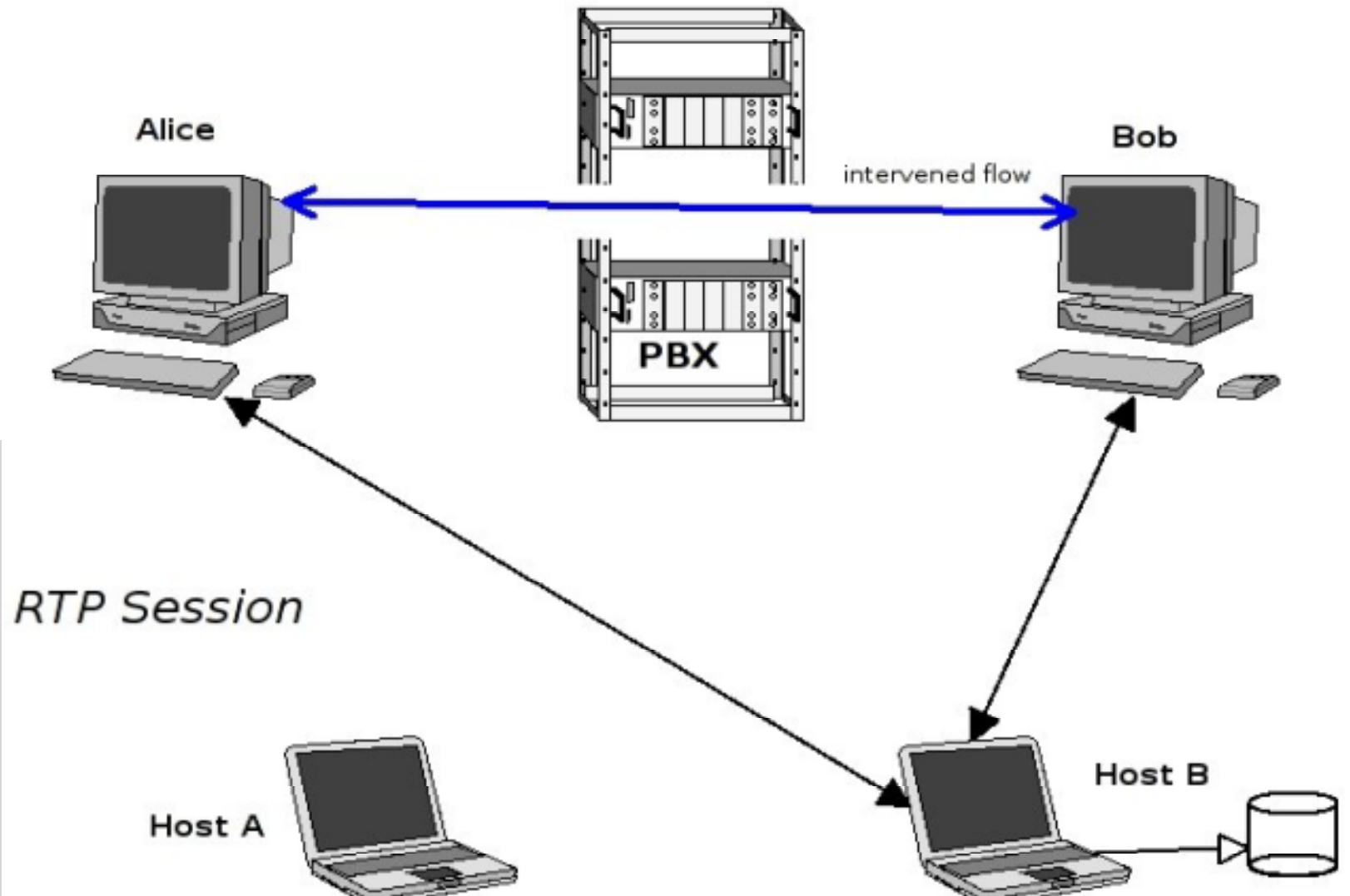


Bob initiates a call to Alice.

Now the 'fun' starts...

Security!

The MitM



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?

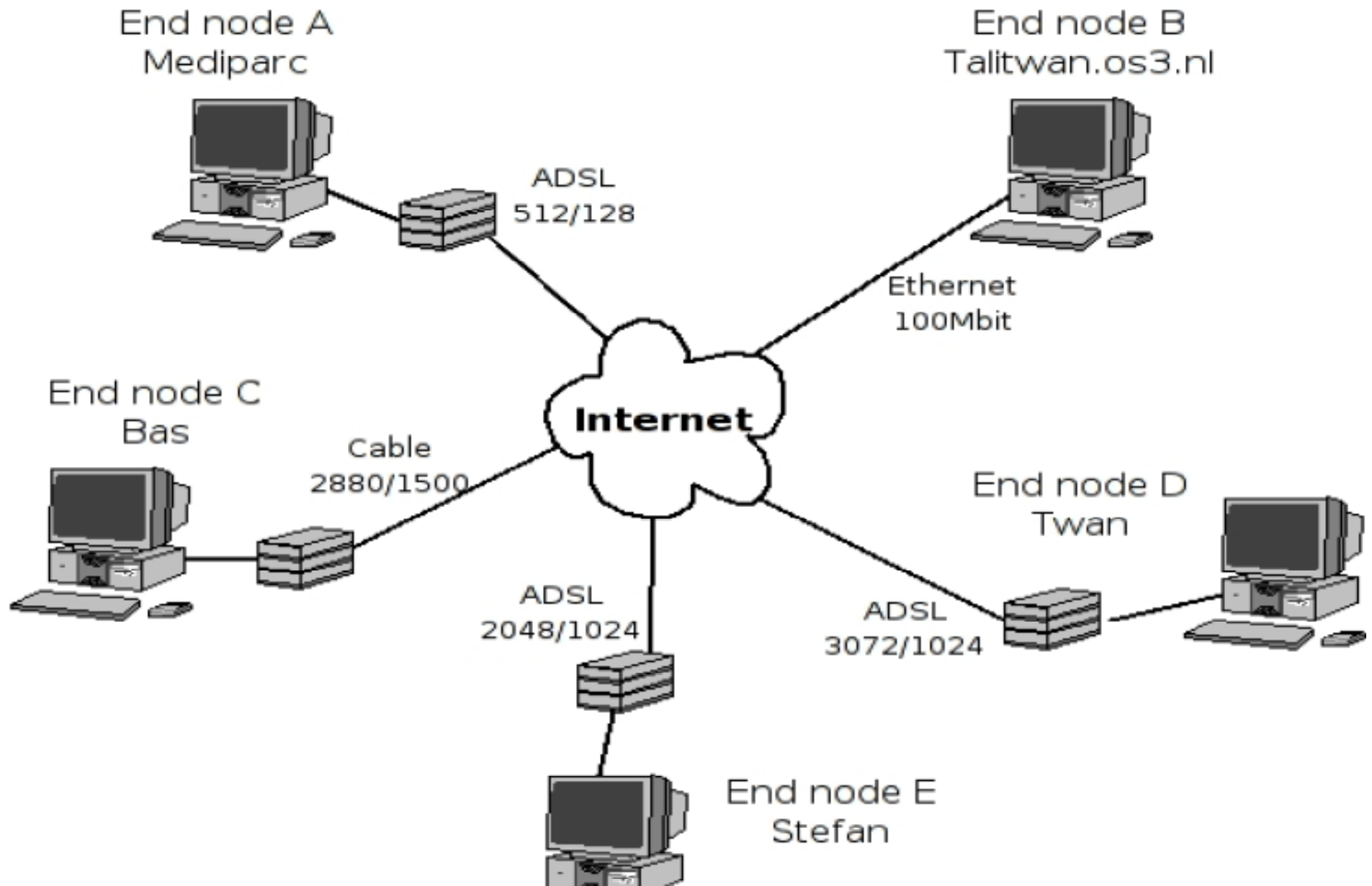
Reliability and performance

Tests performed:

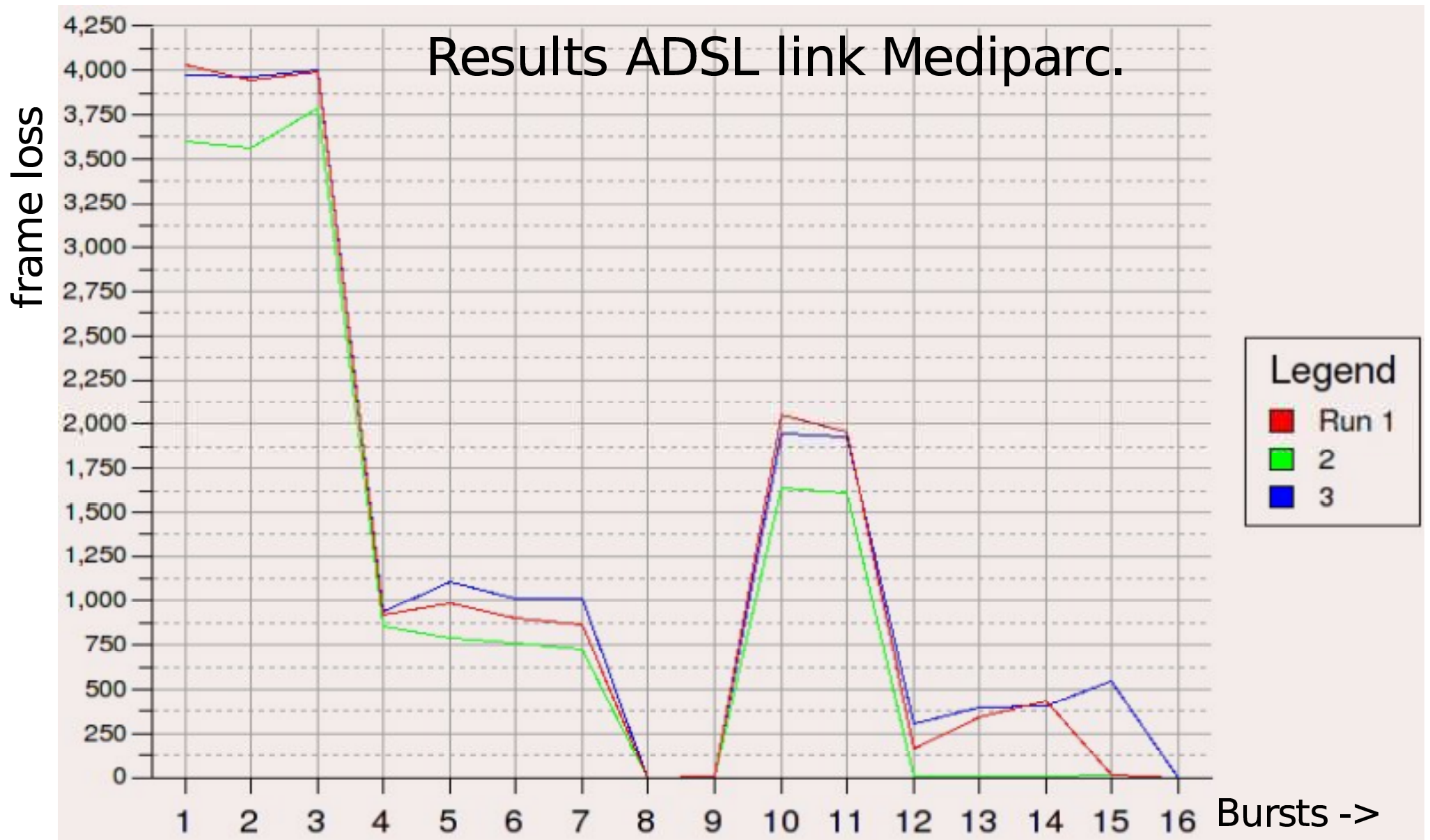
- **Packet transmission with shifting burst size.**
- **Different stream sizes in Kb/s.**
- **'Many' nodes to assure the results.**

Burst == X-number of frames/packet.

ADSL issues



ADSL issues



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:**
 - **<http://www.os3.nl/~talitwan/RP2/>**
 - **<http://www.os3.nl/~bas/RP2/>**

Questions

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