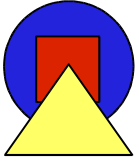


Voice over IP with Skype™

Alf Wachsmann

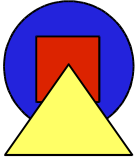
Stanford Linear Accelerator Center

alfw@slac.stanford.edu



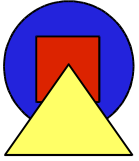
Skype Overview...

- Skype is a "Global P2P Telephony Company™"
- "created by Niklas Zennström and Janus Friis, founders of KaZaA" in 2004
- Located in Luxembourg
- Now owned by eBay (Sep 12, 2005: \$2.6bn)
- "54 million members in 225 countries and territories"
- Skype clients exist for
 - Windows
 - Mac OS X
 - Linux
 - Pocket PC (Windows Mobile 2003)



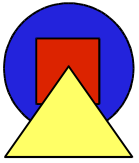
...Skype Overview

- Proprietary signaling
 - Not compatible with (e.g.) SIP or H.323
- However, APIs are open and documented:
 - Phone API
 - interface that Skype uses to access devices, including, but not limited to, USB phones
 - Access API
 - interface Skype publishes to 3rd party applications to access Skype functionality, for example to place a call, to send a text message, to get Skype user profile, etc.



Skype Features

- GUI tool for supported client OSes
- Voice calling another Skype user
- Voice conference calling with up to 4 others
- Voice calling to traditional telephone lines ("SkypeOut")
- Voice calling from traditional telephone lines ("SkypeIn") - includes voice mail
- Chat and IM for groups with up to 48 participants
- Cross-platform file transfers
- Directory and presence management



Rates...

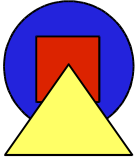
- Calling within the Skype network is for free
- Calls to numbers outside of Skype ("SkypeOut"):



Inside the yellow regions:
€ 0.017 per minute
≈ \$0.020 per minute
Outside: individual rates

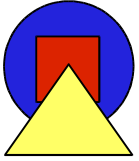
Source: <http://www.skype.com/products/skypeout/rates/>

- Must pre-pay € 10. Expires 6 month after last use.



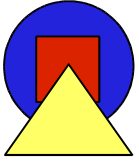
...Rates

- Calls from traditional telephone lines ("SkypeIn")
- Assigns normal phone number to Skype account
- Comes with voicemail
- 12 month subscription is € 30 and 3 months is € 10



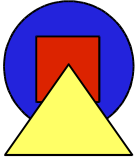
Skype's Inner Workings...

- Peer-to-peer
- No single big central server but P2P "supernodes"
- Reliable user machines become a "supernode"
 - "reliable": running Skype client for ≈ 24 hours
- A "supernode"
 - assists in handling Skype contact list
 - helps with call routing
 - relays third party traffic



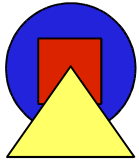
...Skype's Inner Workings

- Outgoing TCP ports 80, 443 and random ports ≥ 1024
- In- and Outgoing UDP ports ≥ 1024 (state ≈ 30 seconds)
- Works behind NAT if translation is consistent
- Works with SOCKS5 and HTTPS/SSL proxies
- Becoming a supernode cannot be disabled or prevented (other than terminating the Skype client)

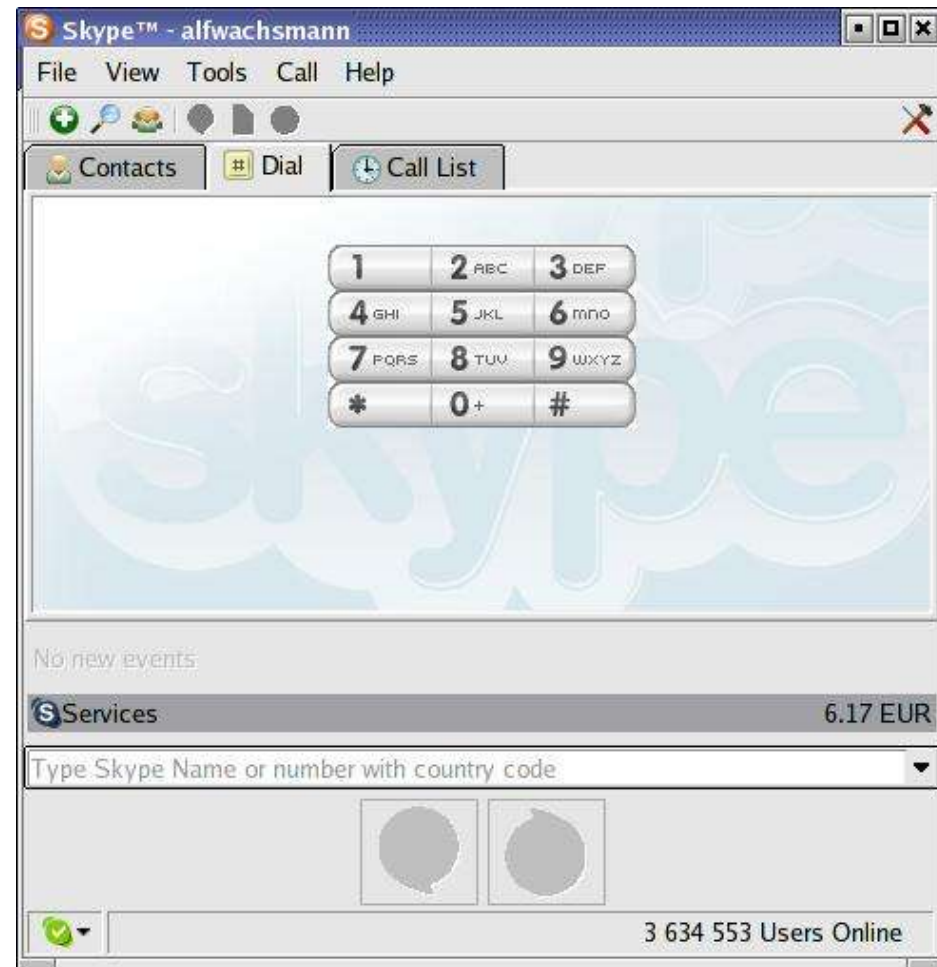


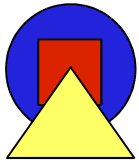
Security

- Confidentiality and Integrity
 - communication parties exchange signed identification credentials and agree upon 256-bit session key
 - Encryption is AES-256
 - All content is encrypted
- Authentication by pass phrase
 - Used to logon to the Skype web site
 - And to use the locally installed VoIP application
- For more details about the protocol, see their "Network Administrators Guide":
<http://www.skype.com/security/guide-for-network-admins.pdf>



Screenshots...





...Screenshots...

Skype™ - Search for Skype Users

Search for Skype Users

Look for Wachsmann

Skype Name	Full Name	City	Country	Language
alfwachsmann	Alf Wachsmann	Menlo Park	United States	
jojo_wachsmann	George Wachsmann	São Paulo	Brazil	Portuguese
marcelowachsmann	marcelo wachsmann	or haner	Israel	Spanish
swachsmann	Shelley Wachsmann		United States	English
tamir_wa	tamir wachsmann	or haner	Israel	
tpkathi	Katharina Wachsmann			

Skype™ - alfwachsmann

File View Tools Call Help

Add Search Conference Send IM Send File View profile Configure

Contacts Dial Call List

<All>

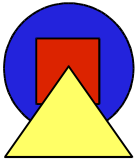
- SLAC SCS Help Desk (SkypeOut) +16509264357
05/18/2005 10:53:31 PM Duration 00:23
- Randy Melen @ home (SkypeOut) +1650 [redacted]
05/18/2005 10:50:13 PM
- Randy Melen @ home (SkypeOut) + [redacted]
05/18/2005 10:49:43 PM
- Denise @ work (SkypeOut) +1650 [redacted]
05/18/2005 08:21:21 AM Duration 17:11
- Denise @ home (SkypeOut) +1 [redacted]
05/17/2005 07:46:35 AM Duration 06:53

No new events

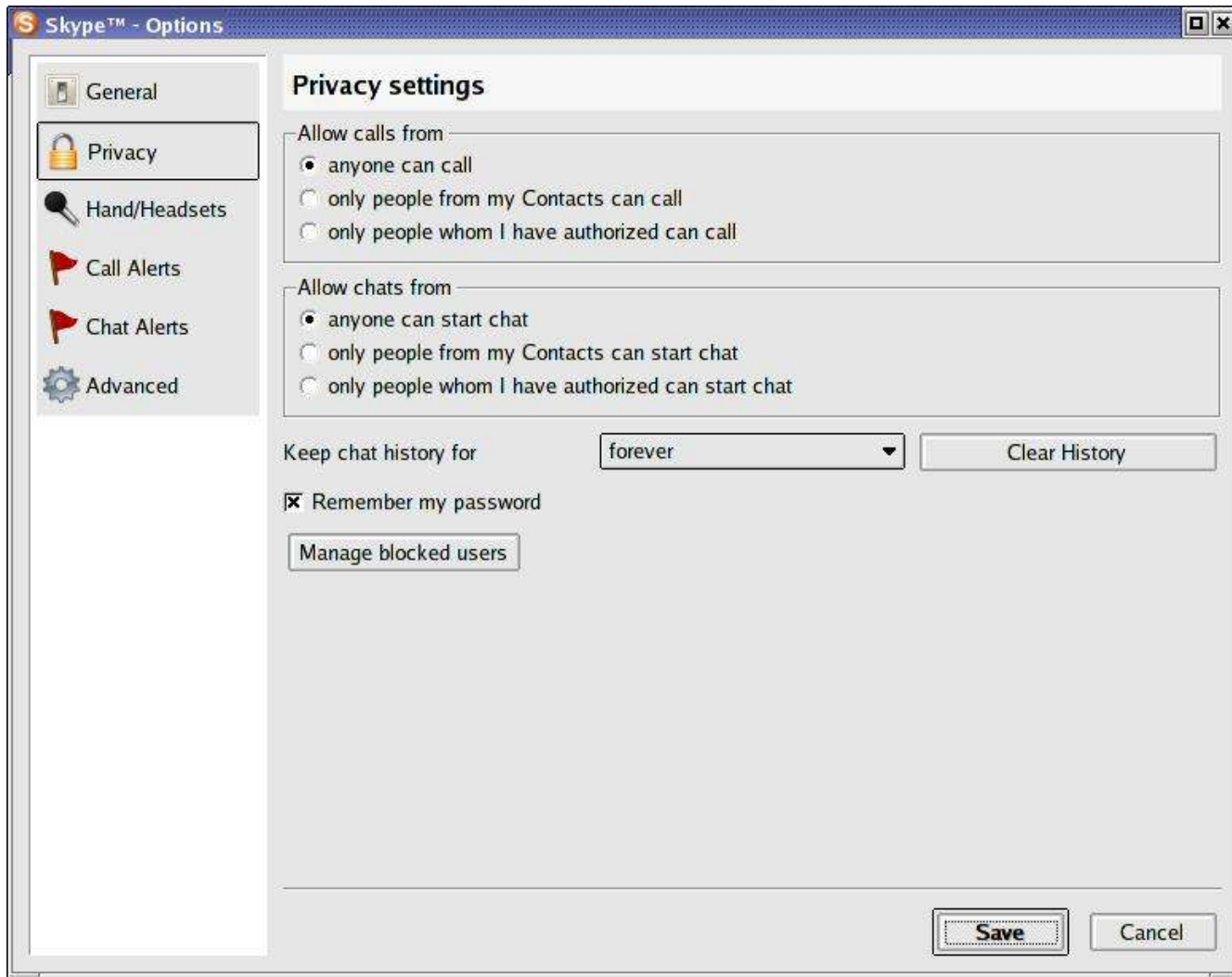
Services 6.17 EUR

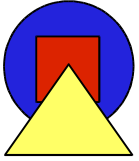
Type Skype Name or number with country code

2 855 324 Users Online



...Screenshots





References

- Voice Over IP Reference Page:
<http://www.protocols.com/pbook/VoIP.htm>
- <http://www.skype.com>
- Certain E-Plus UMTS cellphone contracts come now with Skype client
<http://www.heise.de/newsticker/meldung/63465>