



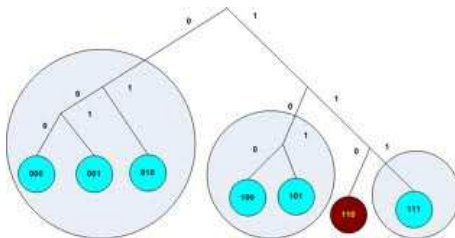
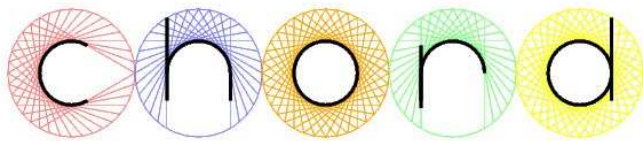
New Applications for P2P

A Research Agenda

Forschungsseminar, KIT, 09.11.2010

Benjamin Schiller, Thorsten Strufe

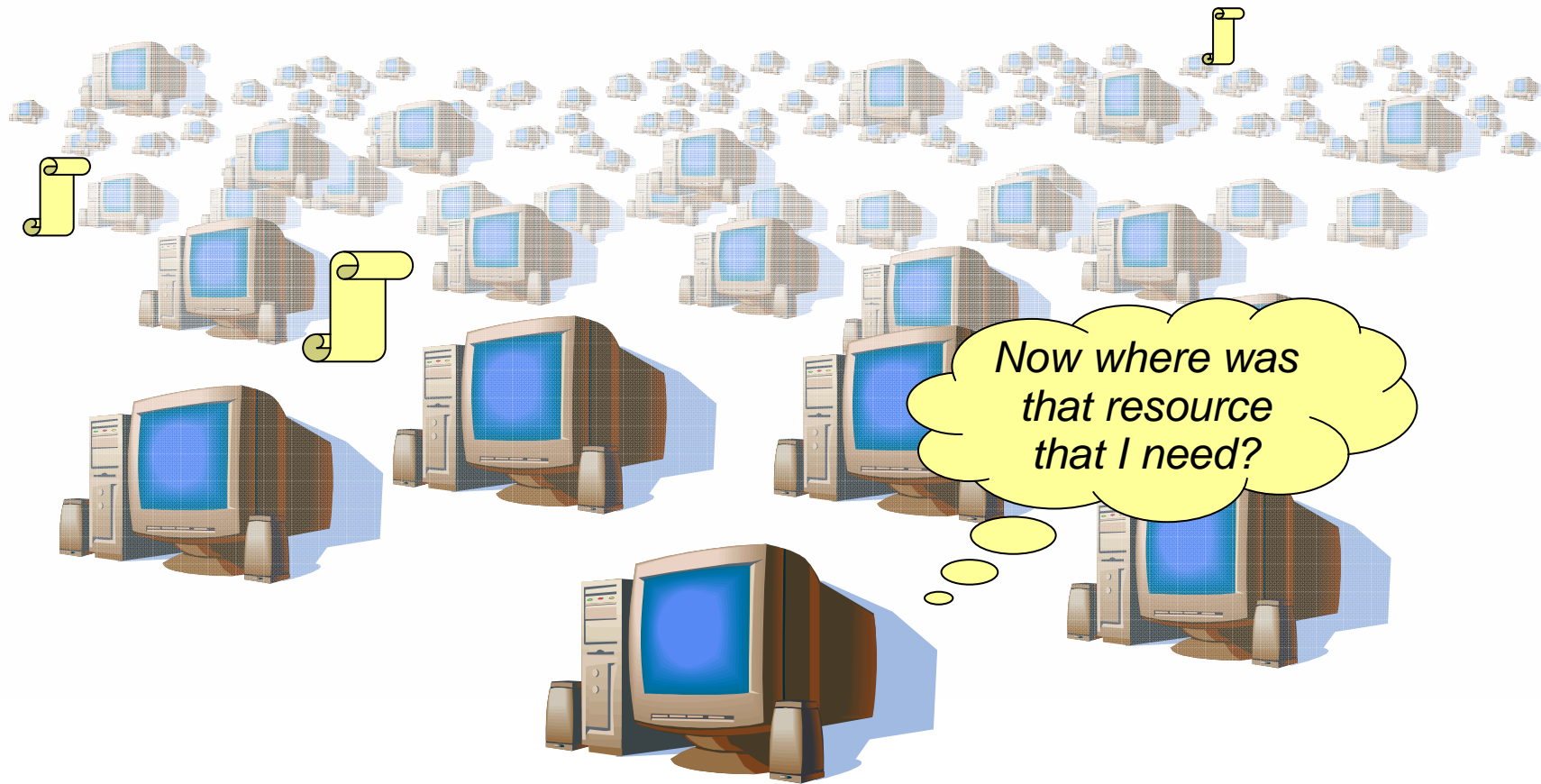
Peer-to-Peer



gnutella



The Peer-to-Peer Problem



P2P in a Nutshell



Properties of (pure) P2P: „**All peers are equal**“

- no dedicated service, no central entity
 - no a-priori knowledge / structure / hierarchy
 - highly dynamic behavior of nodes
- Flat system architecture, flat namespace, unreliable service providers

Main primary problems of P2P:

- Staying connected
- Resource lookup (name resolution, location of replica, especially selecting a good next hop for the delegation → routing)

Standard Solutions (p2p – the executive summary)

- *Connectivity*: select enough fall-back „servers“
- *Name resolution*: unstructured P2P (flooding) or external search engine
- *Resource location*: registry and lookup in structured P2P (DHT!)

Peer-to-Peer (a Definition)



Communication model: asynchronous (request-response)

Role model: a single role (?)

- symmetric behavior, all peers in general (can) do the same
- **BUT:** considering an interaction there is one requesting and n responding peers.

Organisational model: completely unstructured („it's a mess!")

- Other than bootstrapping no knowledge whatsoever about the context, no knowledge about the structure

No **Identifiers**, only names

...all this in order to do:

File sharing, content distribution (BitTorrent), session initiation/chat/voip (skype, jabber), malware distribution/spam (botnets),...



Our first claim:

*Peer-to-Peer is well understood and
there's nothing fundamentally new to learn*

But then:

aren't there more interesting things to do, with all the resources!?

Can we leverage properties of this paradigm for other applications?

Some New Challenges



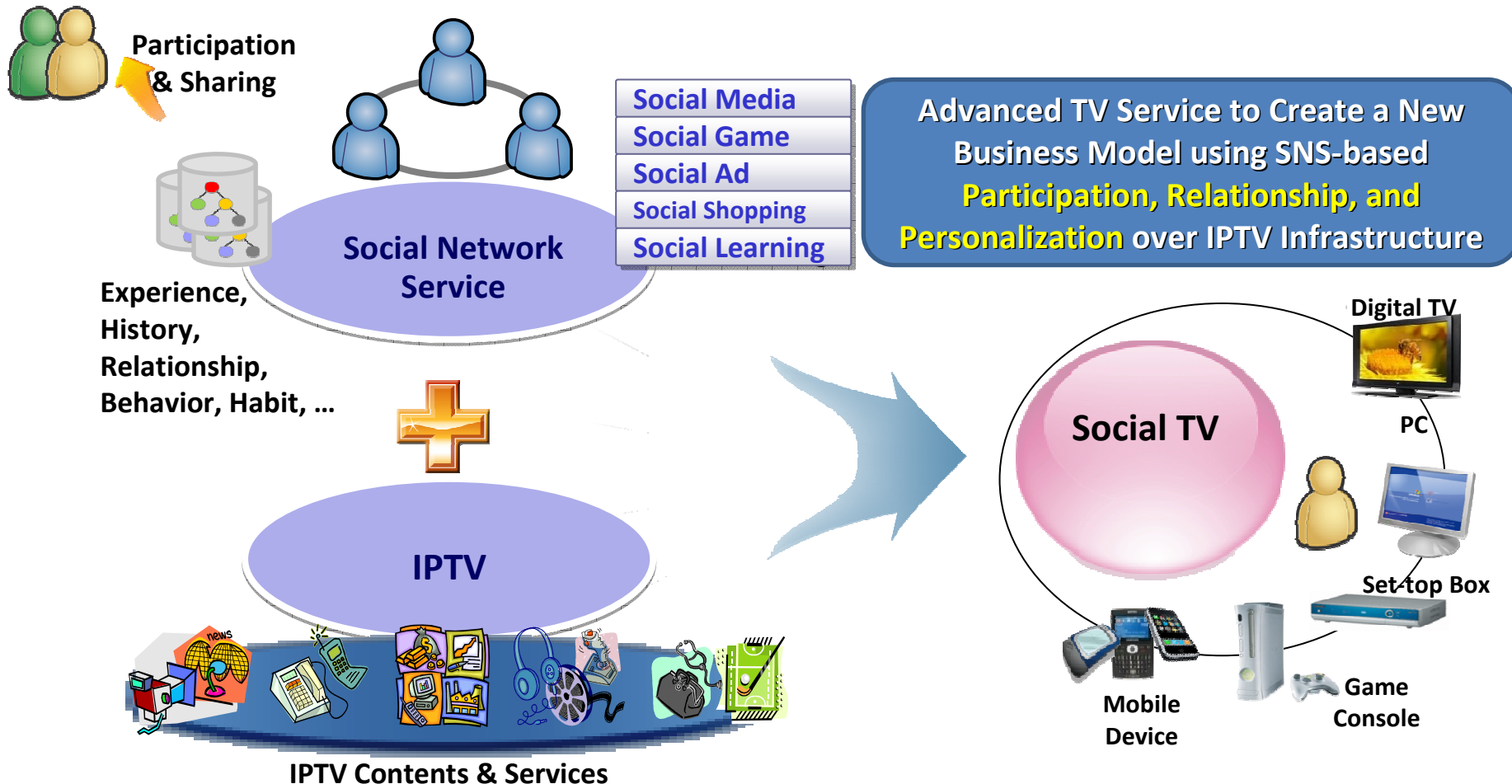
- **Live** multimedia streaming
 - Anonymous communications
 - Resistant communication infrastructures
 - Distributing services
 - Social networking services
-
- „P2P-based Social IPTV“

Social IPTV?



Social TV Concept

Advanced TV service efficiently integrating the legacy IPTV service and web-based social service including personal/group broadcasting, game, advertisement, shopping, telemedicine, etc.



Collaborative IPTV with OSN Integration



Live
Streaming
of Users,
Discussions

Palm Pre Vs. iPhone 3G

Palm Pre Unboxing. Click Here. Browsers: Pre vs iPhone vs Storm

Apple iPhone 3GS Ads by Google

06:06 / 12:32 HD

1,871 ratings 411,898 views

Favorite Share Playlists Flag

Send Video MySpace Facebook (more share options)

Statistics & Data

Discussion Videos:

Post a Video Response

Text Comments (3,294) Options Post a Text Comment

Loganasoar (5 hours ago)
These palm pre owners just say the pre is better than the iPhone because in reality they are crying inside because they have a crappy pre and not an iPhone

latinheat801 (9 hours ago)

Friends watching this channel:

Thorsten Strufe chat

Jussi Kangasharju Finland chat

Kalman Graffi chat

Osama Abboud chat

sandrestina
June 06, 2009 (more info)
TechnoBuffalo: http://technobuffalo.com/ Follow me on twitter: http://cuthut.com/0 Putting the Palm Pre and the Apple Phone head to head. Thanks for watching, Jon

URL: http://www.youtube.com/watch?v=ICoNag4

Embed: <object width="560" height="340"><param

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Integration with Online Social Networks

facebook

Facebook helps you connect and share with the people in your life.

How much money would you spend?

Selection	Votes
1-100	208
101-250	75
251-500	91
501-750	54
751-1000	56
1001-1500	34
1501-2000	19
2001-2500	12
2500+	70
Total	619 votes total

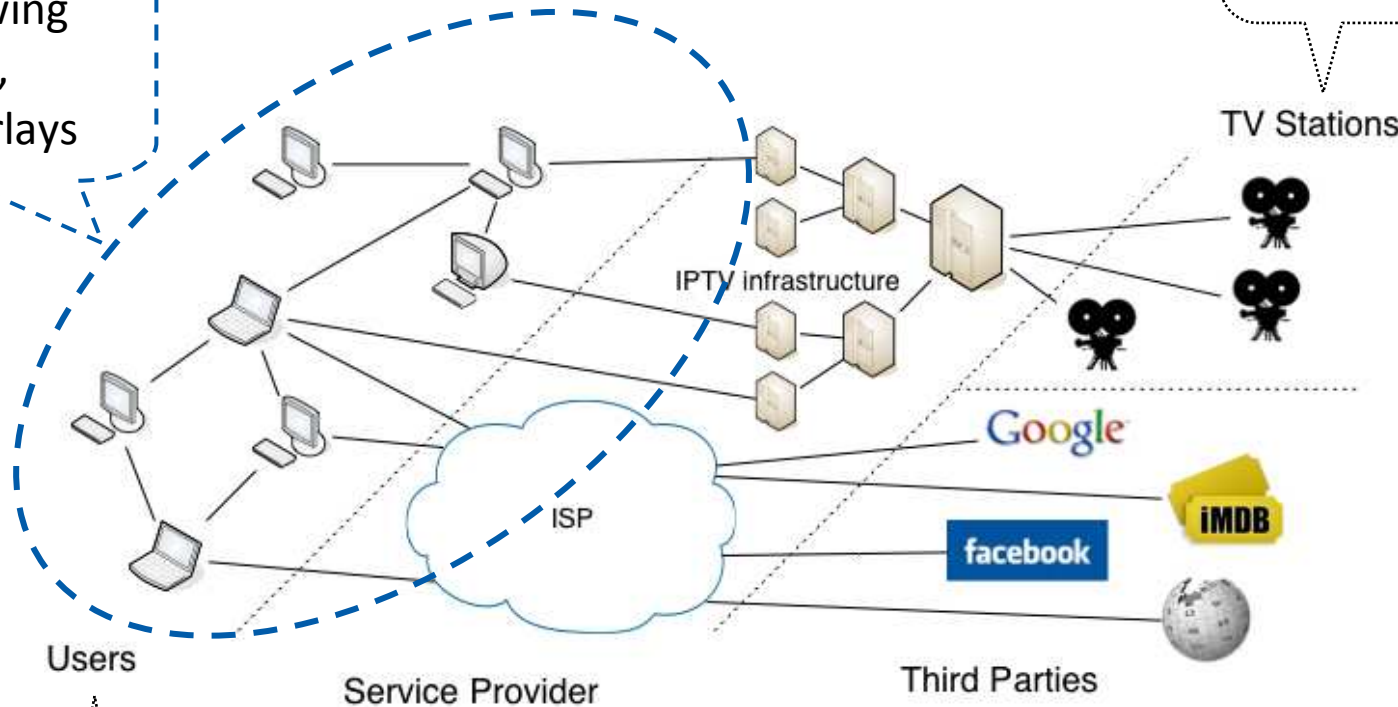
Support of ad-hoc collaborative applications

"Social IPTV" – Content Providers



media streams

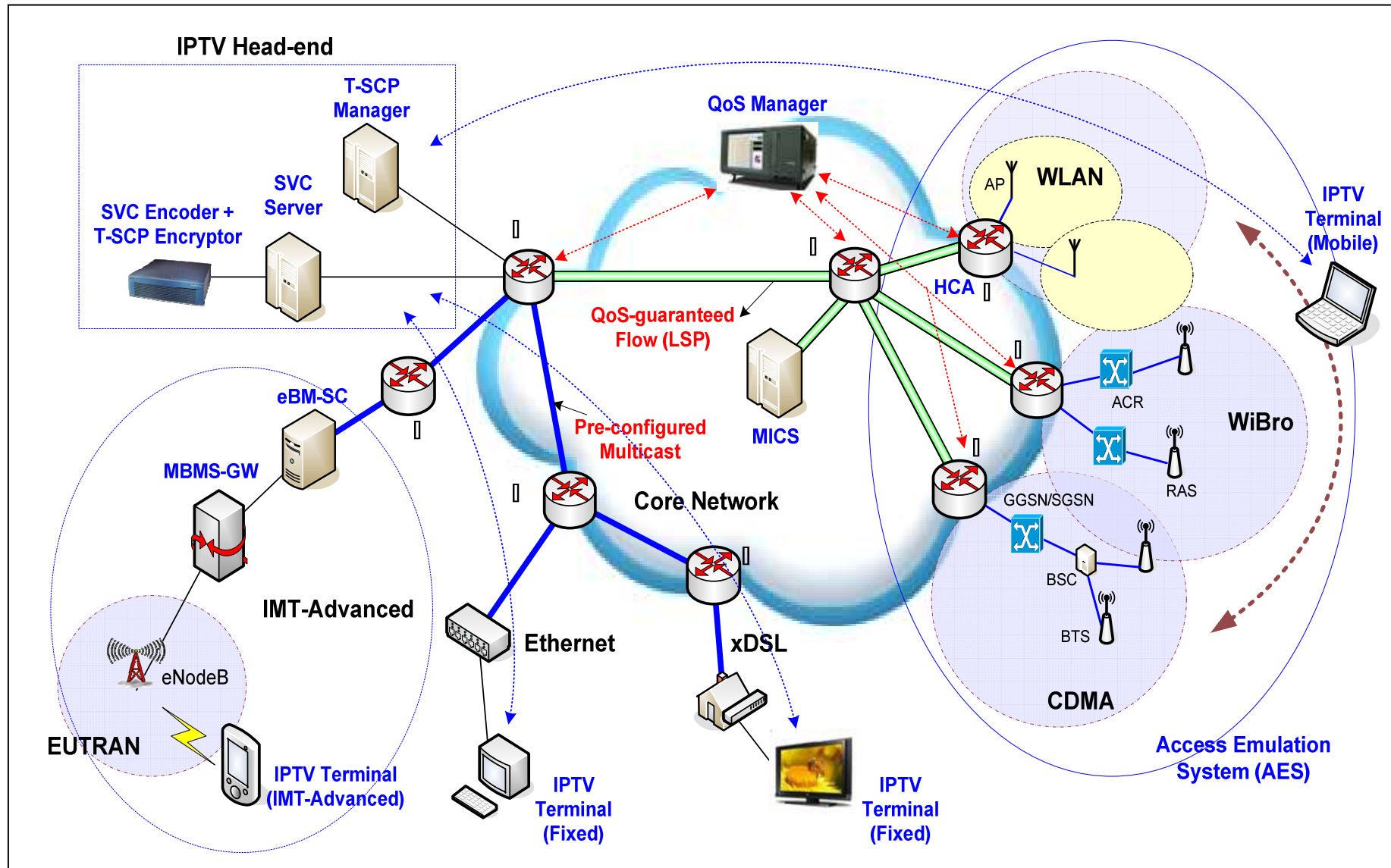
Collab. viewing
overlays,
Service overlays



meta information
mashups
uploading content

meta information
additional services

Social IPTV Testbed in Darmstadt



Social IPTV Testbed in Darmstadt



Summarizing P2P Social IPTV



Leverage the P2P paradigm for multiple „new“ applications

- ALM / live streaming (decrease load of infrastructure)
- Collaborative interaction (the teleconf scenario...)
- Creating, deploying, running „apps“ (P2P service distribution)

A case for

- Resistant / resilient networking (commercialization)
- Privacy protection (direct identification of participants)

Decentralized Social Networking Services



Simplified, walled-garden version of „the Web“:

- Easy to set-up pages („**profiles**“) of **individuals** (... and companies...)
- Links reflecting **real-world relations** between individuals
- Possibility to share user generated content

...including messaging

- “Guest book” / “Wall” (asynchronous broadcast)
- Email (asynchronous unicast)
- Chat (~ synchronous unicast)



Collaborative applications / games

Target Audience / Application Domain



Gowalla Profile: Mr. Crown
 Hamburg, Germany
 2412 Stamps, 79 Pins
 Add as Friend

Activity Highlights:
 Mr. Crown checked in at Funkturm Berlin. about 16 hours ago
 ...and received some Bats. about 16 hours ago
 ...and swapped some Bats for a Yo-yo. about 16 hours ago
 Mr. Crown checked in at Rafih. about 16 hours ago
 ...and swapped a Yellow Kayak for a Fieldnotes & Books. about 16 hours ago
 Mr. Crown checked in at IFA Berlin. Hall #20. about 16 hours ago
 ...and took a photo. about 16 hours ago
 Mr. Crown checked in at IFA Berlin. Hall #20. about 23 hours ago
 ...and took a photo. about 23 hours ago
 ...and took a photo. about 23 hours ago

25 friends (see more)
 TOMS One for One
 MUST PLACES TO VISIT

Top Places
 1. Faisalabad Internation... 4 check-ins
 2. SFO San Francisco Inte... 4 check-ins
 3. Central Park 4 check-ins
 4. Apple HQ 3 check-ins
 5. Adobe Systems 3 check-ins
 6. IFA Berlin. Hall #20 2 check-ins
 7. LIVESTRONG Challenge P... 2 check-ins
 8. Apple Flagship Store 2 check-ins
 9. Fenwick & West 2 check-ins
 10. Bank of America Building 2 check-ins

Triptit BETA
 By Triptit Inc.
 Privacy Policy
 Utility

Application, you are allowing information about you and which the Application uses to... This and other information Application may be displayed on the Application's... confirm your acceptance of... of Use and you... your use of the Application is... cation developer's terms of... lication developer's privacy

Why Bother?



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Top 10 Web Brands for January 2010 (U.S., Home and Work)

RANK	Brand	Unique Audience (000)	Time Per Person (hh:mm:ss)	MOM UA % Change	MOM Time % Change
1	Google	152,708	1:23:54	4.10%	-16.90%
2	Yahoo!	134,561	2:08:11	4.30%	-26.80%
3	Facebook	116,329	7:01:41	5.80%	9.70%
4	MSN/WindowsLive/Bing	109,425	1:25:22	1.20%	-18.10%
5	YouTube	99,525	1:02:27	7.60%	-10.30%
6	AOL Media Network	82,306	1:01:14	-6.80%	-57.80%
7	Wikipedia	64,917	0:15:59	10.70%	-2.70%
8	Fox Interactive Media	62,112	1:23:28	1.00%	-9.10%
9	Amazon	60,772	0:22:34	-8.60%	-32.90%
10	Ask Search Network	57,776	0:12:35	10.70%	-11.40%

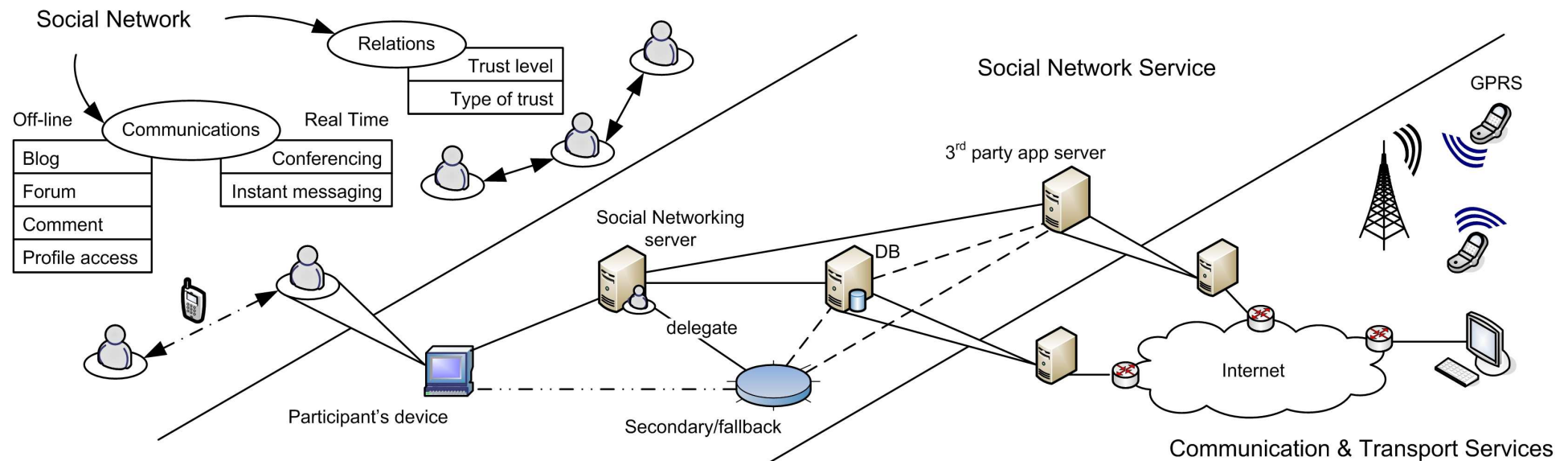
Source: The Nielsen Company

dominate Facebook.com and Google.com — not, for example, Google-owned sites like Gmail.com.

Generalized Architectural Model of SNS



Distributed Environment



Main SNS centralized

Additional 3rd party application servers

Quest to Decentralize



Issues of centralized architectures

- Centralized control
- Centralized data storage
- Full, centralized access to data...
- Single Point of failure



“Taking back the web”

- Breaking out of the walled gardens (again, cf. AOL)
- Re-democratizing the web
- Distribute the services!

Quest to Decentralize



Issue



“Tak

Plethora P2P / Decentralized Social Services



FOSS

- BuddyPress, CrabGrass, Cobs, DaisyChain, Diki, Elgg, FETHR, GNUNet, Gossple, Jappix, Lorea, Mycella, Movim, PeerScape, Pinax, StatusNet

Commercial Approaches

- diaspora, wuala, LifeSocial

Academia

- Friend-of-a-Friend, FriendStore, HelloWorld, LifeSocial, LotusNet (Likir), PeerSon, Safebook, SocialCircle, Tribler, Vis-a-Vis

Focus on systems that

- implement social networking and publication functions
- Provide running software or a comprehensive protocol / system description
- Actually are decentralized

Selected Systems and Proposals

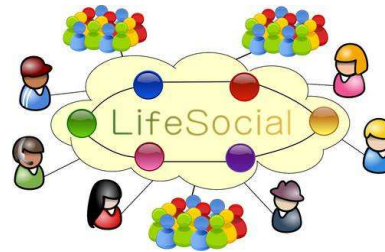


diaspora

diaspora*

Friend-of-a-Friend

LifeSocial



LotusNet / Likir



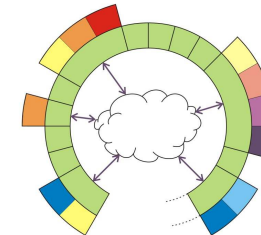
PeerSon

Peer  *N*

Safebook



Vis-A-Vis



Classifying Decentralized OSN



Type of storage / service provision

- Infrastructure-based
 - Dedicated Web-Servers
 - Deployed in the cloud
- Peer-to-Peer-based
- Hybrid

Granularity of service provision

- Replicating whole service
- Distributed storage of attributes

Level of integration

- Stand alone system
- Extension of existing systems

Resource sharing incentives

- None
- Social cooperation
- Payed premium services



<i>Approach</i>	<i>Type of Service</i>	<i>Service Granulariy</i>	<i>Integration</i>	<i>Incentives</i>
<i>diaspora</i>	web-based	complete	external	Premium
<i>FoaF</i>	web-based	complete	external	
<i>vis-à-vis</i>	Cloud	complete	external	
<i>LotusNet</i>	P2P	split	stand alone	
<i>PeerSon</i>	P2P	split	external	
<i>Safebook</i>	P2P	complete	stand alone	Social Coop
<i>LifeSocial</i>	hybrid	split	stand alone	Premium

Our current approach...



Safebook : Privacy-Preserving Online Social Networking

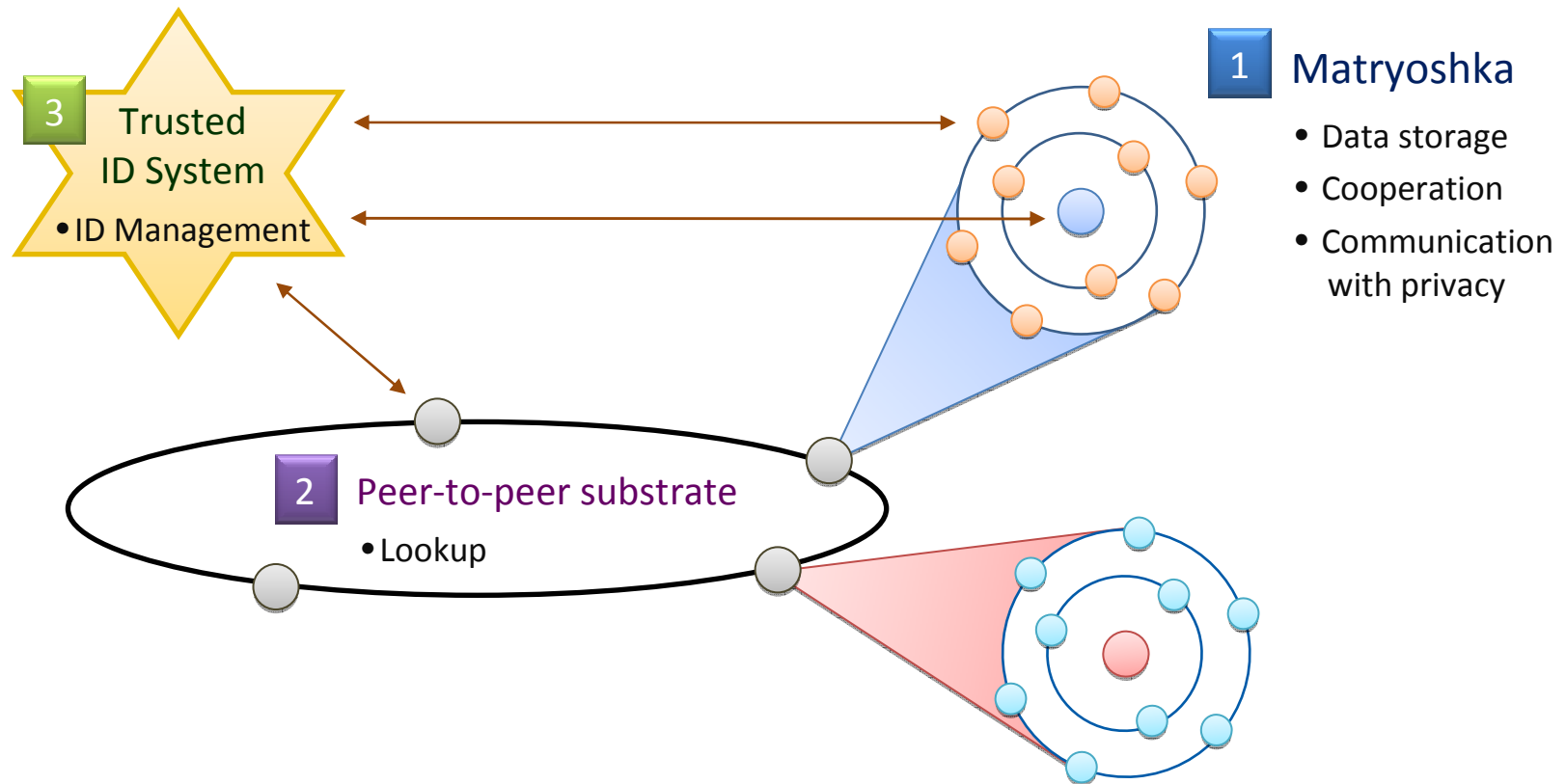
<http://www.safebook.us>

L. A. Cutillo, R. Molva, T. Strufe

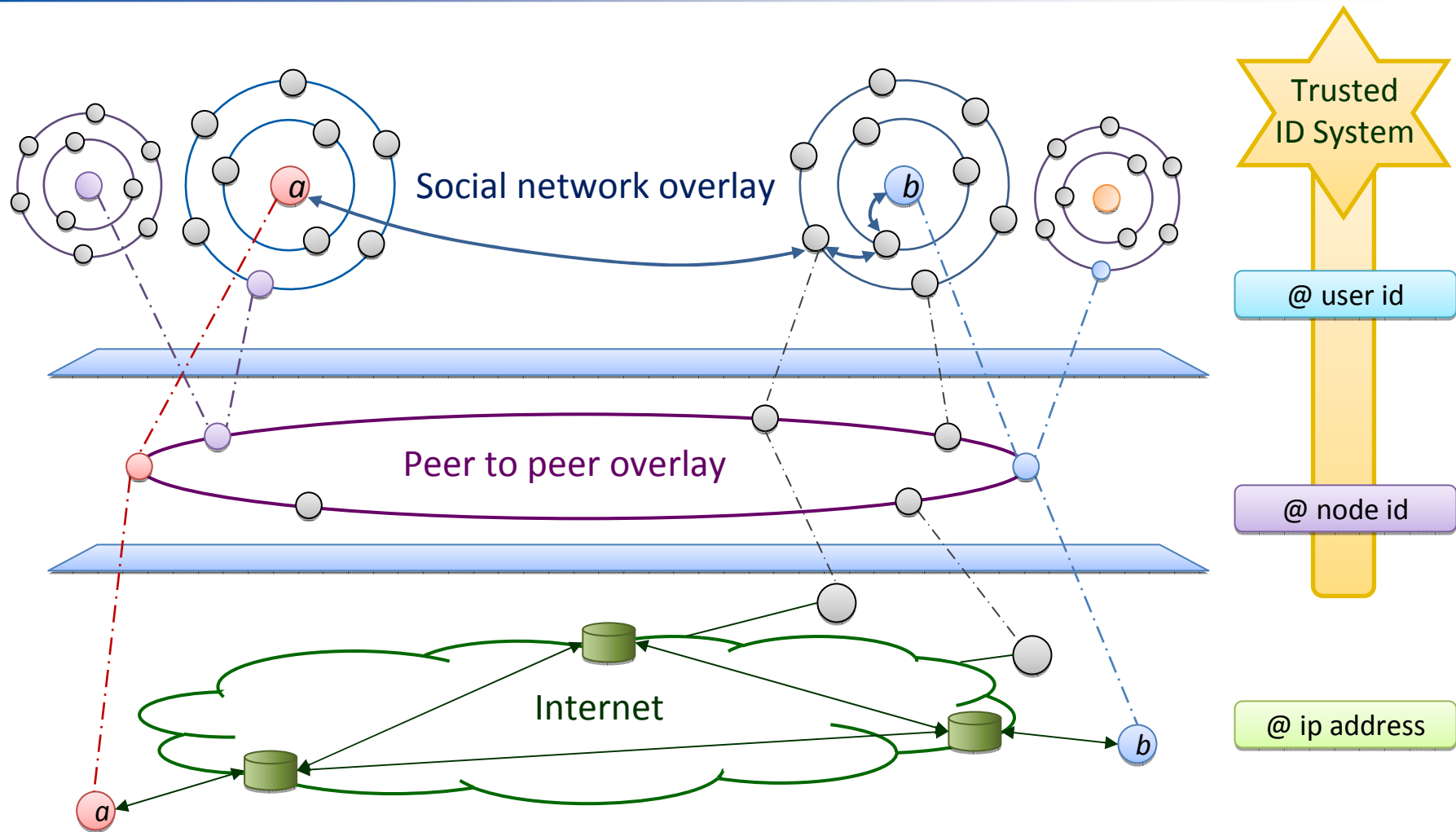
...and plenty of students :-)

Partially funded by
EU SOCIALNETS

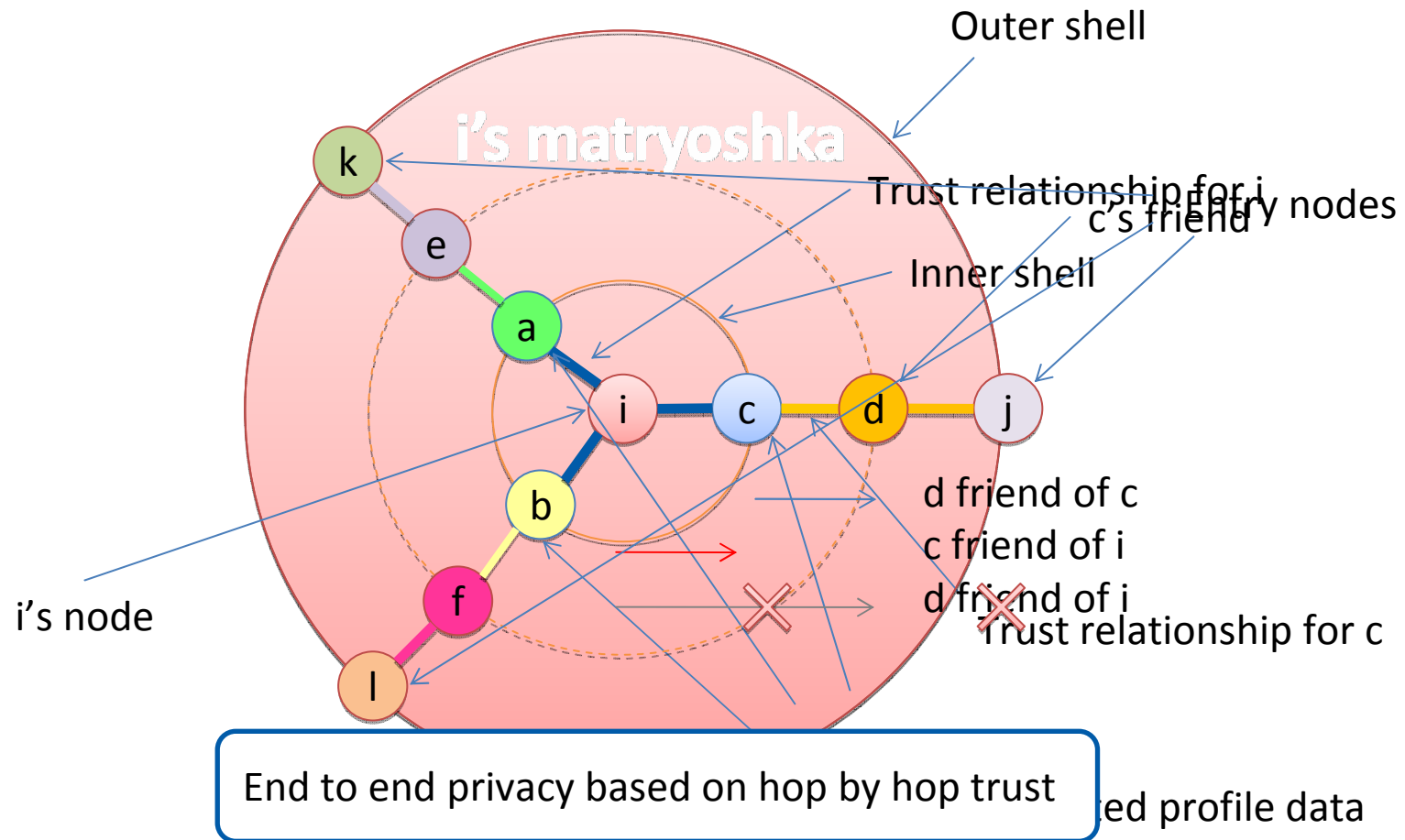
Architecture

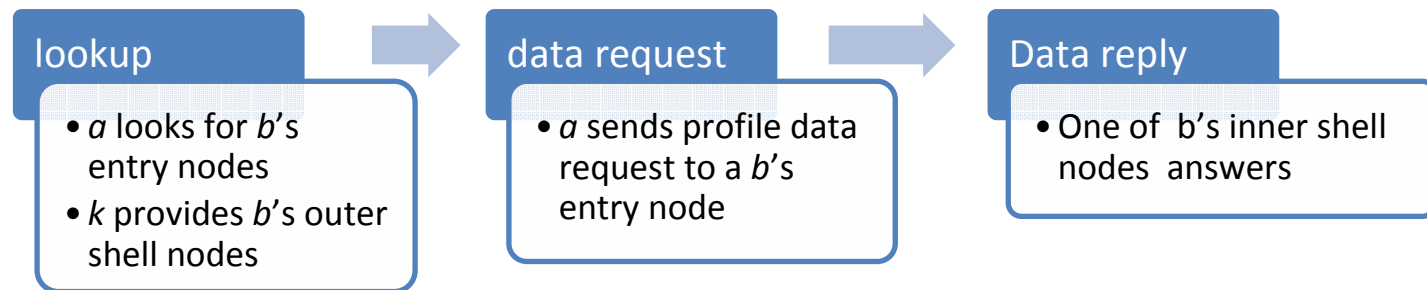


Network view



User i's Matryoshka





Summary



P2P itself is boring

Using P2P for new applications is not ;-)

Some of our current activities include

- Live multimedia streaming
- Anonymous communications
- Resistant communication infrastructures
- Distributing services
- Social networking services

Which we integrate in our „P2P-based Social IPTV platform“