The missing signalling layer for WebRTC?

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WebRTC deliberately specifies no specific signalling protocol.

➔ **It makes interoperability and federation hard.**

➔ **It creates silos.**

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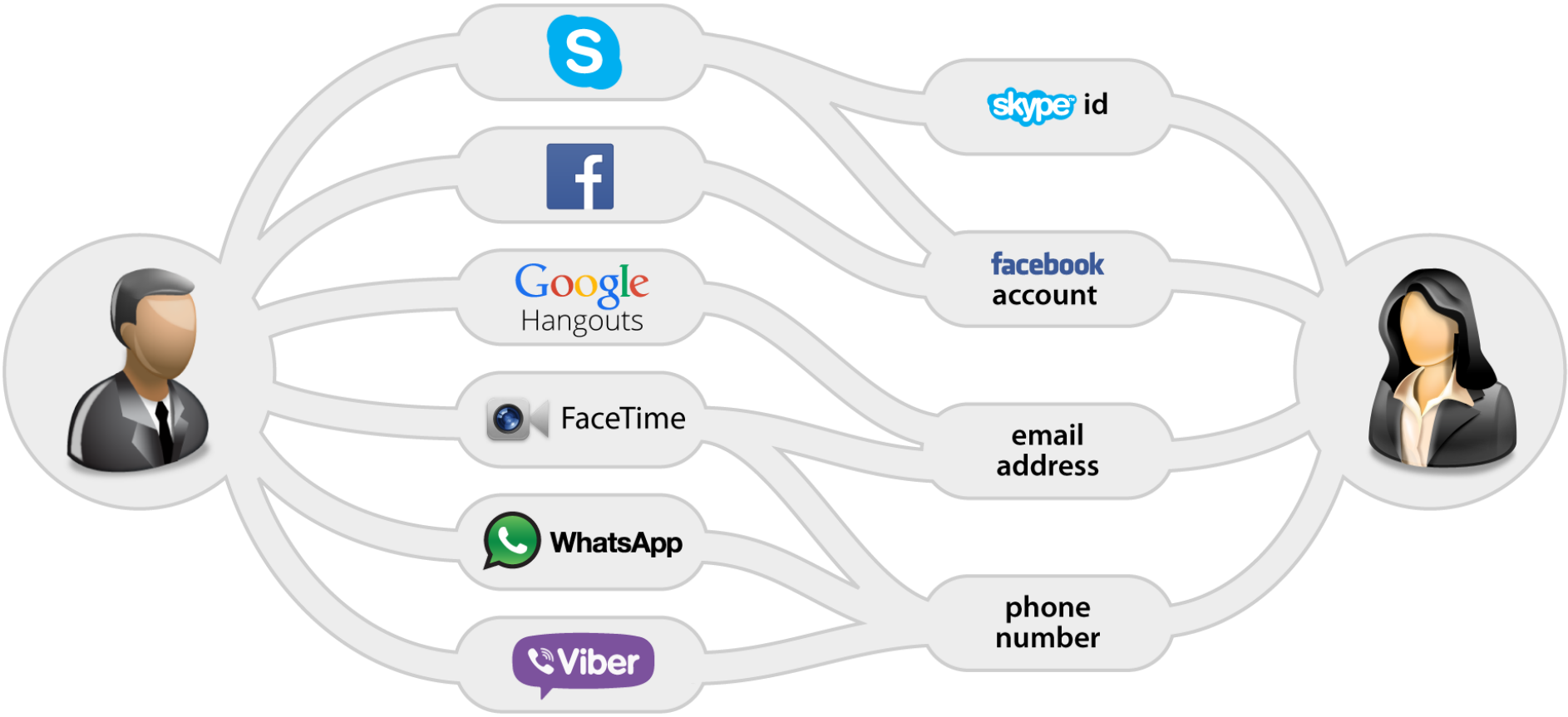
As a user:


Skype
Facebook
Google Hangouts
FaceTime
WhatsApp
Viber
skype id
facebook account
email address
phone number

I want to use my preferred apps and services to communicate

Not be forced into specific services chosen by my contacts.

If email gives me that flexibility, why not VoIP and IM?

Current signalling protocols options are:

- SIP
- XMPP
- Assorted HTTP APIs

SIP:

- Heavyweight
- Complicated specification
- Complicated stack
- Buys little over HTTP

XMPP/Jingle:

- Streamed XML is debatable
- Relatively complicated spec
- Jingle has relatively little uptake
- Custom stack

HTTP APIs:

- Simple
- But fragmented
- And often proprietary
- Or closed (Firebase, Pusher, PubNub...)

Introducing Matrix

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- Publishing pragmatic simple HTTP API standard for federated VoIP (WebRTC), IM and generic messaging.
- Defines client-server and server-server APIs (and, shortly, server<->application-server APIs).
- Provides Apache-Licensed reference implementations of the server and clients (web, iOS, Android, Python, Perl...)

Who is Matrix?

Matthew

- Technical Leader of matrix.org
- Set up and runs the Unified Communications line of business within Amdocs (formerly MX Telecom)
- 11 years of experience building IP telephony solutions and leading units

Amandine

- Business Leader of matrix.org
- Set up and co-runs the Unified Communications line of business within Amdocs as a Product Manager
- 10 years of experience in mobile services and telecommunications

The Technical Experts

- A dozen of experienced developers specialized in VoIP and IM mobile app development
- Most of them historically part of the Amdocs Unified Communications team (current deployment: blah.com)

Matrix comes from realising that VoIP and IM fragmentation is holding back the whole industry - we didn't want to be part of the problem, but try to solve it.

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Key Characteristics

- Entirely open:
  - open standard; open source; open project.
- Message History as first-class citizen
- Group communication as first-class citizen
  - Fully distributed room state (cryptographically signed) - no SPOFs or SPOCs.
- Strong cryptographic identity to prevent spoofing
- Identity agnostic
- End-to-end encryption (RSN)

Demo time!

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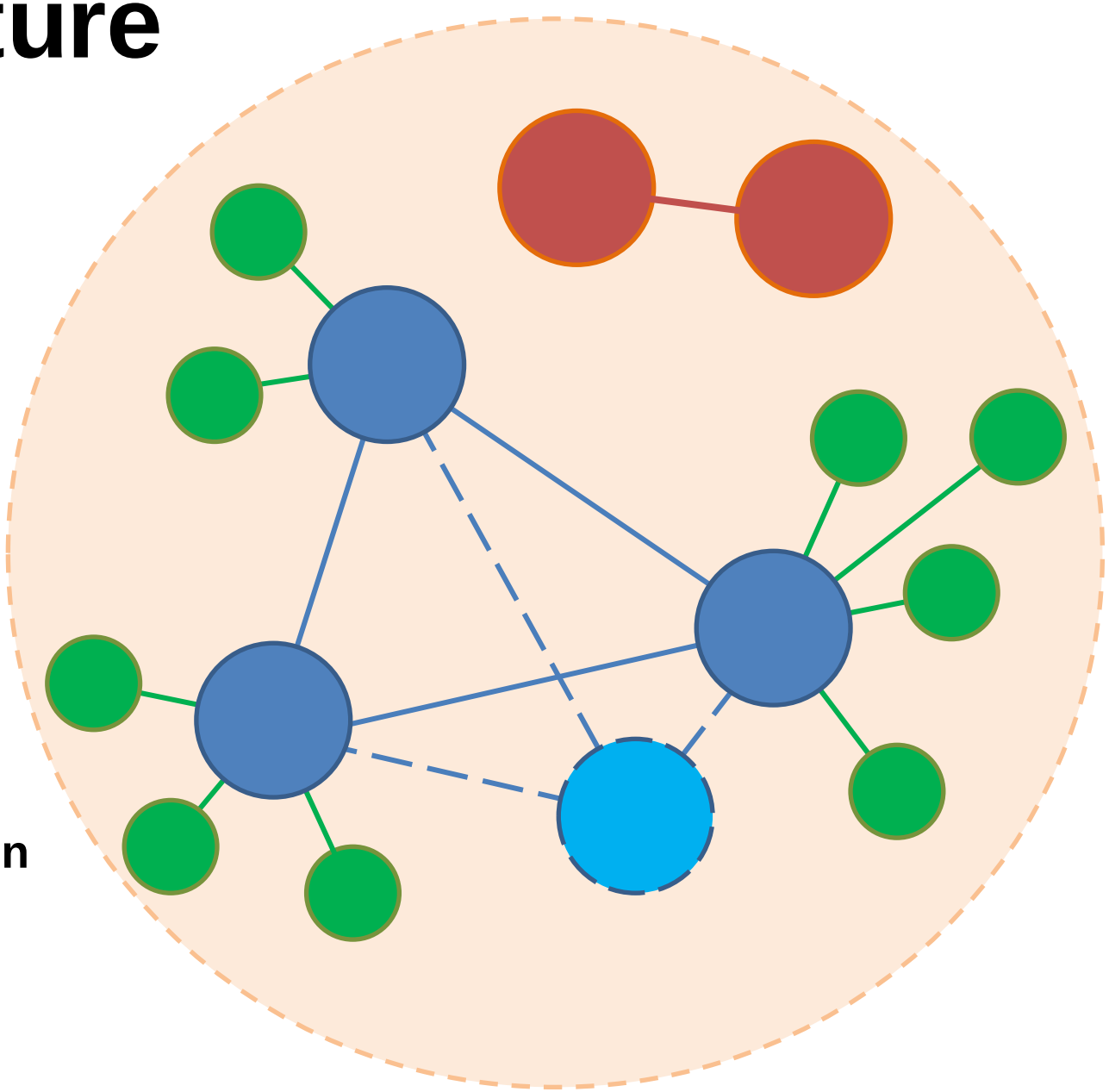
Architecture

Clients

Home Servers

Identity Servers

Application Servers



Federation Demo

The client-server API

To send a message:

```
curl -XPOST -d '{"msgtype":"m.text", "body":"hello"}'
"https://alice.com:8448/_matrix/client/api/v1/rooms/ROOM_
ID/send/m.room.message?access_token=ACCESS_TOKEN"
```

```
{
    "event_id": "YUwRidLecu"
}
```

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The client-server API

To set up a WebRTC call:

```
curl -XPOST -d '{\
  "version": 0, \
  "call_id": "12345”, \
  "offer": {
    "type" : "offer”,
    "sdp" : "v=0\r\no=- 658458 2 IN IP4 127.0.0.1…"
  }
}'
"https://alice.com:8448/_matrix/client/api/v1/rooms/ROOM_ID/send/m.call.invite?access_token=ACCESS_TOKEN"

{ "event_id": "ZruiCZBu” }
```

The server-server API

```
curl -XPOST -H 'Authorization: X-Matrix origin=matrix.org,key="898be4…",sig="j7JXfIcPFDWl1pdJz…"' -d '{
    "ts": 1413414391521,
    "origin": "matrix.org",
    "destination": "alice.com",
    "prev_ids": ["e1da392e61898be4d2009b9fecce5325"],
    "pdus": [{
        "age": 314,
        "content": {
            "body": "hello world",
            "msgtype": "m.text"
        },
        "context": "!fkILCTRBTHhftNYgkP:matrix.org",
        "depth": 26,
        "hashes": {
            "sha256": "MqVORjmjauxBDBzSyN2+Yu+KJxw0oxrrJyuPW8NpELs"
        },
        "is_state": false,
        "origin": "matrix.org",
        "pdu_id": "rKQFuZQawa",
        "pdu_type": "m.room.message",
        "prev_pdus": [
            ["PaBNREEuZj", "matrix.org"]
        ],
        "signatures": {
            "matrix.org": {
                "ed25519:auto": "jZXTwAH/7EZbjHFhIFg8Xj6HGoSI+j7JXfIcPFDWl1pdJz+JJPMHTDIZRha75oJ7lg7UM+CnhNAayHWZsUY3Ag"
            }
        },
        "origin_server_ts": 1413414391521,
        "user_id": "@matthew:matrix.org"
    }]
}' https://alice.com:8448/_matrix/federation/v1/send/916d630ea616342b42e98a3be0b74113
```

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Current Progress

- Began May 2014
- First public release in Sept 2014
- Crypto and iOS/Android landed Oct 2014
- Next up:
  - Complete the spec
  - Complete federation implementation
  - Declare reference server production ready
  - UX polish for the reference clients
  - Define Application Server APIs
  - End-to-End Encryption

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Get involved!

- Run a server
  ➔ host your own data or be a trusted provider for your customers
- Build something (anything!) on top
- Build interoperability gateways
  ➔ add a whole new ecosystem to your community

Check out http://matrix.org!

http://matrix.org

THANK YOU!

@matthew:matrix.org
matthew@matrix.org

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Why not XMPP?

- We used to use XMPP (ejabberd, OpenFire, Spectrum, psyced, Psi, Pidgin, ASmack, Spark, XMPP.Framework)
- We built an alternative because:
  - Single server per MUC is single point of control
  - Synchronised history is a very 2nd class citizen
  - Stanzas aren't framed or reliably delivered
  - XMPP stacks are not easy to implement in a web environment
  - Jingle is complicated and exotic
  - XML is needlessly verbose and unwieldy
  - The baseline feature-set is too minimal
  - JIDs haven't taken off like Email or MSISDNs
  - Not designed for mobile use cases (e.g. push; low bw)
  - Well documented spam and identity/security issues
  - ejabberd

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Why not psyc?

- psyc is an interesting early instance of better-than-XMPP federated chat
- psyc v1 has limitations:
  - Minimal spec
  - Few implementations
  - Security issues
  - Not web-friendly
- psyc v2 has become part of GNUnet, providing end-to-end secure group chat on top of the censorship-resistant GNUnet overlay network.
  - Dependent on the complexities and usability challenges of the GNUnet ecosystem
  - Not web-friendly