



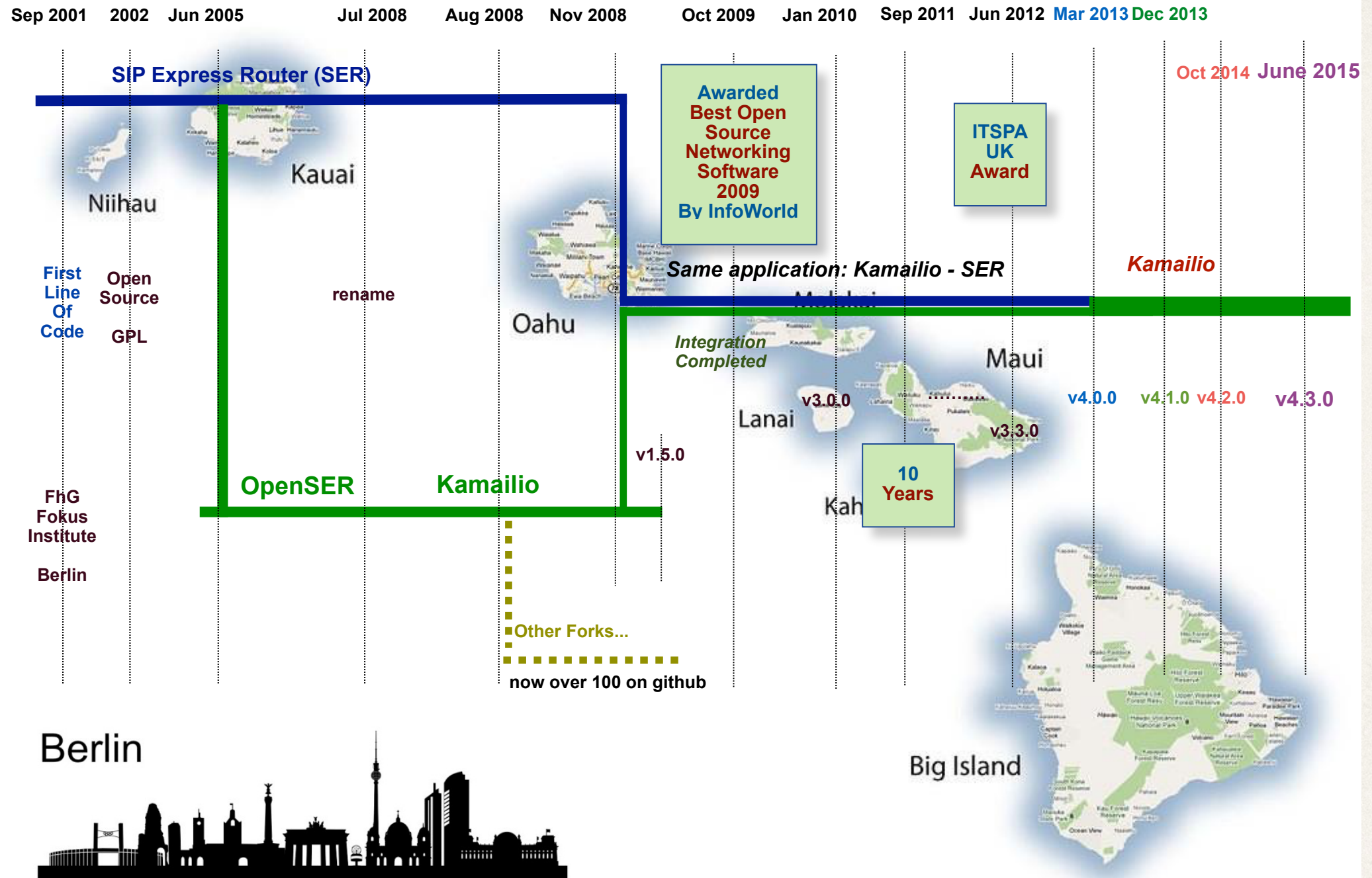
WebRTC, Mobility, Cloud, and More...  
**IIT REAL-TIME COMMUNICATIONS**  
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# SIP Server

Optimizations for Mobile Networks

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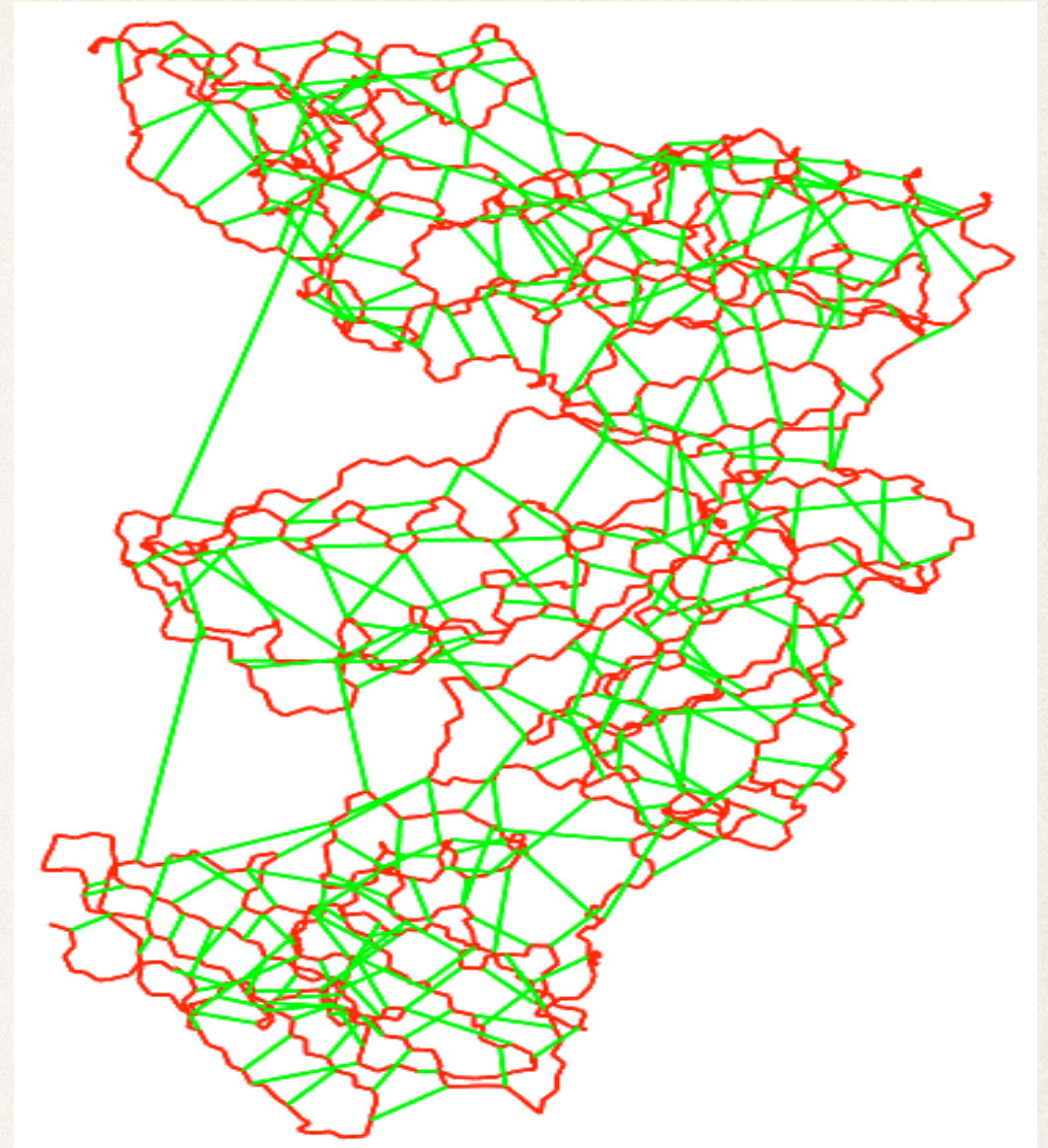


# kamailio

continuous development since 2001

*a very large set of features*

- SIP signalling routing
  - fast
  - reliable
  - flexible
- In other words
  - not initiating calls
  - not answering calls
  - no audio-video processing



open source sip server

framework - toolkit

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*not designed as a typical telephony engine*

# Key Features

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- ❖ Modular SIP Proxy, Registrar and Redirect server
- ❖ Designed for scalability and flexibility
- ❖ IPv4, IPv6, UDP, TCP, TLS, SCTP, WebSocket
- ❖ NAT Traversal, internal and external caching engines
- ❖ JSON, XMLRPC, HTTP APIs
- ❖ IMS Extensions, SIP-I/SIP-T, IM & Presence
- ❖ SQL and NoSQL backends
- ❖ Asynchronous processing (TCP/TLS, SIP routing), external event API
- ❖ Embedded interpreters (Lua, Perl, Python, .Net, Java)
- ❖ Load balancing, LCR, DID routing, Number portability



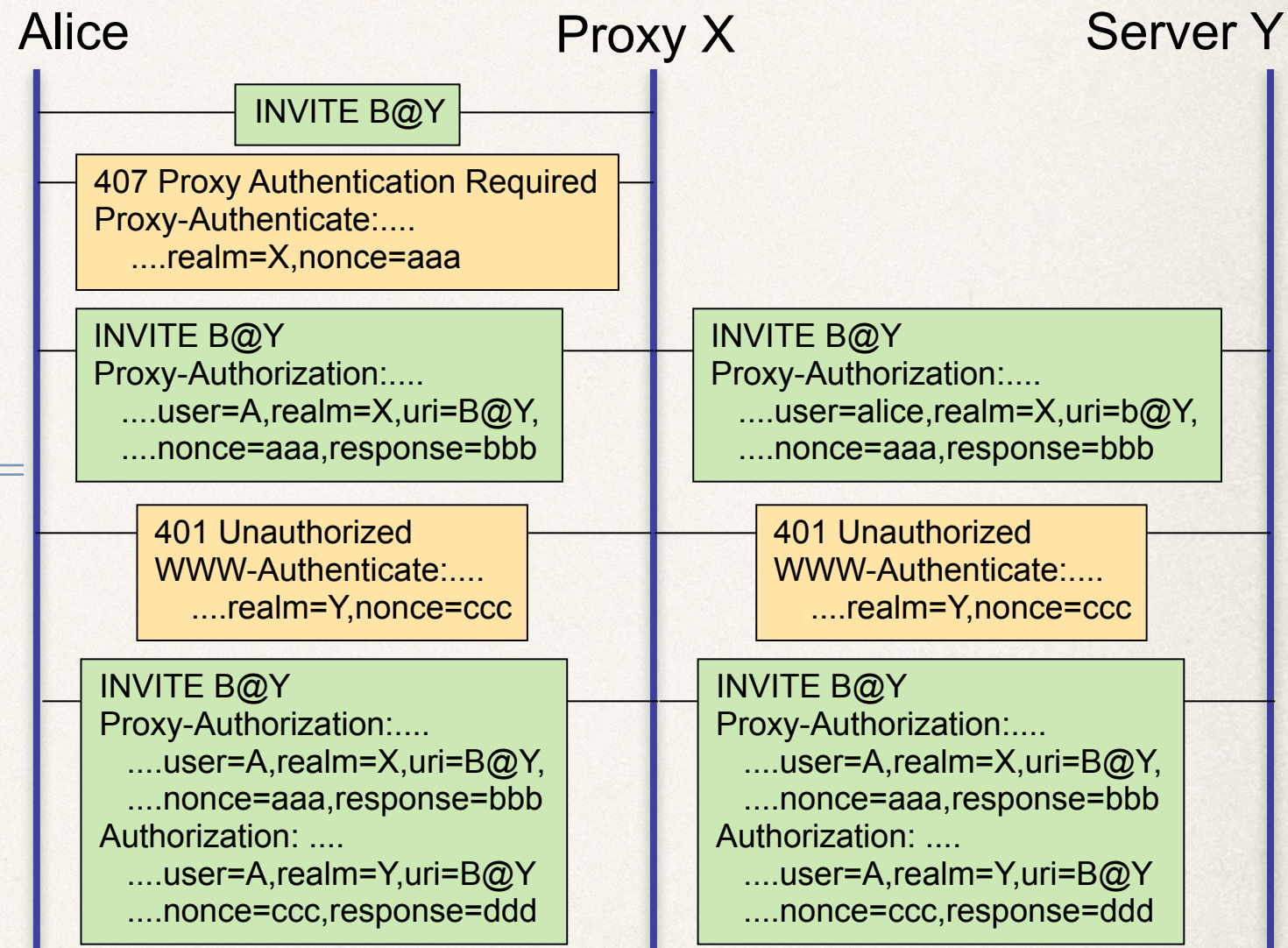
# SIP Servers & Mobile Networks

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optimizations for signaling

# Authentication

sip authentication tunings



- 
- ❖ tls
    - ❖ signaling encryption - privacy, authentication
    - ❖ port 443 for SIP signaling
  - ❖ connection ids
    - ❖ authenticate subsequent SIP traffic, avoiding round trips and lower bandwidth usage
  - ❖ source ip, port and protocol
    - ❖ authenticate subsequent SIP traffic, avoiding round trips and lower bandwidth usage
  - ❖ nonce validity
    - ❖ client may reuse nonce in short term - wake up, registration, call

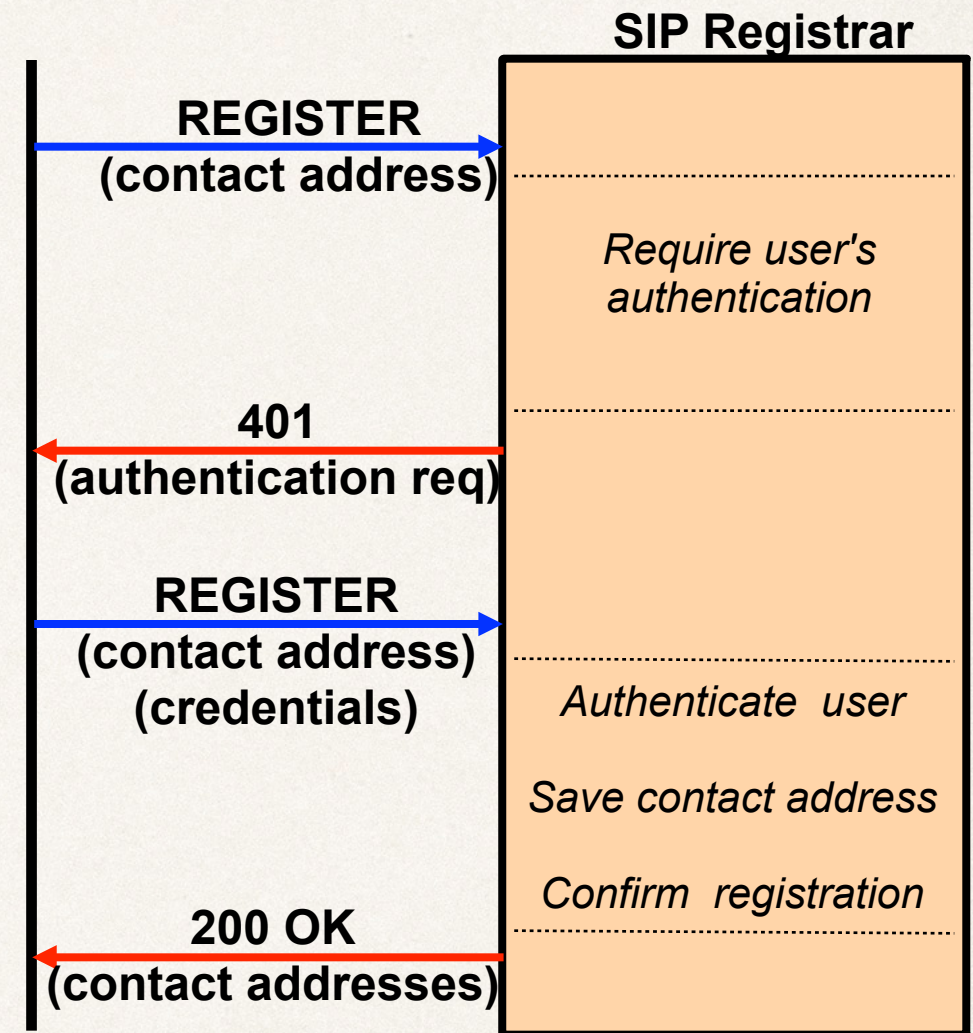
## kamailio.cfg example

```
# check connection id for authentication

modparam("htable", "htable", "conids=>size=8;autoexpire=900;")
request_route {
...
    if(proto==TLS) {
        if($sht(conids=>$fU@$fd) == $conid) {
            # skip authentication - traffic on known connection
            ...
        } else {
            # usual authentication
            route(AUTH);
            # associate connection id with From username@domain
            $sht(conids=>$fU@$fd) == $conid;
        }
    }
}
...
}
```

# Registration

sip registrar tunings



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- ❖ lower registration period

- ❖ clients awake for short intervals, but they can move from across many cells / accept points

- ❖ unregister when not replying

- ❖ track the relaying of the requests, unregister existing location contacts on no reply

- ❖ one contact per device

- ❖ GRUU to ensure one contact per devices
  - ❖ server config option if known that only one devices is allowed

## kamailio.cfg example

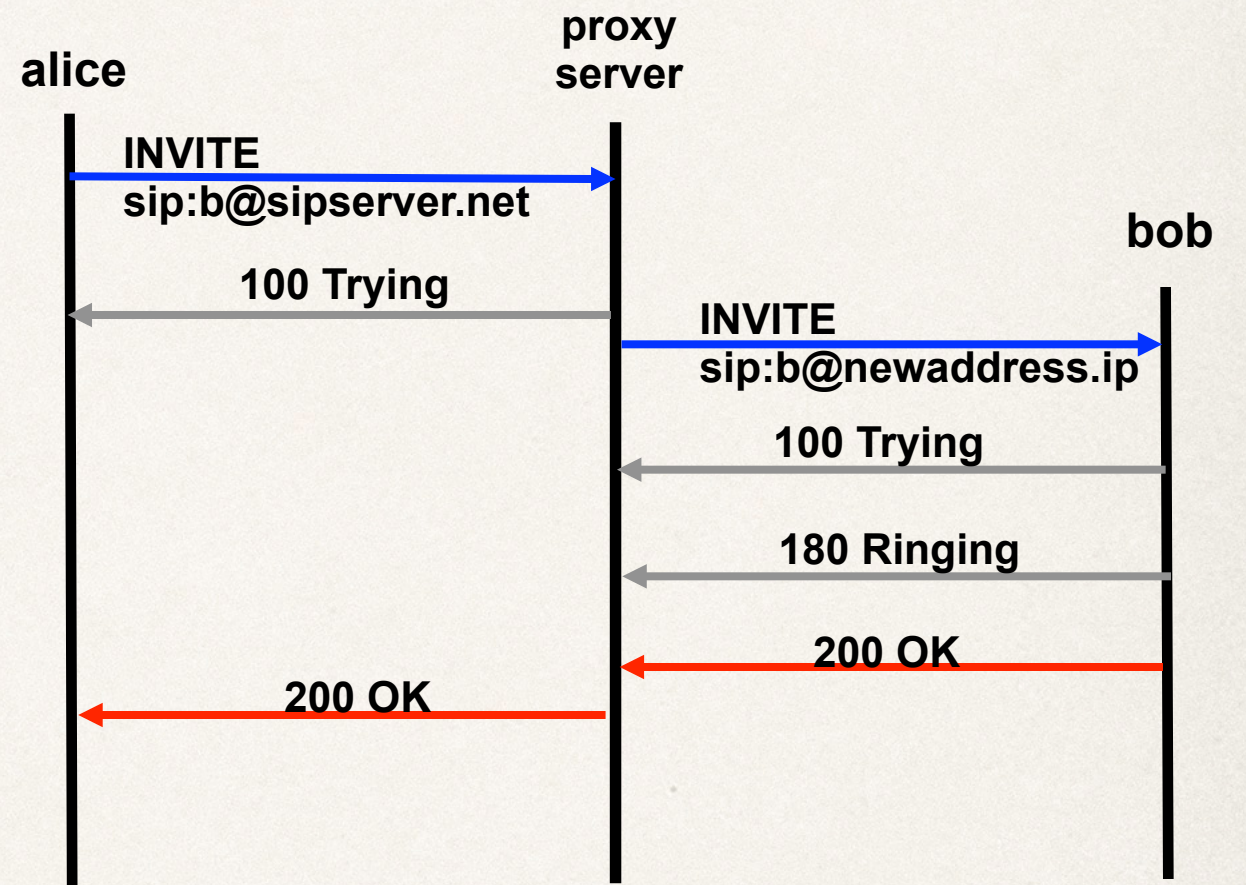
```
# remove location contact if not able to relay or no response from next node

request_route {
...
    $avp(ruri) = $ru;
    if(!lookup("location") {
        send_reply("404", "Not found");
        exit;
    }
    t_on_branch_failure("unregister");
    t_relay();
}

event_route[tm:branch-failure:unregister] {
...
    if(t_check_status("477") || (t_branch_timeout() && !t_branch_replied())) {
        unregister("location", "$avp(ruri)", "$T_branch_ruid");
    }
...
}
```

# Forwarding

sip proxy tunings



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- ❖ remove not mandatory headers

- ❖ keep only what is really useful

- ❖ restrict to supported codecs

- ❖ try to support one-two codecs for each media stream, remove the the others in offer on server

- ❖ remove unsupported media streams

- ❖ if using a mix of clients, track what they support and don't forward unsupported media types

- ❖ short name and compact headers

- ❖ not much gain, but ...

- ❖ compress body

- ❖ gzipcompress - client side support required

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- ❖ handle cancel transmission race

- ❖ fast hang up - CANCEL may arrive before the INVITE

- ❖ tm and tmx modules

- ❖ asynchronous push notifications

- ❖ push may take a while to propagate, don't block the server

- ❖ async or mqueue+rtimer

- ❖ pending calls - registration rendezvous

- ❖ forward new branches as new registrations are processed

- ❖ tsilo module

## kamailio.cfg examples

*# don't reply to CANCEL if no matching active INVITE transaction*

**request\_route {**

...

*# CANCEL processing*

    if (is\_method("CANCEL")) {

        if (t\_check\_trans()) {

            route(RELAY);

        }

        exit;

    }

...

**}**

**request\_route {**

...

*# keep only User-Agent header*

    keep\_hf("User-Agent");

*# keep only G711a and GSM codecs*

    sdp\_keep\_codecs\_by\_name("PCMA,GSM");

*# remove video stream*

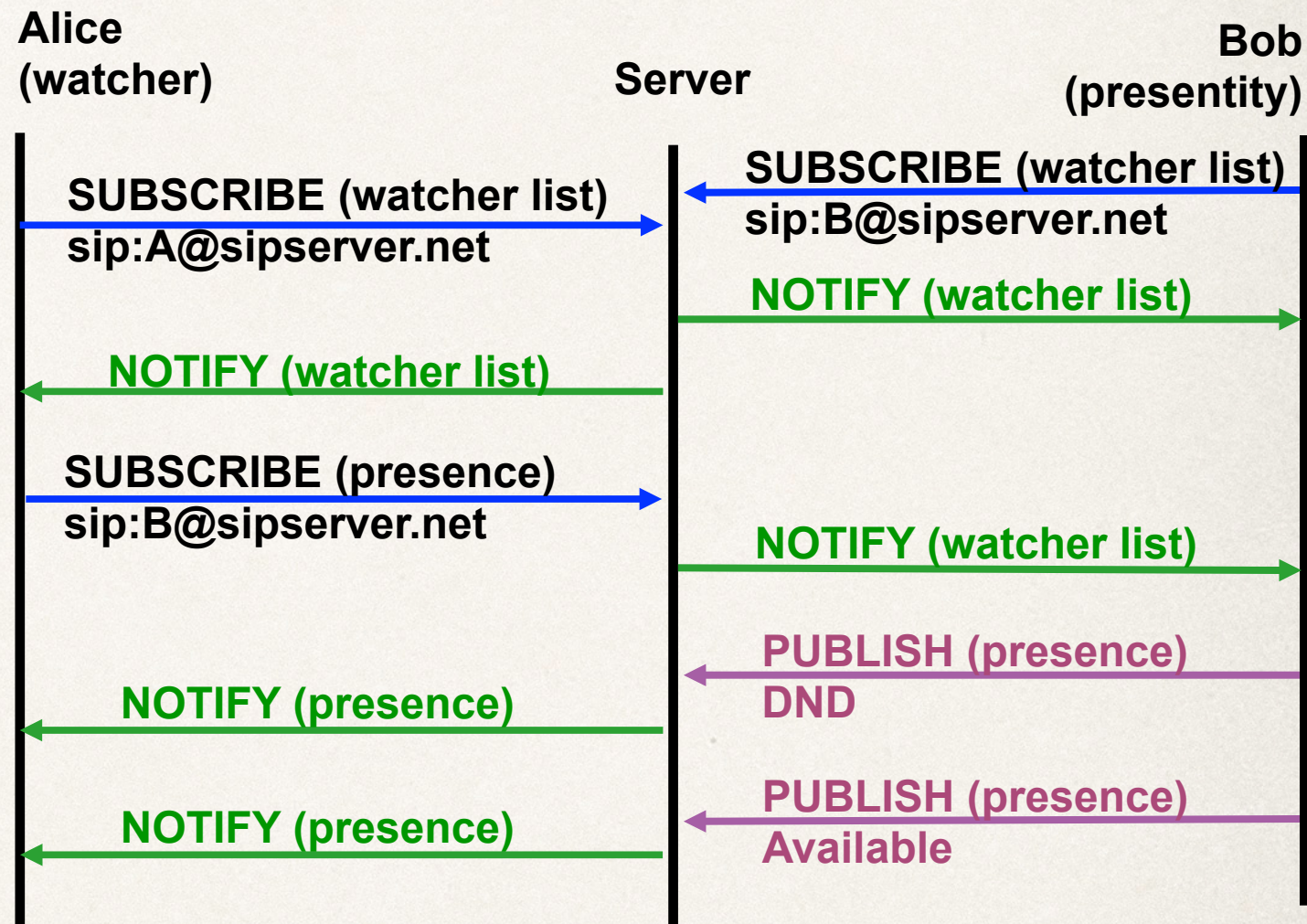
    sdp\_remove\_media("video");

...

**}**

# IM & Presence

sip im&presence tunings



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- ❖ compress body

- ❖ again - body for presence or instant messaging can be big
- ❖ client support required

- ❖ store and forward periodically presence states

- ❖ some devices may change states often
- ❖ not critical states may get stacked (e.g., idle)

- ❖ store and forward instant messages

- ❖ expect always unreliable delivery on mobile networks
- ❖ throttle delivery to avoid discarding on the network
- ❖ msilo or sqllops+uac (uac\_req\_send())

- ❖ client side - important

- ❖ subscribe with 0 expires
- ❖ subscribe only visible contacts



tutorials  
mailing lists  
reference documentation

**[www.kamailio.org](http://www.kamailio.org)**

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<http://www.asipto.com/sw/kamailio-admin-book/>





<http://www.kamailioworld.com>

*YouTube KamailioWorld Channel*

<https://www.youtube.com/channel/UCElq4JNTPd7bs2vbfAAYVJA>

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Thank you!  
Questions?  
@miconda

*Kamailio World 2016 - Planning a Special Edition*

# Kamailio Project

## 15 YEARS OF DEVELOPMENT

2001-2016

*from SER to Kamailio*

[www.kamailioworld.com](http://www.kamailioworld.com)