Thriving in a mobile world

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About me

- Working in **VoIP** since 2001
- Working with **OpenSER/Kamailio** since 2005

  (first patch Jun 8 2007)
- **Libon Voice Team** Tech Coordinator

What's Mobile?

Mobile apps constraints

- Power consumption
- Data consumption
- Socket unreliability
- OS constraints: iOS background mode(s), Android 6.0 Doze mode
- “Unfriendly” networks

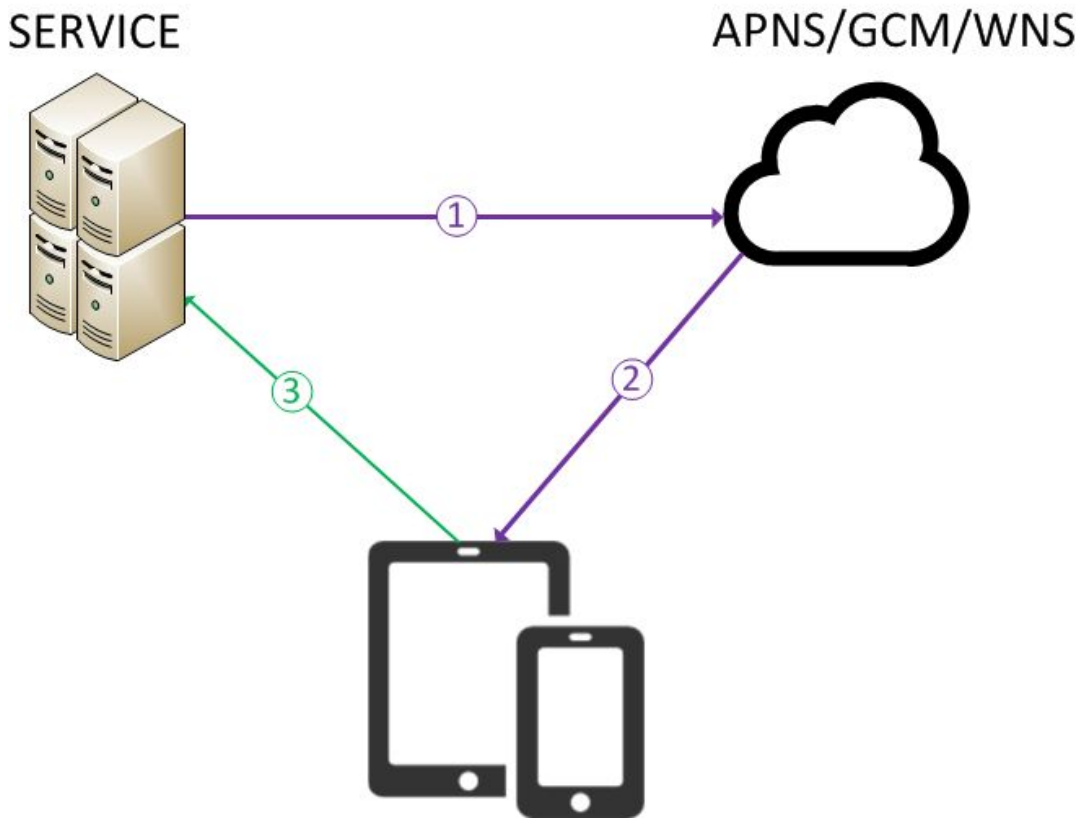
Android Doze mode

- Network access suspended
- Wake locks ignored
- AlarmManager alarms deferred
- No Wi-Fi scans

Push notifications

In mobile context:
a short message sent to a device through a centralized service and targeted to a specific app.

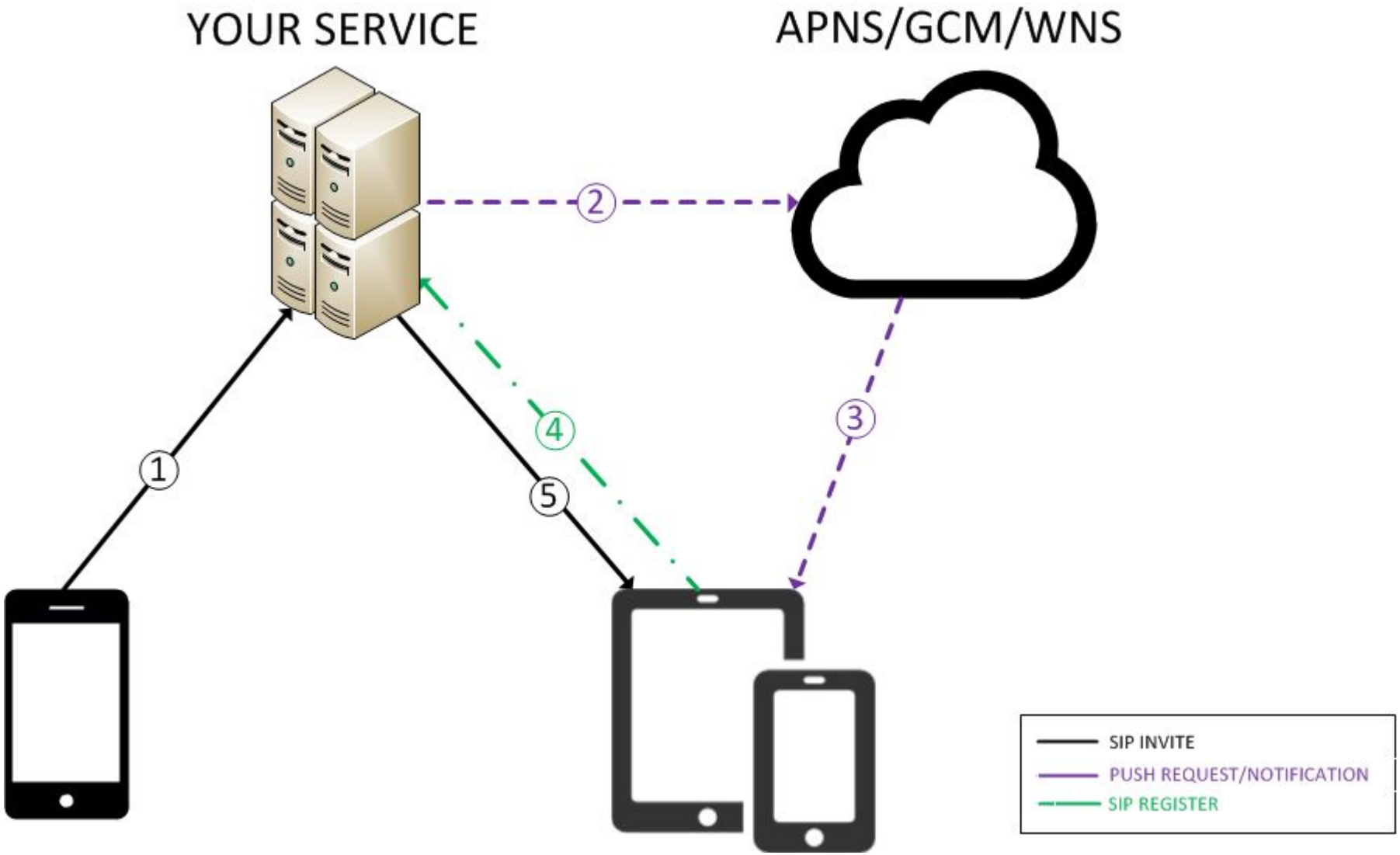
It can be used to trigger an action from the app.



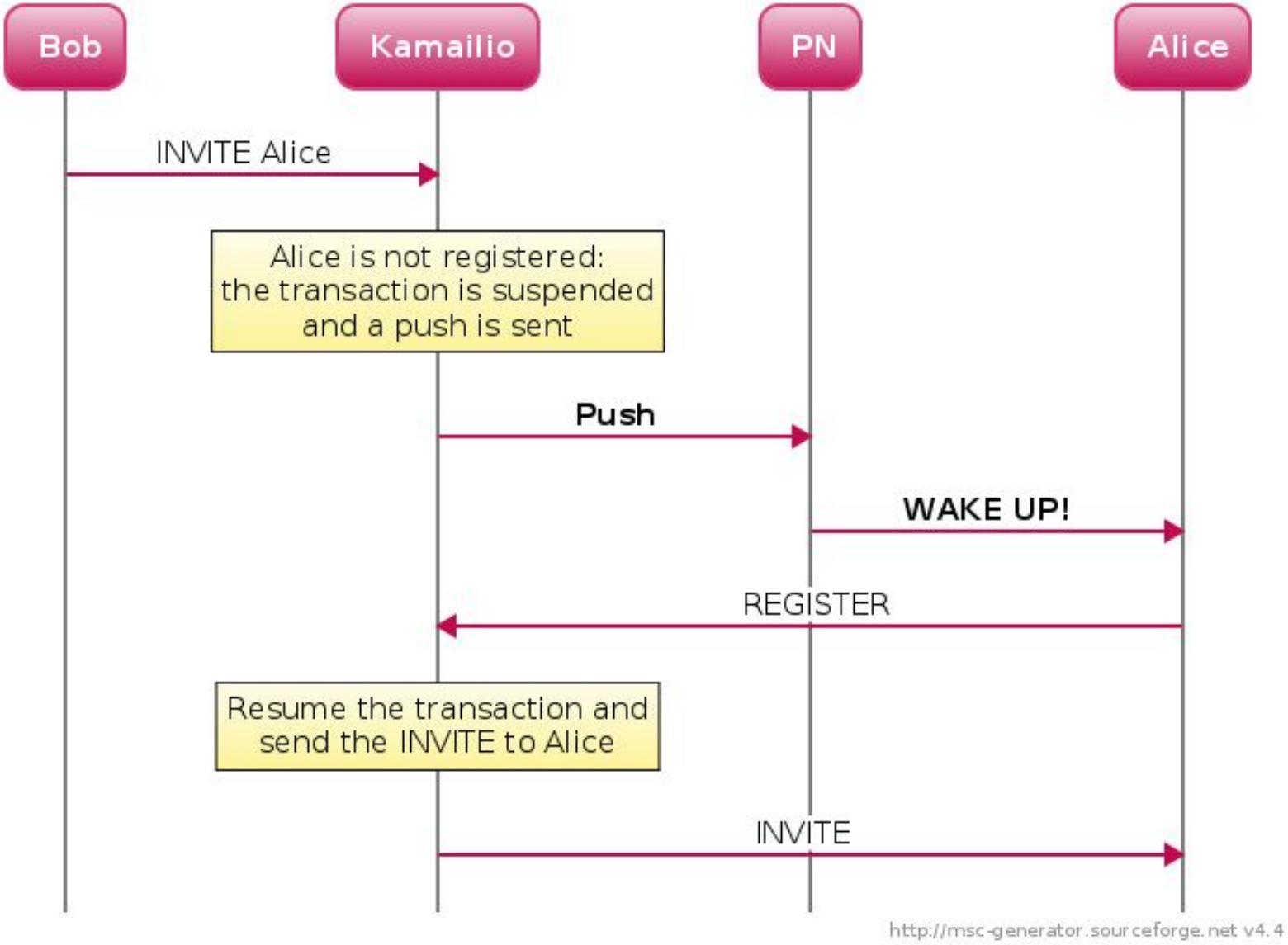
Push notifications

- APN (Apple), GCM (Google), WNS (Windows), ADM (Amazon)
- Chrome Push Notifications, Firefox Notifications (W3C Push API)
- Safari Push Notifications

Push notifications & VoIP



Kamailio: suspend & resume



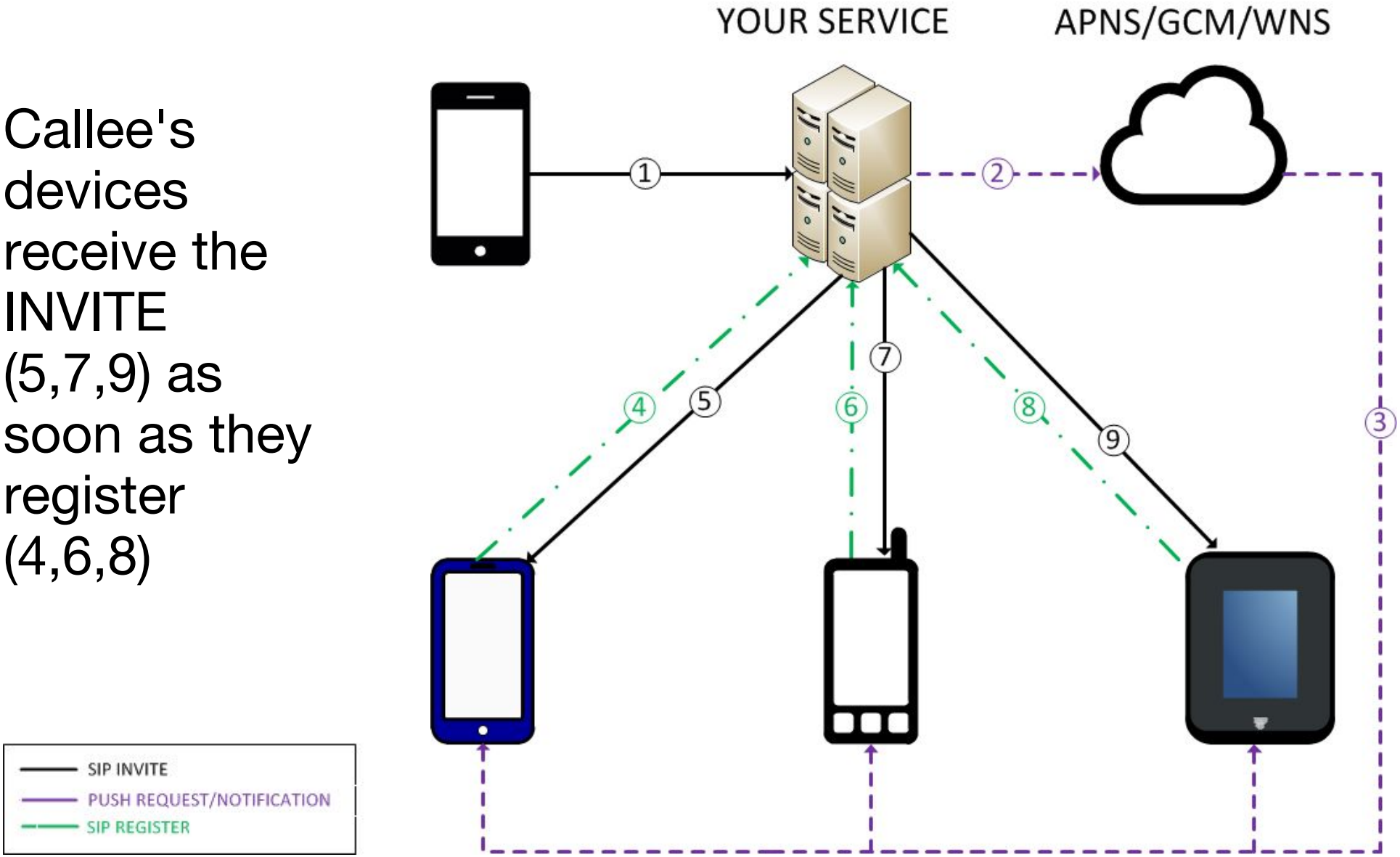
Multi-device: new challenges

- Users can have many devices
- Only some of them may be reachable
- Each device may have a different Push Notification system

How much time do we have to wait before relaying the INVITE?

INVITE & multi-device

Callee's devices receive the INVITE (5,7,9) as soon as they register (4,6,8)

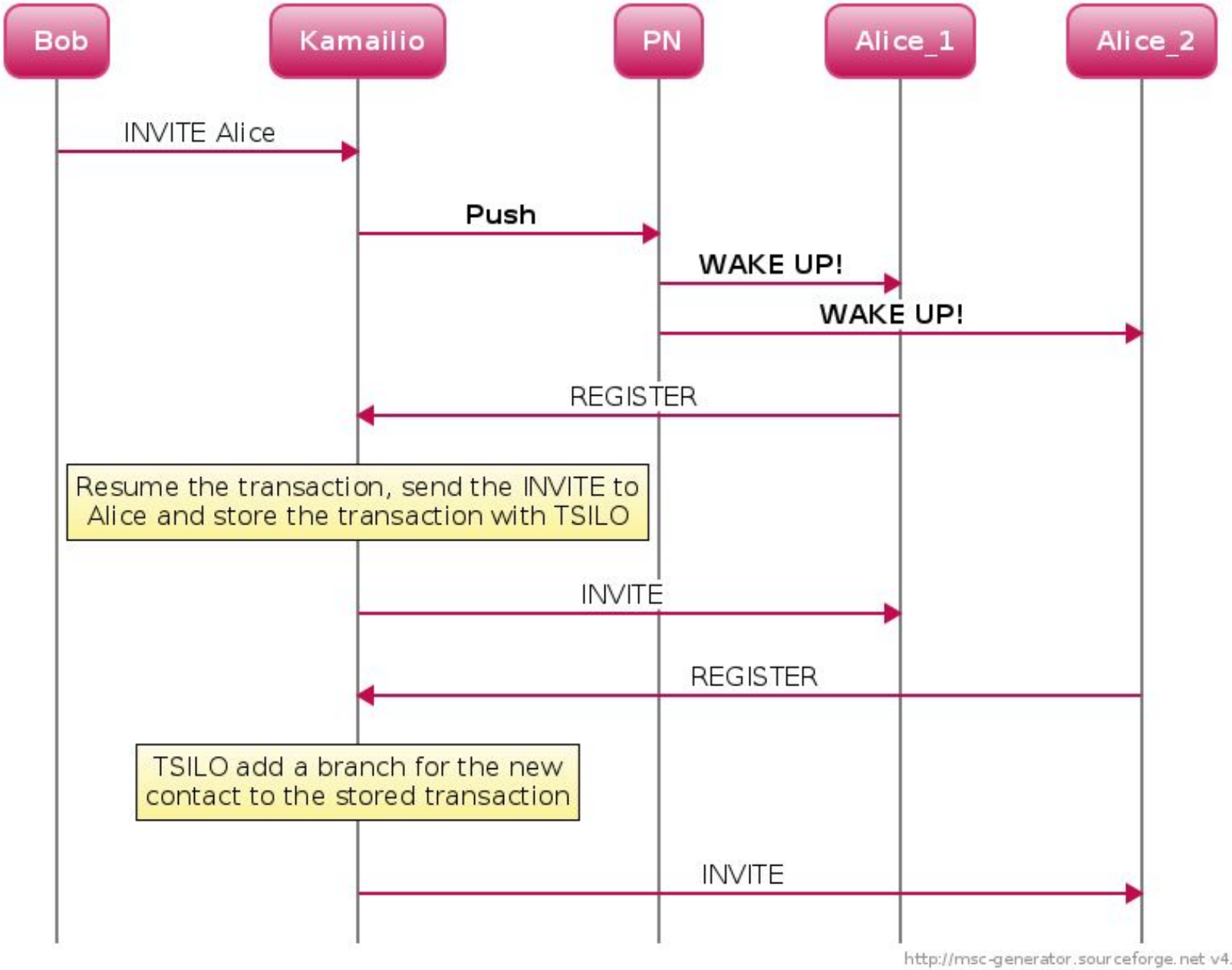


“Late” parallel forking

Instead of forking an INVITE just to the currently registered contacts, send the INVITE to the available ones and continue adding branches as soon as new ones register and as long as the transaction hasn't got a final reply.

TSILO = Transactions Silo

Kamailio: Push + TSILO



Push notifications: ***pros***

- Simple way for a service to send notifications to user's device
- Available on several platforms/OS
- **Someone is doing the hard job for you!**
- Reliable (APNS > 99% success rate)
- No need to deal with pinhole/NAT
- No need to permanently store users' location
- Use resources “on demand”

Push notifications: ***cons***

- No immediate delivery status report
- No delivery guarantee
- Not possible to predict delivery time
- Different API per provider
- Different UX per OS/Version:
  - Apple push before iOS 7 vs Apple “silent push”

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Practical tricks

- Monitor the active sockets: tcpops module
- Be careful with pipelimit/fail2ban
- Be careful with conntrack
- Limit registered contacts:
  - use sip.instance
  - unregister contacts on socket closure event
  - manually delete old contacts

    (http://lists.sip-router.org/pipermail/sr-users/2016-April/092491.html)

“Unfriendly” networks

- Privacy and security problems
- SIP ports blocking
- UDP block
- DPI

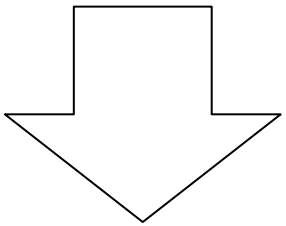
Privacy and Security

USE TLS!!!

"You shall have no other transports before TLS."

SIP Ports blocking

- Use SRV records with other protocols' ports:
  - 80/443
  - 25, 465, 587, 993 (SMTP(S), IMAPS)
- Finding an open port could take too long



NOT COMPATIBLE WITH RTC

SIP Ports blocking: smart app

- Use short timeouts (tcp and SIP)
- Group SRV records by port (breaks RFC 2782)
- Don’t try all the SRV records for a given port (breaks RFCs 2782 and 3263)
- Remember the visited networks
- Use the OS maintenance windows to perform network discovery:

CAREFUL WITH BATTERY CONSUMPTION!!!

- Tune your strategy: collect feedback from the client

UDP Block

- Use ICE
- Use RTP/RTCP multiplexing
- Use TURN/TCP or TURN/TLS:

  which port to use?

ICE can take long with many candidates!

Optimize ICE: Kamailio

- Add rtpengine as a relay candidate (default)
- Remove the useless candidates (host and srvrflx most often)

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Optimizing ICE: application

- Use Trickle ICE
- Retrieve information from signaling layer
- Remember the visited networks
- Adjust candidates priority according to the history
- Tune your strategy: collect feedback from the client

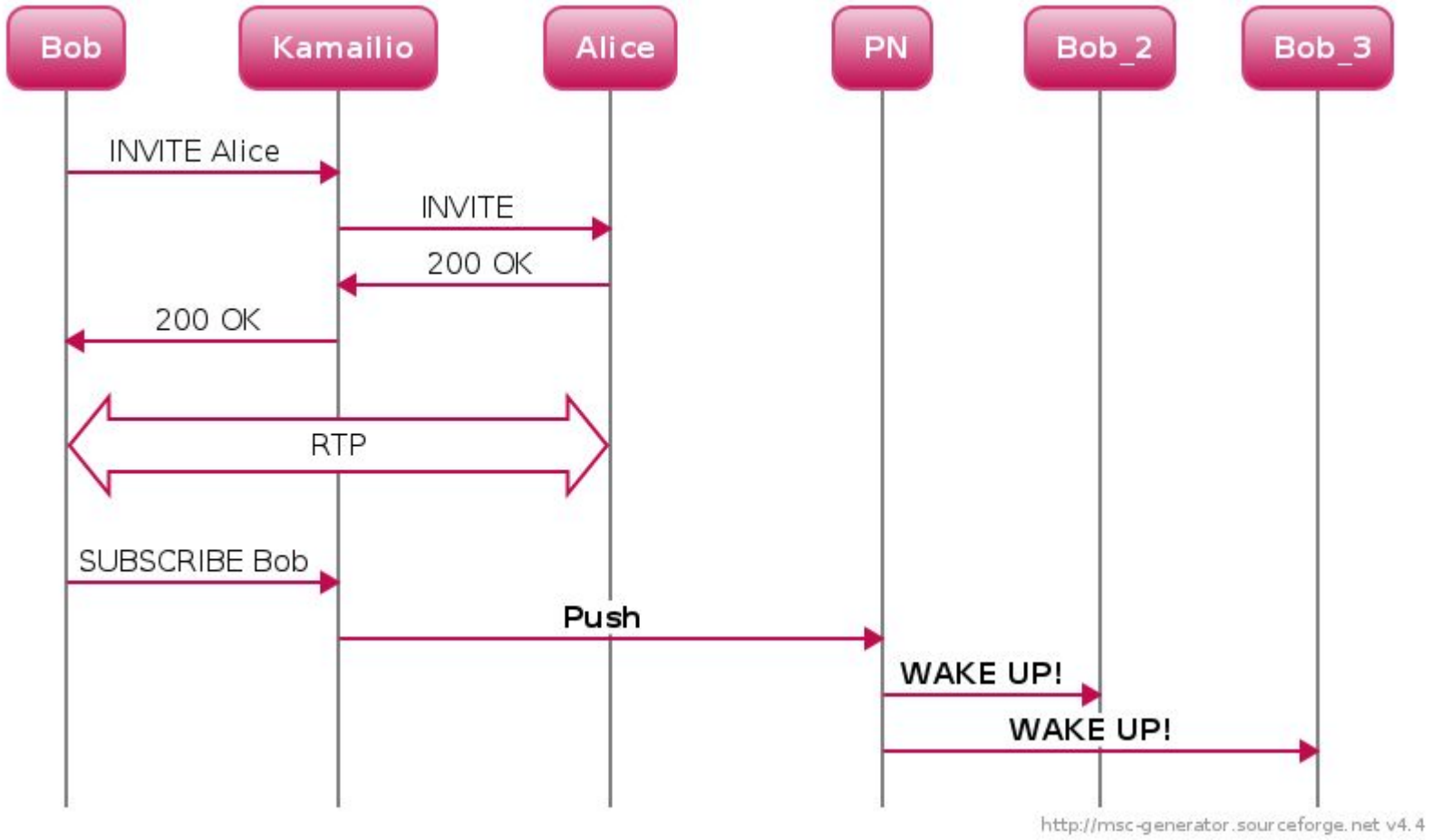
A smart application

- remembers visited networks
- collects & reports

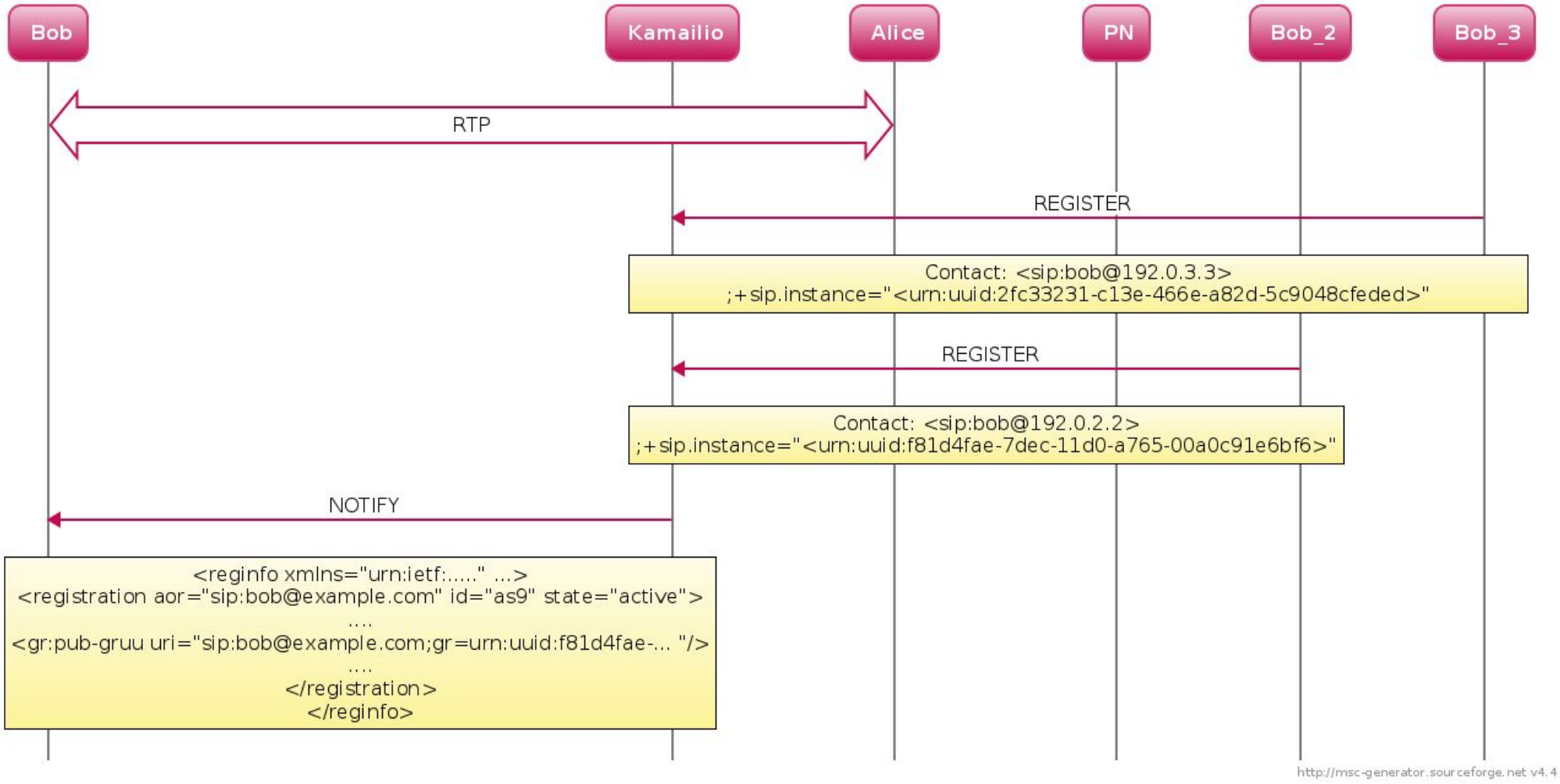
"Cool" features

- Call Continuity
- Call transfer between devices

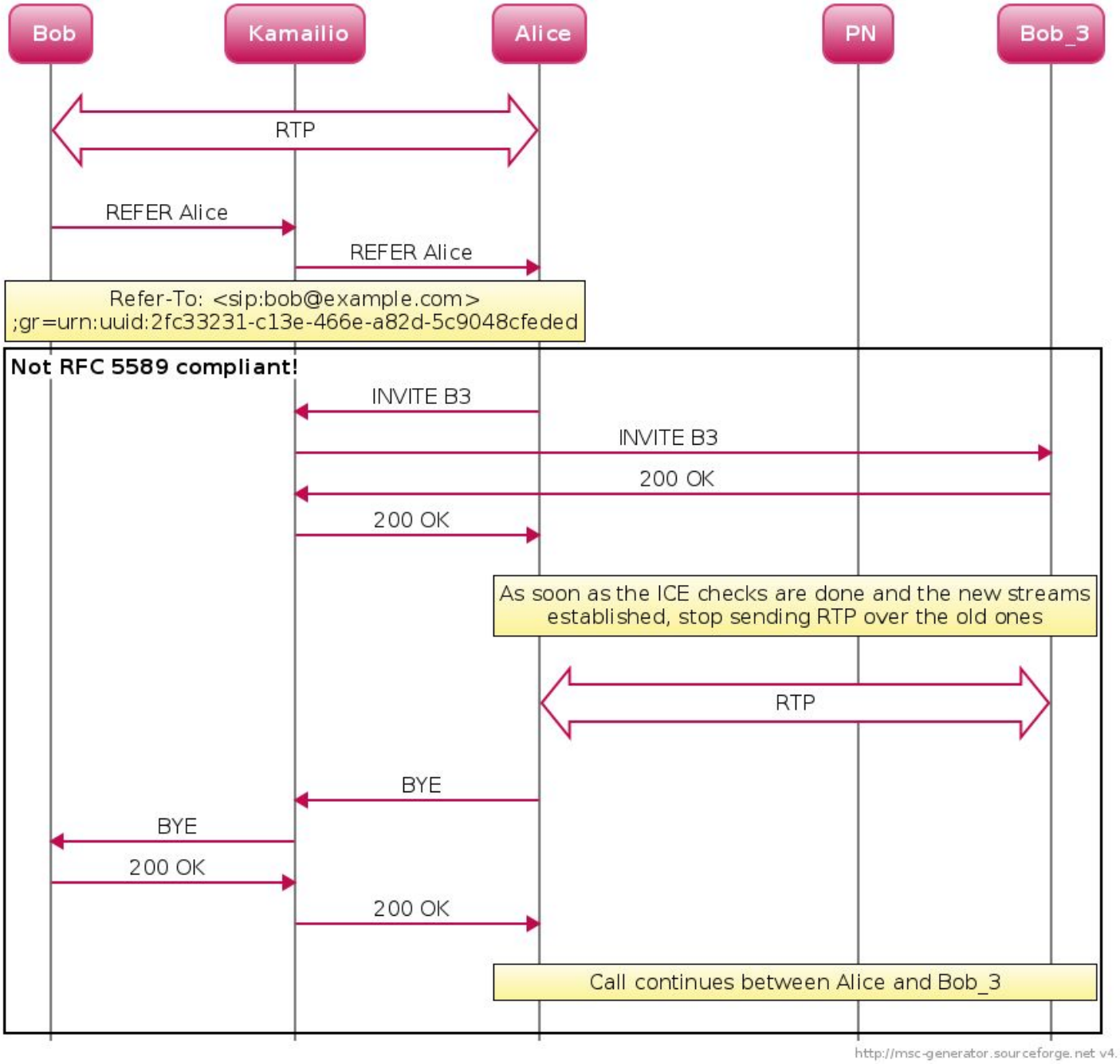
Call transfer: call & subscribe



Call transfer: collect



Call transfer: change device



Thank you!

Questions?

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