A RELOAD Usage for
Distributed Conference Control (DisCo)

draft-knauf-p2psip-disco-00

Alexander Knauf

Gabriel Hege

Thomas Schmidt

Matthias Wählisch

alexander.knauf@haw-hamburg.de, hege@fhtw-berlin.de, {t.schmidt,waehlisch}@ieee.org
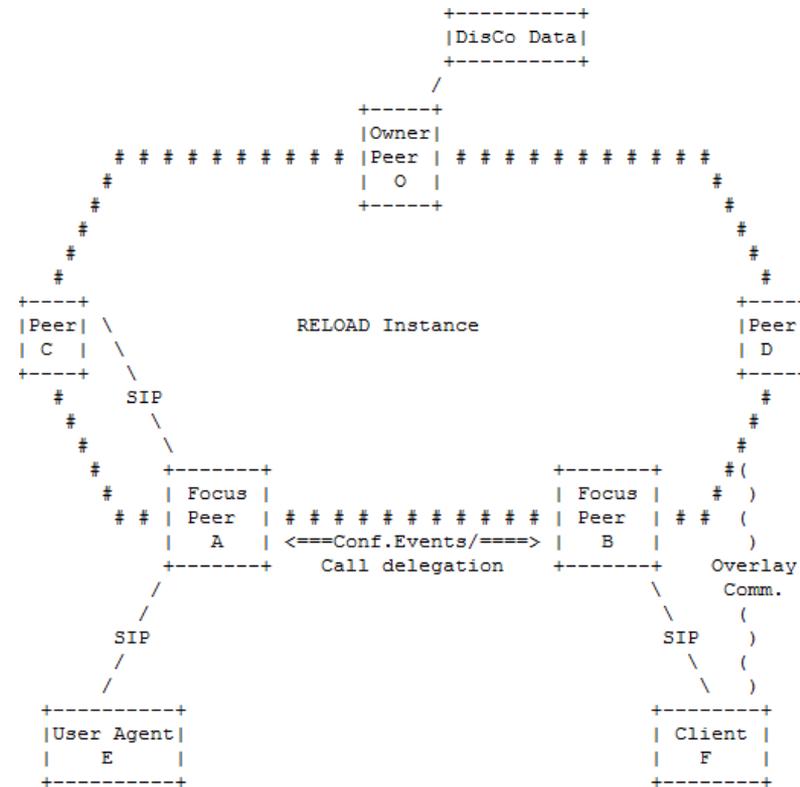
Outline

1. Problem statement and objectives

2. Distributing a conference focus with SIP

3. Publishing a distributed conference in RELOAD

4. Proximity-aware focus selection

Problem Statement for Conferences in P2PSIP Scenarios

- A conference in the tightly coupled model is managed by a *single* entity called *focus* in SIP:
  - Maintains signaling and media parameter negotiation
  - May perform media mixing functions
- **Problem (1)**: The Conference URI
  - *Identifies* the multiparty session, and
  - *locates* the conference focus
    - Single point of failure
- **Problem (2):** No dedicated server architecture in P2PSIP
  - Media mixing performed at the end-user devices
    - Scaling problem within large conferences
  - Conference must be registered and globally accessible
    - Demands a registrar, e.g., available through DNS

Objectives of Distributed Conference Control

- *Separate* the logical conference ID from the controlling entities:
  - Allows *multiple* focus peers to manage a single conference
  - Increases robustness against focus failures
- RELOAD *Usage* for Distributed Conference Control:
  - Conference URI is registered as a *key* for several focus peers that are responsible for conference control

```
                                        +----------+
                                        |DisCo Data|
                                        +----------+
                                            /
                                        +-----+
                                        |Owner|
        # # # # # # # # #   |Peer |  # # # # # # # # #
      #                     |  O  |                    #
      #                     +-----+                     #
     #                                                   #
    #                                                     #
   #                                                       #
  +----+                                               +----+
  |Peer| \            RELOAD Instance                  |Peer|
  | C  |   \                                           | D  |
  +----+    \                                          +----+
   #    SIP  \                                          #
    #         \                                        #
     #          \                                     #
      #          \                                   #(
      #  +-------+              +-------+            # )
    # #  | Focus |              | Focus |          #  (
      #  | Peer  | # # # # # # # | Peer  | # #      )
         |   A   | <===Conf.Events/====> |   B   |      (
         +-------+  Call delegation      +-------+   Overlay
          /                                  \        Comm.
         /                                    \        (
      SIP                                      SIP      )
       /                                        \      (
      /                                          \      )
  +----------+                              +--------+
  |User Agent|                              | Client |
  |    E     |                              |   F    |
  +----------+                              +--------+
```

draft-knauf-p2psip-disco-00

Distributing a focus with SIP

- *First Step:* Transparent distribution of the conference focus
  - Participants in role of *focus peers* are responsible for a subset of conference members
  - Signaling messages sent from *several* focus peers appear as originating from *one 'virtual'* conference focus
    - Routing decision based on an additional *Record-Route* header pointing to the responsible focus peer

```
INVITE sip:bob@dht.example.com SIP/2.0
Call-ID: 0815@141.22.26.55
CSeq: 1 INVITE
From: <sip:conference@dht.example.com>;tag=134652
To: <sip:bob@dht.example.com>;tag=643684
...
Contact: <sip:conference@dht.example.com>;isfocus
Record-Route: <sip:alice@dht.example.com>
...
```

Here: Alice is the focus responisble for Bob

- Alice receives message through the *Record-Route* and – as responsible focus peer - intercepts message from Bob

Operations in a Distributed Conference

- *Second Step:* Definition of protocol schemes for

  - *State synchronization*: Achieved by *conference event package [RFC4575]* extended by elements describing a focus peer's local state

    - Focus peers get consistent and global view of conference state

  - *Call delegation*: Transfer calls using SIP REFER requests carrying session identifier (for semantic recognition of calls)

    - Used in cases of overloading, leaves or failures of focus peers

  - *Focus Discovery*: Allocating new focus peers that support the conference

    - Enables load distribution

draft-knauf-p2psip-disco-00

Definition of a Distributed Conferencing (DisCo) Kind

- *DisCo-Registration* stores a dictionary of :

  - *Address-of-Records* or *Node-IDs* of focus peers

  - A *coordinates vector* describing the focus' relative network position

- DisCo-Registration is a *shared* resource of all focus peers

```
enum {
  sip_focus_uri (1),
  sip_focus_node_id (2), (255)
} DisCoRegistrationtType;

struct {
  opaque coordinate<0..2^16-1>

  select (DisCoRegistrationtType.type) {
    case sip_focus_uri:
      opaque uri<0..2^16-1>

    case sip_focus_node_id:
      Destination destination_list<0..2^16-1>

    /* This type can be extended */
  }

} DisCoRegistrationData;

struct {
  DisCoRegistrationtType type;
  uint16 length;
  DisCoRegistrationData data;
} DisCoRegistration;
```

Creating a Conference

1) Probe on existence of Conference URI
   - *StatReq* is sent to storing peer for duplicate addresses detection
2) Request a *new certificate* that is used for the DisCo-Registration
   - Certificate for the *"virtual"* conference user
3) Store mapping *Conf-ID to <creating peer, coordinates value>* at storing peer

```
Enroll.Serv      Alice        Peer1      Overlay       PeerN    StoringPeer
-------------------------------------------------------------------------
        |           |       StatReq Res:Conf-URI         |           |
        |           |-------->|-------->|-------->|-------->|
        |           |             StatAns      |           |           |
        |           |<--------|<--------|<--------|<--------|
        |<==Cert===|             |           |           |           |
        |           |             |           |           |           |
        |===Cert==>|   StoreReq Res:Conf-URI Kinds:DisCo[,SIP]   |
        |           |-------->|-------->|-------->|-------->|
        |           |             StoreAns     |           |           |
        |           |<--------|<--------|<--------|<--------|
        |           |             |           |           |           |
```

draft-knauf-p2psip-disco-00

Joining a Conference and publishing Focus-ability

1) Resolve Conf-ID by RELOAD *fetch* request
   - Answer contains available focus peers

2) Select closest focus

3) Establish transport connection by *AppAttach* request to Alice

4) ICE-Checks

5) Create SIP dialog using the existing transport

6) Alice passes writing permission for the DisCo-Registration to Bob

7) Bob may stores its mapping and becomes a *potential* focus peer

```
Bob        Peer1      Overlay      PeerN       OwnerOfID       Alice
-----------------------------------------------------------------------
|     FetchReq Res:Conf-URI Kind:DisCo         |            |
|-------->|-------->|-------->|-------->|       |            |
|         |FetchAns  |         |        |       |            |
|<--------|<--------|<--------|<--------|       |            |
|         |         |         |        |       |            |
|  Bob calculates Alice as closest Focus        |            |
|         |         |         |        |       |            |
|         |AppAttach--application:5060          |            |
|-------->|-------->|-------->|-------->|-------->|           |
|         |AppAttach--application:5060          |            |
|<--------|<--------|<--------|<--------|<--------|           |
|         |         |         |        |       |            |
|<-----------------ICE Checks---------------------->|        |
|         |         |         |        |       |            |
|         |         |   INVITE sip:Alice |       |            |
|~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~>|        |
|         |         |      200 OK        |       |            |
|<~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~|        |
|         |         |       ACK          |       |            |
|~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~>|        |
|         |         |         |        |       |            |
|  Optinally, Alice passes writing permission   |            |
|         |         |         |        |       |            |
|         |INFO content:Cert{DisCo-Resource}    |            |
|<~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~|        |
|         |         |         |        |       |            |
```
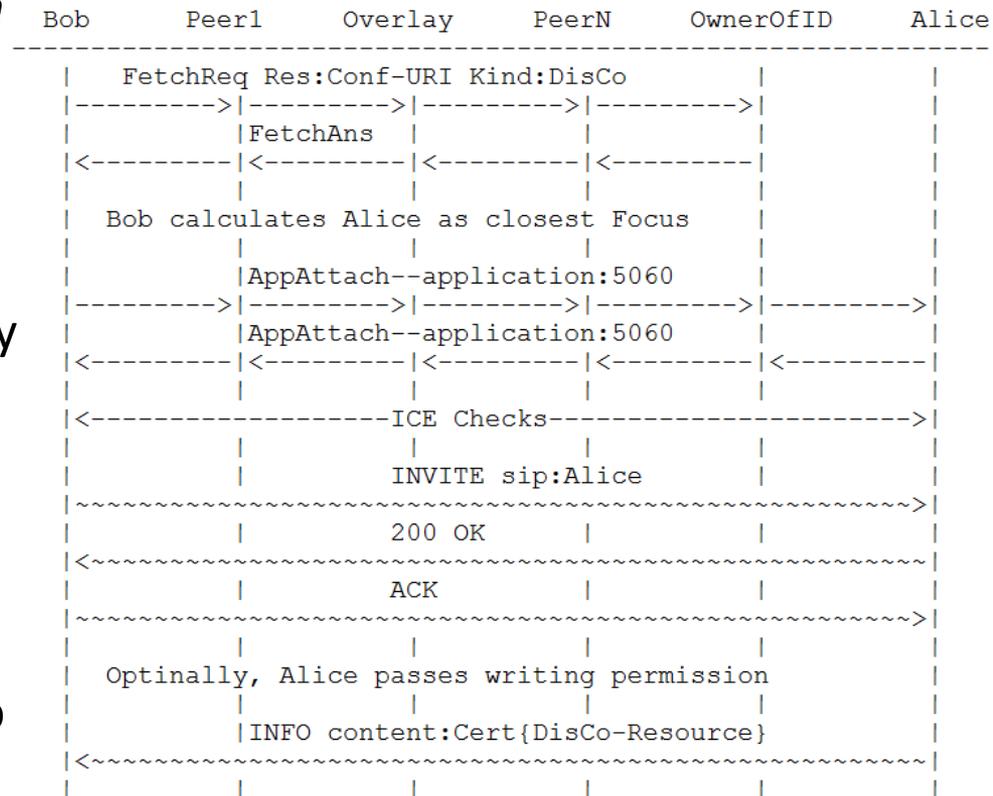
Thanks for your attention!

Questions?

Alexander Knauf, Gabriel Hege, Thomas Schmidt, Matthias Wählisch

http://inet.cpt.haw-hamburg.de/