SIP : A Preliminary study for modelling of the protocol

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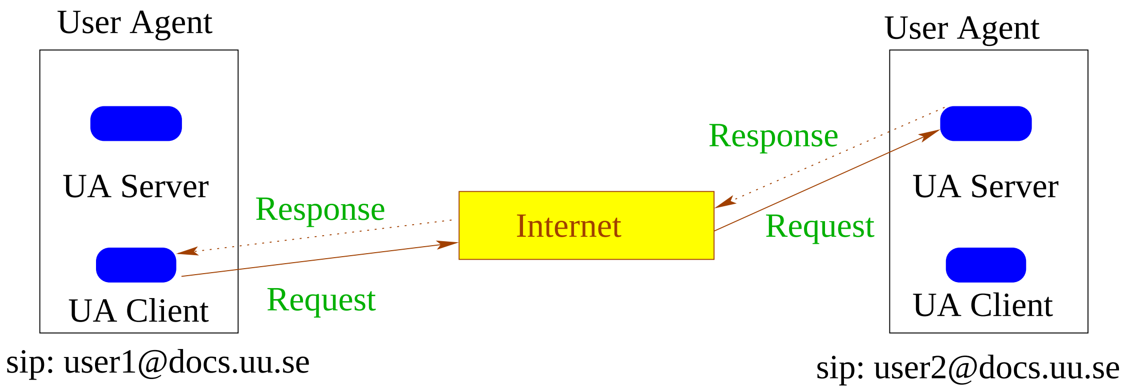
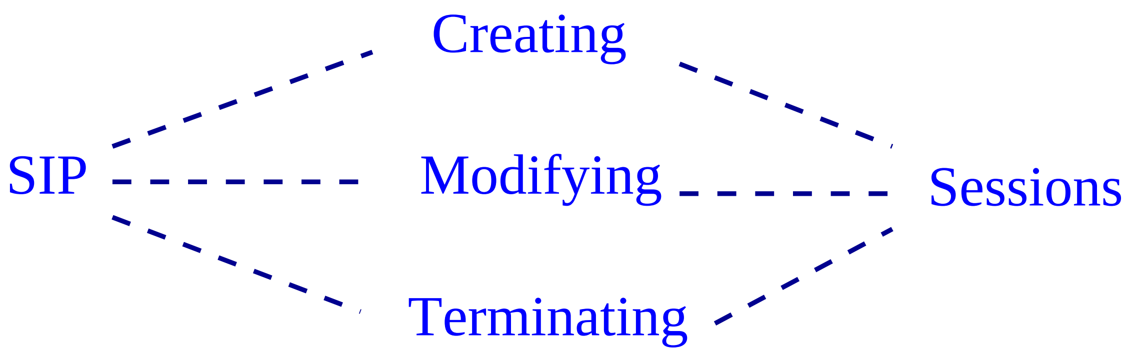
Outline

- What is SIP ?
- SIP Architecture
- Examples of Connection Establishment by SIP
- State Diagrams of SIP Components
- Infinite Aspects of Modelling SIP
- Future Work

What is SIP ?


User Agent
UA Server
UA Client
sip: user1@docs.uu.se
Response
Request
Internet
Response
Request
User Agent
UA Server
UA Client
sip: user2@docs.uu.se


Creating
SIP
Modifying
Sessions
Terminating

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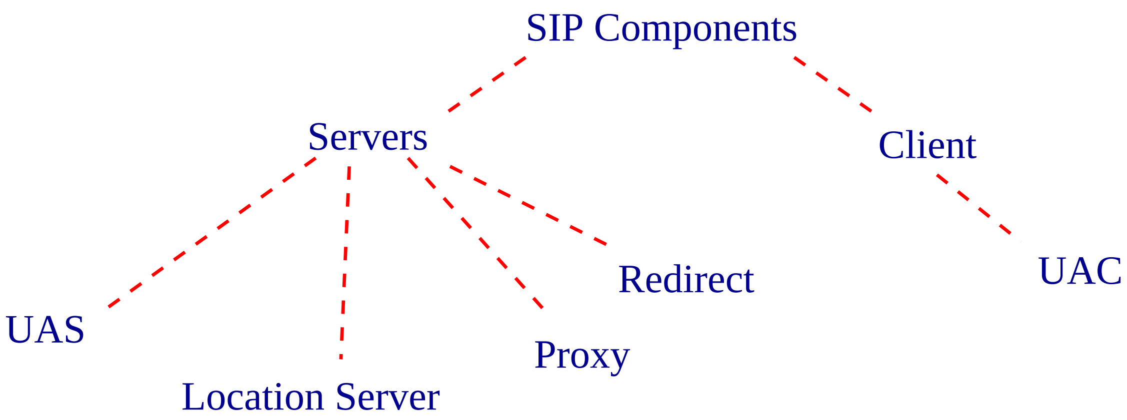
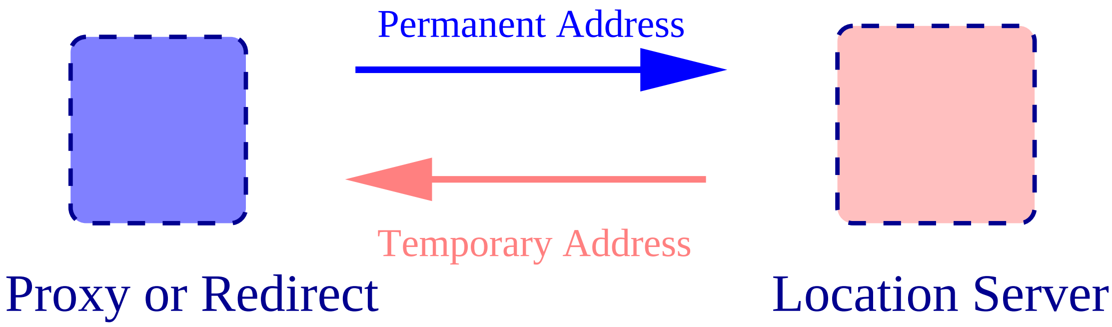
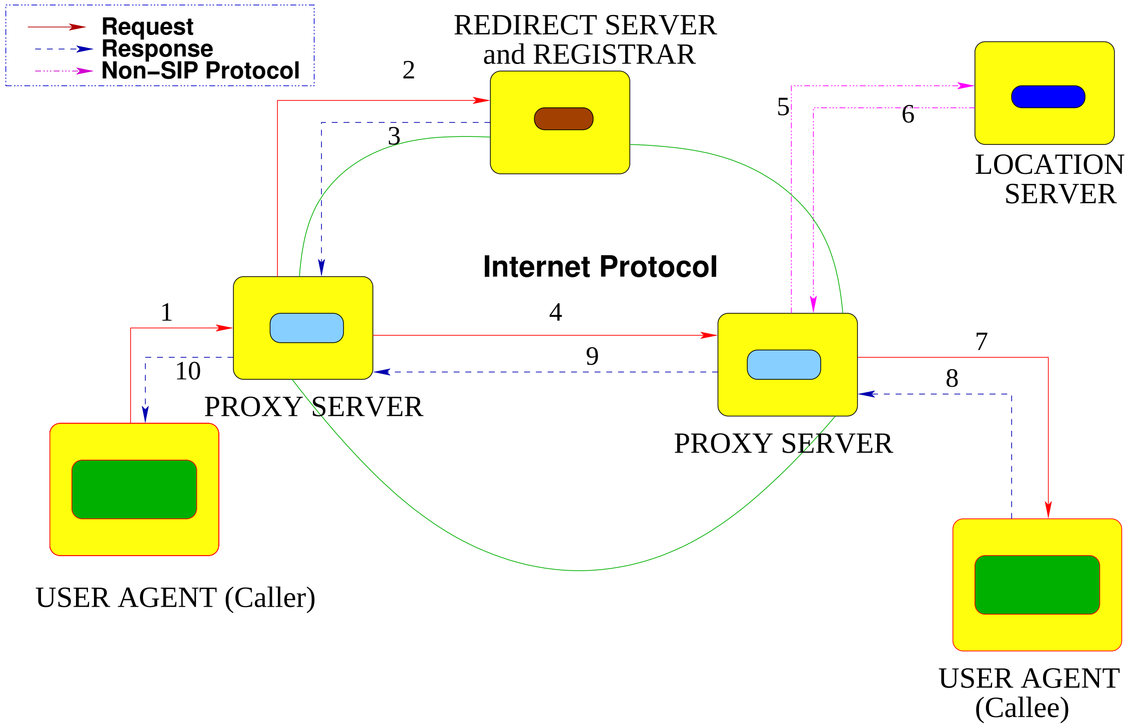
SIP Architecture





SIP Architecture



General Architecture of SIP

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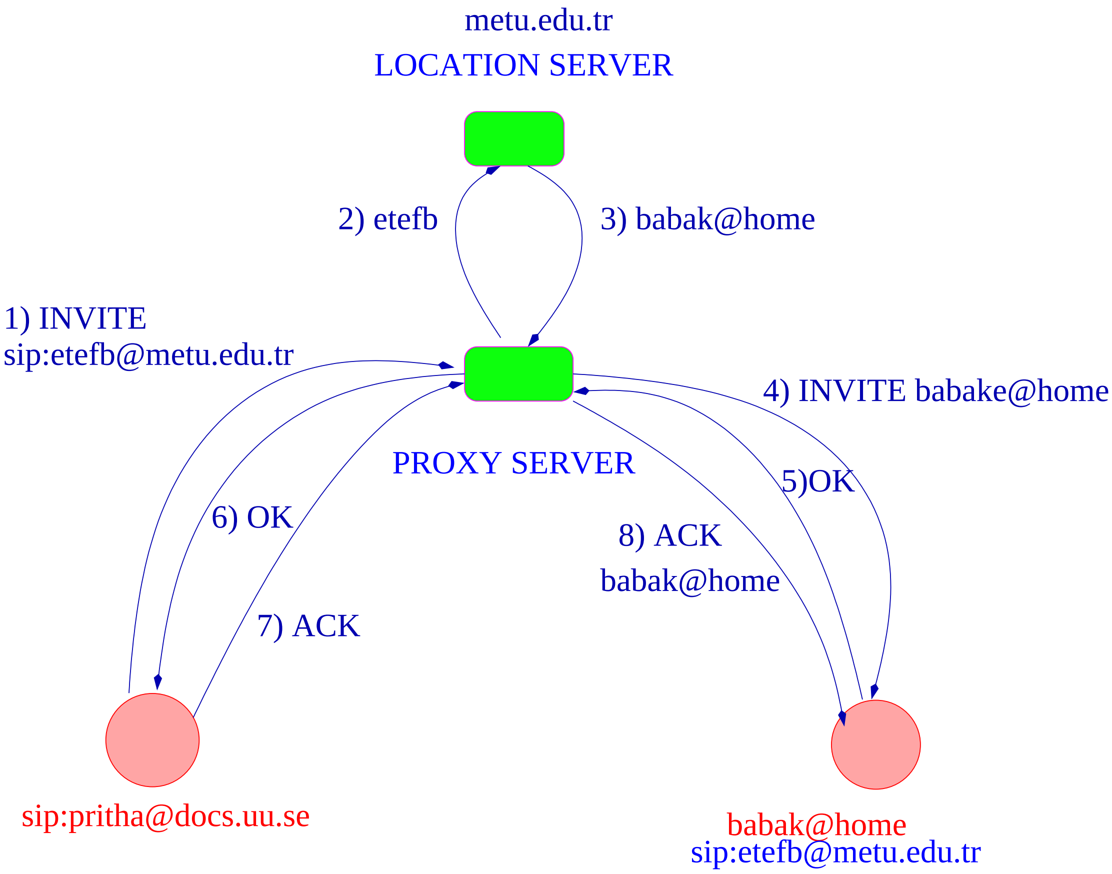
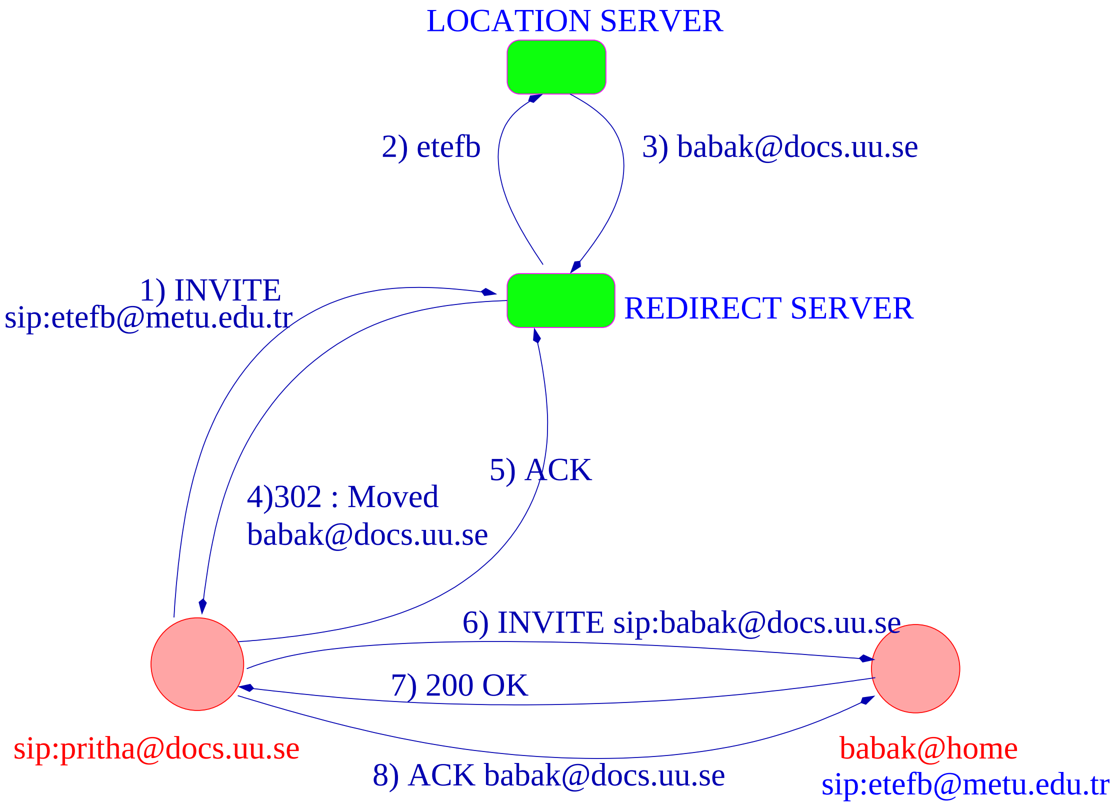
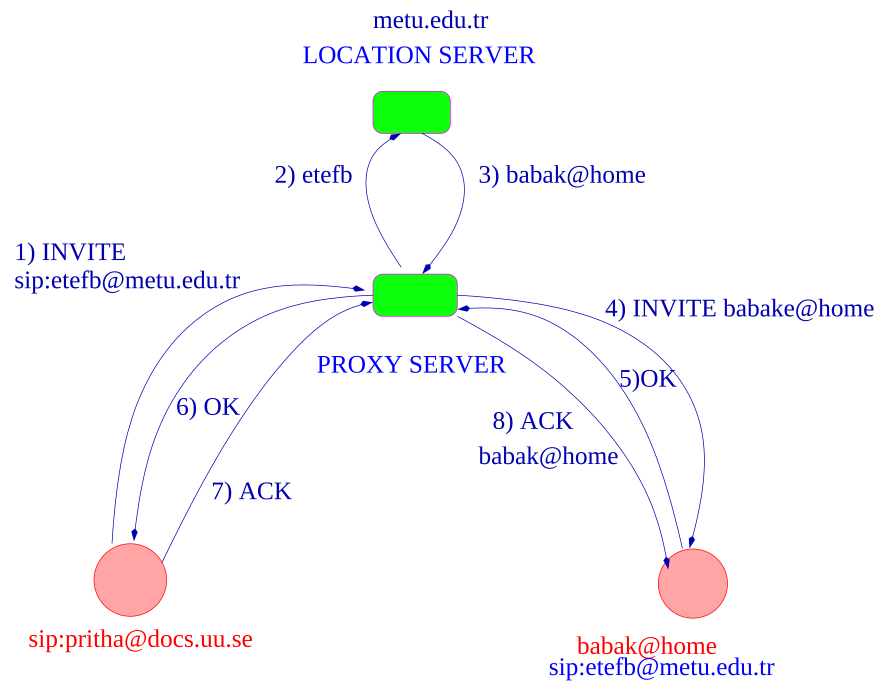
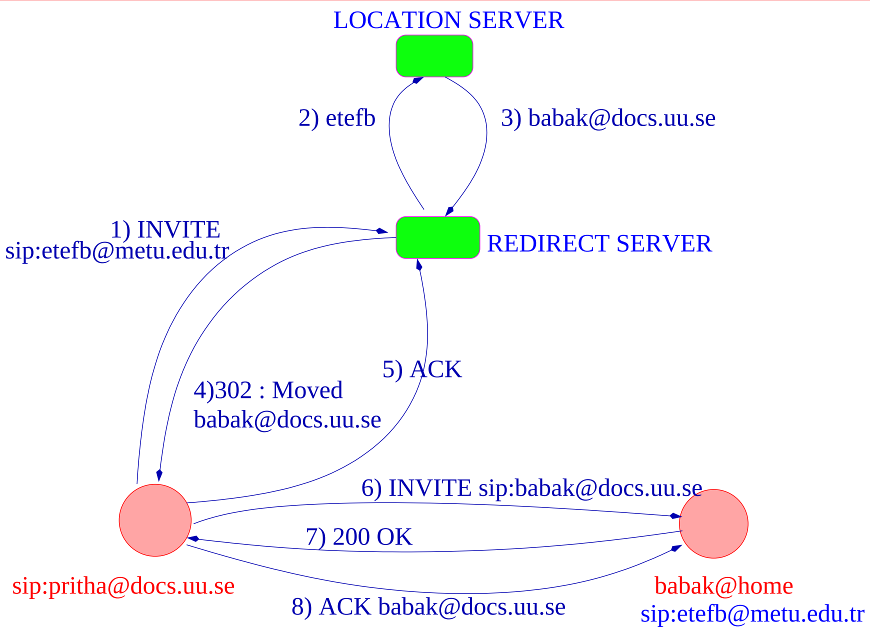
An Example of Connection Establishment in SIP via Proxy Server



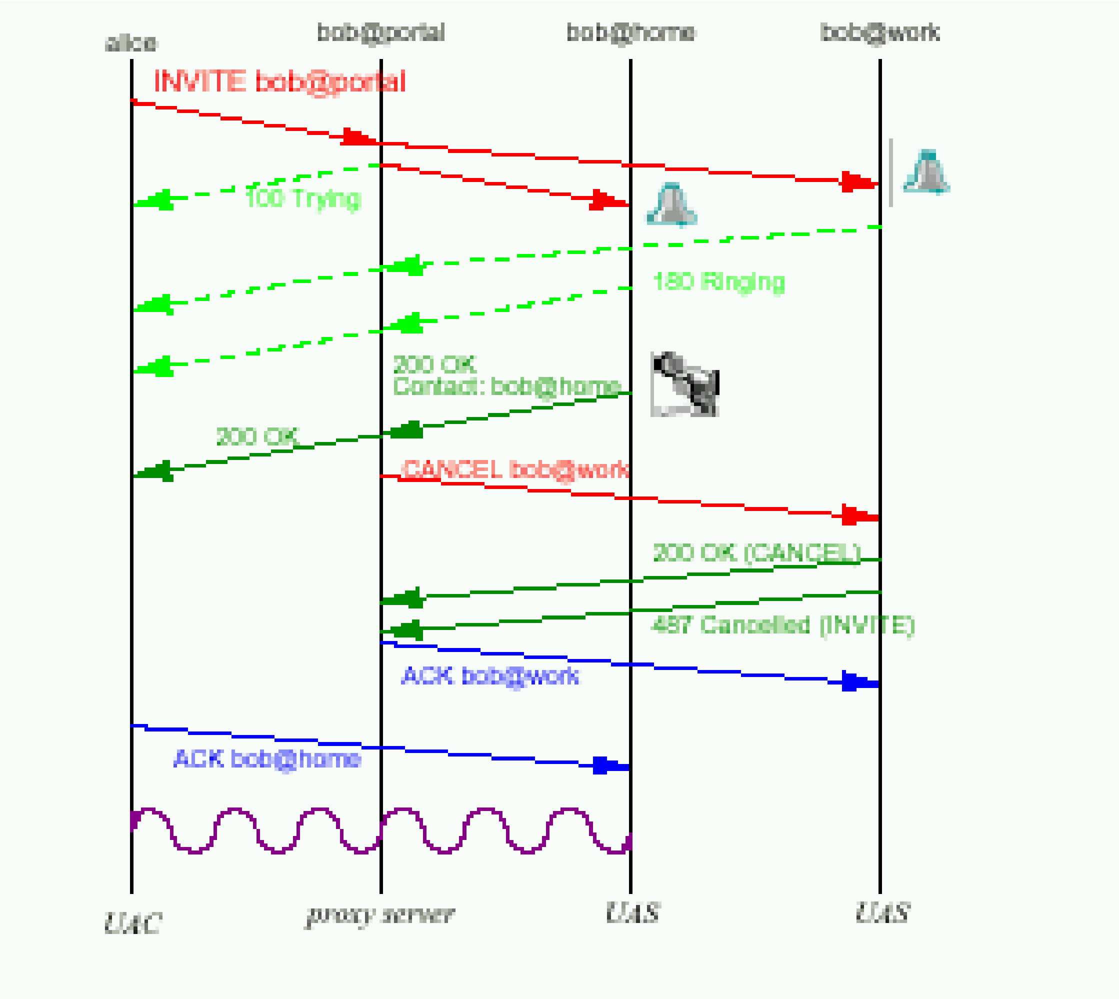
An Example of Connection Establishment in SIP via Redirect Server




metu.edu.tr
LOCATION SERVER
2) etefb
3) babak@home
1) INVITE
sip:etefb@metu.edu.tr
4) INVITE babake@home
PROXY SERVER
5)OK
6) OK
8) ACK
babak@home
7) ACK
sip:pritha@docs.uu.se
babak@home
sip:etefb@metu.edu.tr


LOCATION SERVER
2) etefb
3) babak@docs.uu.se
1) INVITE
sip:etefb@metu.edu.tr
REDIRECT SERVER
5) ACK
4)302 : Moved
babak@docs.uu.se
6) INVITE sip:babak@docs.uu.se
7) 200 OK
sip:pritha@docs.uu.se
babak@home
8) ACK babak@docs.uu.se
sip:etefb@metu.edu.tr

An Example of Communication with a Proxy Server



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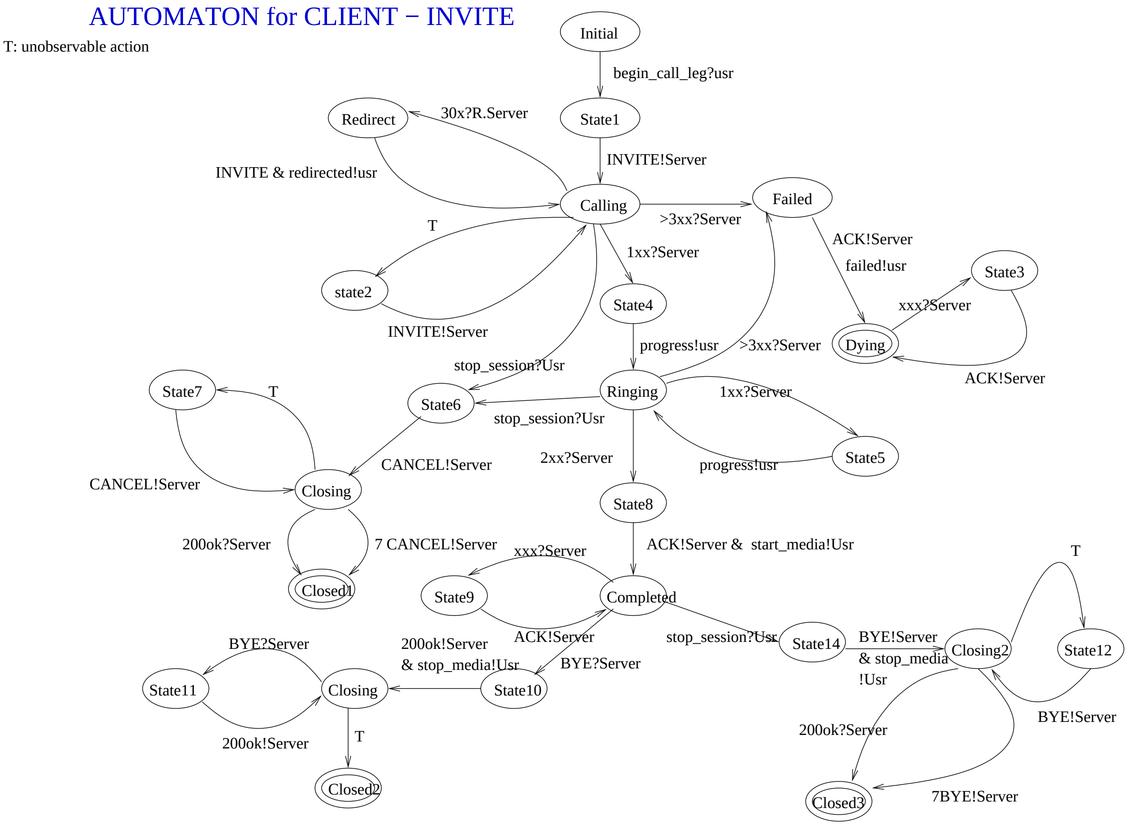
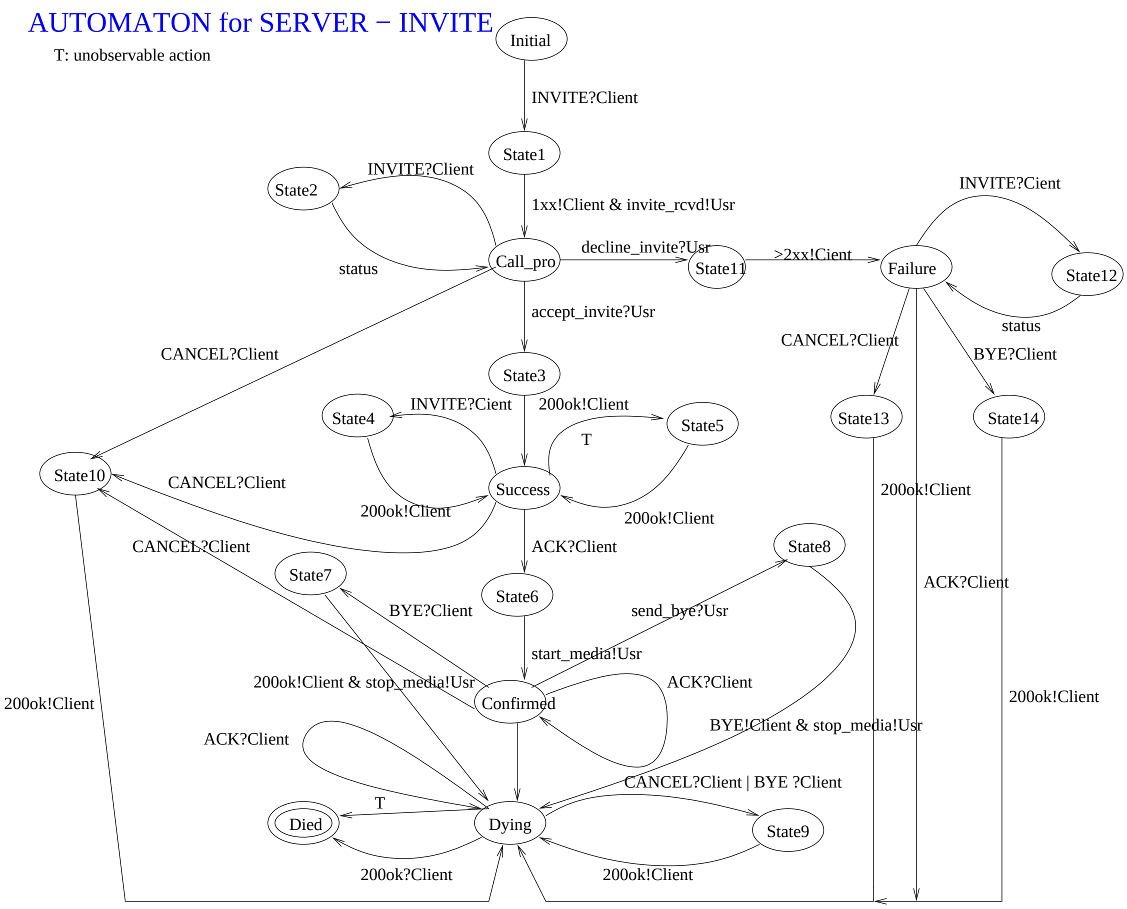
State Diagrams

- States
- Transitions
  - "m ! c" : Message m is sent to the component c.
  - "m ? c" : Message m is received from the component c.
  - "T" : Unobserved Action.

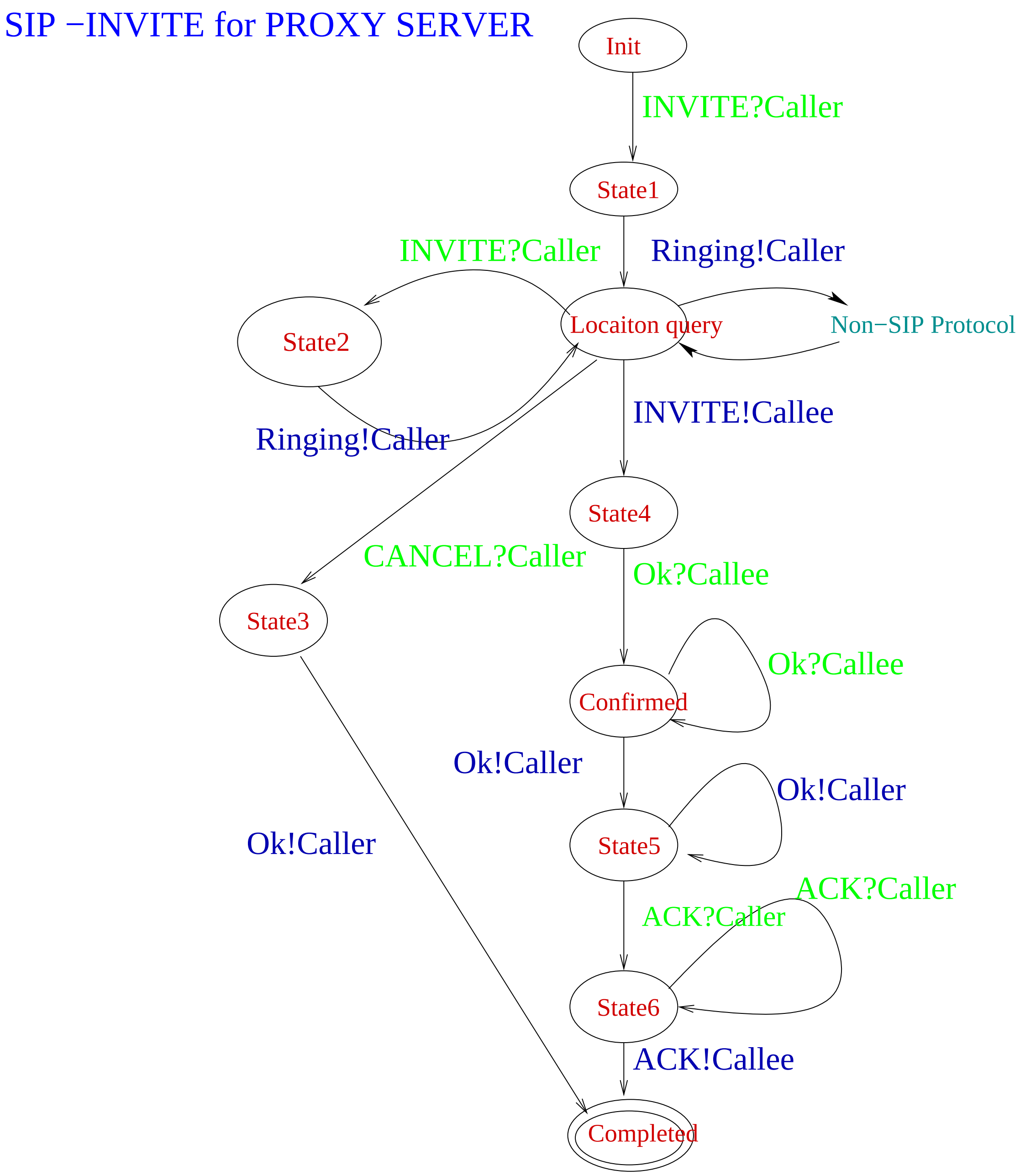
Automaton for User Agent Client generating invite



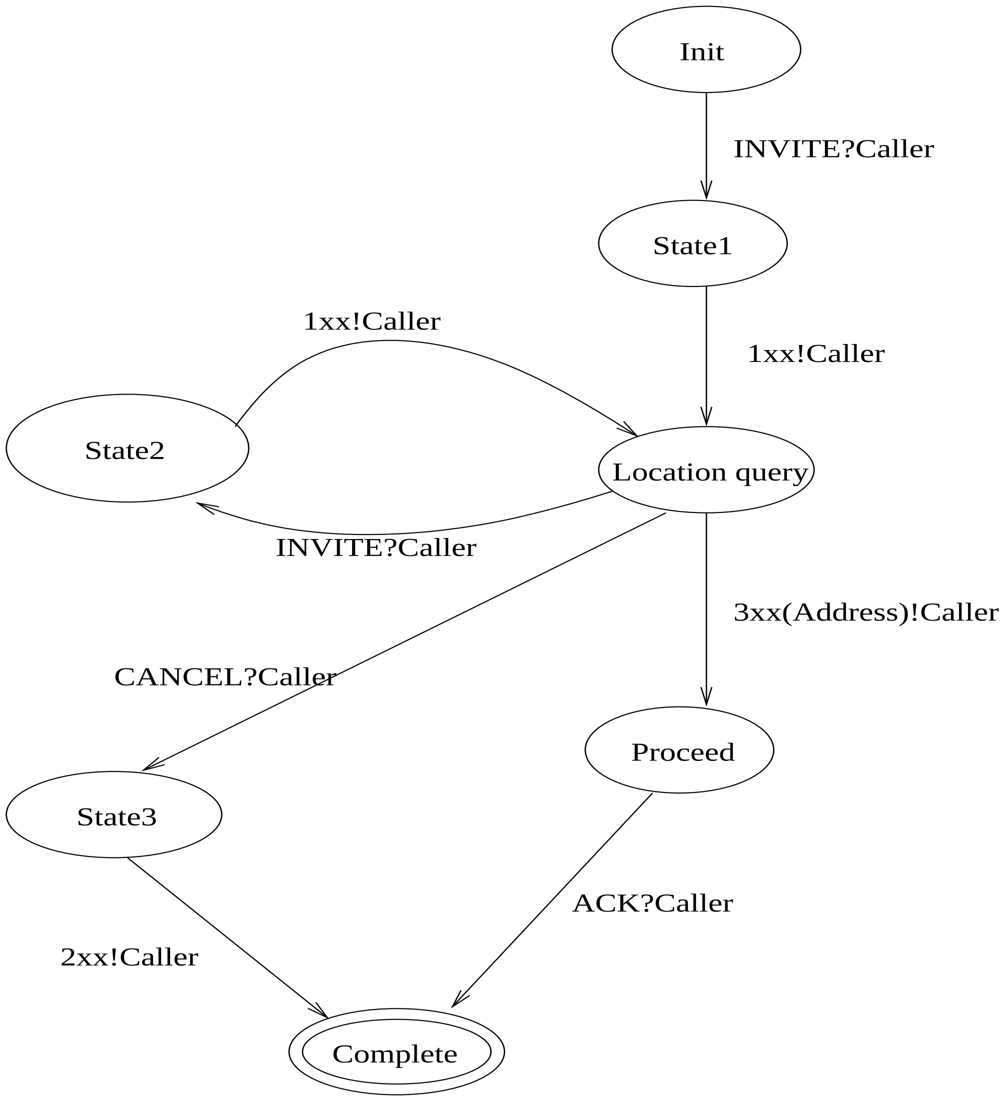
Automaton for User Agent Server receiving Invite



Automaton for Proxy Server receiving Invite



Automaton for Redirect Server receiving Invite



SIP − INVITE for REDIRECT SERVER

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Infinite Aspects of Modelling SIP

- Parameterized verification -
  - parameter - number of servers in the network.
  - parameter - number of users in the multicast communication.
- Unbounded data-buffer of the components - FIFO aspect and non-FIFO aspect.
- Delays of Retransmission.
- Counters for retrials.

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Future Work

- Refine the modelling including all infinite state aspects.

- Define the set of properties to verify.

- Co-operation.