

# IP Multimedia Subsystem

## (IMS)

# Architektúra NGN, SSW a IMS

## Čo je to IMS?

- IMS je IP Multimedia Subsystem, definovaný 3GPP/ETSI
  - 3GPP IMS štandard definuje sietovú doménu určenú na riadenie a integráciu multimediálnych služieb
  - IMS je definovaný 3GPP od Release 5 (2002), [dnes R7/R8...]
  - 3GPP2 ekvivalent IMS je MMD (MultiMedia Domain), plne interoperabilný s 3GPP IMS
- IMS je „srdce“ NGN
  - IMS sa nachádza v core 3GPP (mobile) a TISPAN (fixed) sietových architektúr
- IMS je vybudovaná na IETF protokoloch
  - základ tvoria SIP, SDP, COPs a Diameter, RTP, RTCP
  - 3GPP rozširuje tieto IETF protokoly smerom k mobilite
- IMS v skratke
  - Otvorená architektúra, ktorá podporuje množstvo IP služieb pre PS ako aj pre CS siete, prostredníctvom pevných ako aj bezdrôtových prístupových sietí



S T U . .  
. . . . .  
F I I T .  
. . . . .

NGN siete, služby, protokoly

## Introduction to SIP protocol

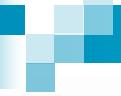
### History

SIP was initially defined within the framework of the MBONE for the establishment of multicast sessions (1996)

Version 1 protocol issued by the IETF in 1997.

SIP reaches the statute of "Standard Internet" with the version 2 of March 1999 (RFC 2543).

Since June 2002, a new version has been described in the RFC 3261



S T U : :  
: . . . :  
F I I T :  
. . . . :

NGN siete, služby, protokoly

## What is SIP?

SIP supports **5 facets** of establishing and terminating multimedia communications:

- User location: determination of the end system to be used for communication
- User availability: determination of the willingness of the called party to engage in communications
- User capabilities: determination of the media and media parameters to be used
- Session setup: "ringing", establishment of session parameters at both called and calling party
- Session management: including transfer and termination of sessions, modifying session parameters, and invoking services



S T U : :  
: . . . :  
F I I T :  
. . . . :

NGN siete, služby, protokoly

## SIP Overview (RFC 2543 & 3261)

- Application Layer Signaling Protocol
- Used to establish, modify, and terminate multimedia sessions
- Part of Internet Multimedia Architecture
- Based on HTTP (Web)
  - Similar text-based structure
  - Uses URIs (Uniform Resource Indicators)
- Applications include (but not limited to):
  - Voice, video, gaming, instant messaging, presence, call control, etc.



S T U : :  
: . . : :  
F I I T :  
. . . . .

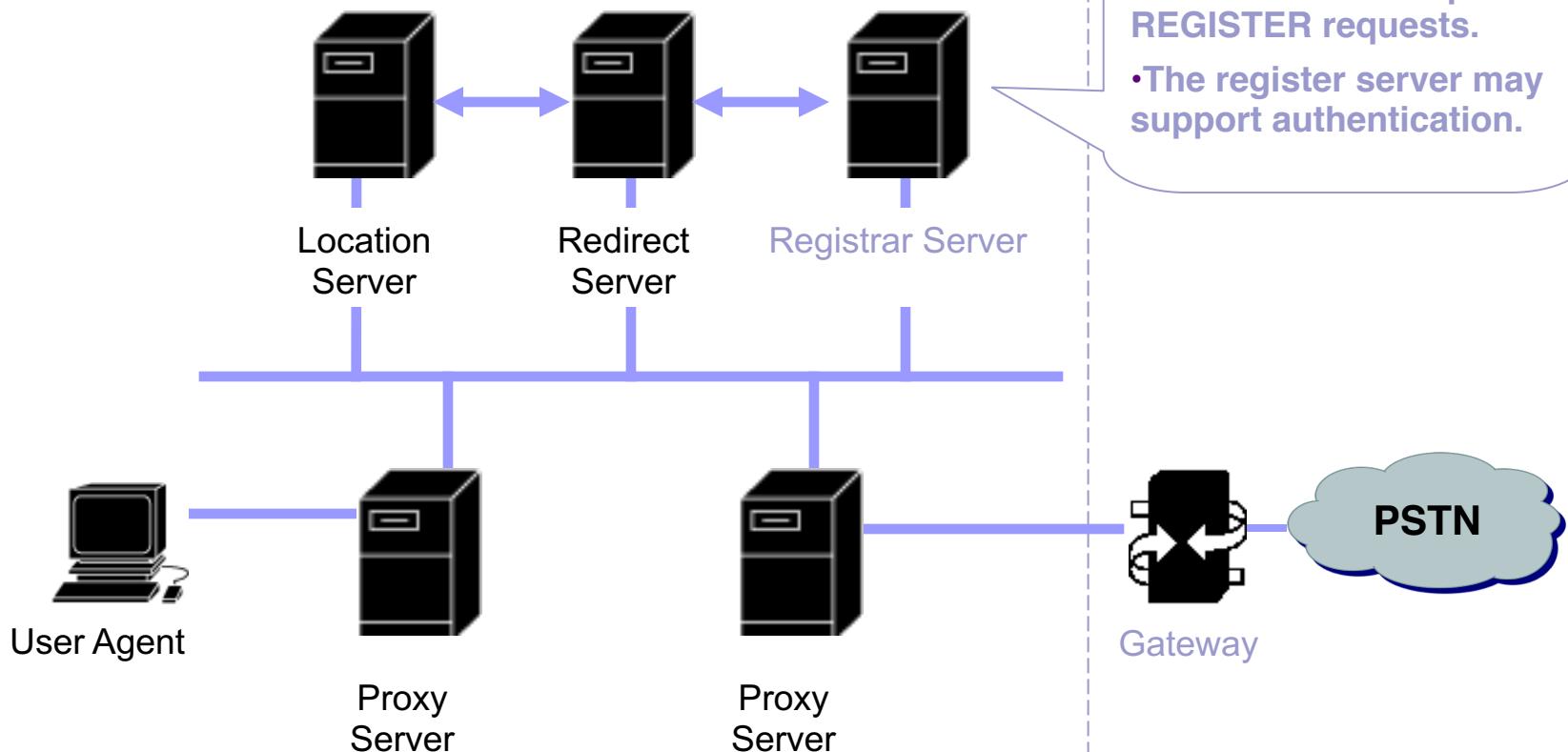
## NGN siete, služby, protokoly

### SIP

- Logically, there are several parts to a SIP system
  - UA* (User-Agent, Endpoint) – the phone itself – can also be a softphone – computer software (UA = User Client + User Server)
  - Registrar* – keeps track of where the user is within a system
  - Redirect Server* – used to inform devices when they need to contact different locations
  - Proxy Server* – used to relay messages back and forth within the system
- In practice, several functions may actually be in the same server/program

## SIP Architecture

### SIP Components





S T U : :  
: . . : :  
F I I T :  
. . . . .

NGN siete, služby, protokoly

## SIP Uniform Resource Indicators

- Same form as email addresses: **user@domain**
- URI scheme:  
**sip:user@domain.com** is a SIP URI
- Two types of SIP URIs:

Address of Record (AOR) (identifies a user)

**sip:user@domain.com**

(Needs DNS SRV records to locate SIP Servers for domain.com domain)

Contact (identifies a device)

**sip:user@130.20.10.5** or **sip:user@lab.domain.com**

(Which needs no resolution for routing)



S T U : :  
: . . . :  
F I I T :  
. . . . :

NGN siete, služby, protokoly

## Basic SIP Methods

- INVITE A user is being invited to participate in a session
- ACK confirms that the client has received a final response to an INVITE request
- OPTIONS The server is being queried as to its capabilities
- BYE The user agent client uses BYE to indicate to the server that it wishes to release the call
- CANCEL The CANCEL request cancels a pending request
- REGISTER A client uses the REGISTER method to register the address listed in the To header field with a SIP server

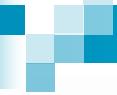


S T U : :  
: . . . :  
F I I T :  
. . . . :

NGN siete, služby, protokoly

## SIP Responses

- 1xx **informational** - request received, continuing to process the request
- 2xx **success** - the action was successfully received, understood, and accepted
- 3xx **redirection** - further action needs to be taken in order to complete the request
- 4xx **request failure** - the request contains bad syntax or cannot be fulfilled at this server
- 5xx **server failure** - the server failed to fulfill an apparently valid request
- 6xx **global failure** - the request cannot be fulfilled at any server

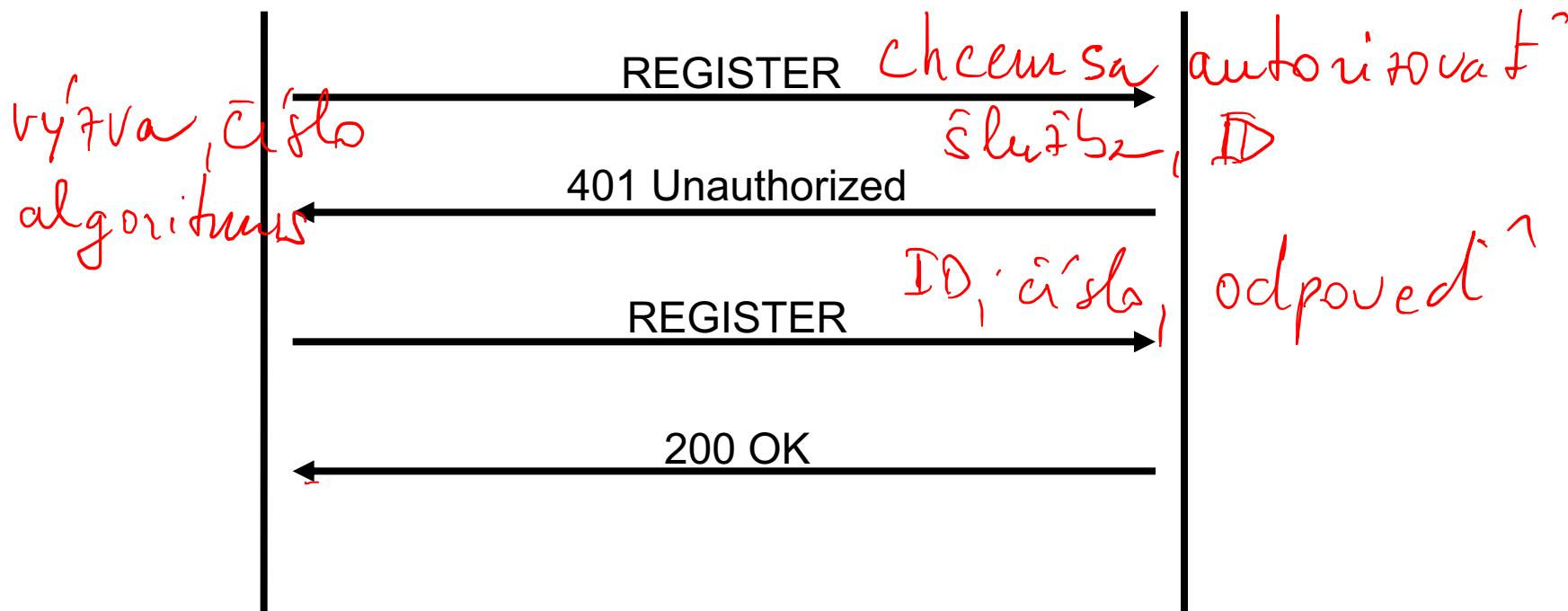


S T U : :  
: . . : :  
F I I T :  
. . . : :  
User Agent Alice

NGN siete, služby, protokoly

Registration

SIP Server

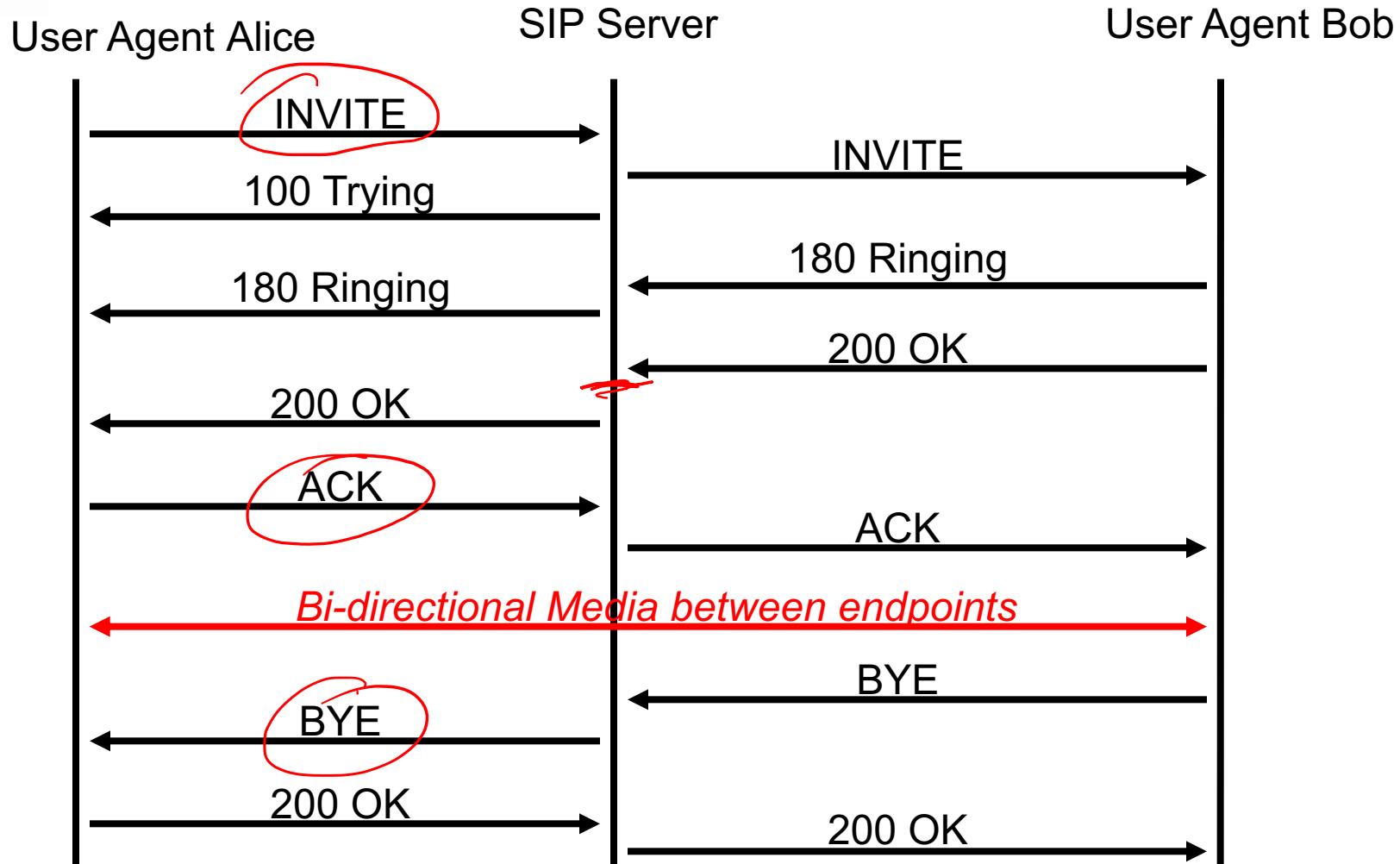




S T U · ·  
· · · · ·  
F I I T ·  
· · · · ·

## NGN siete, služby, protokoly

### Basic Call



S T U . .  
. . . . .  
F I I T .  
. . . . .  
— Request  
— Response

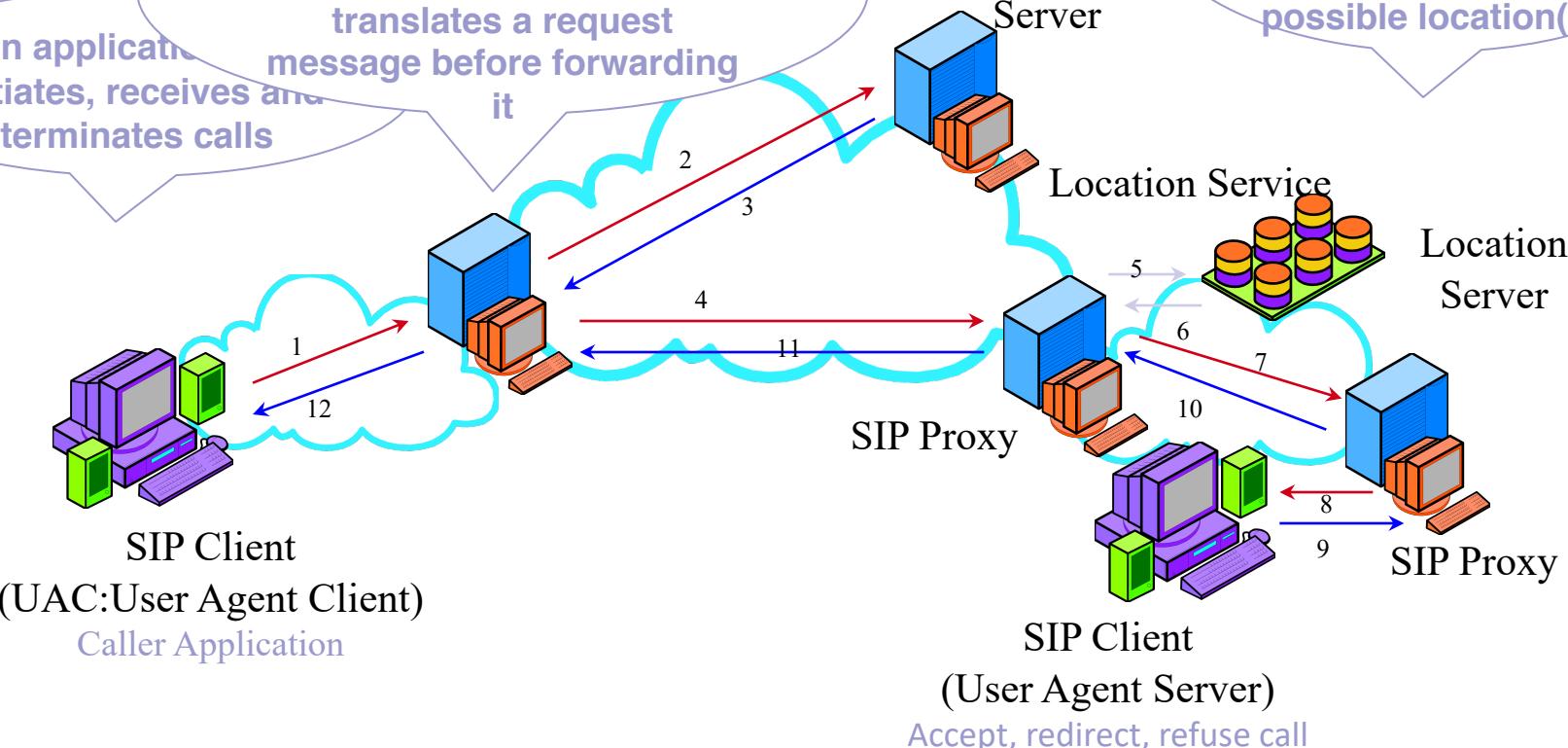
## NGN siete, služby, protokoly

### SIP Architecture

An application initiates, receives and terminates calls

Server + Client, Interprets, rewrites or translates a request message before forwarding it

A server that accepts a SIP request, maps the address into zero or more new addresses and returns these addresses to the client. used by a SIP redirect or proxy server to obtain information about a called party's possible location(s).

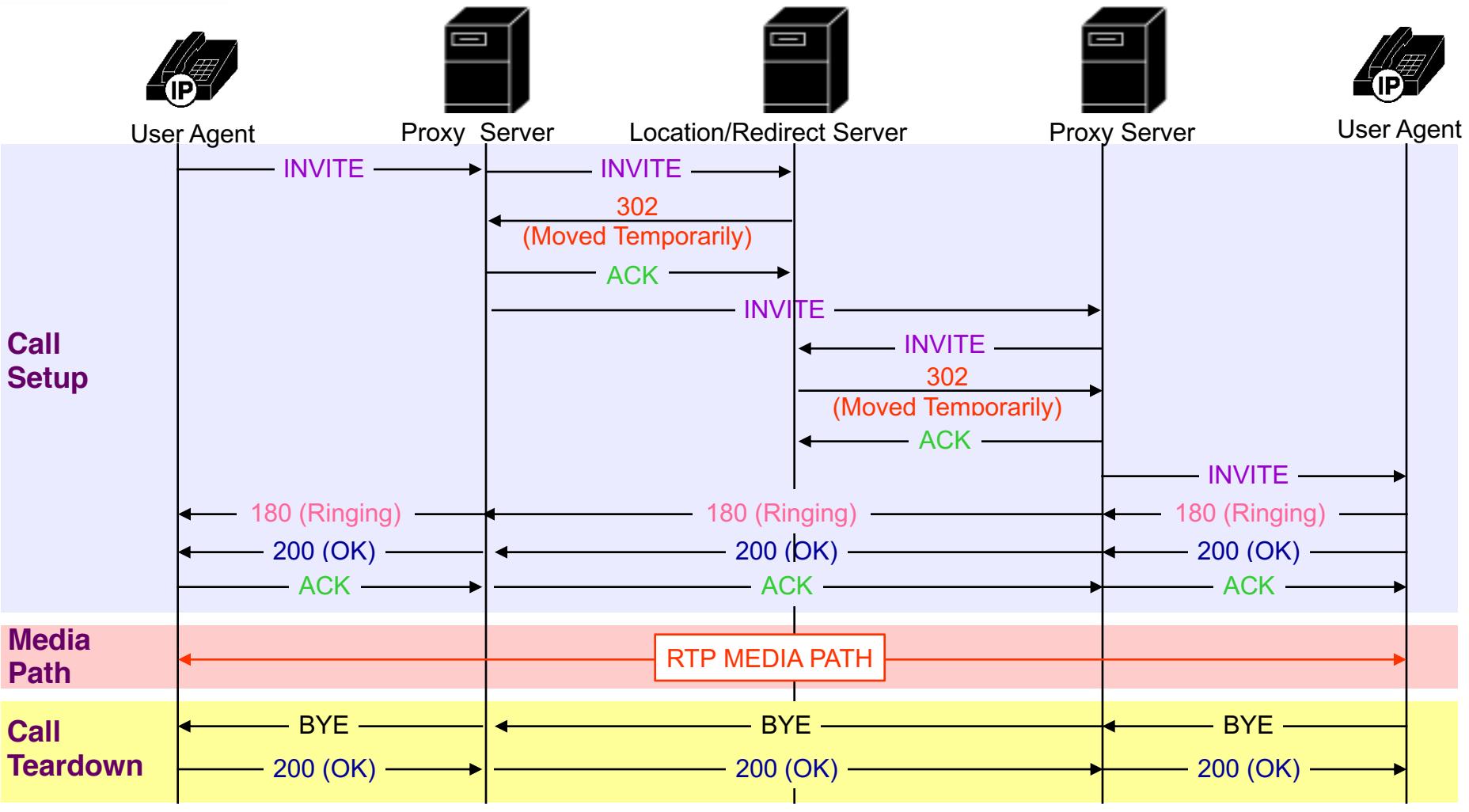




S T U · ·  
· · · · ·  
F I I T ·  
· · · · ·

NGN siete, služby, protokoly

## SIP Call Setup and Tear down





S T U : :  
: . . . :  
F I I T :  
. . . . :

NGN siete, služby, protokoly

## Protokol SDP

Tento protokol je určený k opisu multimedialnej relácie v prípade ohlásenia spojenia, požadovania spojenia a pri všetkých formách inicializácie multimedialného spojenia. Pomocou SDP (Session Description Protocol) sa špecifikujú parametre prenosu, použité kódovanie a ďalšie parametre potrebné počas komunikácie. Samotná správa protokolu je umiestnená v tele správy protokolu SIP v podobe riadkov v tvare typ=hodnota.



S T U . .  
. . . . .  
F I I T .  
. . . . .

## NGN siete, služby, protokoly

### INVITE message

INVITE sip:bob@quickmart.com SIP/2.0  
Via: SIP/2.0/TCP aliceua.phonecompany.com:5060  
From: Alice <sip:alice@phonecompany.com>  
To: Bob <sip:bob@quickmart.com>  
Call-ID: 3848276298220188511@phonecompany.com  
CSeq: 1 INVITE  
Contact: <sip:alice@aliceua.phonecompany.com;transport=tcp>  
Content-Type: application/sdp  
Content-Length: 151

v=0  
o=Cisco-UserAgent 10010 605 IN IP4 aliceua.phonecompany.com  
s=SIP Call  
c=IN IP4 192.0.1.1  
t=0 0  
m=audio 49172 RTP/AVP 0 8 16



S T U : :  
: : : : :  
F I I T :  
: : : : :

NGN siete, služby, protokoly

INVITE message - SIP

INVITE sip:bob@quickmart.com SIP/2.0

*SIP request, method is INVITE – this message will start a new call*

Via: SIP/2.0/TCP aliceua.phonecompany.com:5060

*Via header tracks where it has been – so far just Alice's UA*

From: Alice <sip:alice@phonecompany.com>

*Message is from Alice, and this is the SIP URL for Alice*

To: Bob <sip:bob@quickmart.com>

*Alice is trying to contact Bob at his SIP URL*

Call-ID: 3848276298220188511@phonecompany.com

*Call-ID is a (hopefully) unique ID to track this particular call.*

*Alice's UA generated this*

CSeq: 1 INVITE

*We also count messages within a call to see what responses go with what messages. This first exchange is an INVITE exchange.*

*The response to this will also have a CSeq of 1 INVITE*

Contact: <sip:alice@aliceua.phonecompany.com;transport=tcp>

*How to contact Alice directly – you can sometimes “skip” the proxy.*

<snip!>



S T U : :  
: . . : :  
F I I T :  
. . . . :

NGN siete, služby, protokoly

INVITE message - SDP

<snip!>

Content-Type: application/sdp  
Content-Length: 151

*The content of the message is SDP – to describe the media of the call. We have 151 bytes of SDP*

v=0

*v is the SDP version number -- 0*

o=Cisco-UserAgent 10010 605 IN IP4 aliceua.phonecompany.com

*o is a description of the UA and a session ID*

s=SIP Call

*s is an string to encode a name for this session*

c=IN IP4 192.0.1.1

*c tells the other side what address to send the media to*

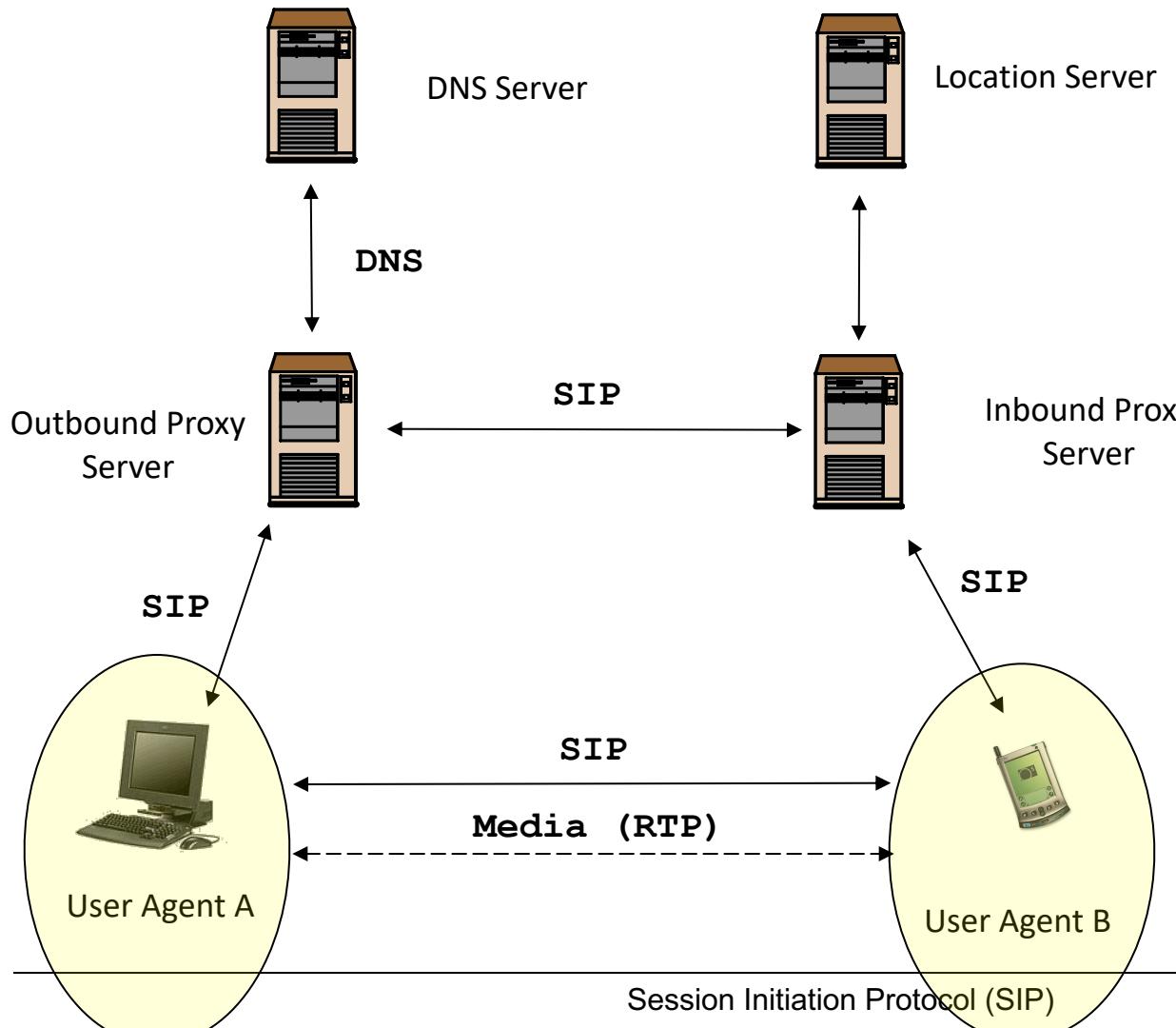
t=0 0

*t indicates start and end times. 0 and 0 don't specify times in advance*

m=audio 49172 RTP/AVP 0 8 16

*m describes the media. We are listening for audio of type RTP/AVP on port 49172*

## SIP Elements – User Agents



Capable of sending and receiving SIP requests.

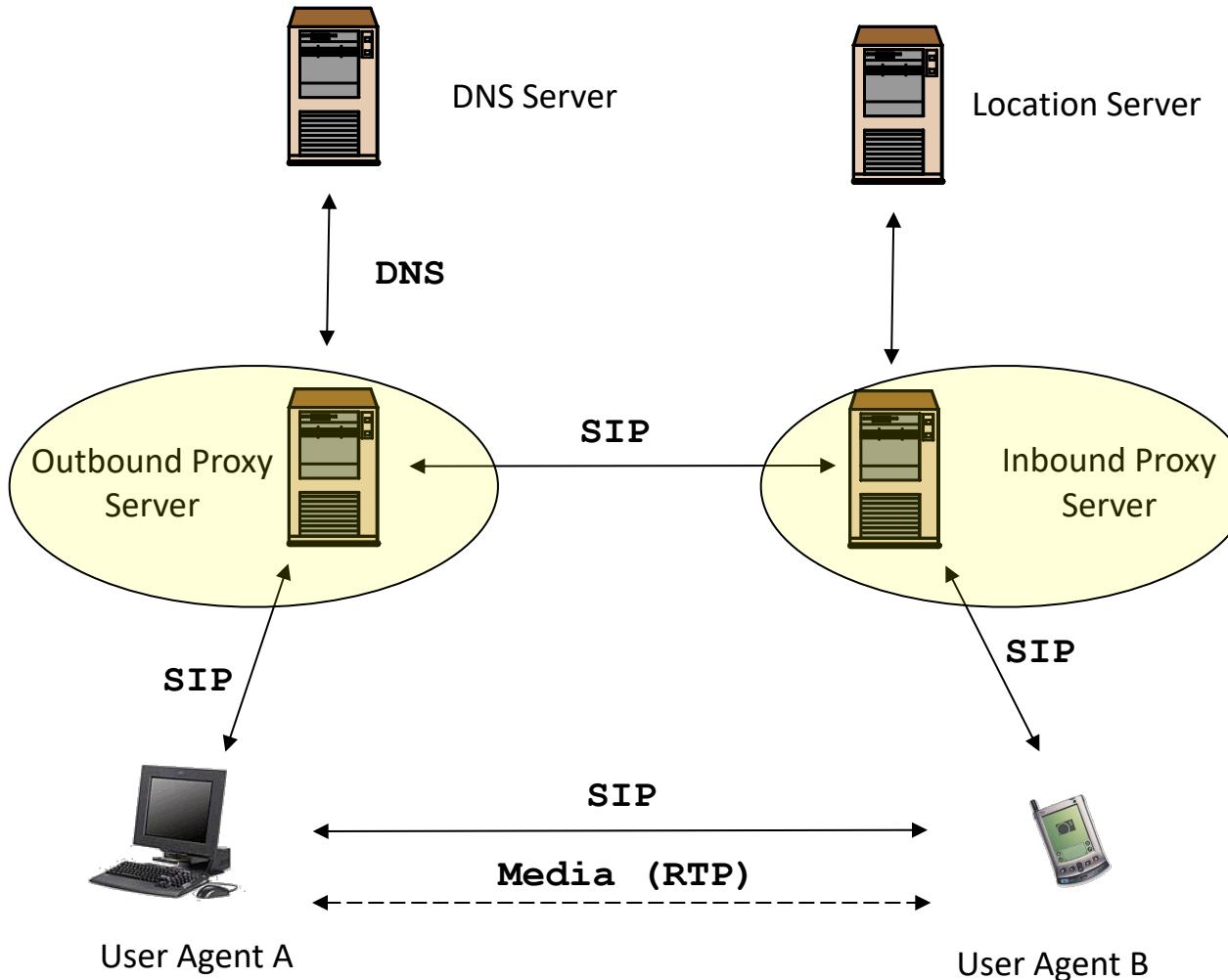
- UAC – User Agent Client
- UAS – User Agent Server

End Devices

- SIP phone
- PC/laptop with SIP Client
- PDA
- mobile phone

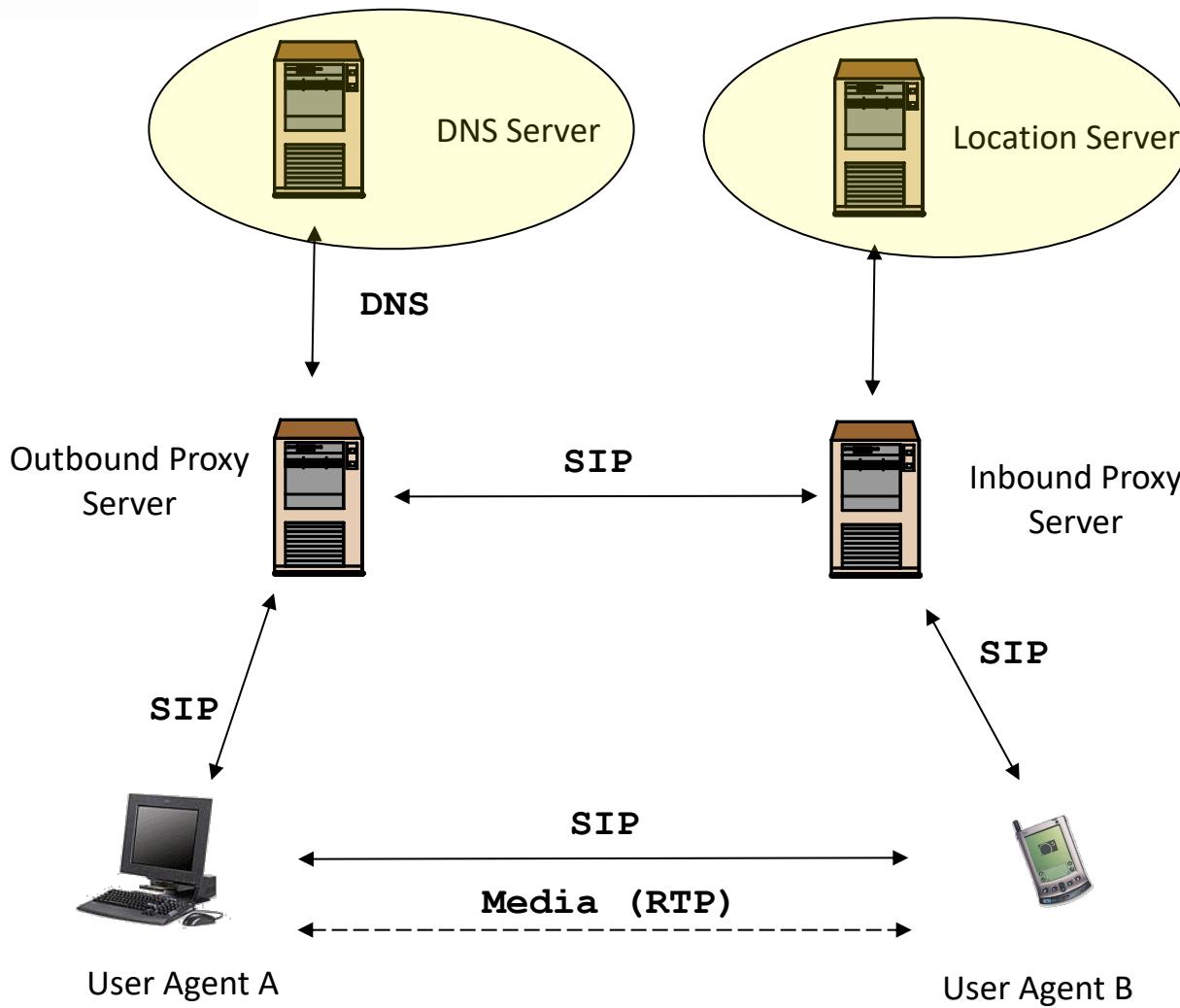
PSTN Gateways are a type of User Agent

## SIP Elements – Proxy Servers



Forward or “proxy” requests on behalf of User Agents  
Consult databases:  
➤ DNS  
➤ Location Server  
No media capabilities  
➤ Ignore SDP  
Normally bypassed once dialog established, but can Record-Route to stay in path.

## NGN siete, služby, protokoly SIP Elements – Other Servers



### Location Server

Database of locations of SIP User Agents  
Queried by Proxies in routing  
Updated by User Agents by Registration

### DNS Server

SRV (Service) Records used to locate Inbound Proxy Servers



S T U : :  
: : : : :  
F I I T :  
: : : : :

NGN siete, služby, protokoly

## SIP Call Flow - Scenarios

- Call Attempt - Unsuccessful
- Presence Subscription
- Registration
- Presence Notification
- Instant Message Exchange
- Call Setup – Successful
- Call Hold
- Call Transfer

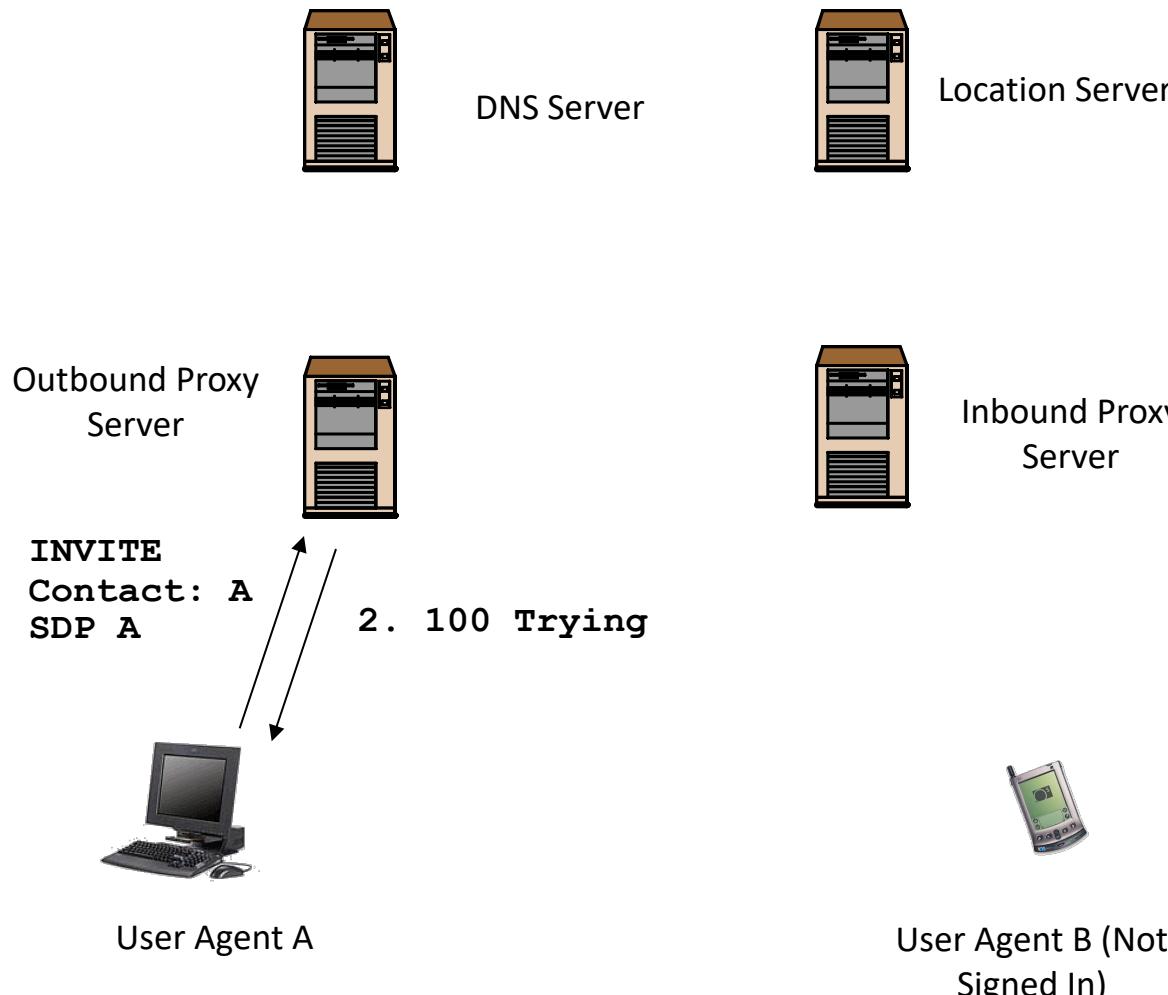
Call Flows and full message details:

- “SIP Basic Call Flow Examples” I-D by A. Johnston et al.
- “SIP Service Examples” I-D by A. Johnston et al.

S T U . .  
. . . . .  
F I I T .  
. . . . .

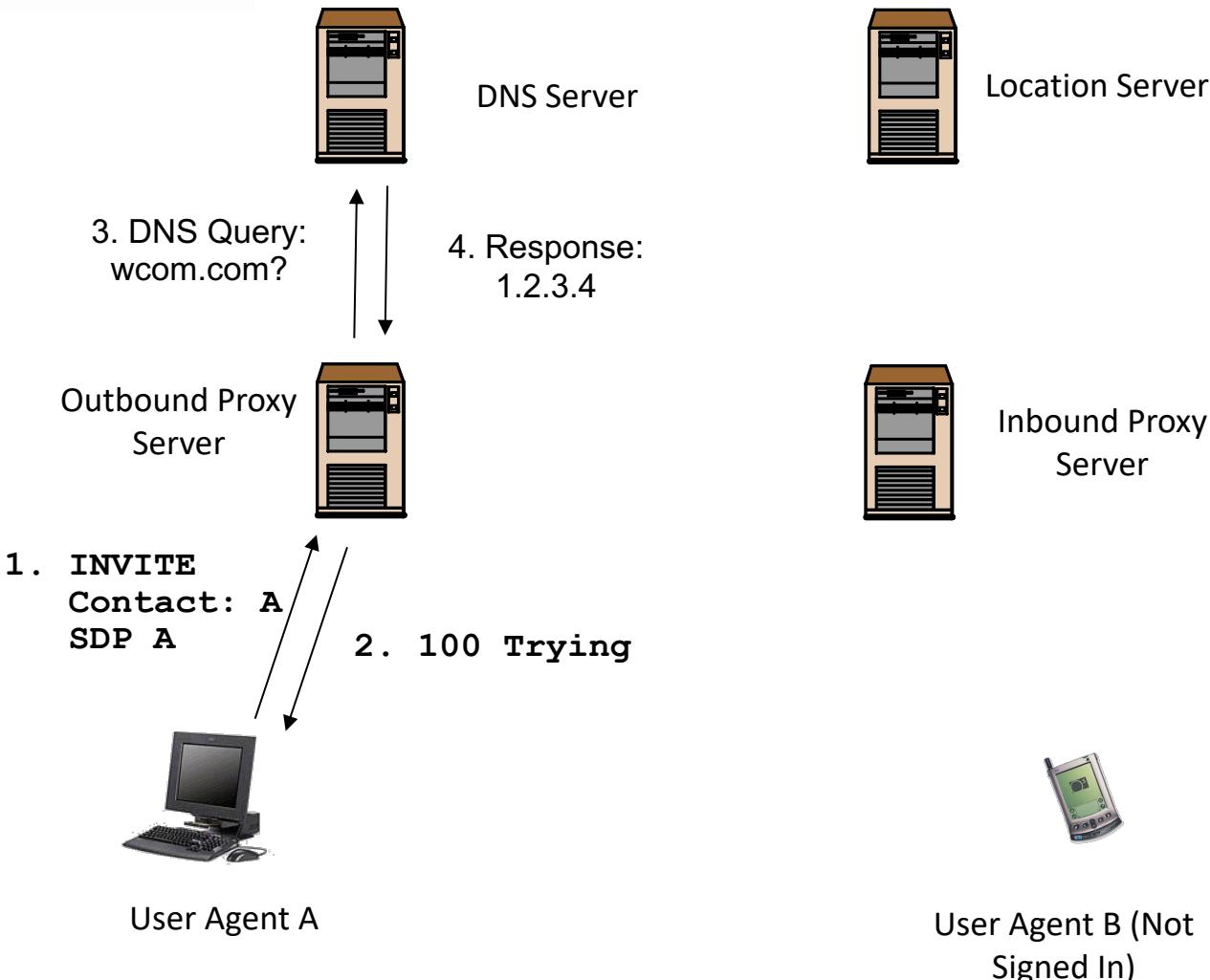
## NGN siete, služby, protokoly

### SIP Call Setup Attempt Scenario



1. A “dials” SIP AOR URI `sip:B@wcom.com`. User Agent A sends INVITE to outbound Proxy Server.
2. Outbound Proxy sends 100 Trying response.

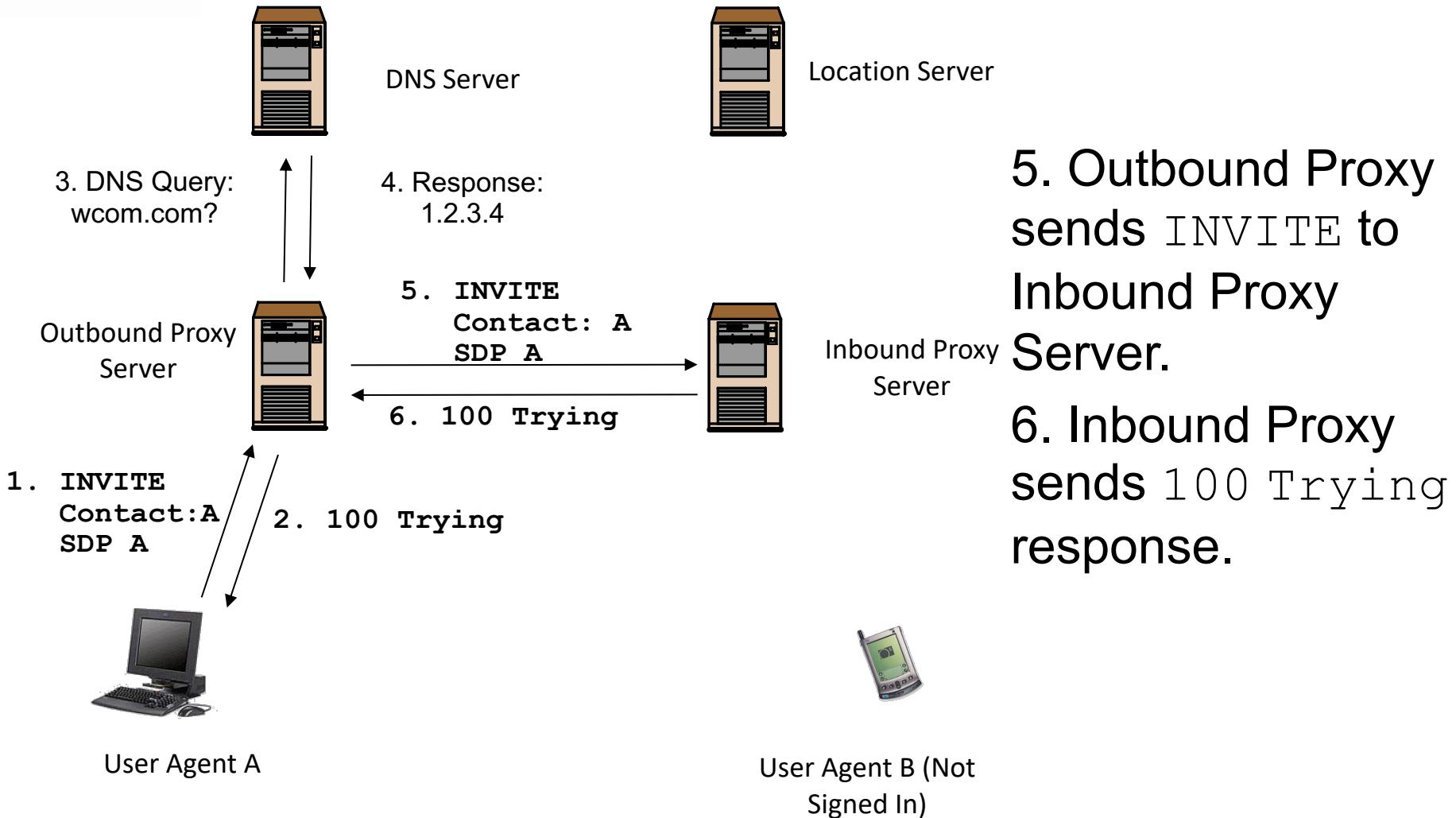
## SIP Call Setup Attempt Scenario



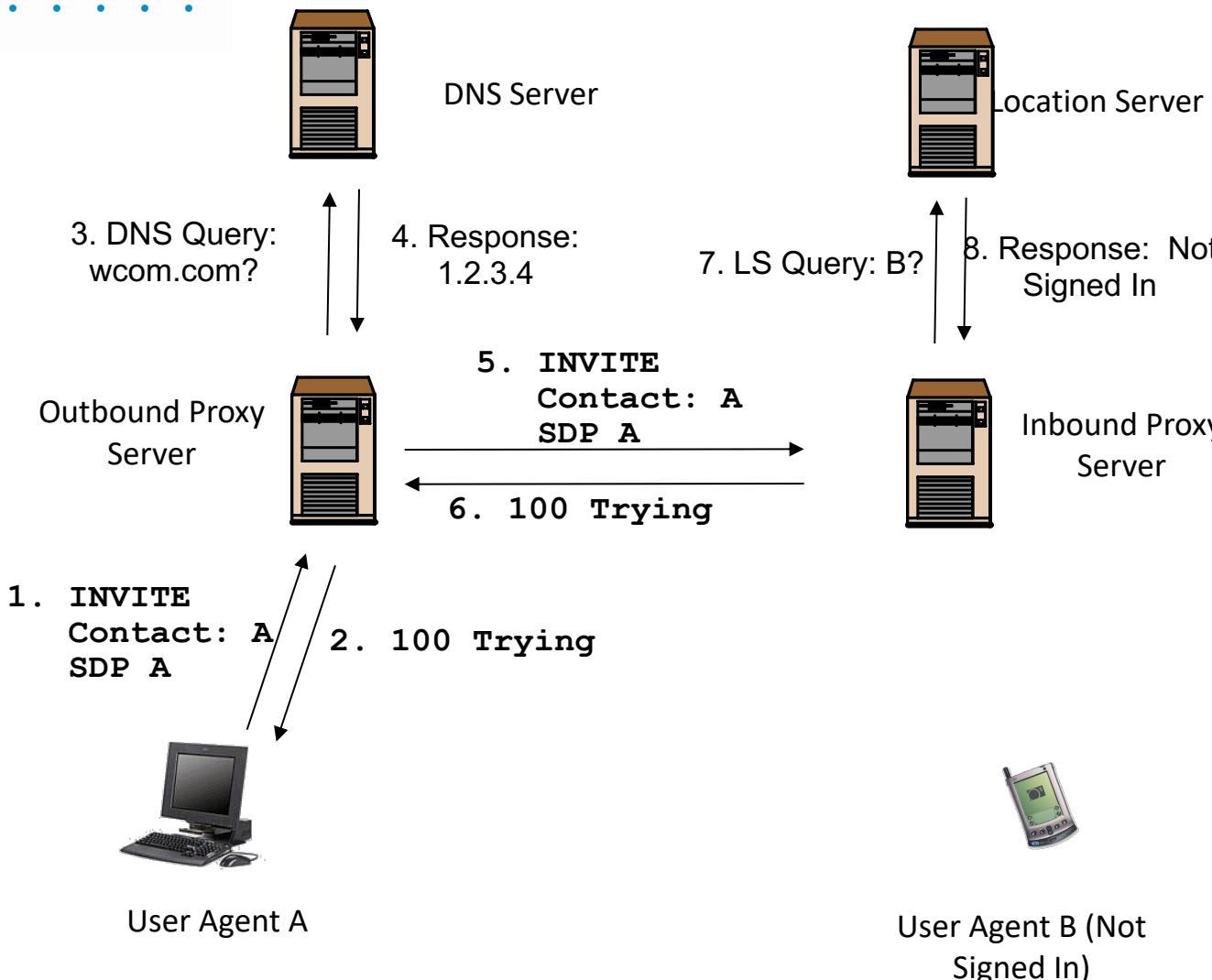
**3. Outbound Proxy does DNS query to find proxy server for wcom.com domain.**

**4. DNS responds with IP address of wcom.com Proxy Server.**

## SIP Call Setup Attempt Scenario

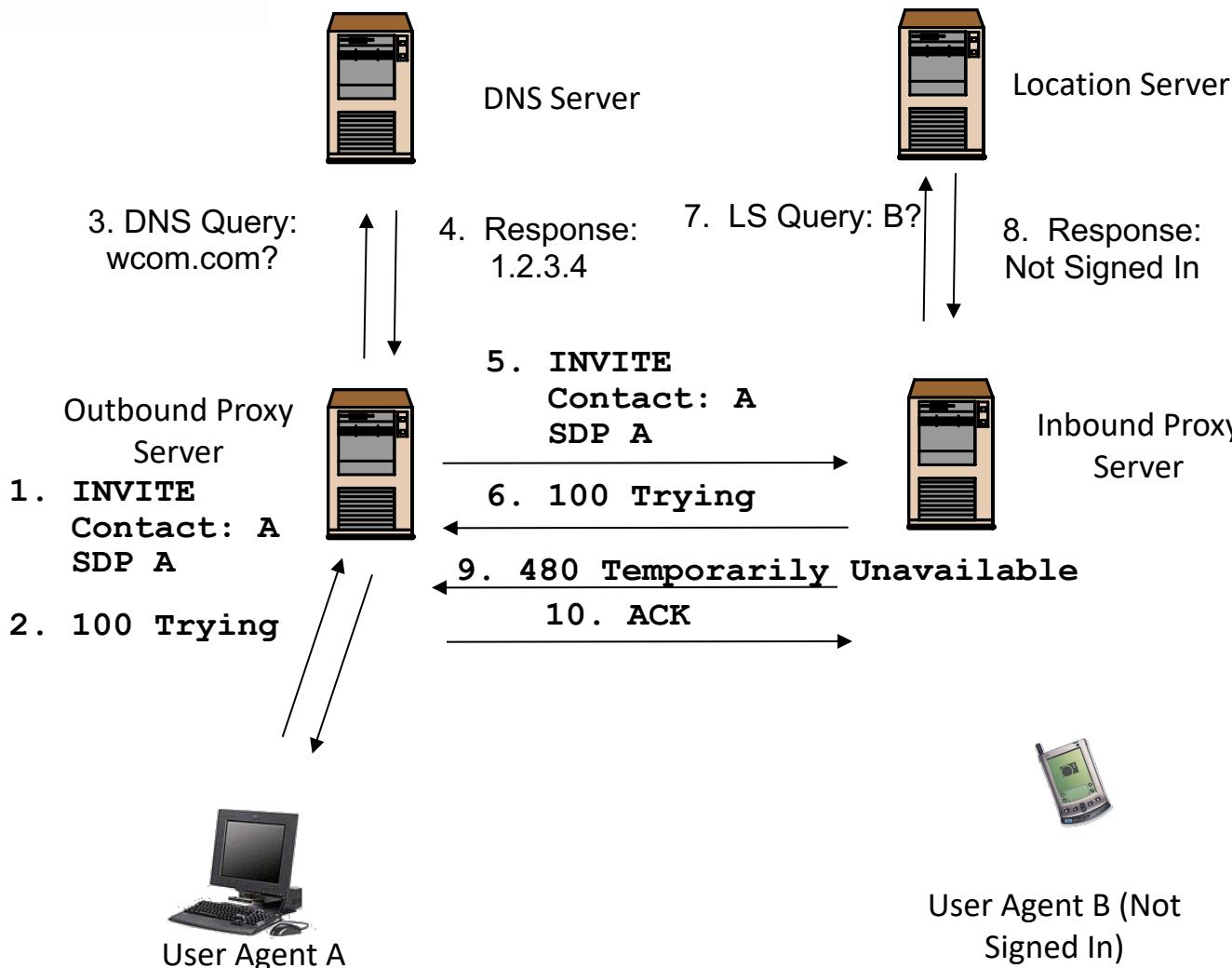


## SIP Call Setup Attempt Scenario



7. Inbound Proxy consults Location Server.
8. Location Server responds with “Not Signed In.”

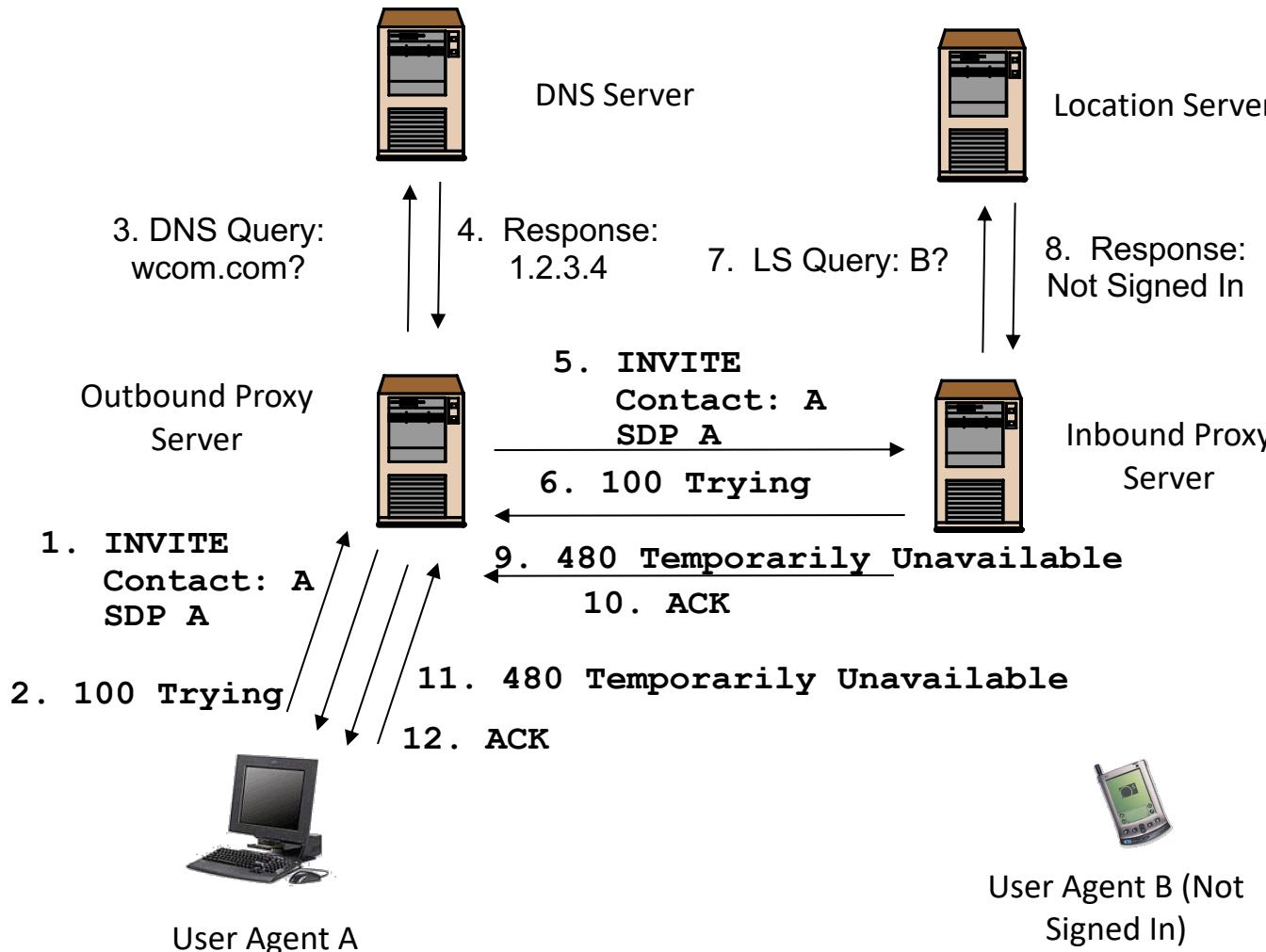
## SIP Call Setup Attempt Scenario



**9. Inbound Proxy sends 480 Temporarily Unavailable response.**

**10. Outbound Proxy sends ACK response.**

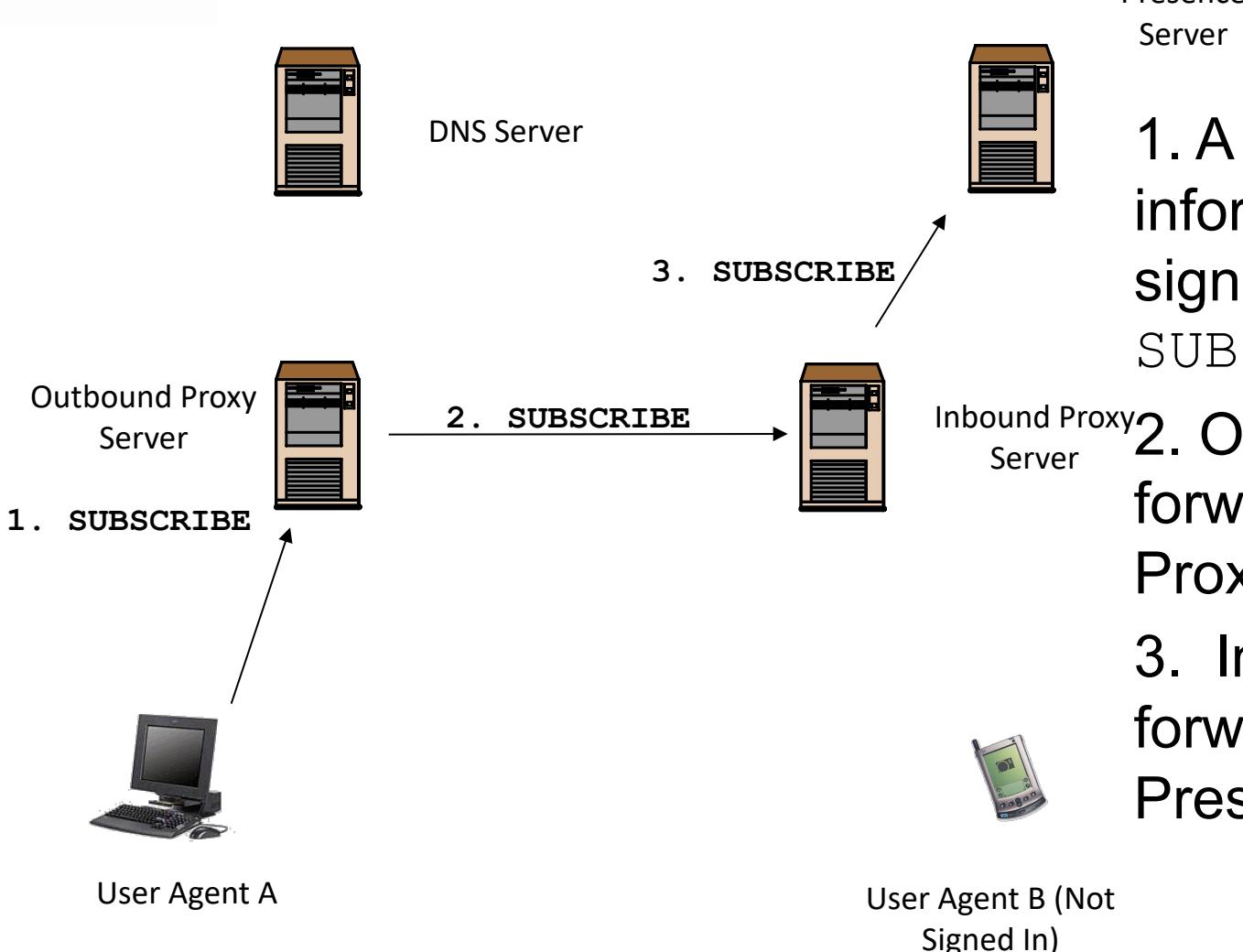
## NGN siete, služby, protokoly SIP Call Setup Attempt Scenario



**11. Outbound Proxy forwards 480 response to A.**

**12. A sends ACK response.**

NGN siete, služby, protokoly  
SIP Presence Example



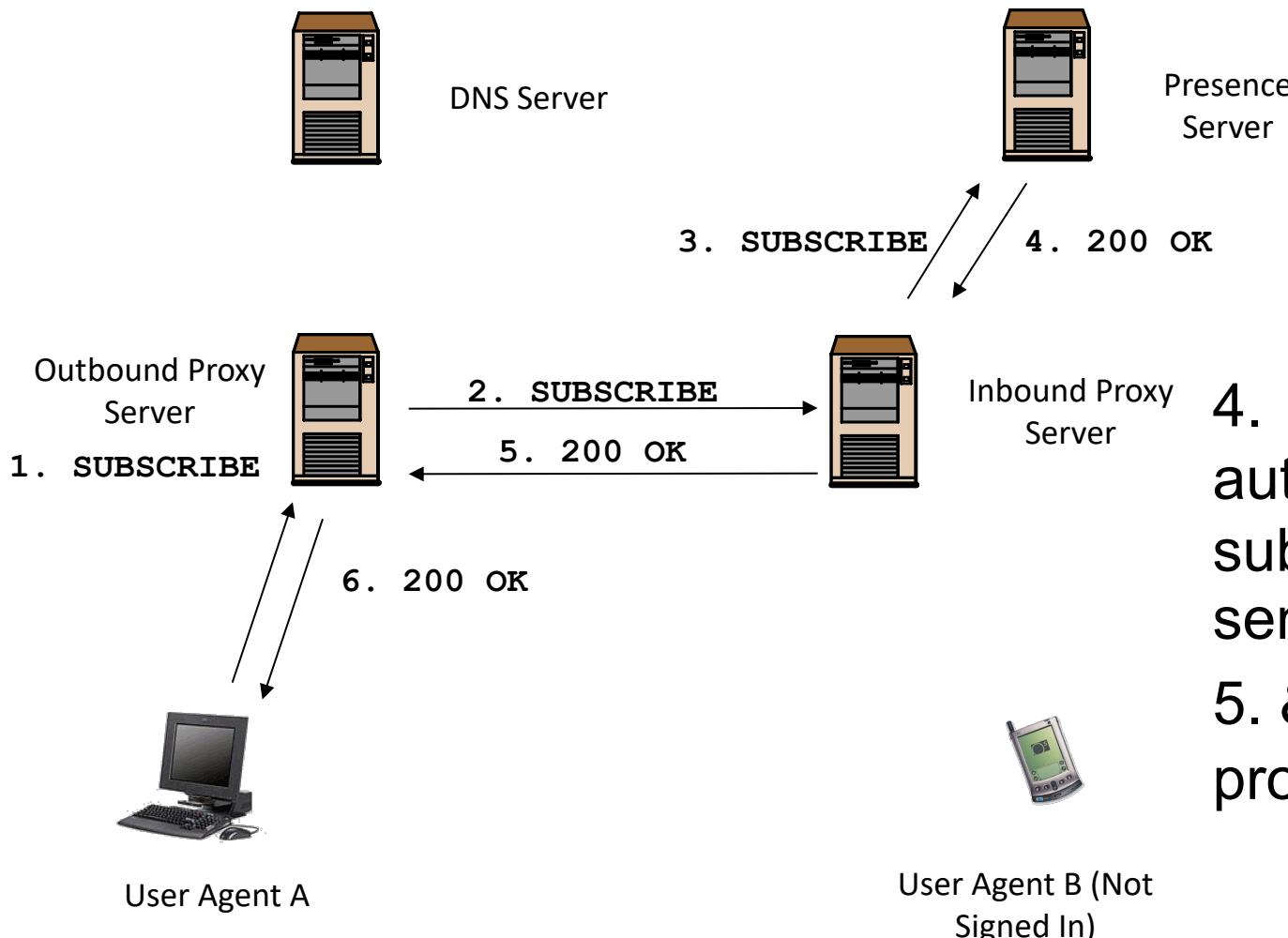
1. A wants to be informed when B signs on, so sends a SUBSCRIBE
2. Outbound Proxy forwards to Inbound Proxy
3. Inbound Proxy forwards to B's Presence Server



S T U . .  
. . . . .  
F I I T .  
. . . . .

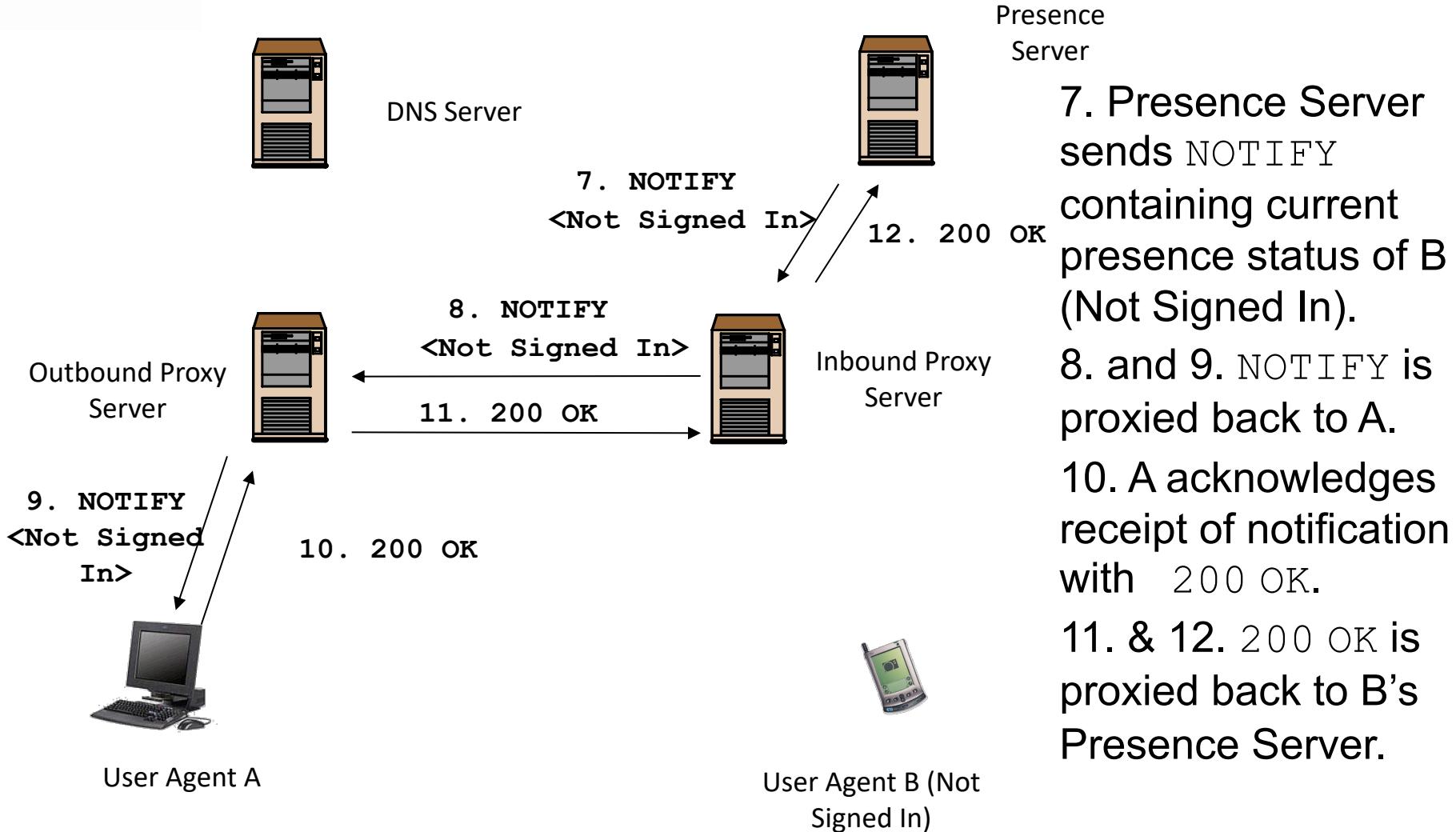
NGN siete, služby, protokoly

## SIP Presence Example

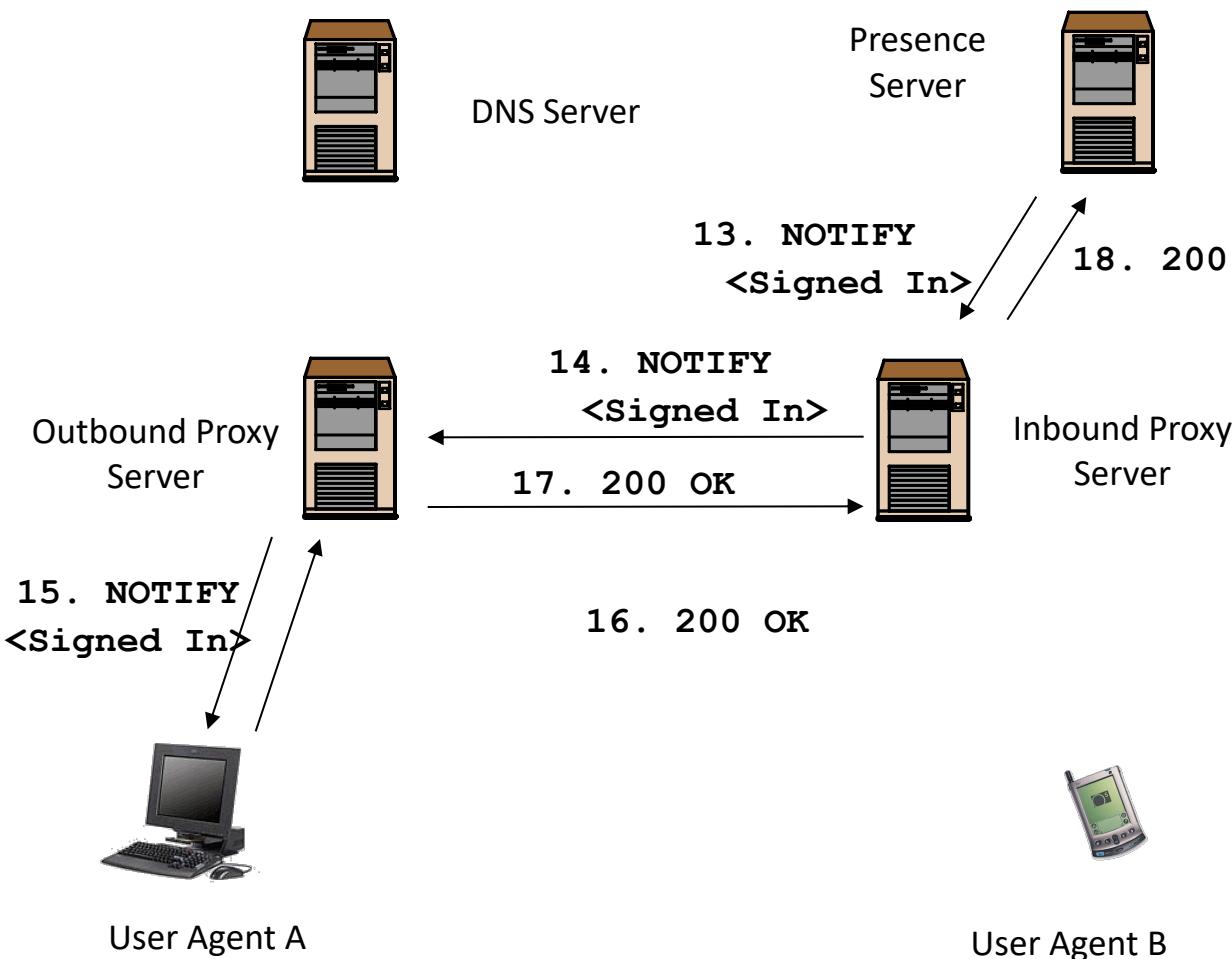


4. Presence Server authorizes subscription by sending a 200 OK.  
5. & 6. 200 OK proxied back to A.

## SIP Presence Example

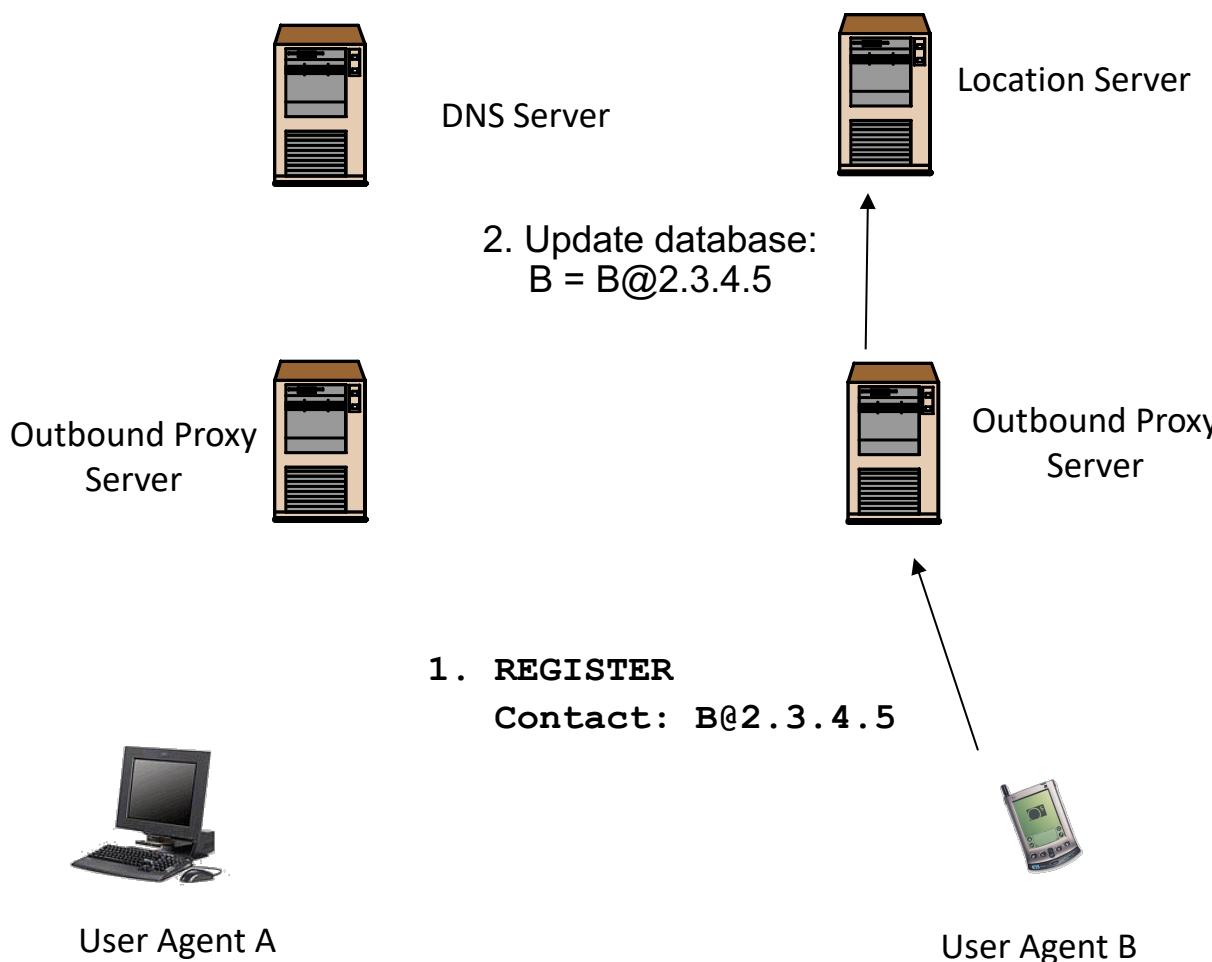


## NGN siete, služby, protokoly SIP Presence Example



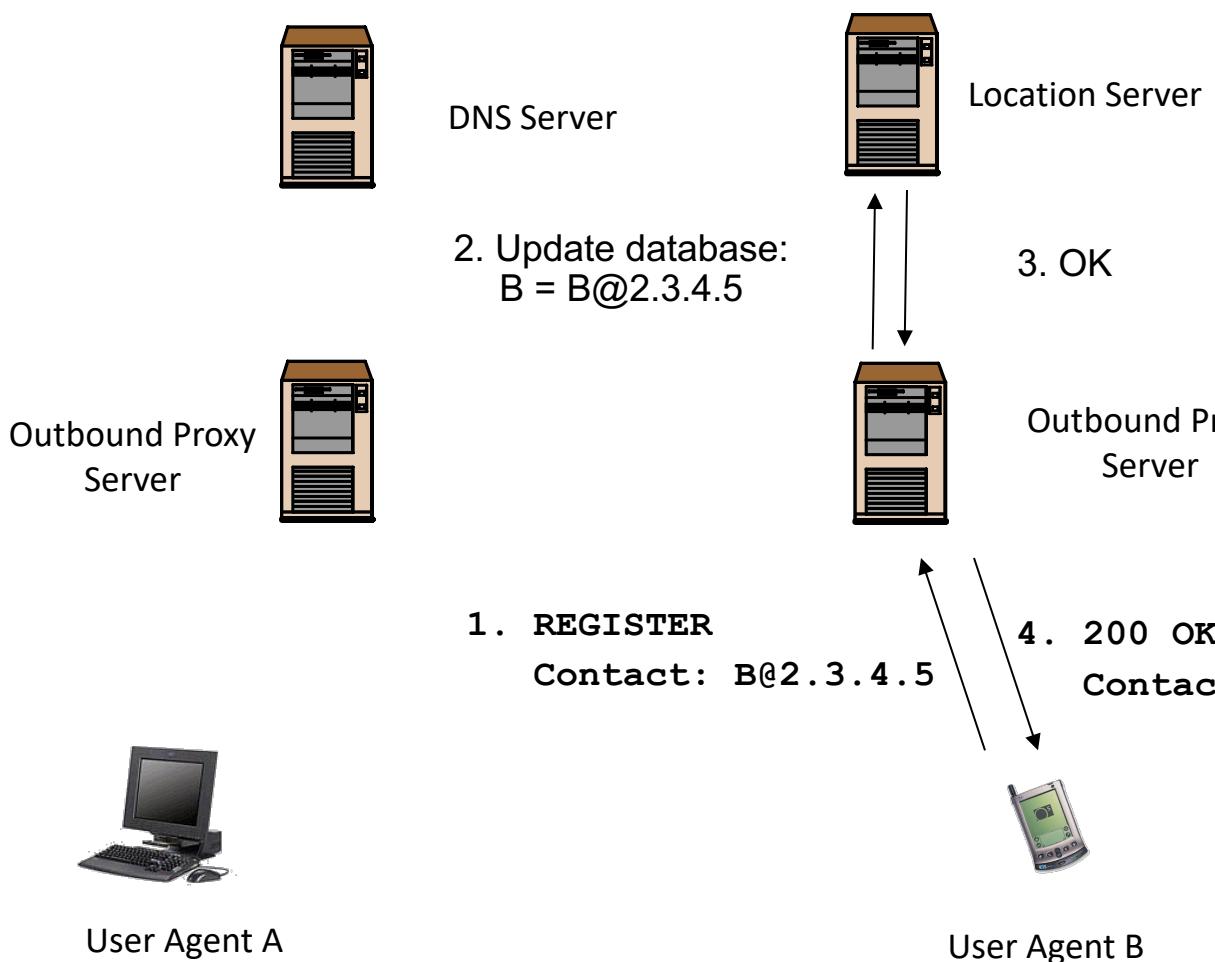
- 13. Presence Server learns of B's new status from the Location Server and sends a NOTIFY containing new status of B (Signed In).
- 14. & 15. NOTIFY is proxied back to A.
- 16. A acknowledges receipt of notification with 200 OK.
- 17. & 18. 200 OK is proxied back to Presence Server.

## SIP Registration Example



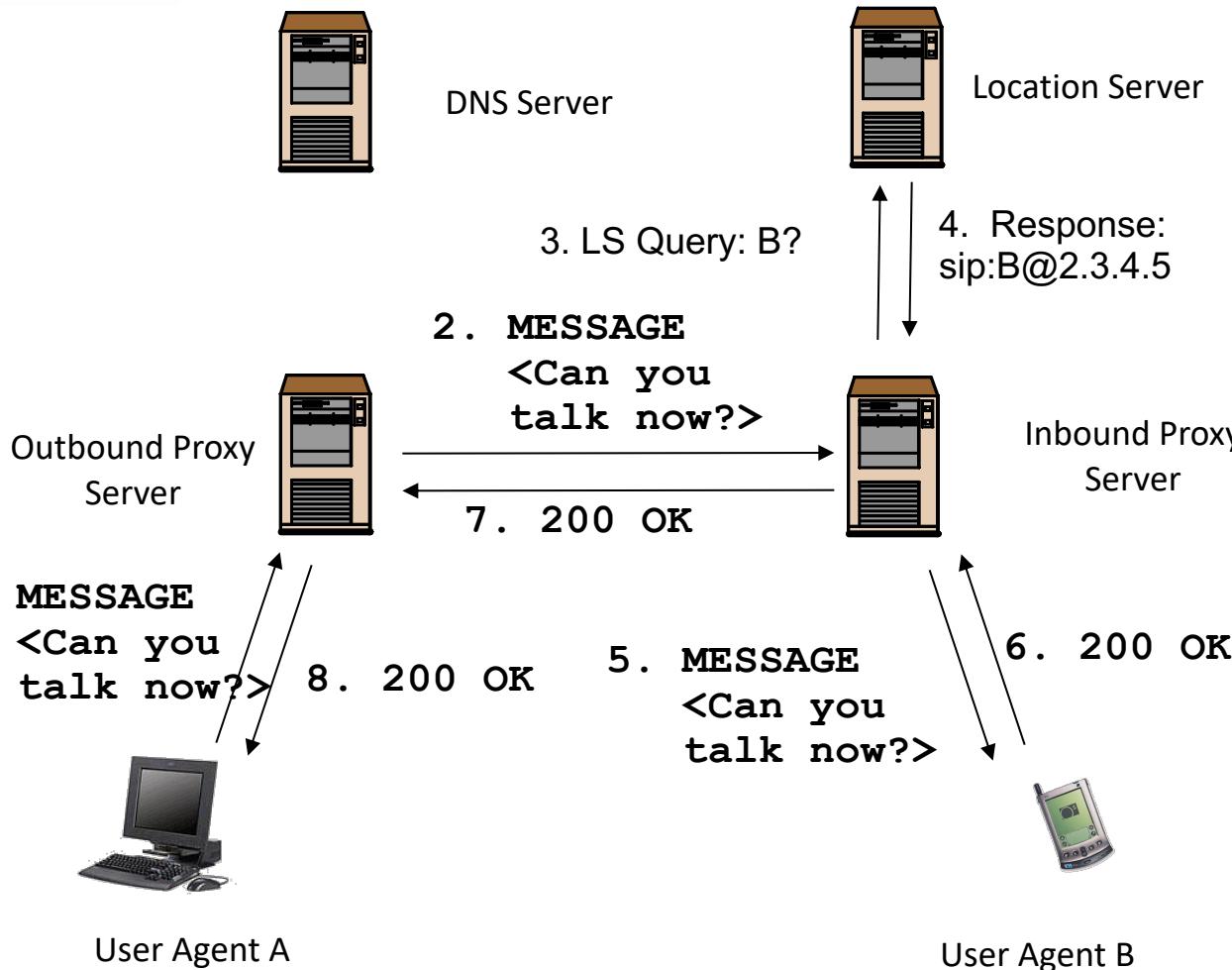
- 1. B signs on to his SIP Phone which sends a REGISTER message containing the FQDN URI of B's User Agent.**
- 2. Database update is sent to the Location Server**

NGN siete, služby, protokoly  
SIP Registration Example



3. Location Server database update is confirmed.
4. Registration is confirmed with a 200 OK response.

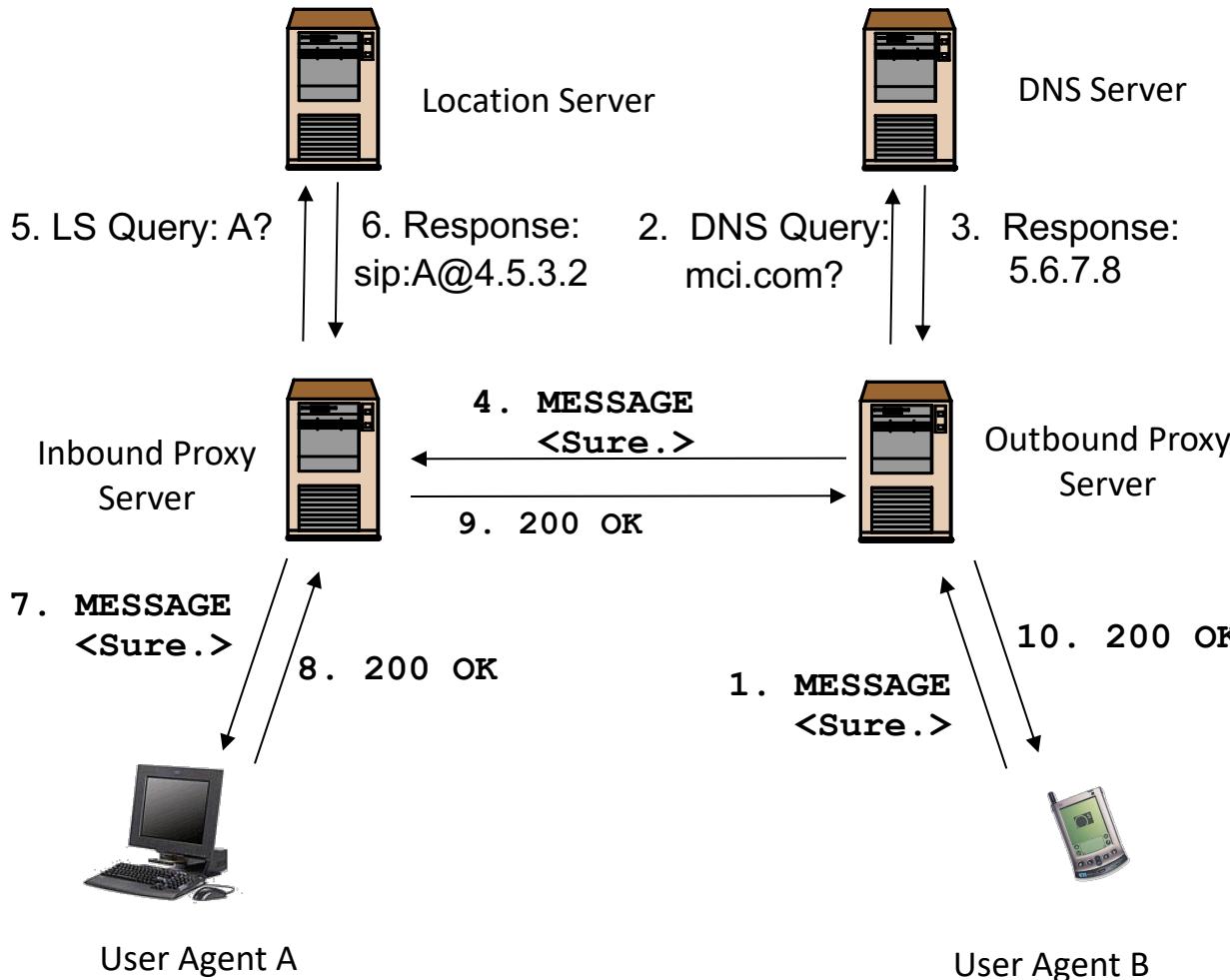
## NGN siete, služby, protokoly SIP Instant Message Scenario



1. A sends an Instant Message to B saying “Can you talk now?” in a MESSAGE request.
- 2., 3. & 4. MESSAGE request is proxied, Location Server queried.
5. Inbound Proxy forwards MESSAGE to B.
6. User Agent B responds with 200 OK.
7. & 8. 200 OK is proxied back to A.

# NGN siete, služby, protokoly

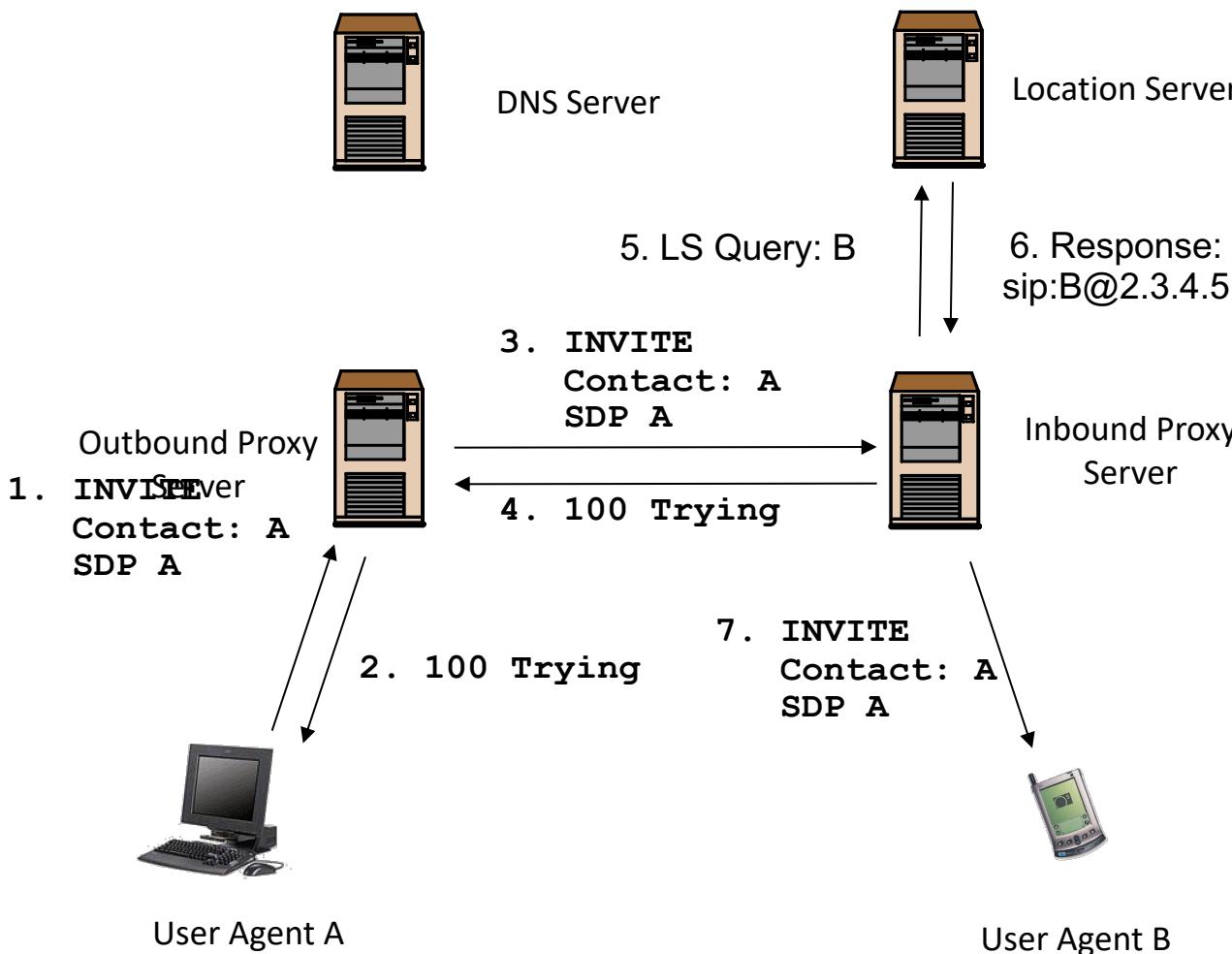
## SIP Instant Message Scenario



S T U . .  
. . . . .  
F I I T .  
. . . . .

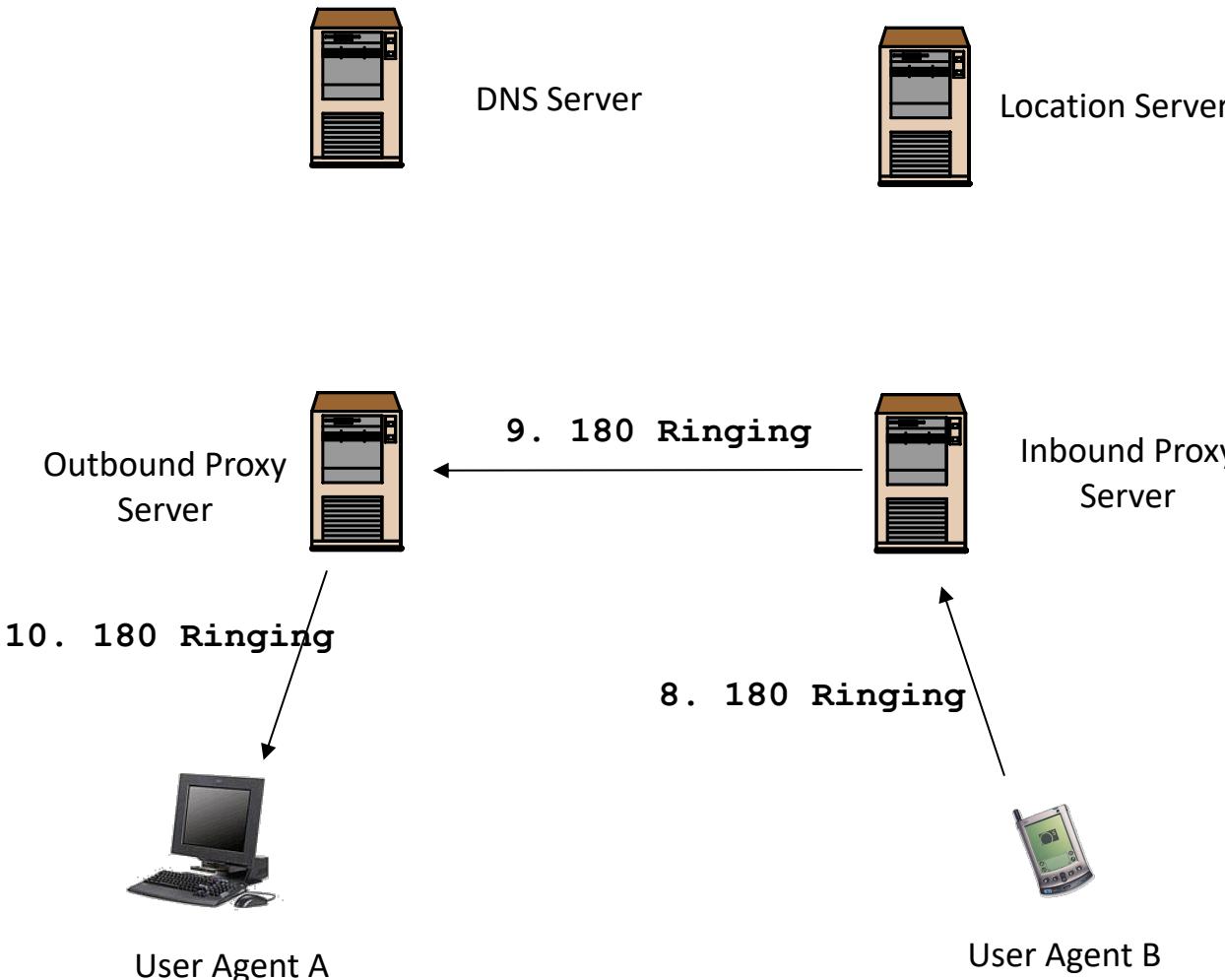
## NGN siete, služby, protokoly

### SIP Call Setup Attempt Scenario



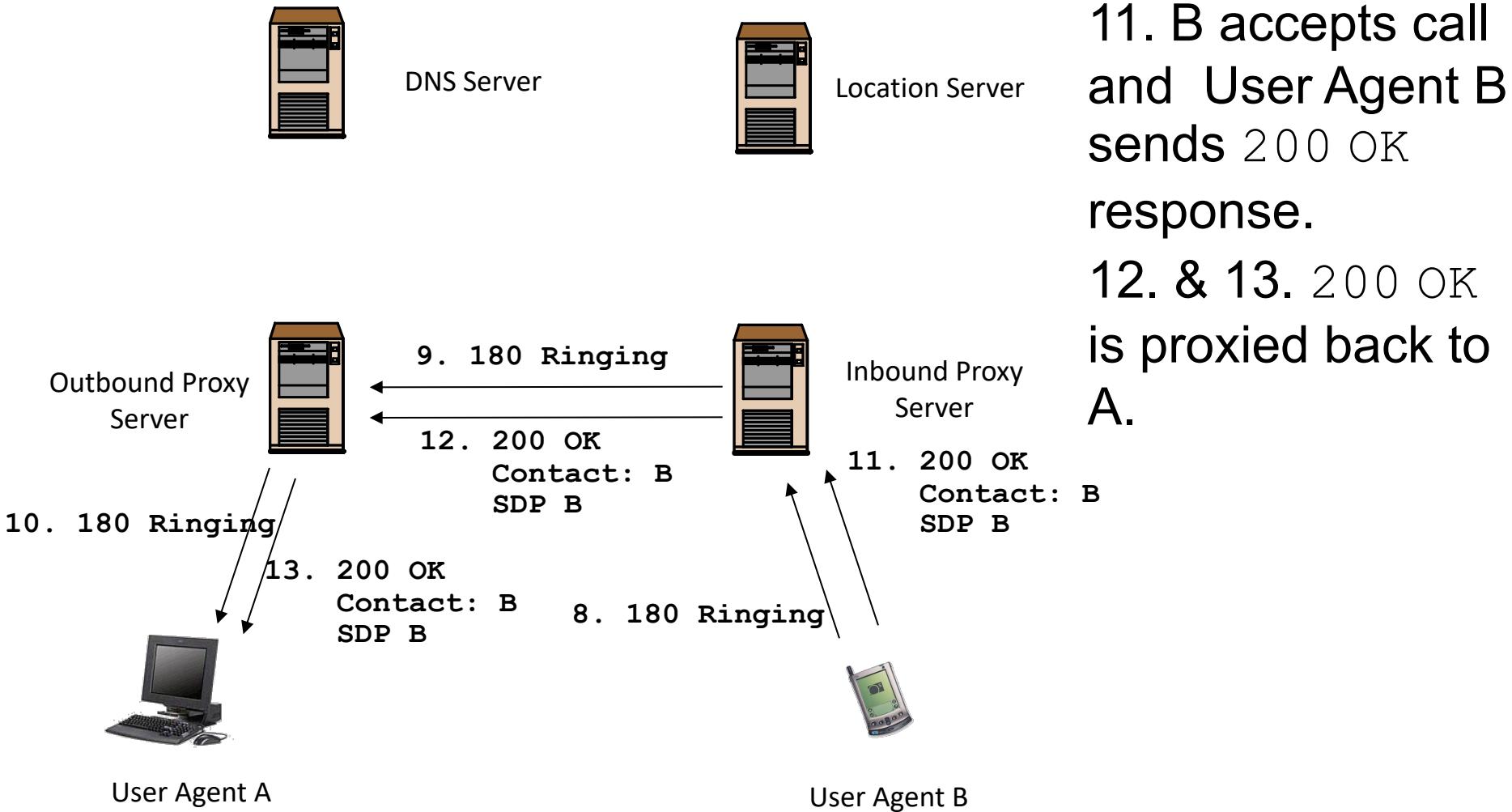
1. to 5. A retries INVITE to B which routes through two Proxy Servers.
6. Location Server responds with the FQDN SIP URI of B's SIP Phone.
7. Inbound Proxy Server forwards INVITE to B's SIP Phone.

## SIP Call Setup Scenario



**8. User Agent B alerts B and sends 180 Ringing response.**  
**9. & 10. 180 Ringing is proxied back to A.**

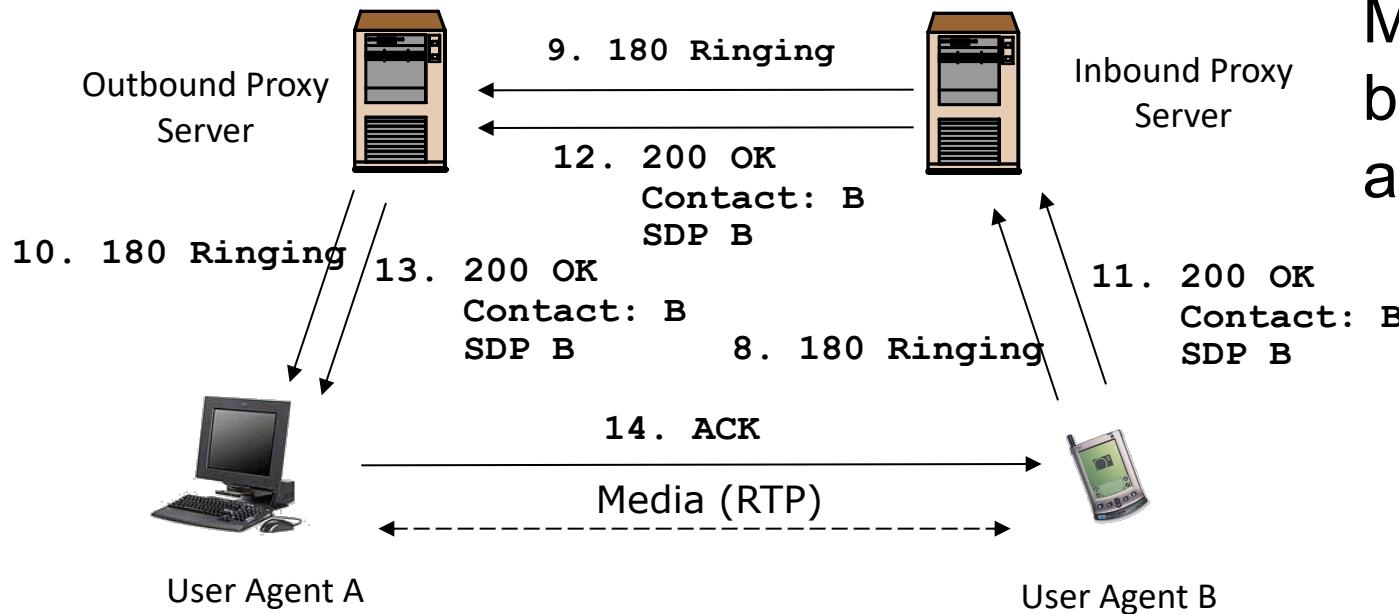
NGN siete, služby, protokoly  
SIP Call Setup Scenario



NGN siete, služby, protokoly  
 SIP Call Setup Scenario



14. ACK is sent by A to confirm setup call bypassing proxies.



Media session begins between A and B!



S T U . .  
. . . . .  
F I I T .  
. . . . .

NGN siete, služby, protokoly

For More Information

## IETF:

IETF home page

<http://www.ietf.org/>

Internet-draft search engine

<http://search.ietf.org/search/brokers/internet-drafts/query.html>

RFC search engine

<http://www.rfc-editor.org/rfcsearch.html>

Megaco WG charter

<http://ietf.org/html.charters/megaco-charter.html>

Megaco documents repository

<ftp://standards.nortelnetworks.com/megaco/>

<ftp://standards.nortelnetworks.com/megaco/docs/latest/>

## ITU:

ITU home page

<http://www.itu.int/ITU-T/index.html>

SG-16 document repository (H.323, H.248)

<ftp://standard.pictel.com/avc-site>

Most Megaco/H.248 related documents should also be available through Megaco WG, above

# Architektúra NGN, SSW a IMS

## Čo je to IMS?

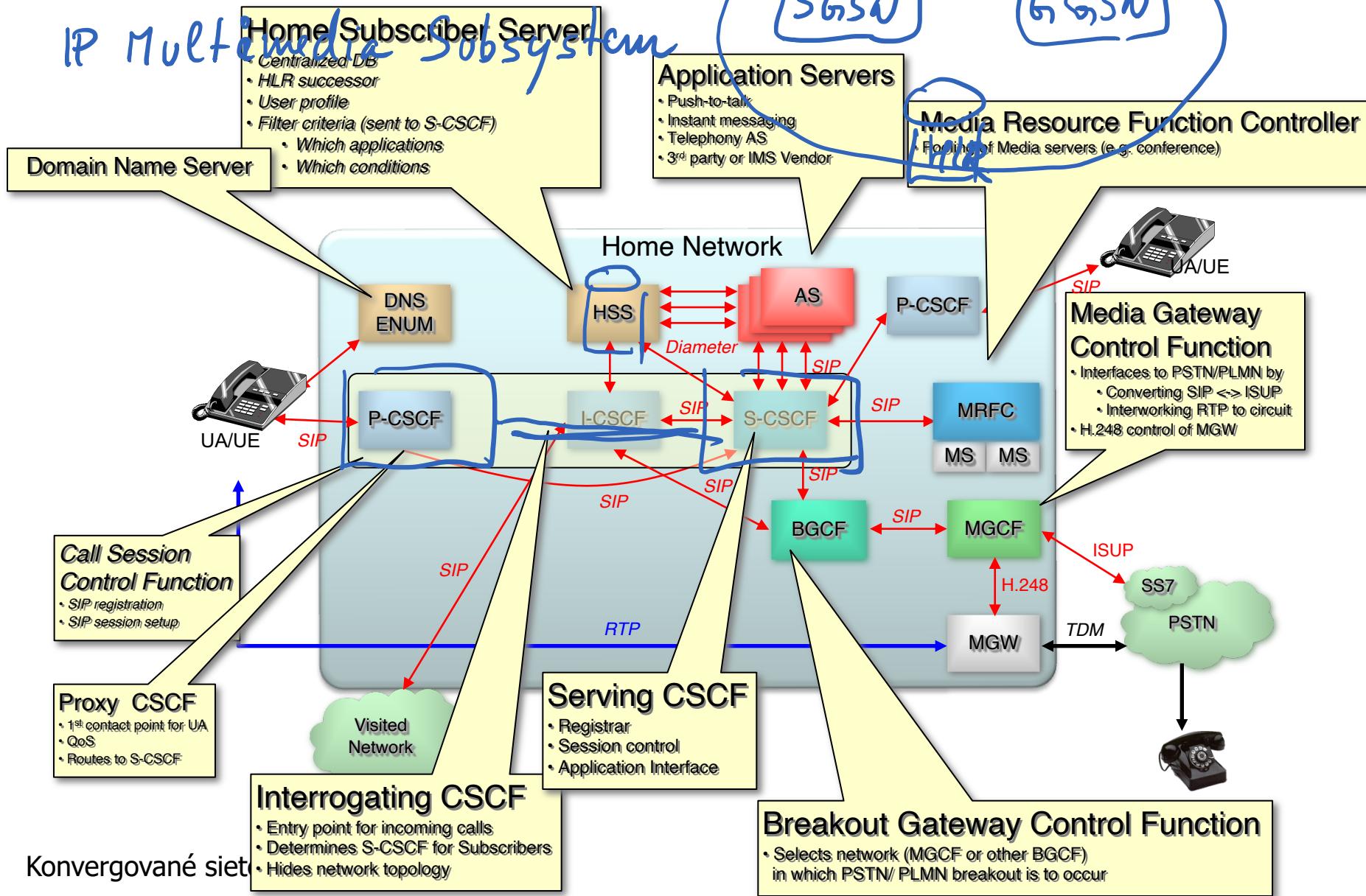
- IMS je IP Multimedia Subsystem, definovaný 3GPP/ETSI
  - 3GPP IMS štandard definuje sietovú doménu určenú na riadenie a integráciu multimediálnych služieb
  - IMS je definovaný 3GPP od Release 5 (2002), [dnes R7/R8...]
  - 3GPP2 ekvivalent IMS je MMD (MultiMedia Domain), plne interoperabilný s 3GPP IMS
- IMS je „srdce“ NGN
  - IMS sa nachádza v core 3GPP (mobile) a TISPAN (fixed) sietových architektúr
- IMS je vybudovaná na IETF protokoloch
  - základ tvoria SIP, SDP, COPs a Diameter, RTP, RTCP
  - 3GPP rozširuje tieto IETF protokoly smerom k mobilite
- IMS v skratke
  - Otvorená architektúra, ktorá podporuje množstvo IP služieb pre PS ako aj pre CS siete, prostredníctvom pevných ako aj bezdrôtových prístupových sietí

# IMS vývoj

- Vyvinul sa v mobilných sietiach (ako 3GPP štandard)
- 2G siete podporovali (takmer iba) prenos hlasu (circuit-switch) aplikácie
- 3G siete mali natívnu podporu pre prenos dát pomocou paketov
- Používatelia majú prístup k rýchlemu Internetu  
=> Používatelia už nepotrebuju hlasové služby od operátora!!!

# Architektúra NGN, SSW a IMS

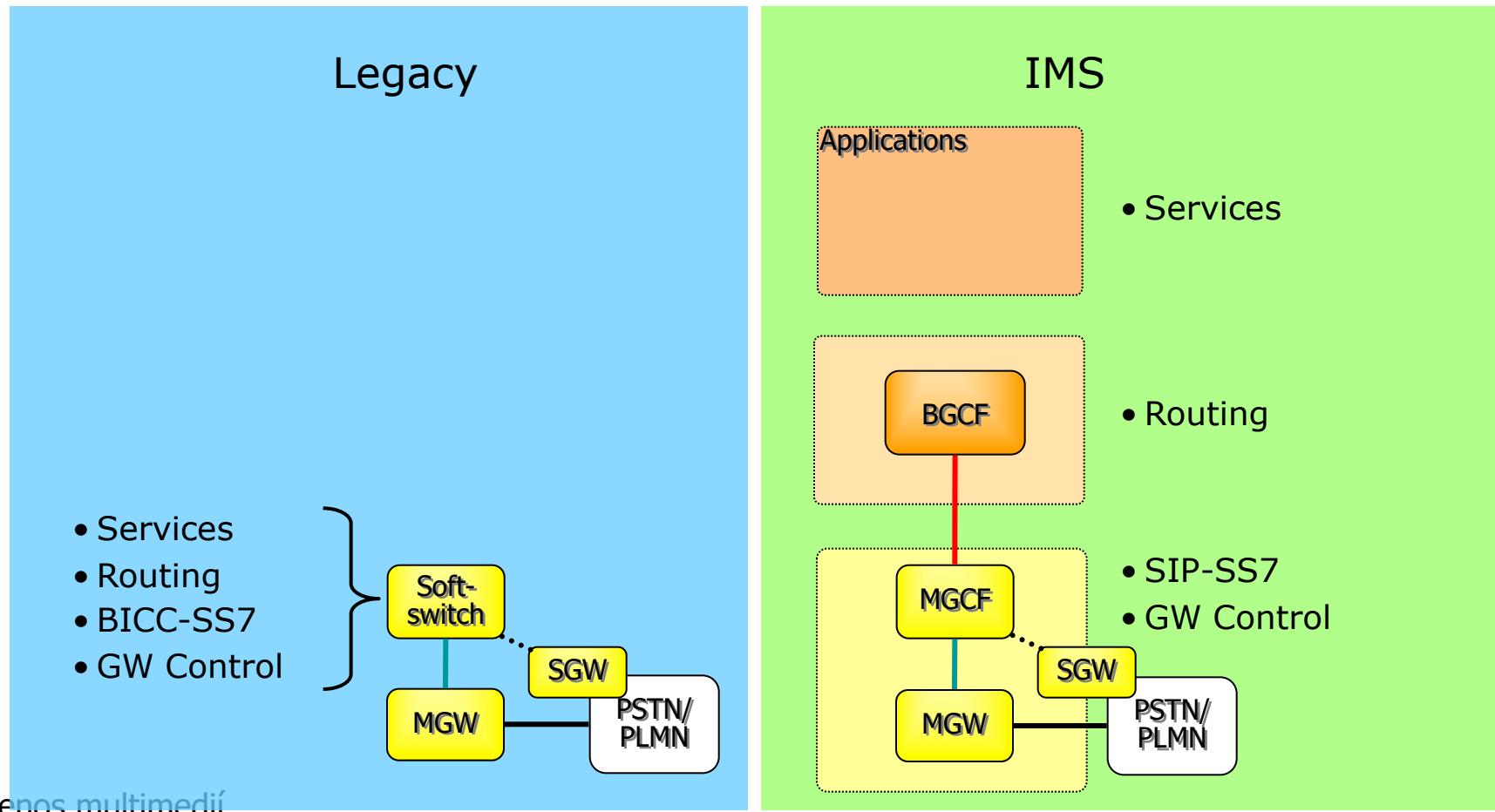
## IMS Home Network - Functional Elements



Konvergované sieti

# Architektúra NGN, SSW a IMS

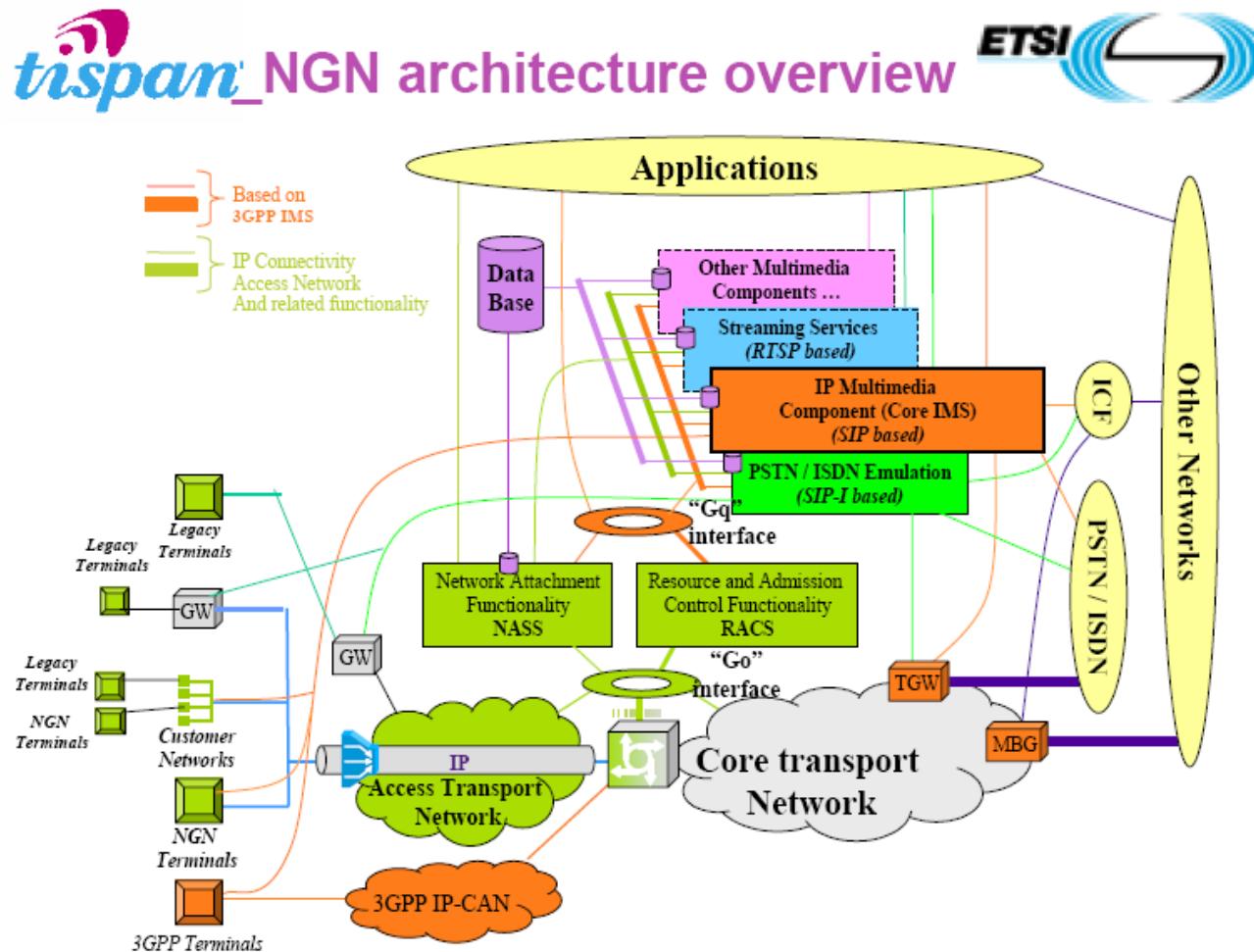
## NGN – porovnanie: SSW - IMS architektúra



Prenos multimedijí  
paketovými sietami

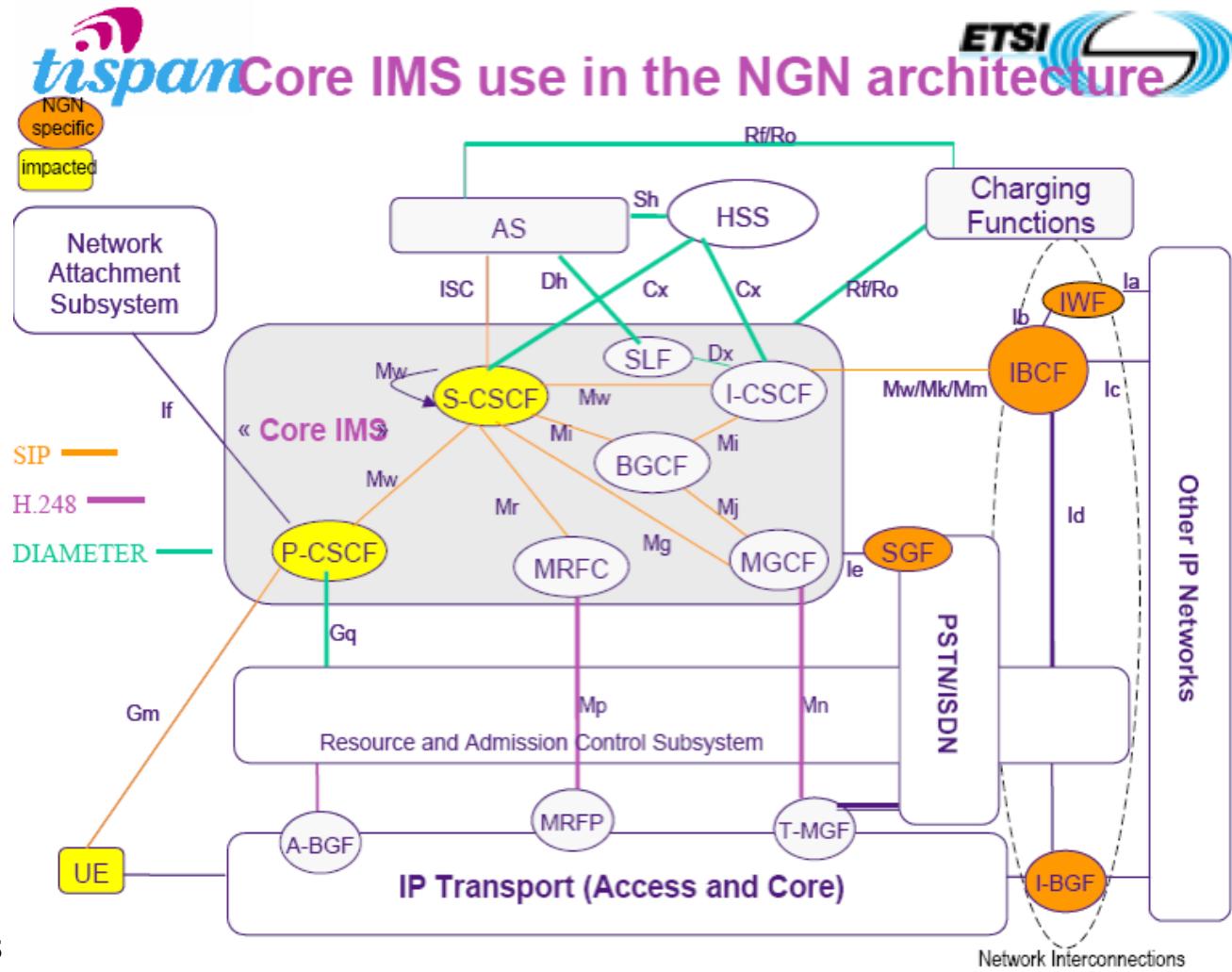
# Architektúra NGN, SSW a IMS

## NGN – NGN IMS architektúra



# Architektúra NGN, SSW a IMS

## NGN – IMS architektúra



Prenos  
paketovými sietami

Tispan

**IMS is an open architecture for mobile and fixed services**

The core and its services are independent from the access

**Layered architecture**

Transport, session control, applications

Transparency through standard interfaces

**Session Control Layer**

End point registration

Session establishment

**Application Layer**

Service Logic

Recapitulation ctd.

## Service Control Layer

SIP: P/I/S-CSCF

DIAMETER: HSS

## Application Layer

SIP/DIAMETER interface towards service control layer

SIP/XCAP interface (based on HTTP) towards UE

Call related application logic

IMS service (e.g., Presence, PoC)

Service Creation Environment

CSCF components separate logical functionality

P-CSCF eq. SIP Proxy. It acts as access point for UE towards the IMS core.

I-CSCF placed on the borders of two IMS domains.  
Entry point for served home users from visited networks.

S-CSCF eq. SIP Registrar. It also acts as an anchor point for IMS service control (ISC) and service invocation (based on iFCs).

HSS contains all subscriber and service related data

## User identities

Private User Identity (user@realm)

Authentication and Subscription identification

Not used for routing

Public User Identity (sip:user@domain.tld or  
tel:+1234567890)

Contact to be reached by others

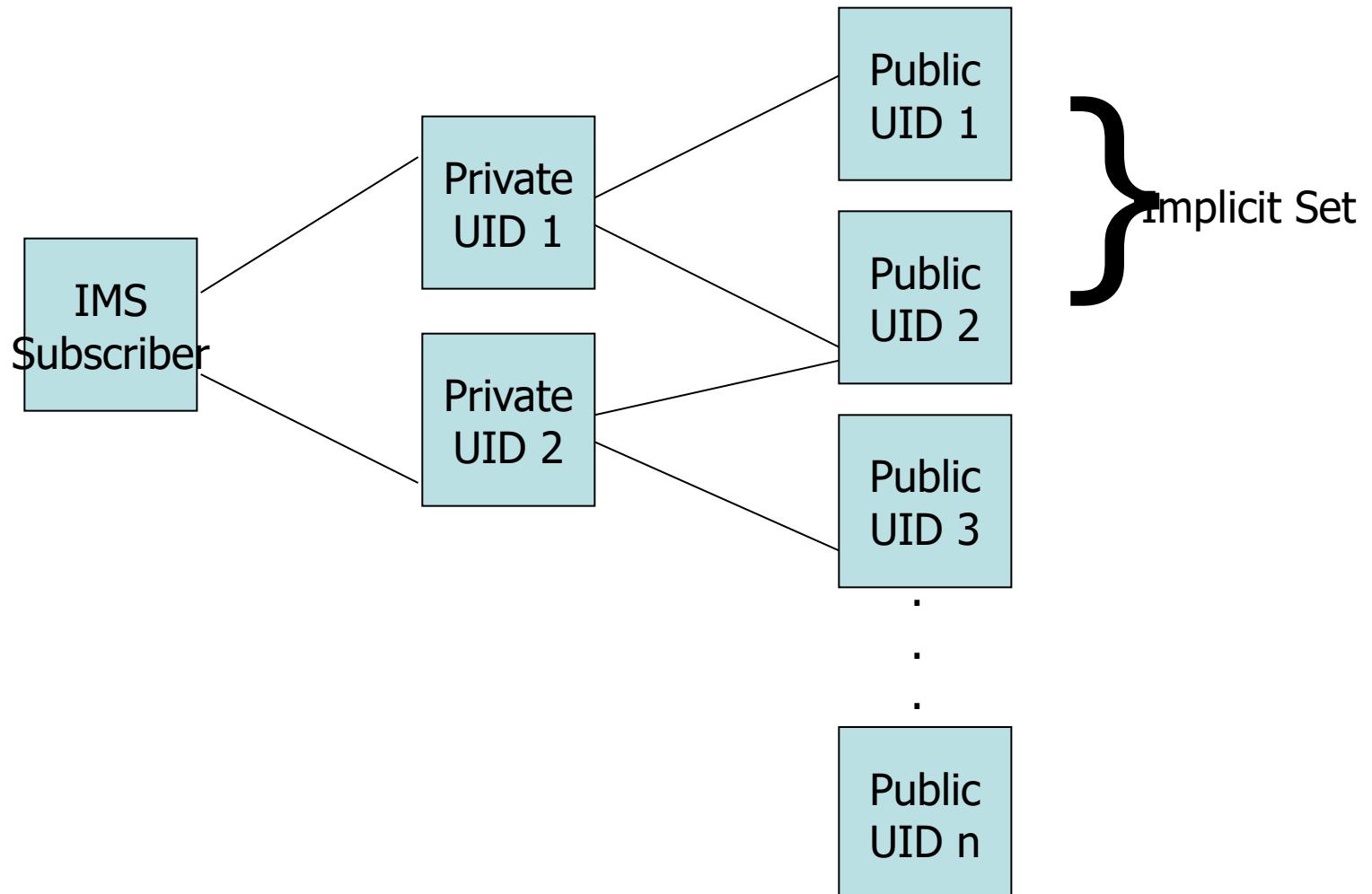
SIP URI or tel URI

Implicit set of public user identities for grouping registration

Services and other network entities can be addressed using a SIP URI

User identities are part of the user profile

## Relations between Identities



Required before a user can access services or perform calls

Precondition: UE has IP address and knows IMS entry point

All CSCF are used

P-CSCF (home/visited): Entry point, determines I-CSCF

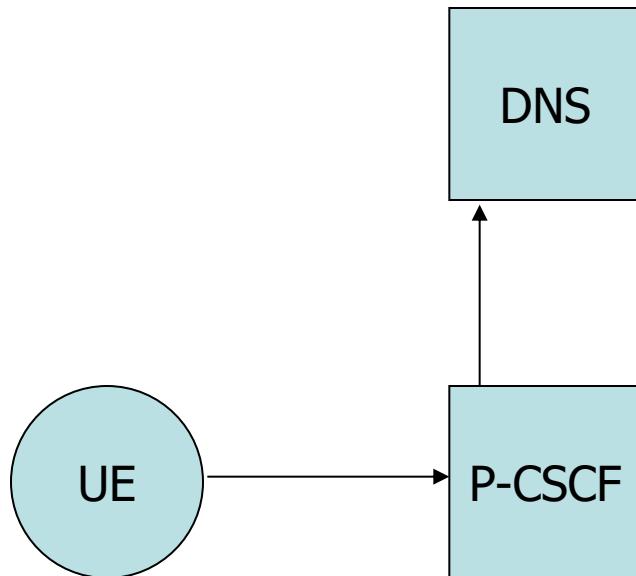
I-CSCF (home): Determines S-CSCF

S-CSCF (home): Authenticates the subscriber, registers IMS subscriber, interacts with service layer

User assigned to one S-CSCF after successful registration

Knows user profile until de-registration

# Registration (simplified)



Please see "Architektúra NGN, SSW a IMS" from Tomas Kovacik for details.  
This is a follow-up of slides 21-24.

Link IP addresses with domain names  
Support in locating SIP servers

NAPTR lookup

SRV lookup

A/AAAA lookup

**NAPTR** resolves the preferred protocol and the DNS string to locate the service

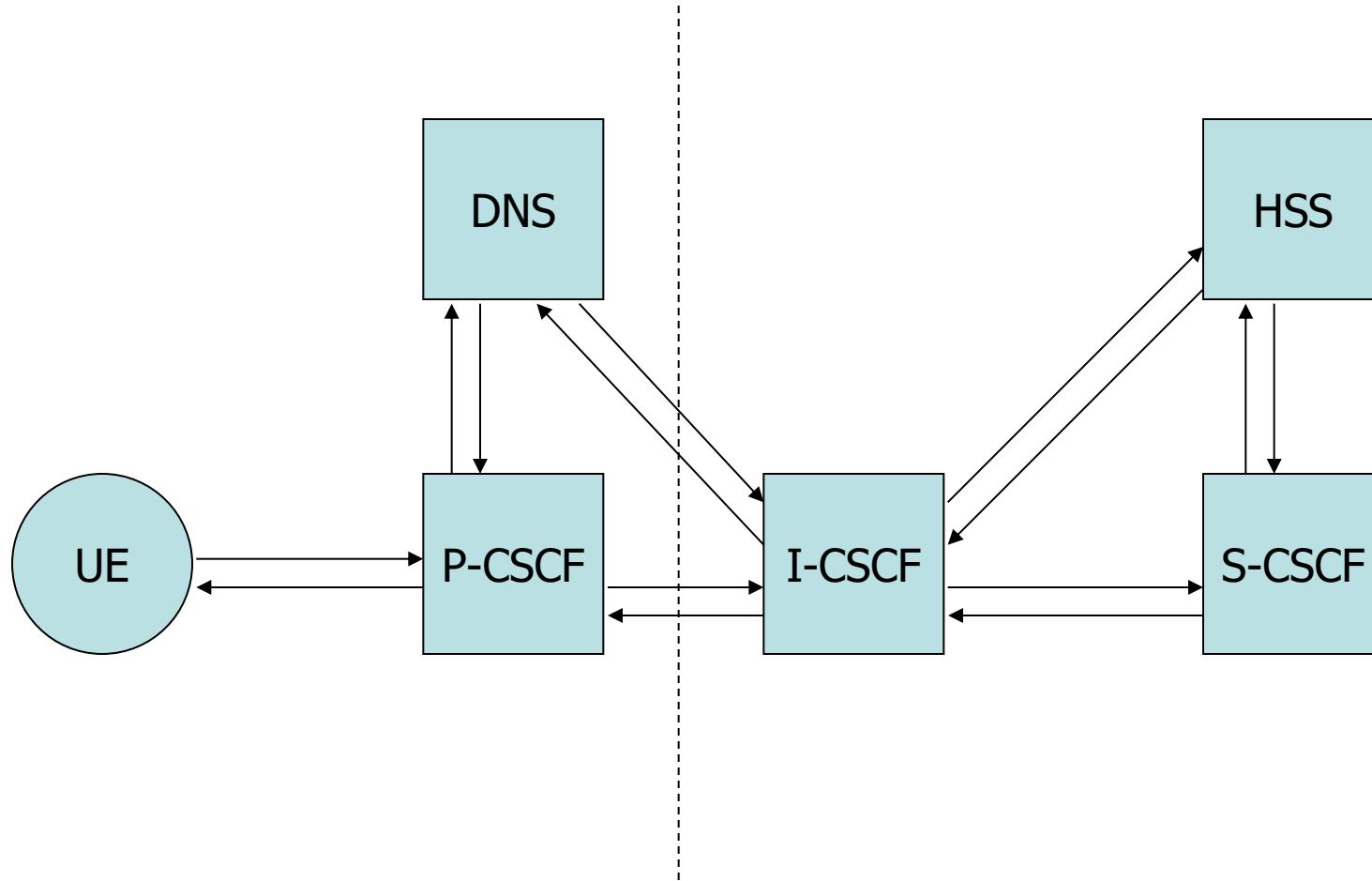
ngnlab.eu. 7200 IN NAPTR 10 50 "s" "SIP+D2T"  
\_sip.\_udp.ngnlab.eu.

**SRV** look-up for a NAPTR given address indicates the domain and port the service listens on

\_sip.\_udp.ngnlab.eu. 7200 IN SRV 0 0 5060 icscf.ngnlab.eu.

**A/AAAA** to find the IP address of the domain name  
icscf.ngnlab.eu. 7200 IN A 147.175.103.213

# Registration (simplified)



Please see "Architektúra NGN, SSW a IMS" from Tomas Kovacik for details.  
This is a follow-up of slides 21-24.

Important SIP “additions”

P-Access-Network-Info includes port location/cell  
From/To eq. IMPU

Path inform S-CSCF about routing destination for  
terminating requests

Authorization contains IMPI and other values

200 OK Service-Route to populate S-CSCF address to  
P-CSCF for originating requests

Important SIP “additions” – ctd.

P-Associated-URI informs client about reg. IMPUs  
P-Preferred-Identity (UE-P), P-Asserted-Identity (P-) to choose a registered IMPU for session establishment  
Event: reg after registration to inform UE about events on S-CSCF (e.g., HSS-initiated deregistration)

After registration, subscriber is reachable through  
public user identity for communication  
IMS subscriber can access services now or  
perform calls

### P-CSCF (home or local)

Proxy, contacts assigned S-CSCF for the calling subscriber

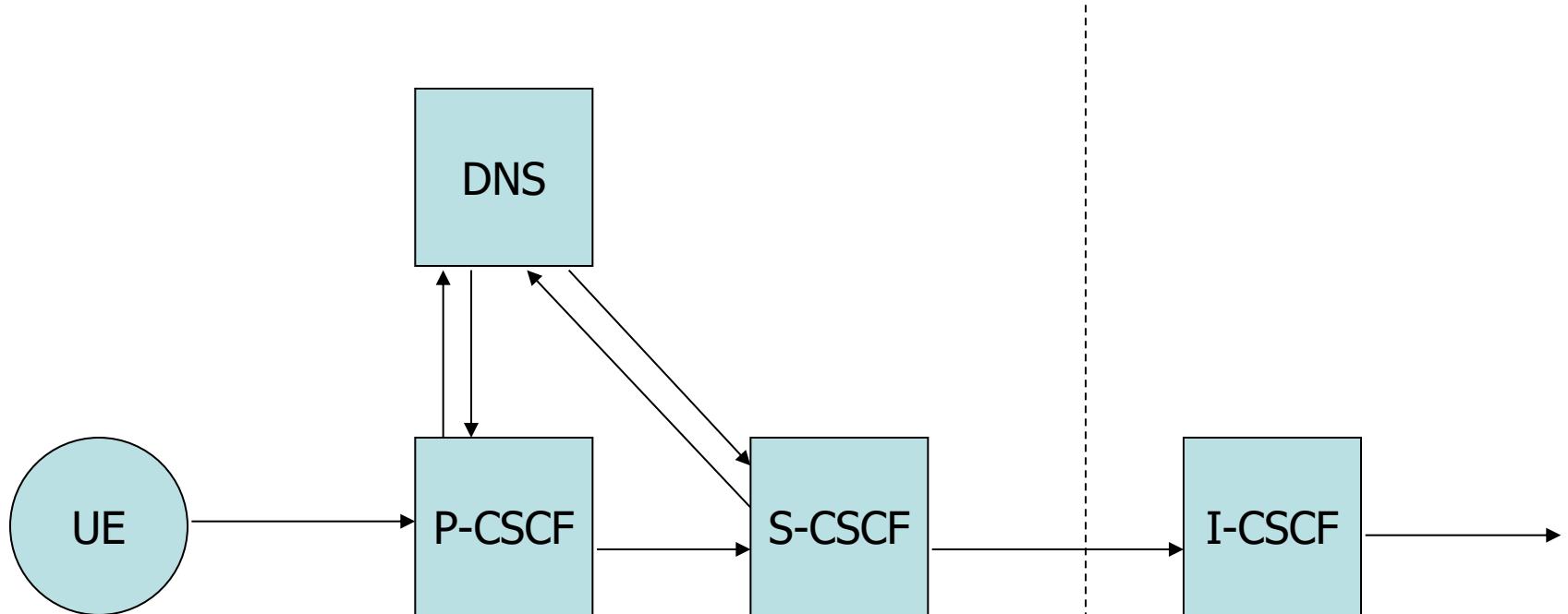
### S-CSCF (home)

Service control and logic  
Contacts application or other party

### I-CSCF

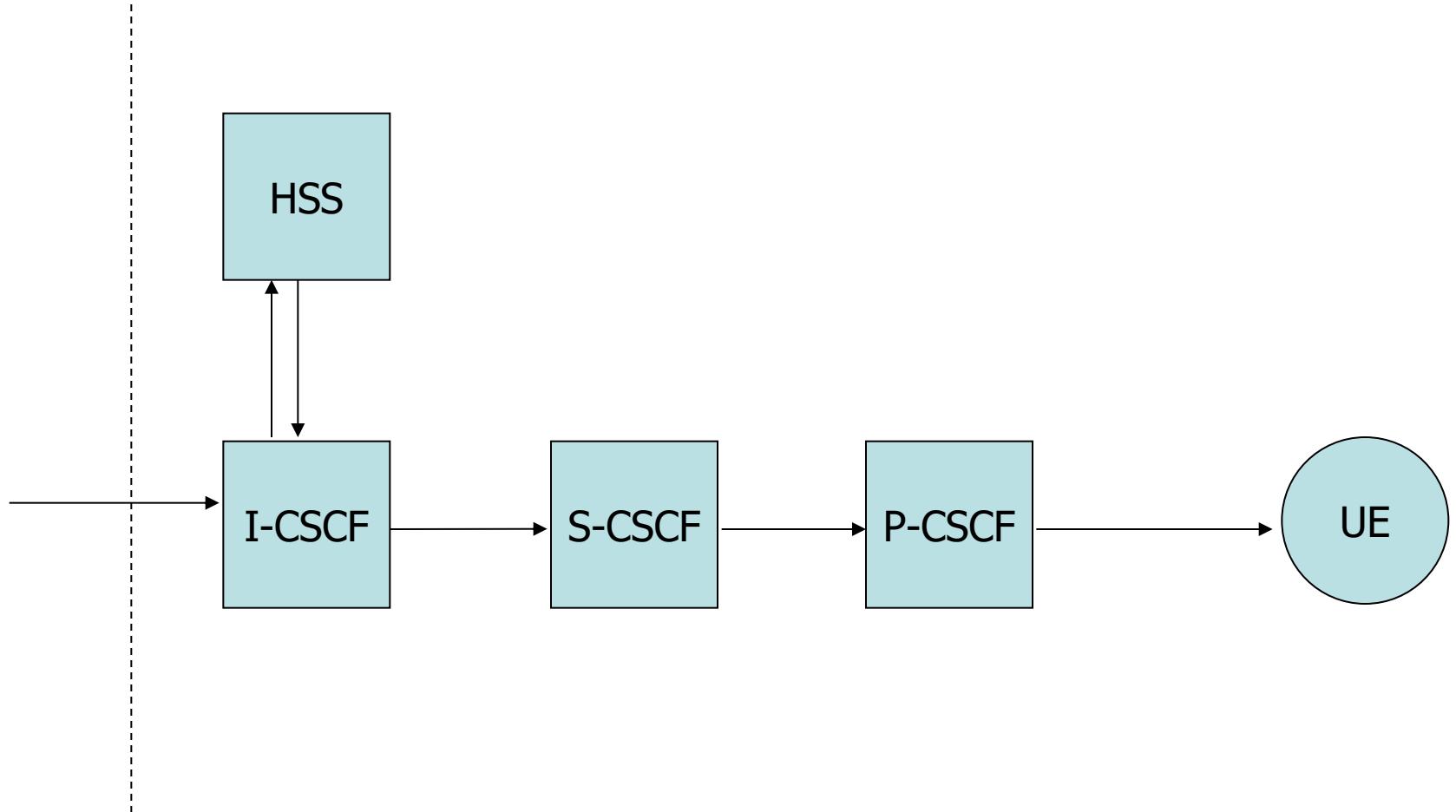
Entry point for communication from other domain

# Session establishment outgoing (simplified)



Please see "Architektúra NGN, SSW a IMS" from Tomas Kovacik for details.  
Please take notes to understand and follow the process.

# Session establishment incoming (simplified)



To simplify matters ,DNS is omitted in these slides.

User profile contains also service profile

## Service Profile

Public Identification (assigned subscribers)

Initial Filter Criteria (triggering AS interaction)

Initial Filter Criteria (iFC)

Trigger points with service point triggers  
(conditions when to interact)

Application server (SIP URI for interaction)

## Service Profile

### **User Profile**

### **Service Profile**

Includes information about service access and dependencies to user registration state and service availability.

Each service profile can be specified for a single user or shared by different users by linking the service profile.

## User Profile

### Service Profile

Indicator: registered/unregistered/independend

The Indicator describe the dependency to user registration state.

Three different states will be differ:

- registered (user is registered)
- unregistered (user is not registered)
- independend (user registered or not)

## Triggering

### User Profile

### Service Profile

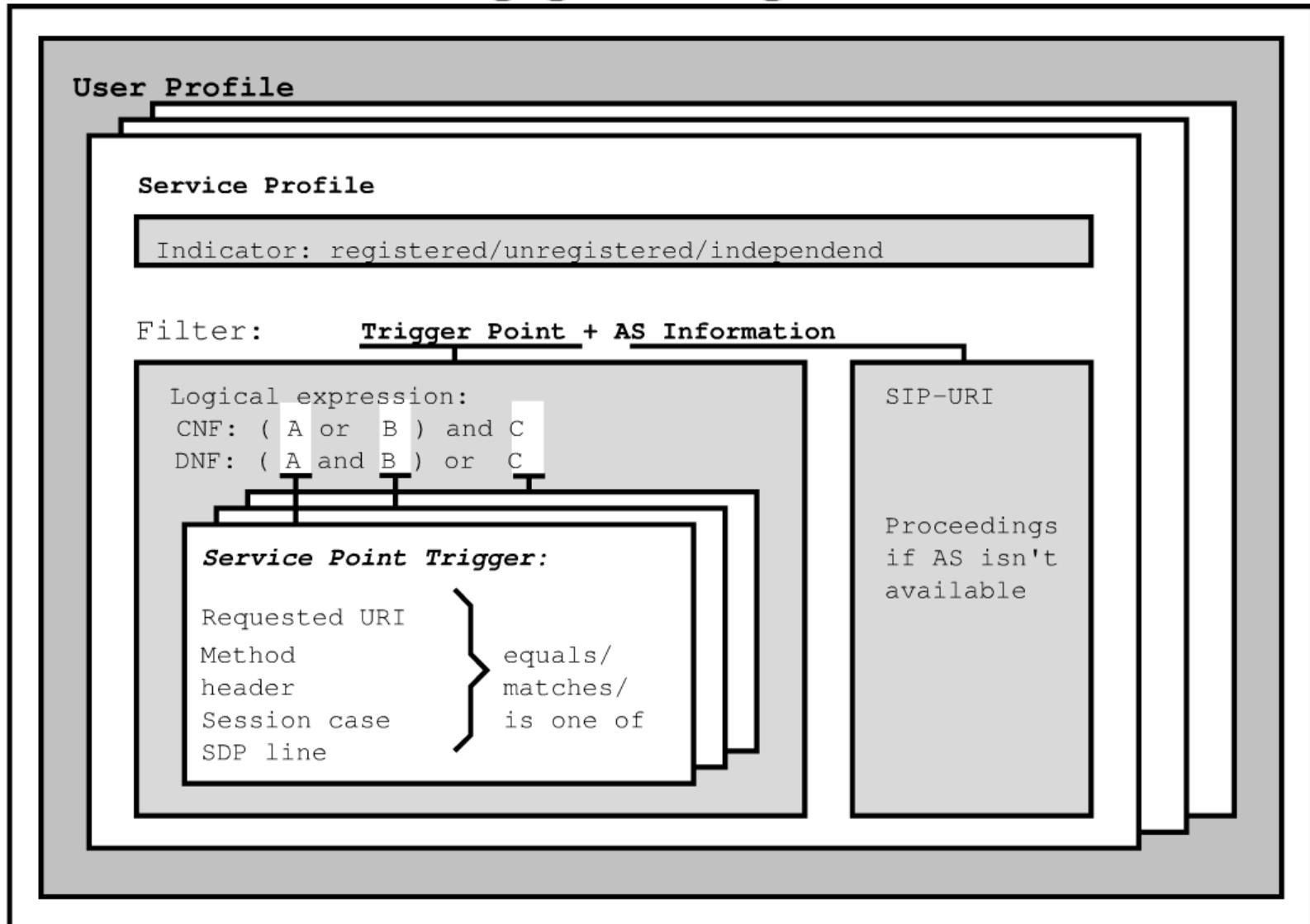
Indicator: registered/unregistered/independend

Filter: **Trigger Point + AS Information**

Filter describe an term including information about trigger point and application server access data belong the service profile.

An trigger point is a logical expression including sip message parts and matching expressions according the service.

## Triggering ctd.



## Filtering

Only initial SIP requests

Initial filter criteria (iFC) retrieved from HSS  
during registration

Subsequent filter criteria (sFC) provided by application  
server (beyond 3GPP R8)

Allow dynamic definition of trigger points during  
application runtime

I/S-CSCF are interaction points with the service layer

- I-CSCF for public service identities (PSI)

- S-CSCF for services (of served users)

Applications have interface towards HSS

- User profile information

- Location information, service information

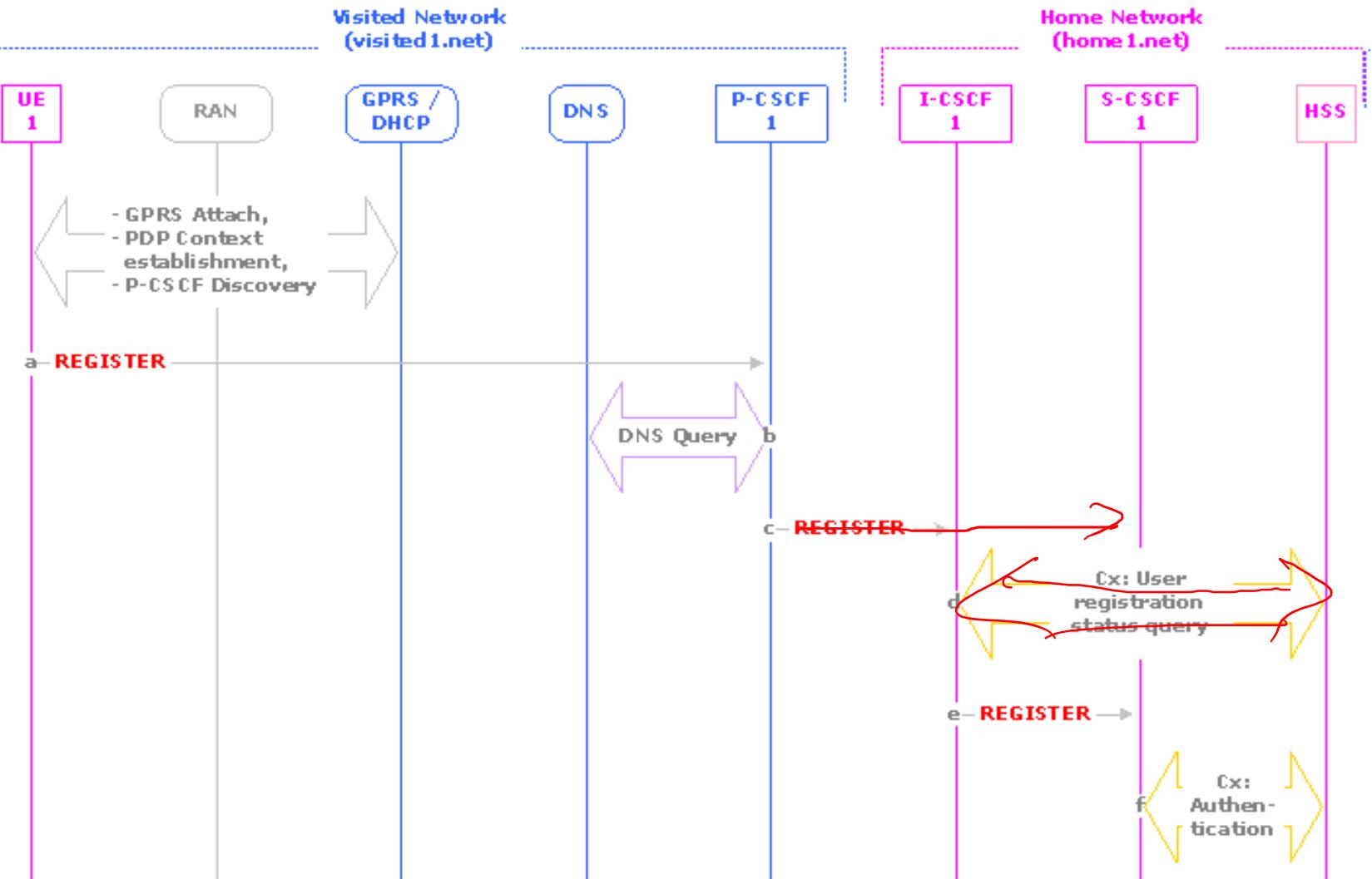
Complexity of security, authorization, access interaction

etc. all handled by the core

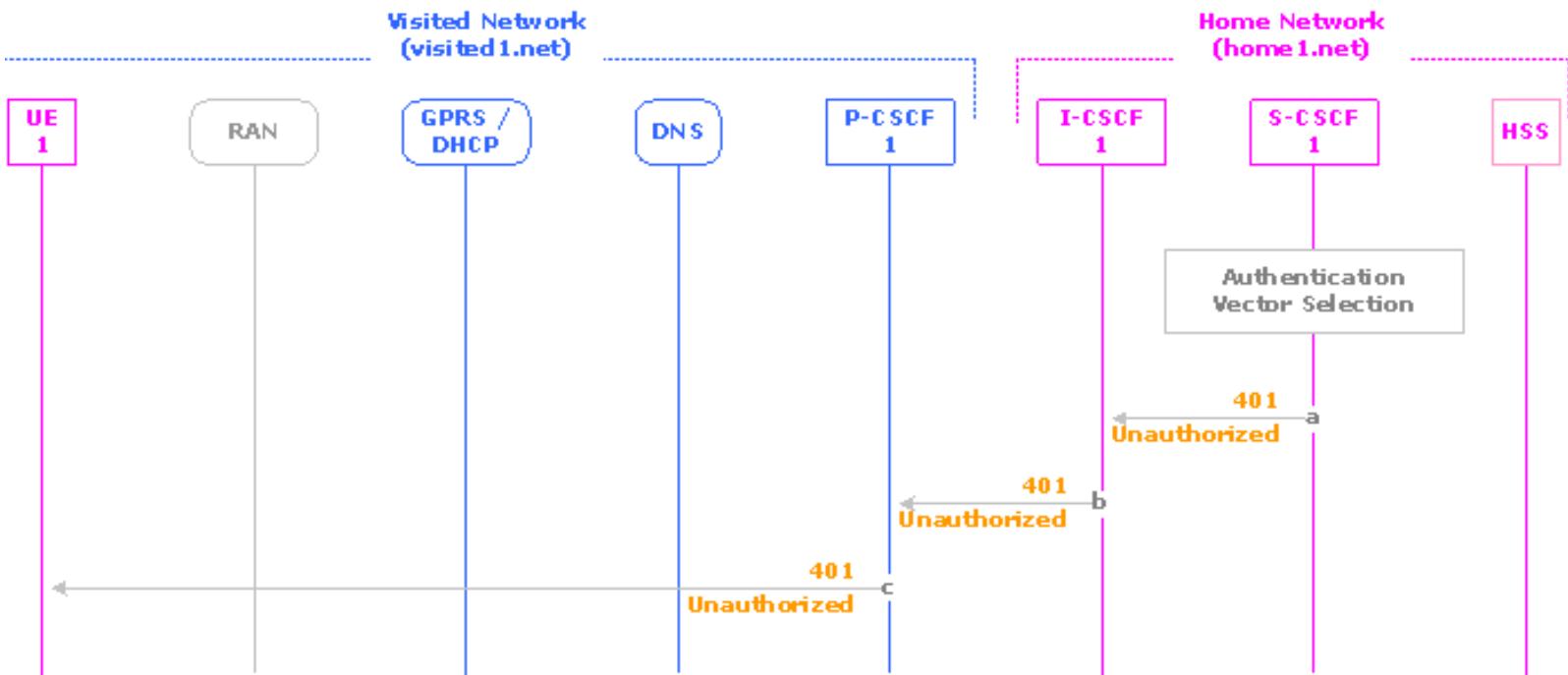
Application server (AS) can have different functions

- Terminating AS (e.g., acting as user agent)
- Originating AS (e.g., wake up service, click to dial)
- SIP Proxy server (e.g., for SIP header manipulation)
- Back-to-back user agent (e.g., for deeper modifications in SIP dialog as supplementary service enabler)

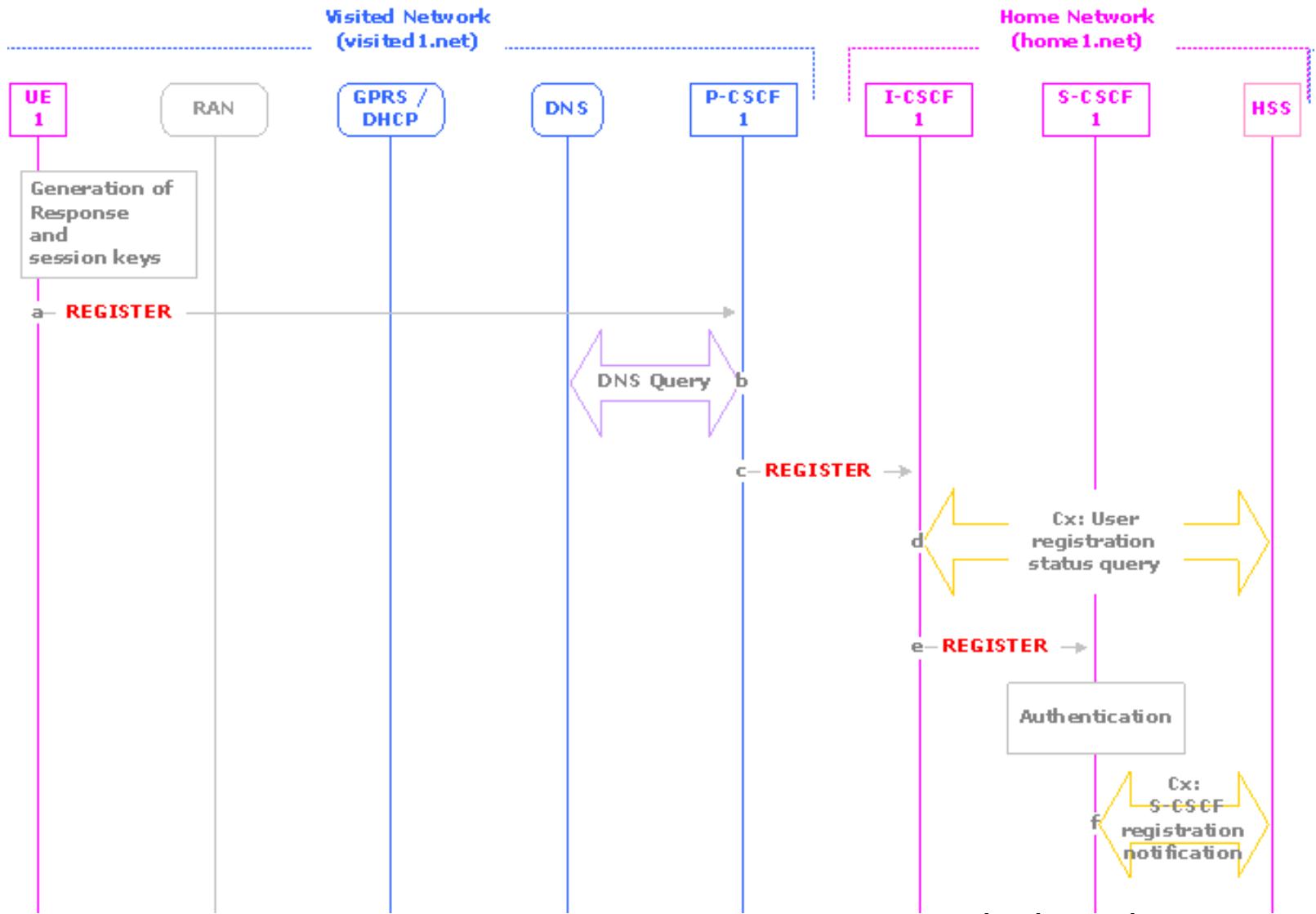
# Registration procedure 1



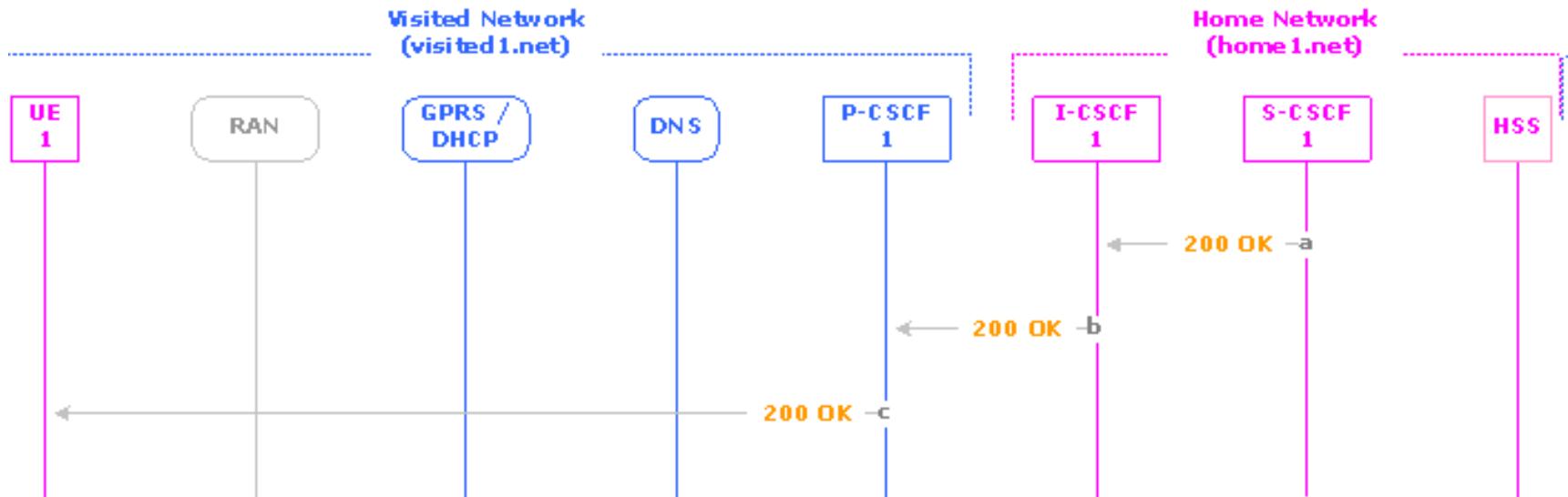
# Registration procedure 2



# Registration procedure 3



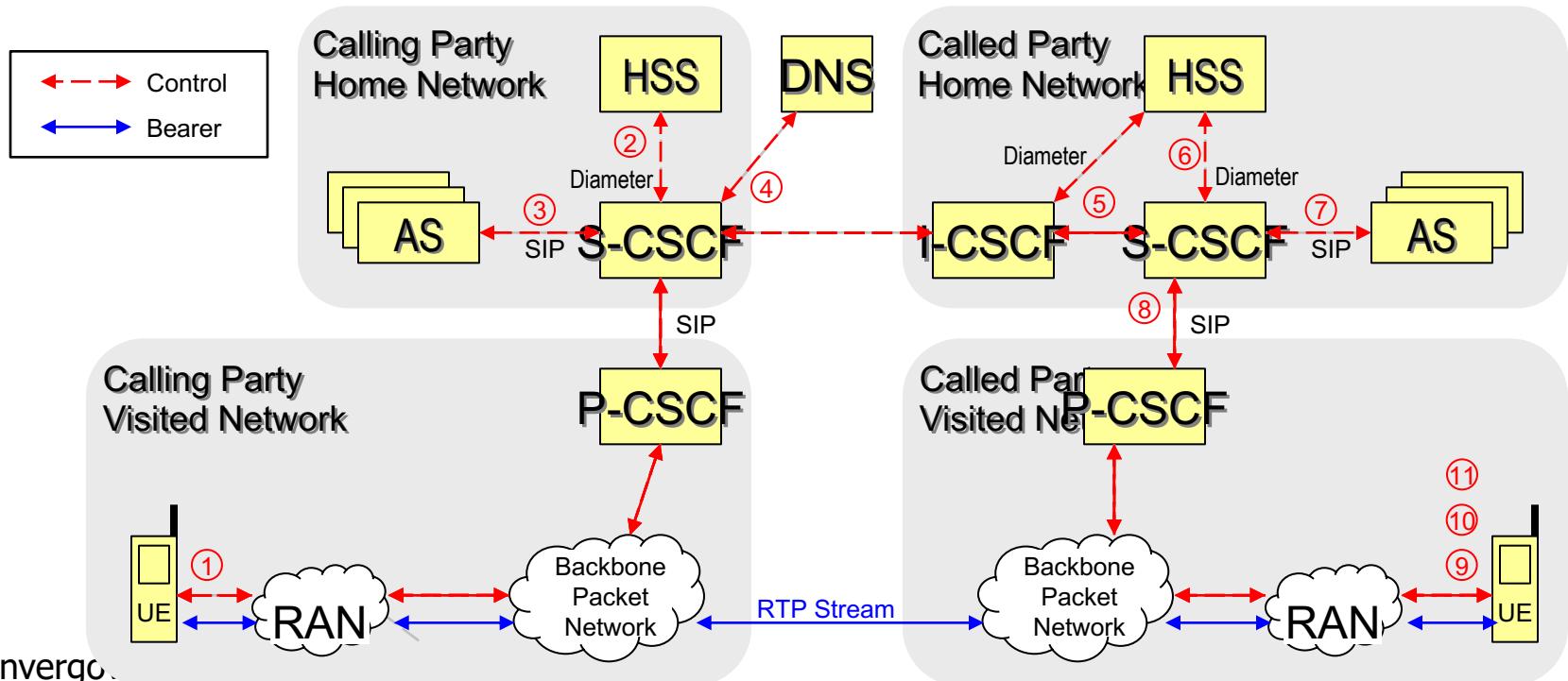
# Registration procedure 4



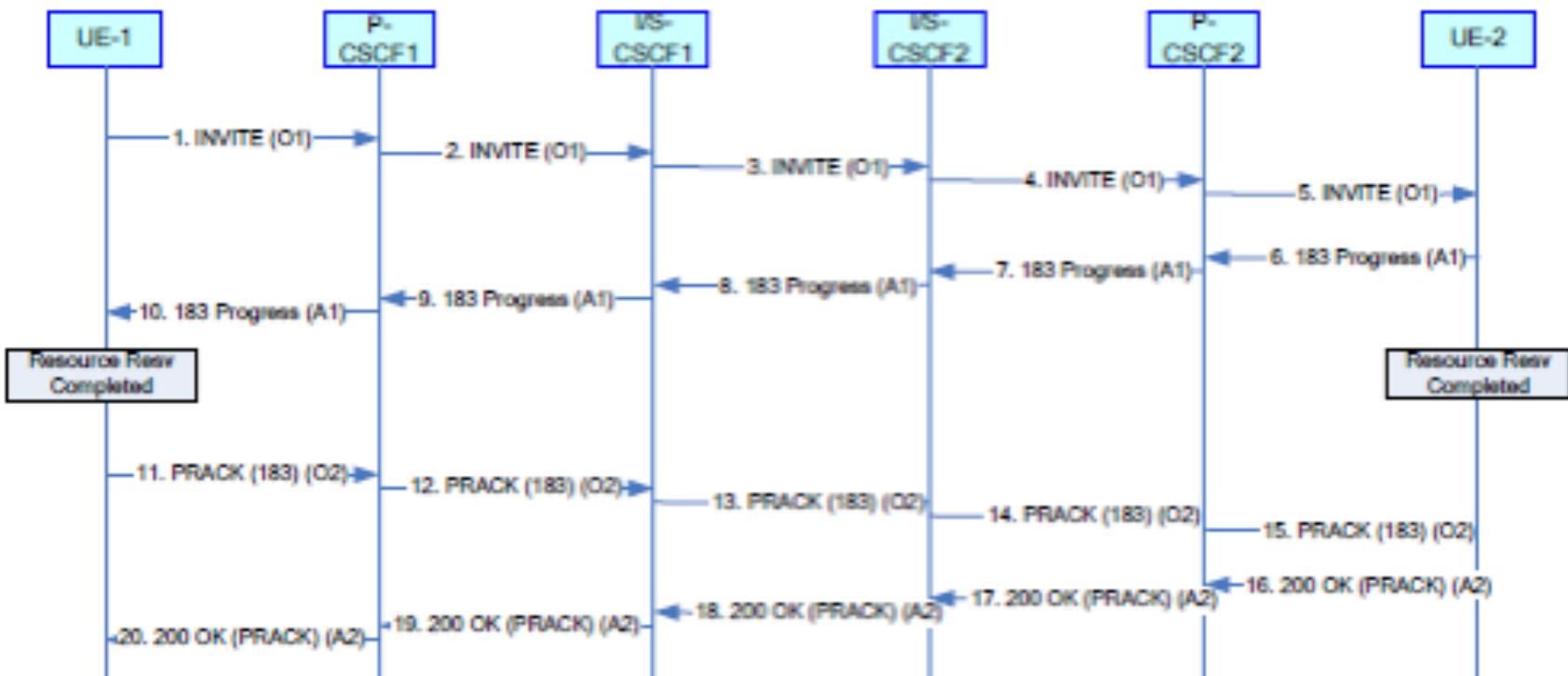
# Architektúra NGN, SSW a IMS

## IMS Subscriber to IMS Subscriber high level call flow

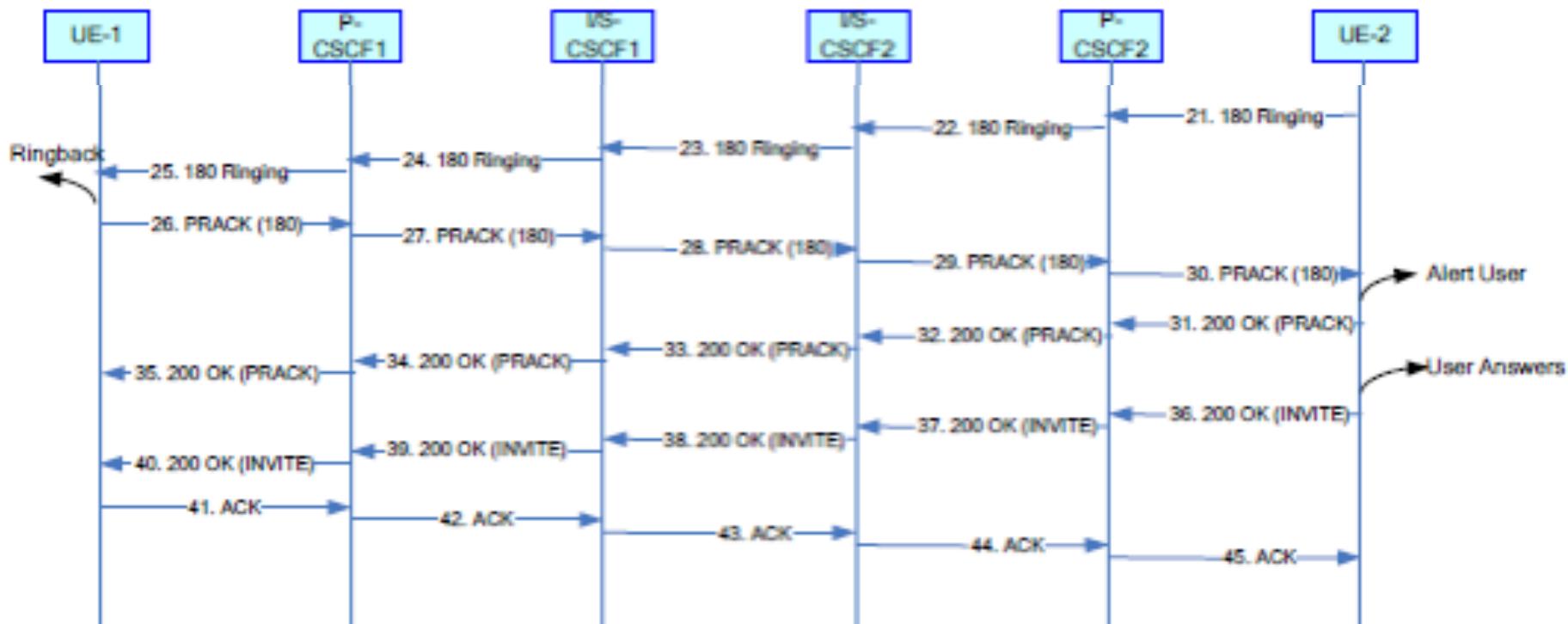
- |   |  |
|---|--|
| ① Initiate SIP Invitation   | ⑥ Retrieve Subscriber Profile (if needed)        |
| ② Retrieve Subscriber Profile (if needed)                           | ⑦ Apply Service Logic                            |
| ③ Apply Service Logic   | ⑧ Forward INVITE to CLD Party                    |
| ④ Retrieve Address of CLD Party Home Network<br>and Forward INVITE. | ⑨ SDP Negotiation / Resource Reservation Control |
| ⑤ Identify Registrar of CLD Party and Forward INVITE.               | ⑩ Ringing / Alerting                             |
|   | ⑪ Answer / Connect                               |



# Hovor 1



# Hovor 2



# Architektúra NGN, SSW a IMS

Porovnanie vlastností PSTN/IN, internetu a NGN

|                                 | PSTN/IN    | Internet | NGN          |
|---------------------------------|------------|----------|--------------|
| Multimedialiéne služby          | nie        | áno      | áno          |
| Podpora QoS                     | áno (hlás) | nie      | áno          |
| Inteligencia siete              | áno        | nie      | áno          |
| Inteligentné koncové zariadenia | nie        | áno      | áno          |
| Integrovaný dohľad a riadenie   | nie        | áno      | áno          |
| Spoločahlivosť                  | vysoká     | nízka    | vysoká       |
| Vytváranie služby               | komplexné  | ad-hoc   | systematické |
| Jednoduchosť používania služieb | stredná    | vysoká   | vysoká       |
| Modularita                      | nízka      | stredná  | vysoká       |
| Doba na uvedenie služby         | dlhá       | krátka   | krátka       |
| Otvorenosť architektúry         | nízka      | vysoká   | vysoká       |

# Architektúra NGN, SSW a IMS

## NGN – funkčné entity IMS architektúry

- CSCF — Call Session Control Function
- PROXY-CSCF — The P-CSCF is the first entry point for the user equipment (UE) into the IMS.
- INTERROGATING-CSCF — The I-CSCF is used for initially choosing the correct S-CSCF.
- SERVING-CSCF — The S-CSCF handles call session state in the IMS, including coordinating the use of Application Servers for enhanced services. Also, it is the subscriber registrar and is always in the home network.
- BGCF —The Breakout Gateway Control Function routes calls to the public switched telephone network (PSTN) or any other circuit-based network.
- MGCF/MGW — The Media Gateway Control Function/ Media Gateway handles media to and from the PSTN.
- SGW - The Signaling Gateway passes circuit-based signaling to and from the PSTN.
- AS — An Application Server (i.e., SIP AS, OSA AS, or CAMEL IM-SSF) offers value-added services and resides in the user's home network or in a third party location. An AS based in the home network can access the HSS as needed.
- HSS — The Home Subscriber Server is the master database for subscriber data, containing subscription-related information to support call processing network entities. The HSS interfaces with call control servers in order to complete routing/roaming procedures by authentication, authorization, naming/ addressing resolution, location dependencies, etc.