SEMS SBC

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Contents

- SEMS and SBC introduction

- SBC from user's POV

- Architecture and comparison to SER

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SEMS history

- Started 2002 at MOBIS/iptel.org group as media server for SER-based VoIP

- 2002 – 2005 @ FOKUS

- 2005 – 2008 @ iptelorg/Tekelec

- 2007 – 2010 @ IPTEGO

- Since 2010   @ FRAFOS

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SEMS – What it is

- Application and Media server

- Focus on SIP

- Out of the box: announcements, RBT, voicemail, conferencing etc

- Powerful APIs: DSM state charts scripting, Python

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# Dialog stateful?

Function	Proxy	B2BUA
Message manipulation	√	√
Topology hiding	√	√
Load balancing/routing	√	√
Overload/DOS protection	(√)	√
CDR generation	(√)	√
RTP anchoring		√
Transcoding		√
Session Timer		√
Prepaid		√
SIP authentication		√

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SEMS SBC

- High performance B2BUA
  - 500 CAPS with HA on small dual core servers

- Flexible profile based control of signaling details

- Rich media features

- Integrates well with prepaid billing, accounting, LCR

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SBC use cases
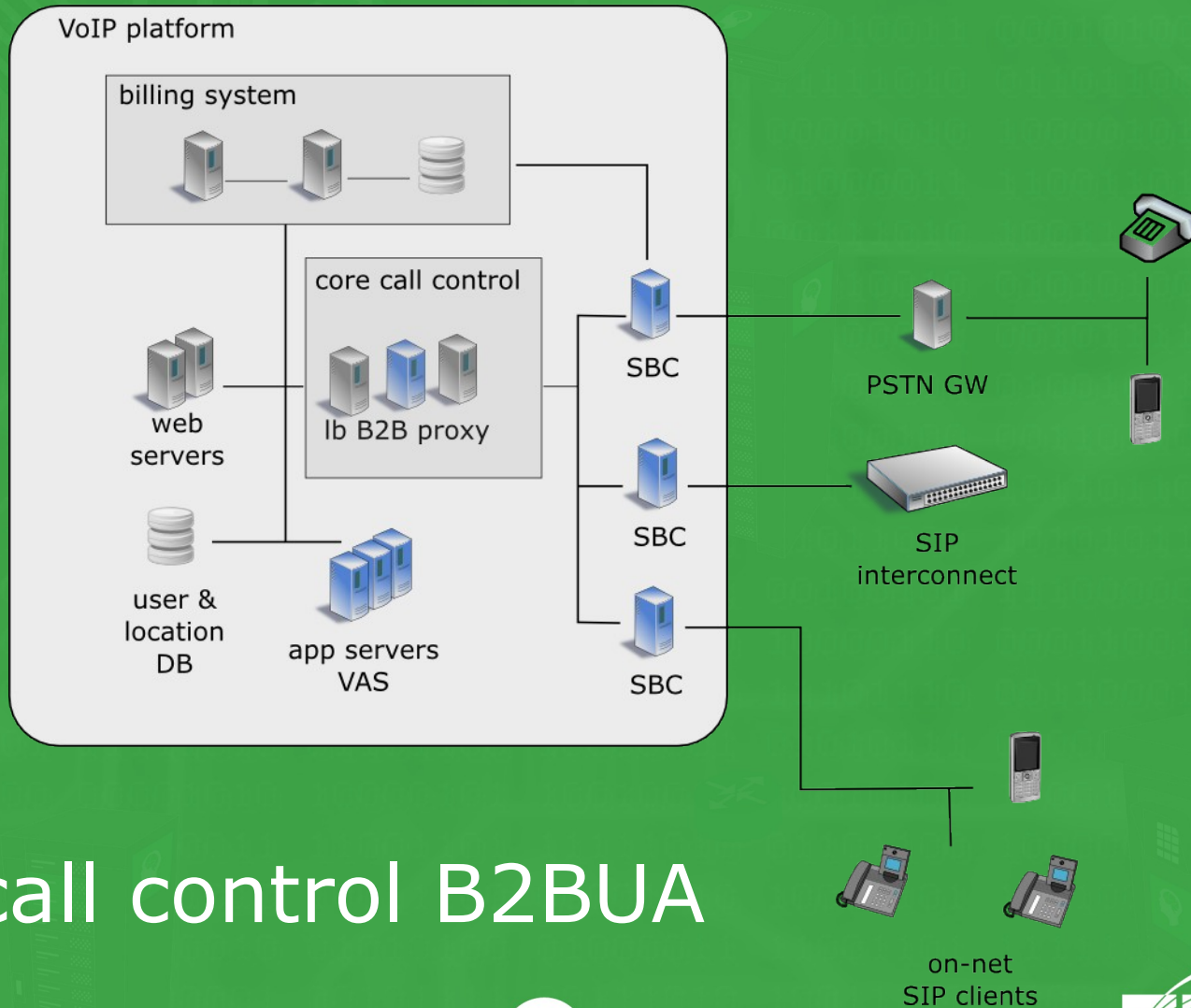
- NNI
- UNI
- Core call control B2BUA

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SBC profiles

sbc.conf

```
load_profiles=iptelecho
active_profile=iptelecho
...
```

iptelecho.sbcprofile.conf

```
URI=sip:echo@iptel.org
From=<anonymous@mynet.net>
To=<sip:echo@iptel.org>
...
```

SEMS SBC

```
#
U 210.13.3.122:5080 -> 210.13.3.100:5060
INVITE sip:+49123@osbc1.mynet.net SIP/2.0
From: "John" <sip:+431556221@mynet.net>;tag=12
To: "Clara" <+49123@mynet.net>
Call-ID: 3cde5d1a960a-dez6oz34llo4
...
```

```
#
U 210.13.3.100:5060 -> 213.192.59.75:5060
INVITE sip:echo@iptel.org SIP/2.0
From: <anonymous@mynet.net>;tag=3213
To: <sip:echo@iptel.org>
Call-ID: y76IIPf4UD68bb
...
```

• define SBC behaviour in profiles

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Set RURI, From, To, Call-ID ...

set_fromto.sbcprofile.conf

```
URI=$tU@sbc1.mypeer.net
From=<$fU@mynet.net>
To=<sip:$tU@mypeer.net>
Call-ID=$ci_leg2
...
```

known
SER
pseudo-variables

SEMS SBC

```
#
U 210.13.3.122:5080 -> 210.13.3.100:5060
INVITE sip:+49123@osbc1.mynet.net SIP/2.0
From: "John" <sip:+431556221@mynet.net>;tag=12
To: "Clara" <+49123@mynet.net>
Call-ID: 3cde5d1a960a-dez6oz34llo4
...
```

```
#
U 210.13.3.100:5060 -> 213.192.59.75:5060
INVITE sip:+49123@sbc1.mypeer.net SIP/2.0
From: <+431556221@mynet.net>;tag=3213
To: <sip:+49123@mypeer.net>
Call-ID: 3cde5d1a960a-dez6oz34llo4_leg2
...
```

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Replacement patterns

- RURI, From, To, PAI, PPI ($r, $f, $t, $a, $p)

- Call-ID ($ci)

- src, dst IP address/port ($si, $pi, $Ri, $Rp)

- P-App-Param hdr parameter ($P(myparam))

- Header value ($H(P-My-Header))

- Map any value via regexp ($M(val=>map))

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Control SBC from proxy

dynamic_rtprelay_sst.sbcprofile.conf

```
...
enable_rtprelay=$H(P-Enable-RTPRrelay)
enable_session_timer=$H(P-Enable-SST)
...
```

SEMS SBC

```
#
U 210.13.3.122:5080 -> 210.13.3.100:5060
INVITE sip:+49123@osbc1.mynet.net SIP/2.0
From: "John" <sip:+431556221@mynet.net>;tag=12
To: "Clara" <+49123@mynet.net>
Call-ID: 3cde5d1a960a-dez6oz34llo4
P-Enable-RTPRelay: no
P-Enable-SST: yes
...
```

```
#
U 210.13.3.100:5060 -> 213.192.59.75:5060
INVITE sip:+49123@sbc1.mypeer.net SIP/2.0
From: <+431556221@mynet.net>;tag=3213
To: <sip:+49123@mypeer.net>
Call-ID: 3cde5d1a960a-dez6oz34llo4_leg2
Session-Expires: 300
...
```

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Signaling Features

- From, To, RURI, Contact, Call-ID manipulation

- Adding headers

- Header and message filter

- Reply code translation

- SIP authentication

- SIP Session Timer

- Call Timer

- Prepaid accounting

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Media features

- RTP anchoring

- NAT traversal

- Symmetric RTP (comedia style)

- Physical network separation

- Codec filter

- SDP normalization

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Profile selection

- Static

  - active_profile=static_config

- Pseudo-var

  - active_profile=$rU

- Mapping

  - active_profile=$M(val=>map)

- Select first matched

  - active_profile=$M($si=>ipmap),
    $M($ru=>urimap),$H(P-SBCProfile),refuse

ipmap.conf

```
^10\.0\..*=>internal1
^10\.1\..*=>internal2
```

urimap.conf

```
iptel.org=>iptel
fliptel.com=>fliptel
```
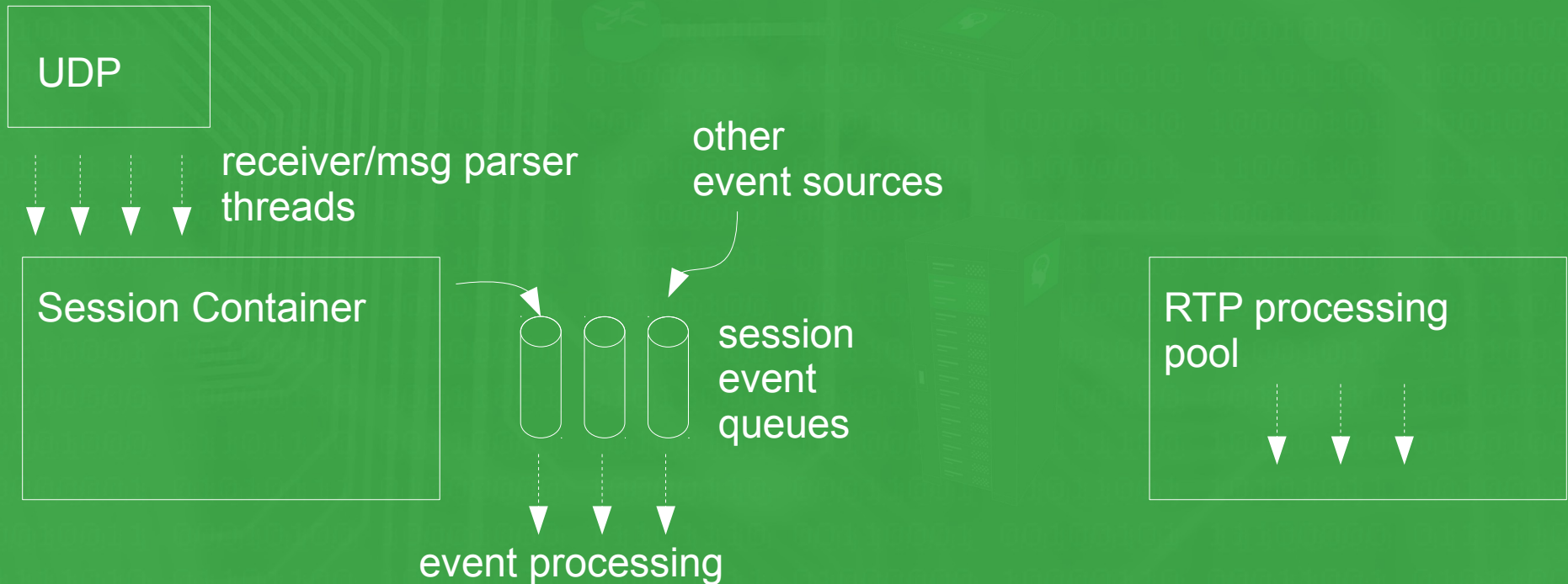
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Manage

- sems-sbc-* tools
  - get and set active profile
  - load and reload profiles
  - load and reload mappings

- Track profile versions with MD5 hash

- Get statistics from monitoring module

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A look inside: SER vs. SEMS

	SER	SEMS
language	C	C++, C
module API	callbacks	polymorphism
msg structures	C struct, lumps	Objects in STL containers
dialog container	linked list	STL map (balanced RB-tree)
execution model	processes	threads
serialization	refcount and locking	per-dialog event queues
RTP handling	external processes	integrated media engine

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Processing model

UDP

receiver/msg parser
threads

other
event sources

Session Container

session
event
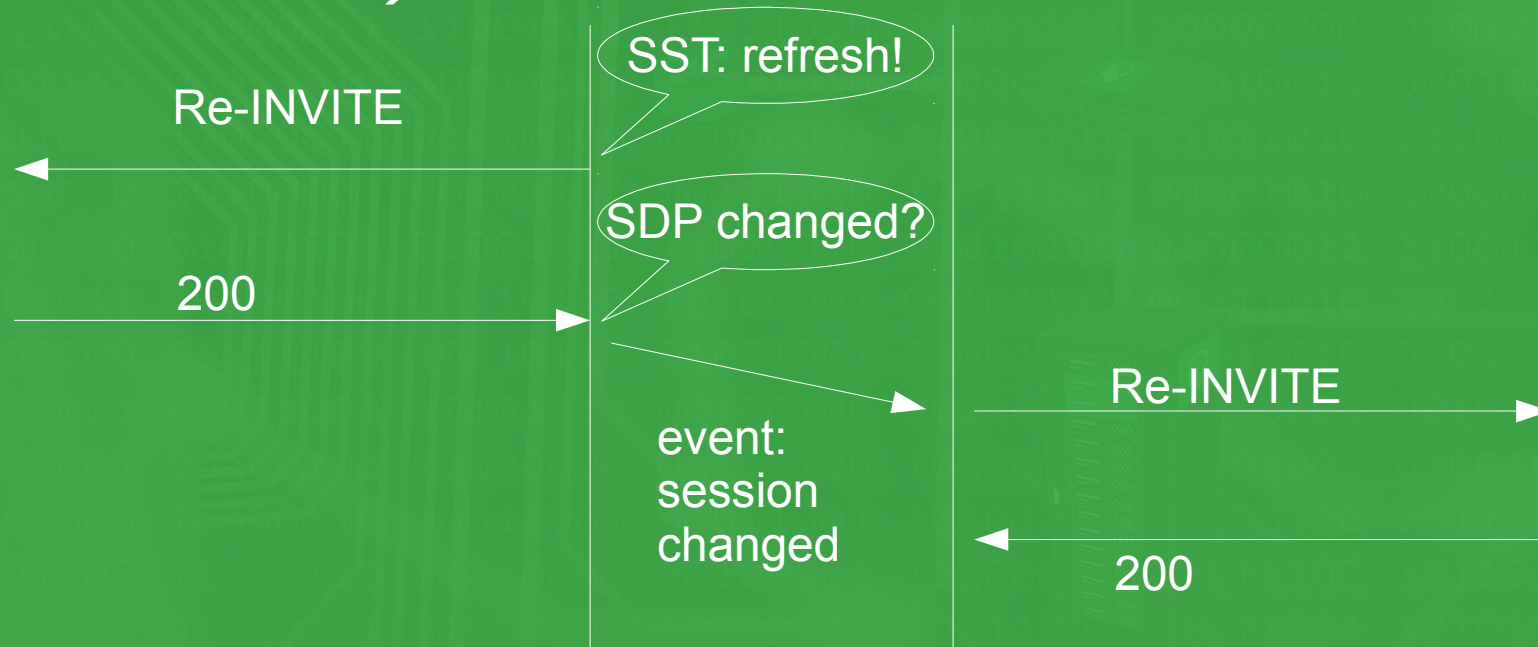queues

RTP processing
pool

event processing

- Signaling: Async, one thread per call or thread pool

- Media: Sync, Thread pool

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SEMS B2BUA architecture
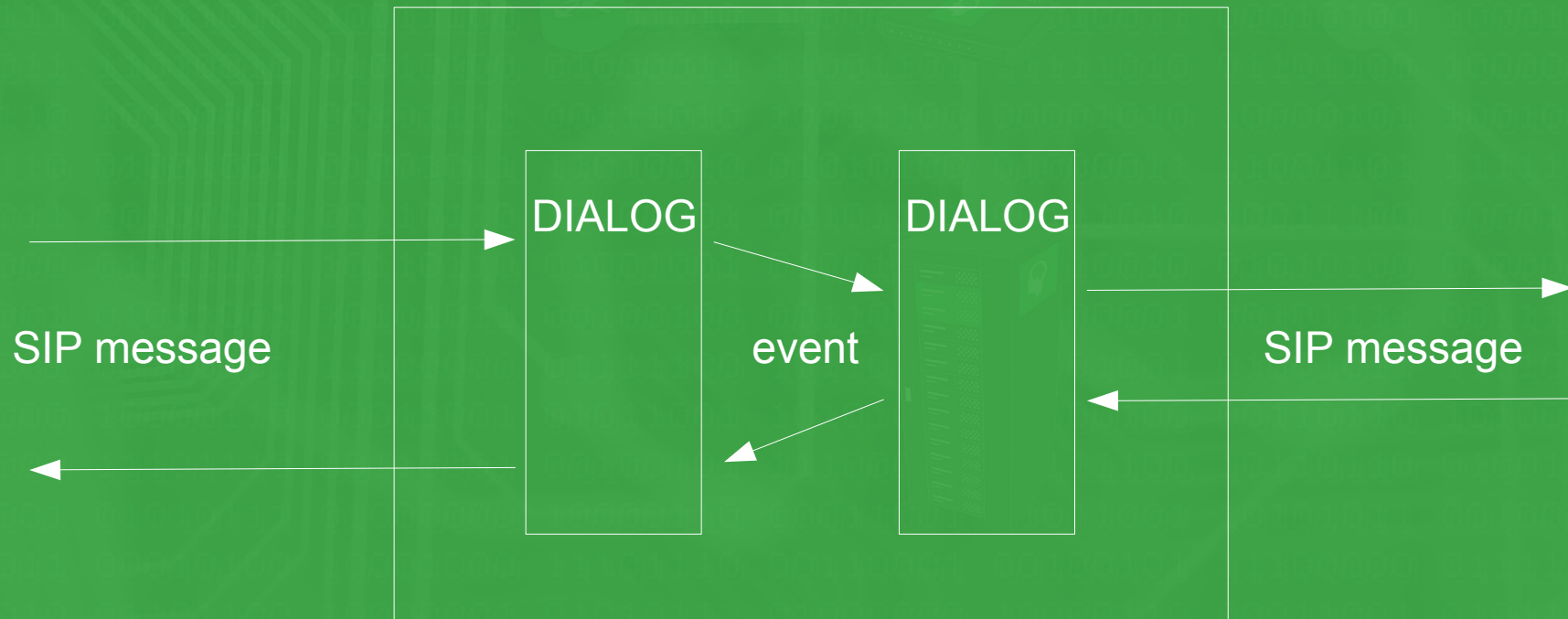
- Two complete, separate instances of SIP dialog handling

Session Timers

- Use UPDATE or re-INVITE for refresh

- SST and timer values per leg

- Try to have e2e refresh

FRAFOS: HA setup

- Save call state in redis DB

- Replication to standby server

- Transparent fail-over

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In the pipeline…

- Multi-profile matching and composition

- Load monitoring and SLA control

- OAM web interface

- Transcoding

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Thank You.