

ISUP / SIP
debugging

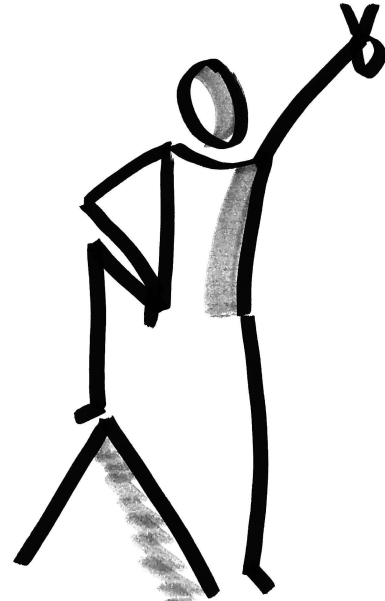
using
homer



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SIP and SS7



SIP debugging

- Wireshark
- Asterisk logs



Cons:

- only for operations
- complex for basics
- need to know the code



Use of SS7 and SIP

- SS7 carrier interconnection ISUP
- mobile integration ISUP, CAMEL/MAP
- YATE as SS7 adapter

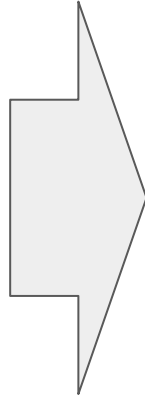
Use of SS7 and SIP

What about debugging SS7?



SS7 debugging

- t-shark
- log files
- educated guess

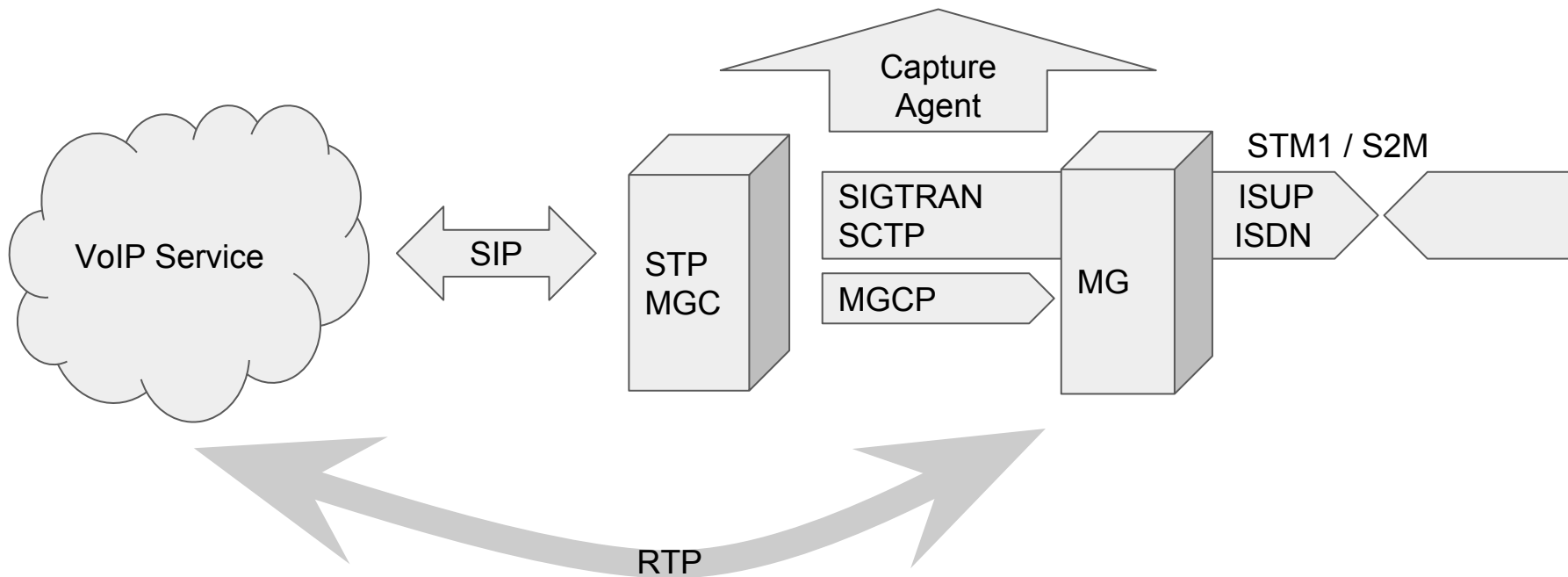


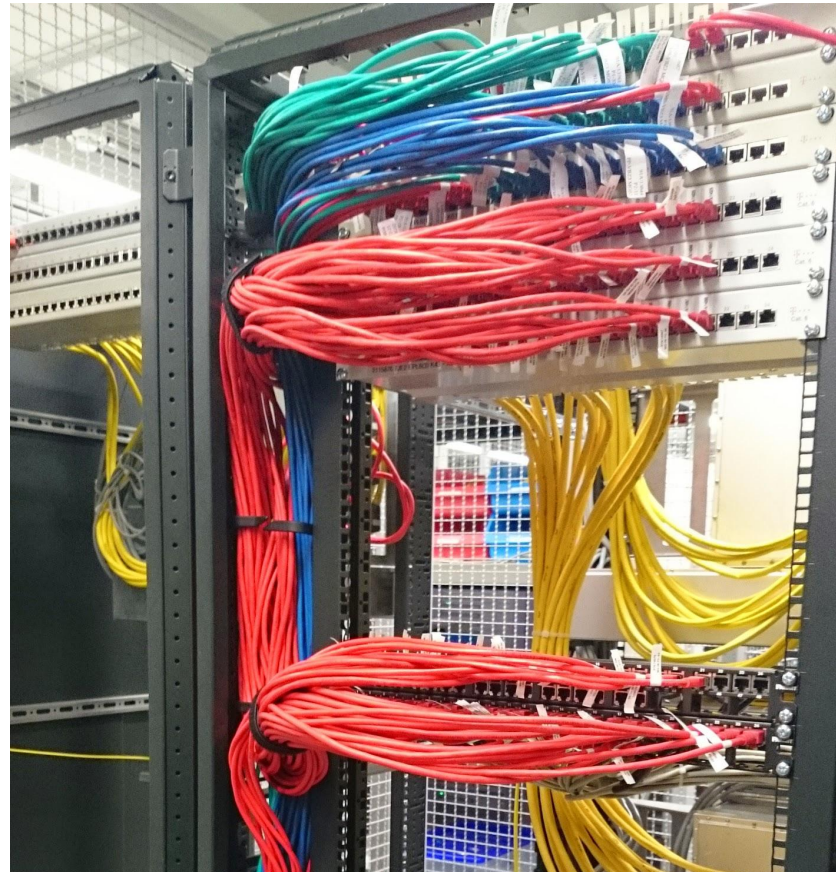
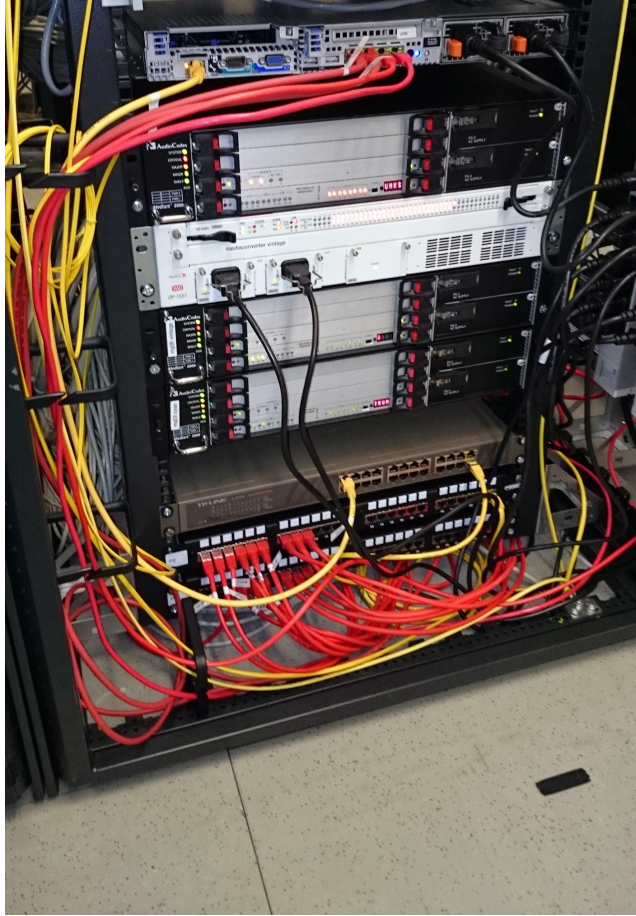
* at least the ISUP

Reason for homer integration

- one tool for calls
- other tools very expensive
- easy use

SS7 setup





Configuration:

- Capture agent
- Capture node
- MySQL DB
- Webhomer

Configuration:

All config files available online:

-> <http://sipg.at/homerconfig>

capture agent

captagent.xml

```
<configuration name="modules.conf" description="Modules">
  <modules>
    <load module="transport_json" register="local"/>
    <load module="transport_hep" register="local"/>
    <load module="protocol_sip" register="local"/>
    <load module="protocol_ss7" register="local"/>
    <load module="database_hash" register="local"/>
    <load module="socket_pcap" register="local"/>
  </modules>
</configuration>
```

<http://sipg.at/homerconfig>

capture agent

socket_pcap.xml

```
<?xml version="1.0"?>
<document type="captagent_module/xml">
<module name="socket_pcap" description="HEP Socket" serial="2014010402">
  <profile name="socketspcap_isup" description="HEP Socket" enable="true" serial="2014010402">
    <settings>
      <param name="dev" value="bond0"/>
      <param name="promisc" value="false"/>
      <param name="reasm" value="true"/>
      <param name="ipv4fragments" value="true"/>
      <param name="ipv6fragments" value="true"/>
      <param name="capture-plan" value="isup_capture_plan.cfg"/>
      <param name="filter">
        <value>(sctp)</value>
      </param>
    </settings>
  </profile>
</module>
</document>
```

<http://sipg.at/homerconfig>

capture agent

captureplans/isup_capture_plan.cfg

```
capture[pcap] {  
    if (parse_isup()) {  
        if(!send_hep("homer")) {  
            clog("ERROR", "ISUP: Enter good error message here");  
        }  
    } else{  
        clog("ERROR", "ISUP: Enter good error message here");  
    }  
}
```

<http://sipg.at/homerconfig>

capture agent

```
vinzens@awesomeMashine:/usr/local/etc/captagent$ ps fax
...
 5259 ?      S        0:00| \_ supervise captagent
 5263 ?      Sl       8:42| | \_ captagent -f /usr/local/etc/captagent/captagent.xml
...
vinzens@awesomeMashine:/usr/local/etc/captagent$
```

<http://sipg.at/homerconfig>

capture agent

```
vinzens@awesomeMashine:~$ ngrep -pqt -d any -W byline '' port 9060
interface: any
filter: (ip or ip6) and ( port 9060 )

U 2017/04/25 11:52:10.210486 1.2.3.4:58431 -> 5.6.7.8:9060
HEP3.....X.....X.....
X..J...
.
..5R.....
.....
.tt.....
.tt.....stp01MyHep2001.....2.....,.....>.....}
```

...

...

<http://sipg.at/homerconfig>

capture node

kamailio.cfg

```
loadmodule "ss7ops.so"
```

```
####
```

```
event_route[sipcapture:request] {
```

```
if ($hlep(0x00b) == 8) {
```

```
    $var(payload) = $hlep(0x00f);
```

```
    $var(res) = isup_to_json(8);
```

```
    if ($var(res) == 1) {# just route there is valid ISUP
```

```
        route(STORE_ISUP);
```

```
        drop;
```

```
    }
```

```
    else {
```

```
        return 0;
```

```
    }
```

```
}
```

<http://sipg.at/homerconfig>

capture node

kamailio.cfg

```
loadmodule "ss7ops.so"
####

event_route[sipcapture:request] {

if ($hlep(0x00b) == 8) {
    $var(payload) = $hlep(0x00f);
    $var(res) = isup_to_json(8);

    if ($var(res) == 1) {# just route there is valid ISUP
        route(STORE_ISUP);
        drop;
    }
    else {
        return 0;
    }
}
}
```

**Do not forget SIP, logs, RTCP
in your event route!!**

<http://sipg.at/homerconfig>

capture node

kamailio.cfg

```
if ($hep(0x00b) == 8) { # M2UA
    $var(payload) = $hep(0x00f);
    $var(res) = isup_to_json(8);
    ...
    ...
}

if ($hep(0x00b) == 13) { # M2PA
    $var(payload) = $hep(0x00f);
    $var(res) = isup_to_json(13);
    ...
    ...
}
```

<http://sipg.at/homerconfig>

capture node

kamailio.cfg

```
route[STORE_ISUP] {
    $var(json) = $(isup(1){sql.val});
    $var(method) = $(isup(method){sql.val});
    $var(opc) = $isup(opc);
    $var(dpc) = $isup(dpc);
...
... lots of vars
...
    $var(table) = "isup_capture_all_" + $var(utc);
    sql_query("is", "INSERT INTO $var(table)
(correlation_id, method, opc, dpc, cic, called_inn, called_ton,
called_npi, called_number, calling_ni, calling_restrict,
...
... lots of inserts
...
}
```

<http://sipg.at/homerconfig>

MySQL

homer_data

Tldr; -> link for dump

```
CREATE TABLE `isup_capture_all_20170420` (  
  `id` bigint(20) unsigned NOT NULL AUTO_INCREMENT, `date` timestamp NOT NULL DEFAULT CURRENT_TIMESTAMP, `micro_ts` bigint(18) NOT NULL  
  DEFAULT '0', `method` varchar(4) NOT NULL DEFAULT '', `correlation_id` varchar(256) NOT NULL DEFAULT '', `opc` int(10) NOT NULL DEFAULT  
  '0', `dpc` int(10) NOT NULL DEFAULT '0', `cic` int(10) NOT NULL DEFAULT '0', `called_number` varchar(16) DEFAULT '', `called_ton`  
  int(10) DEFAULT '0', `called_npi` int(10) DEFAULT '0', `called_inn` int(10) DEFAULT '0', `calling_number` varchar(16) DEFAULT '', `calling_ton`  
  int(10) DEFAULT '0', `calling_npi` int(10) DEFAULT '0', `calling_ni` int(10) DEFAULT '0', `calling_restrict` int(10) DEFAULT  
  '0', `calling_screened` int(10) DEFAULT '0', `calling_category` int(10) DEFAULT '0', `cause_standard` int(10) DEFAULT '0', `cause_location`  
  int(10) DEFAULT '0', `cause_itu_class` int(10) DEFAULT '0', `cause_itu_cause` int(10) DEFAULT '0', `event_num` int(10) DEFAULT  
  '0', `hop_counter` int(10) DEFAULT '0', `nci_satellite` int(10) DEFAULT '0', `nci_continuity_check` int(10) DEFAULT '0', `nci_echo_device`  
  int(10) DEFAULT '0', `fwc_nic` int(10) DEFAULT '0', `fwc_etem` int(10) DEFAULT '0', `fwc_iw` int(10) DEFAULT '0', `fwc_etei` int(10) DEFAULT  
  '0', `fwc_isup` int(10) DEFAULT '0', `fwc_isup_pref` int(10) DEFAULT '0', `fwc_ia` int(10) DEFAULT '0', `fwc_sccpm` int(10) DEFAULT  
  '0', `transmission_medium` int(10) DEFAULT '0', `user_coding_standard` int(10) DEFAULT '0', `user_transfer_cap` int(10) DEFAULT  
  '0', `user_transfer_mode` int(10) DEFAULT '0', `user_transfer_rate` int(10) DEFAULT '0', `user_layer1_ident` int(10) DEFAULT  
  '0', `user_layer1_proto` int(10) DEFAULT '0', `source_ip` varchar(60) NOT NULL DEFAULT '', `source_port` int(10) NOT NULL DEFAULT  
  '0', `destination_ip` varchar(60) NOT NULL DEFAULT '', `destination_port` int(10) NOT NULL DEFAULT '0', `proto` int(5) NOT NULL DEFAULT  
  '0', `family` int(1) DEFAULT NULL, `type` int(5) NOT NULL DEFAULT '0', `node` varchar(125) NOT NULL DEFAULT '', `msg` varchar(5000) NOT NULL  
  DEFAULT '', `expires` int(5) NOT NULL DEFAULT '-1', PRIMARY KEY (`id`, `date`), KEY `date` (`date`), KEY `called_number` (`called_number`), KEY  
  `calling_number` (`calling_number`), KEY `correlationid` (`correlation_id` (255))) ENGINE=InnoDB DEFAULT CHARSET=utf8 ROW_FORMAT=COMPRESSED  
  KEY_BLOCK_SIZE=8 COMMENT='20170420';
```

Do not forget to enable rotate Script for new tables

<http://sipg.at/homerconfig>

Webhomer

System Admin

Admin Alias

Local Aliases + Add Alias

Id	Alias	Gid	IP	Port	Capture ID	Is a STP	status	Created
173	QSC->Safran	10	87.2...	5060		0	1	2016-02-18 0...
172	BT DUS	10	62.1...	5060		0	1	2016-02-18 0...
171	MG-media54-...	10	212....	5060		0	1	2016-02-18 0...
170	MG-media53-...	10	212....	5060		0	1	2016-02-18 0...
169	MG-media52-...	10	212....	5060		0	1	2016-02-18 0...
168	MG-media51-...	10	212....	5060		0	1	2016-02-18 0...
167	MG-media50-...	10	212....	5060		0	1	2016-02-18 0...
166	MG-media49-...	10	212....	5060		0	1	2016-02-18 0...
165	Voxbone	10	81.2...	5060		0	1	2016-02-18 0...
164	safran LB02	10	217....	5060		0	1	2016-02-18 0...
163	MG-media48-...	10	212....	5060		0	1	2016-02-18 0...

Webhomer

System Admin

Admin Alias

Local Aliases New Alias x

Alias

Awesome Mashine

IP

1.2.3.4

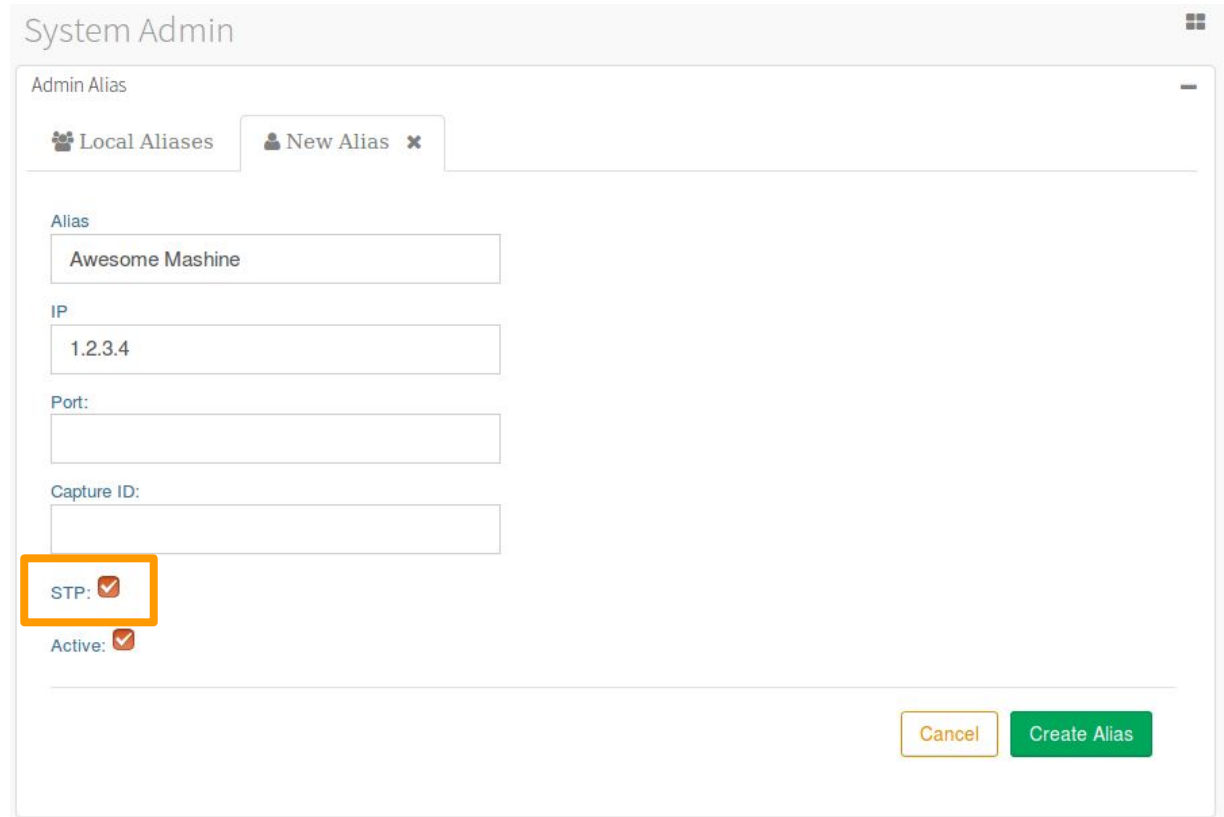
Port:

Capture ID:

STP:

Active:

Cancel Create Alias



Webhomer

Admin Alias


Local Aliases + Add Alias

Id	Alias	Gid	IP	Port	Capture ID	Is a STP	status	Created
210	SS7-WIESE	10	212. [REDACTED]	0		0	1	2017-03-24 1...
209	SS7-EMMER	10	217. [REDACTED]	0		0	1	2017-03-24 1...
208	MGC-DTAG-...	10	212. [REDACTED]	0		1	1	2017-02-20 1...
207	STP-EPLUS-...	10	212. [REDACTED]	0		1	1	2017-02-20 1...
206	MGC-DTAG-...	10	217. [REDACTED]	0		1	1	2017-02-20 1...
205	STP-EPLUS-...	10	217. [REDACTED]	0		1	1	2017-02-20 1...
204	QSC via Safran	10	92.1 [REDACTED]	5060		0	1	2016-12-06 1...
203	sipconnect.si...	10	200 [REDACTED]	5060		0	1	2016-07-26 1...
202	sipconnect.si...	10	200 [REDACTED]	5060		0	1	2016-07-26 1...
201	sipconnect.si...	10	200 [REDACTED]	5060		0	1	2016-07-26 1...

Webhomer How does it look?

Webhomer

SIP Signaling

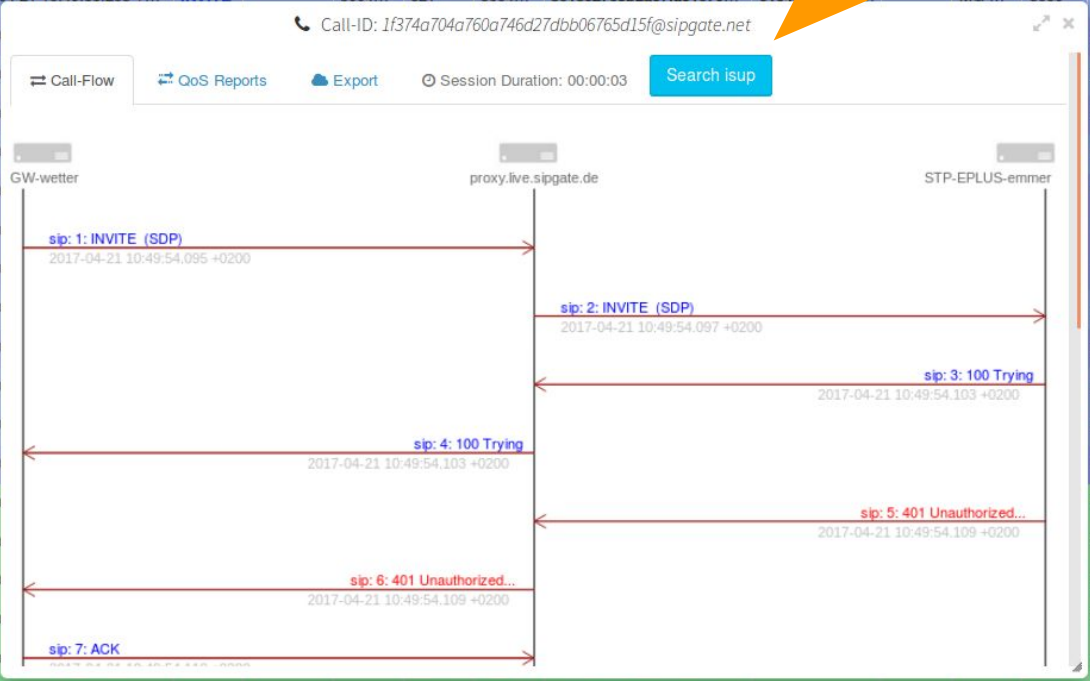
Search 

Regex Filter ...

Id	Date	Method	Reason	RURI	From	To	CallID	CallID_AL	Port	Sourc	SPort	Destl	DPort	Pr	Nöde
1303...	2017-04-21 10:49:53.205	INVITE		3004...	621	3004...	5618e27c5b2a37fa51676...	3134...		MG...	5060	local...	5060	udp	wieda...
1303...	2017-...											local...	5060	udp	wieda...
1303...	2017-...											ser08...	5060	udp	wieda...
1303...	2017-...											ser08...	5060	udp	wieda...
1303...	2017-...											local...	5060	udp	wieda...
1303...	2017-...											local...	5060	udp	wieda...
1303...	2017-...											ser08...	5060	udp	wieda...
1303...	2017-...											ser08...	5060	udp	wieda...
1303...	2017-...											ser08...	5060	udp	wieda...
1303...	2017-...											sipga...	5060	udp	wieda...
1303...	2017-...											sipga...	5060	udp	wieda...
1303...	2017-...											GW-...	5060	udp	wieda...
1303...	2017-...											proxy...	5060	udp	wieda...
1303...	2017-...											STP-...	5060	udp	wieda...
1219...	2017-...											proxy...	5060	udp	barnit...
1219...	2017-...											GW-...	5060	udp	barnit...
1219...	2017-...											proxy...	5060	udp	barnit...

Call-ID: 1f374a704a760a746d27dbb06765d15f@sipgate.net

Call-Flow QoS Reports Export Session Duration: 00:00:03 Search isup

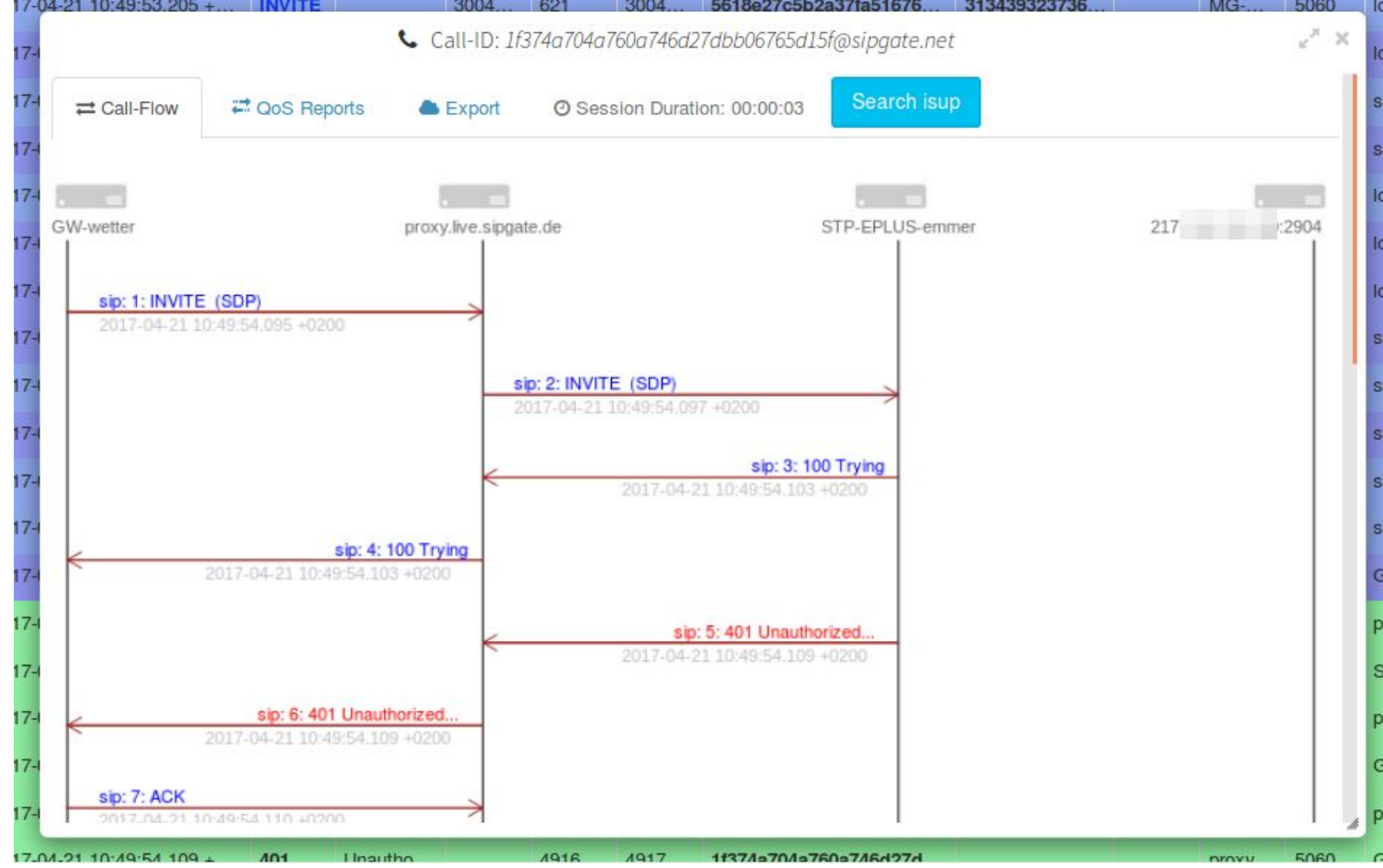


Total Items: 31

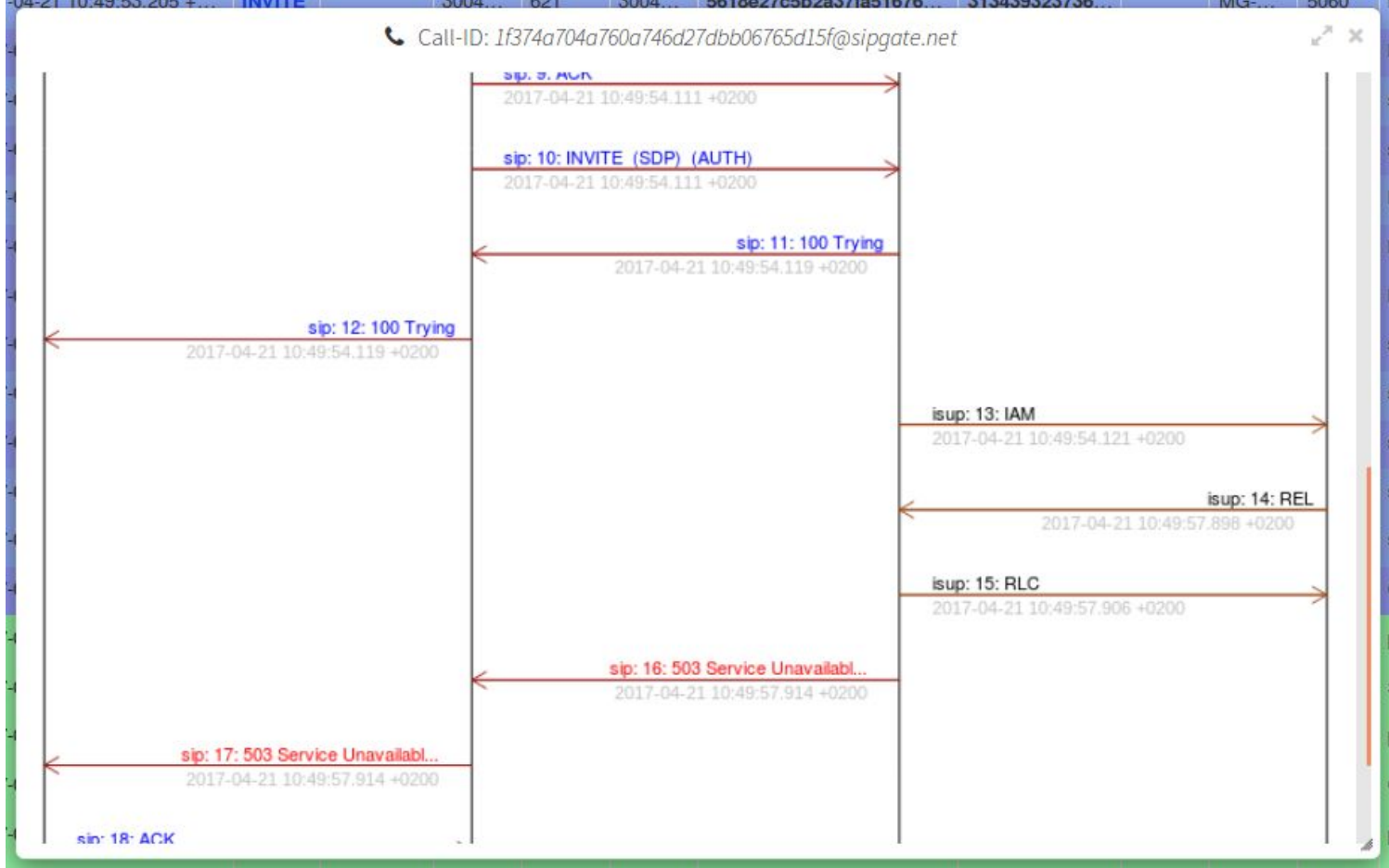
1 / 1 1000 items per page

1 - 31 of 31 items

Webhomer



Webhomer



Webhomer

SIP Signaling

MSG ID: 69595

Message [Details](#)

2017-04-21 10:49:54 +0200 : 217. [redacted]:2904 -> 217. [redacted]:2904

Message	IAM
CIC	362
OPC	[redacted]
DPC	[redacted]
Called Num	4917605810248F
Called Inn	routing to internal network number not allowed
Called NPI	ISDN (Telephony) numbering plan (ITU-T Recommendation E.164)
Called TON	international number
Calling Num	1637 [redacted]
Calling NI	complete
Calling Restrict	presentation allowed
Calling Screened	network provided
Calling NPI	ISDN (Telephony) numbering plan (ITU-T Recommendation E.164)
Calling TON	national (significant) number
Calling Party	ordinary calling subscriber
nature_of_connection satellite	no satellite circuit in the connection

Total Items: 31

Navigation: [Back] [Previous] [1] [Next] [Forward]

CallID_AL	User	Sourc	SPort	Dest
27c5b2a37fa51676...	313439323736...	MG...	5060	loca

5765d15f@sipgate.net

isup: 13: IAM
2017-04-21 10:49:54.121 +0200

isup: 14: REL
2017-04-21 10:49:57.898 +0200

isup: 15: RLC
2017-04-21 10:49:57.906 +0200

Unavailabl...
57.914 +0200

70a760a716d27d...	prox...	5060	GW-
-------------------	---------	------	-----

Webhomer

The screenshot displays the Webhomer interface with a table of SIP messages and a detailed view of message ID 69615. The table has columns for Date, Method, Reason, RURI, From, To Us, CallID, CallID_AL, User, Source, SPort, Destination, and DPort. The detailed view shows the message content and various SIP headers.

Message Details:

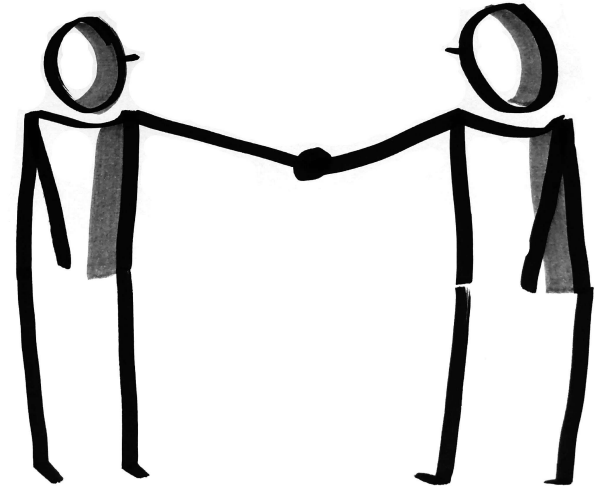
- MSG ID: 69615
- Message
- Details
- 2017-04-21 10:49:57 +0200 : 217. [redacted] :2904 -> 217 [redacted] 2904
- Message: REL
- CIC: 362
- OPC: [redacted]
- DPC: [redacted]
- cause standard: ITU-T
- cause location: public network serving the local user (LN)
- cause itu_class: normal event
- cause itu_cause: Resource unavailable, unspecified

Message Log:

- 2017-04-21 10:49:53.205 +0200: INVITE
- 2017-04-21 10:49:54.111 +0200: sip: 12: [redacted]
- 2017-04-21 10:49:54.121 +0200: AM
- 2017-04-21 10:49:57.898 +0200: isup: 14: REL
- 2017-04-21 10:49:57.906 +0200: LLC
- 2017-04-21 10:49:57.911 +0200: sip: 17: 503 Service Unavailable
- 2017-04-21 10:49:58.109 +0200: sin: 18: ACK

Special thanks to:

- Homer project
- Holger Freyther
(moiji-mobile.com)



Questions ?

