OpenSIPS 3.3 - Messaging in the IMS and UC Ecosystems

Liviu Chircu

- Feb 5th, 2023 -

FOSDEM'23

About Me

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opensips

@liviuchircu

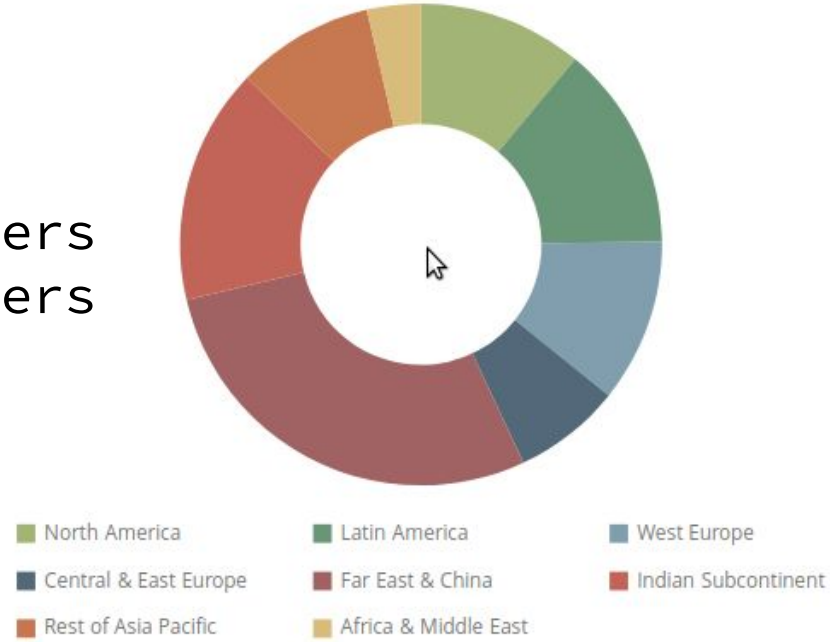
- opensips developer & maintainer
- Design, Develop & Maintain SIP Platforms

OPENSIPS SOLUTIONS

RCS Forecasts

2022: 1.2B subscribers
2026: **3.2B** subscribers

Figure 2: Global Number of Mobile Subscribers that Are RCS Capable in 2022, Split by 8 Key Regions: 1.2 Billion



Source: Juniper Research

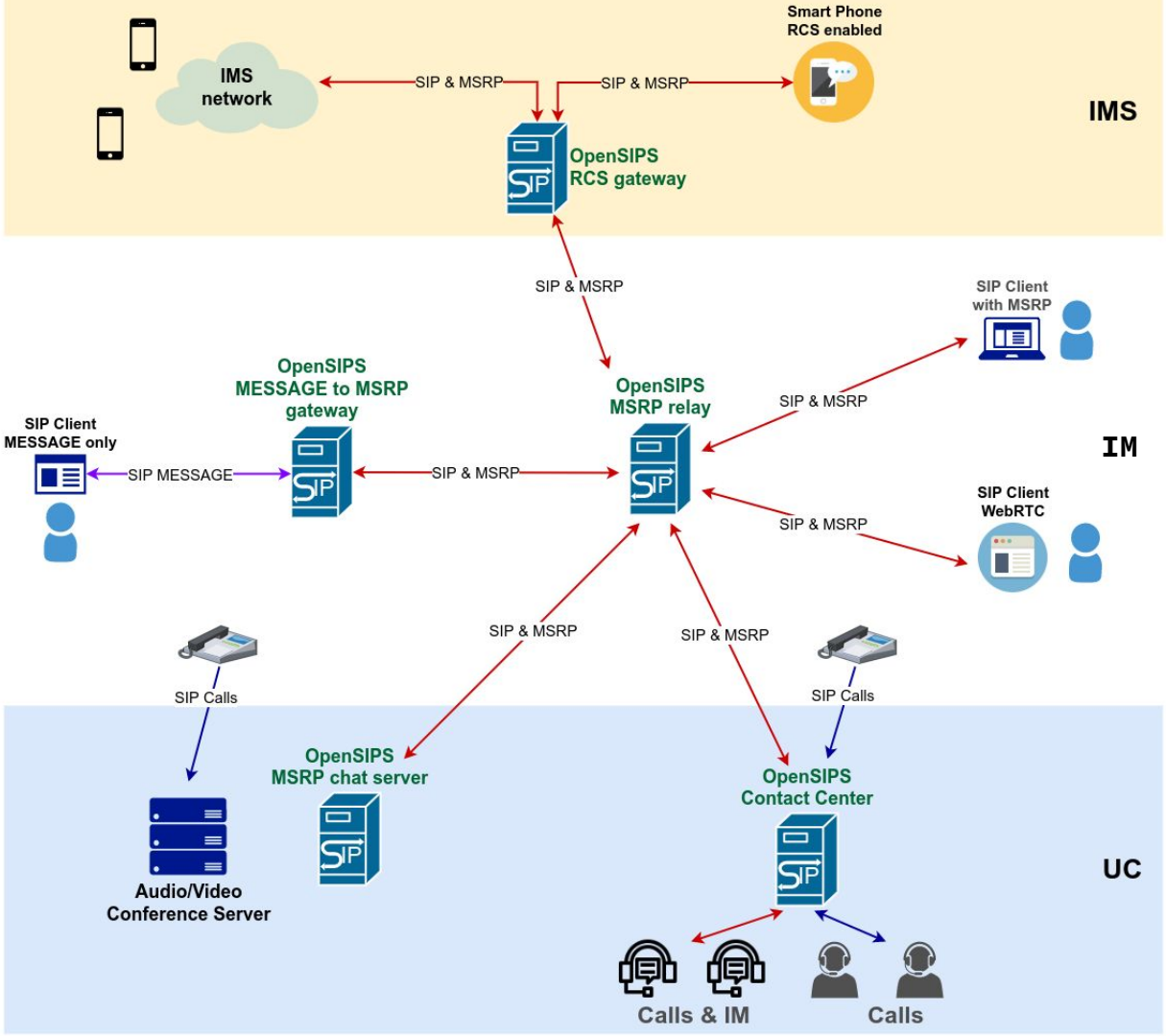
OpenSIPS 3.3

..is “**Instant Messaging**” focused

- IM was always neglected in SIP

- IM is now important in IMS ecosystem (RCS)

- There is no Unified Communication without IM


Smart Phone
RCS enabled
IMS network
SIP & MSRP
SIP & MSRP
IMS
OpenSIPS
RCS gateway
SIP & MSRP
SIP Client
with MSRP
OpenSIPS
MESSAGE to MSRP
gateway
OpenSIPS
MSRP relay
SIP & MSRP
SIP Client
MESSAGE only
SIP MESSAGE
SIP & MSRP
IM
SIP Client
WebRTC
SIP & MSRP
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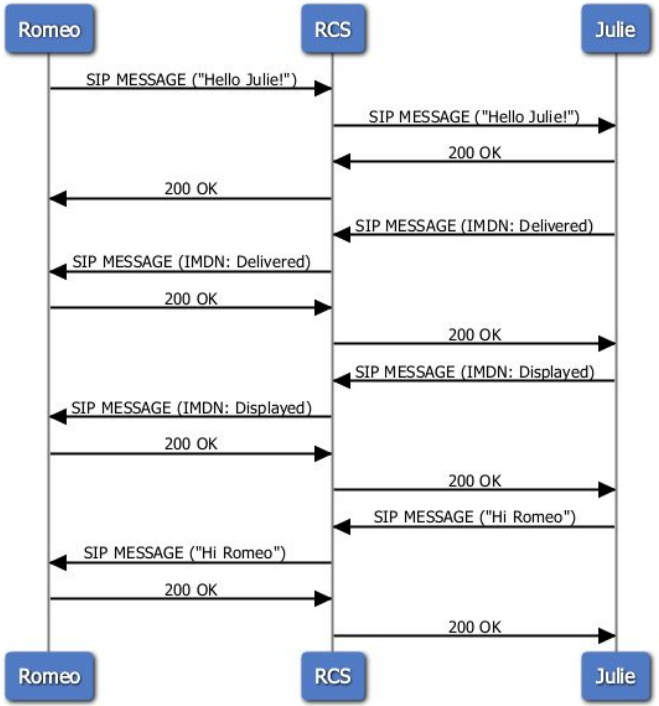
SIP Calls
SIP Calls
OpenSIPS
MSRP chat server
OpenSIPS
Contact Center
Audio/Video
Conference Server
UC
Calls & IM
Calls

Instant Messaging

IM using “Pager Mode”

- SIP MESSAGE (RFC 3428)
- standalone messages (no session)
- media payload is part of the SIP message itself



IM using “Pager Mode”

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```
MESSAGE sip:122334455566@1.2.3.4:5060 SIP/2.0.
Via: SIP/2.0/UDP 4.5.6.7:5060;branch=z9hG4bK1sansay666699265rdb3932.
Record-Route: <sip:sansay666699265rdb3932@4.5.6.7:5060;lr;transport=udp>.
To: <sip:122334455566@1.2.3.4>.
From: <sip:141776@4.5.6.7>;tag=sansay666699265rdb3932.
Call-ID: 200167691-1-1088023530@4.5.6.75.
CSeq: 1 MESSAGE.
Max-Forwards: 69.
Content-Type: text/plain.
Content-Length: 153.
.
PragerU: How did the Framers ensure that presidents wouldn't turn into tyrants?
 https://itbl.co/IhC~VA7I7

Msg&data rates may apply. Text 'STOP' to quit.
```

IM using “Session Mode”

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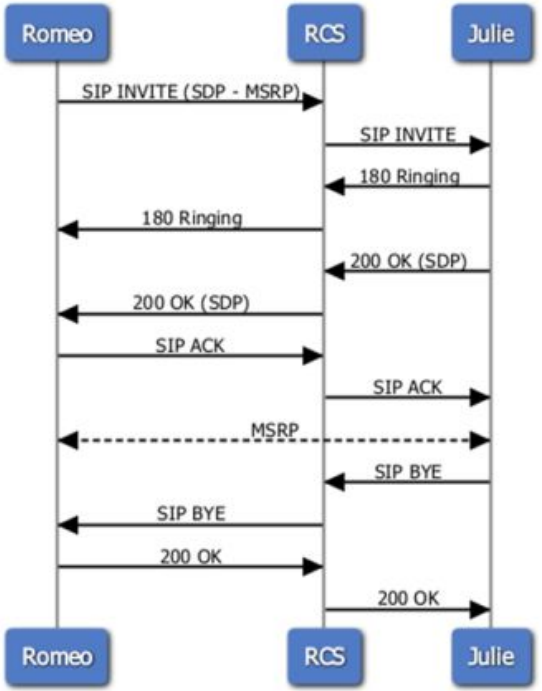
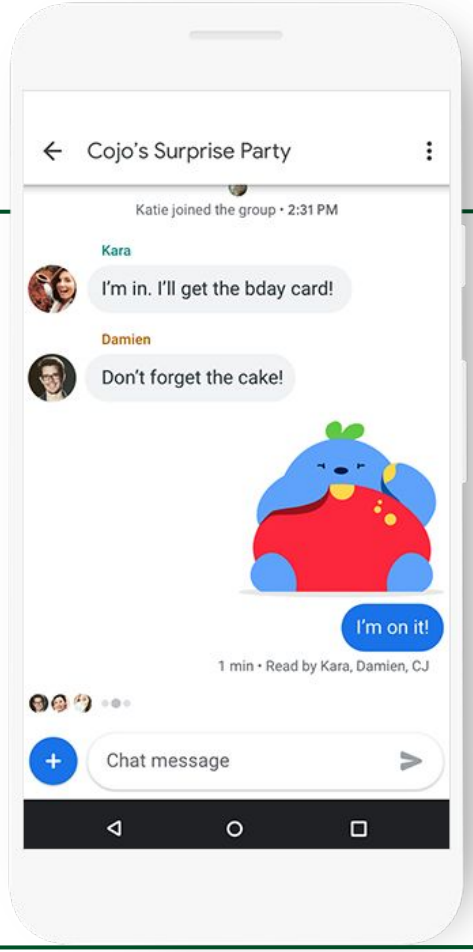
Message Session Relay Protocol (MSRP)
RFC 4975

- Groups messages in **sessions**
- **Uses SIP** as a rendezvous protocol and the MSRP protocol for transporting the media
- Is better suited for building more advanced messaging services such as **read/write receipts**, **group chat**, **file transfer**, **photo sharing**



IM using “Session Mode”



The MSRP Protocol

MSRP overview

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- Text-based, connection-oriented protocol for exchanging arbitrary MIME content, especially IM
- Sessions are established in SIP, using SDP with a few extra MSRP specific attributes
- Is peer-to-peer at its roots but can also use intermediaries called Relays (defined in RFC 4976)
- Uses TCP/TLS for peer-to-peer connections or TLS when a relay is employed
- Has a request-response model with transactions and separate optional success reporting or failure reporting for *delivery status*
- May chunk messages in multiple requests in order to interrupt sending or split up large messages(eg. files)

Example MSRP session setup

INVITE sip:bob@biloxi.example.com SIP/2.0
To: <sip:bob@biloxi.example.com>
From: <sip:alice@atlanta.example.com>;tag=786
Call-ID: 3413an89KU
Content-Type: application/sdp

c=IN IP4 atlanta.example.com
m=message 7654 TCP/MSRP *
a=accept-types:text/plain
a=path:msrp://atlanta.example.com:7654/jshA7weztas;tcp

Example MSRP session setup

SIP/2.0 200 OK
To: <sip:bob@biloxi.example.com>;tag=087js
From: <sip:alice@atlanta.example.com>;tag=786
Call-ID: 3413an89KU
Content-Type: application/sdp

c=IN IP4 biloxi.example.com
m=message 12763 TCP/MSRP *
a=accept-types:text/plain
***a=path:msrp://biloxi.example.com:12763/kjhd37s2s20w2a;tc*p**

Example MSRP exchange

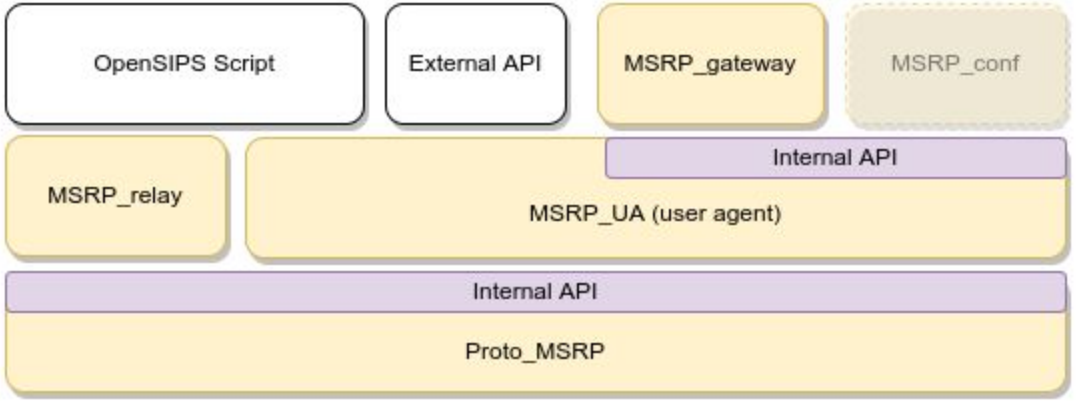

```
MSRP a786hjs2 SEND
To-Path: msrp://biloxi.example.com:12763/kjhd37s2s20w2a;tcp
From-Path: msrp://atlanta.example.com:7654/jshA7weztas;tcp
Message-ID: 87652491
Byte-Range: 1-25/25
Content-Type: text/plain

Hey Bob, are you there?
-------a786hjs2$
```

Example MSRP exchange

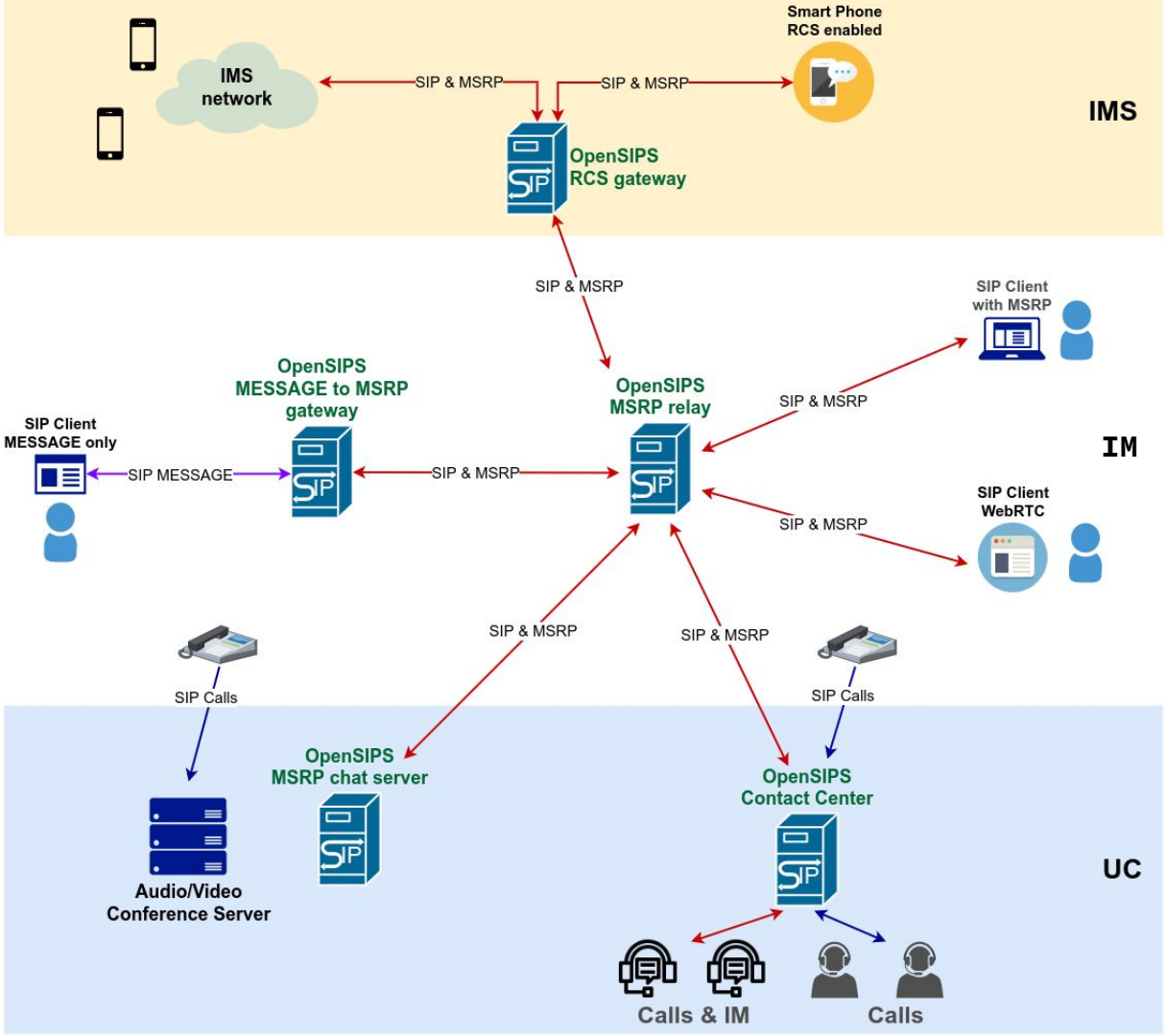
MSRP a786hjs2 200 OK
To-Path: msrp://atlanta.example.com:7654/jshA7weztas;tcp
From-Path:
msrp://biloxi.example.com:12763/kjhd37s2s20w2a;tcp
-------a786hjs2$

The MSRP Stack in OpenSIPS 3.3

MSRP stack in OpenSIPS 3.3



MSRP Relay


Smart Phone
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SIP Calls
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MSRP chat server
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Contact Center
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UC
Calls & IM
Calls

MSRP Relay module

- MSRP requires clients to do **HTTP Digest Authentication** when using a Relay (via the *AUTH* method in MSRP)

- The module provides dedicated script routes for:
  - providing the authentication credentials
  - performing bridging between multiple interfaces

MSRP Relay config example

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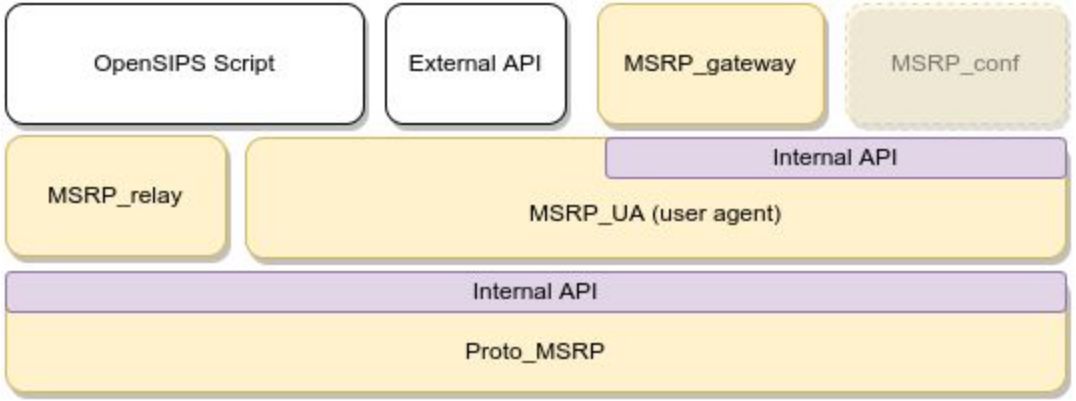
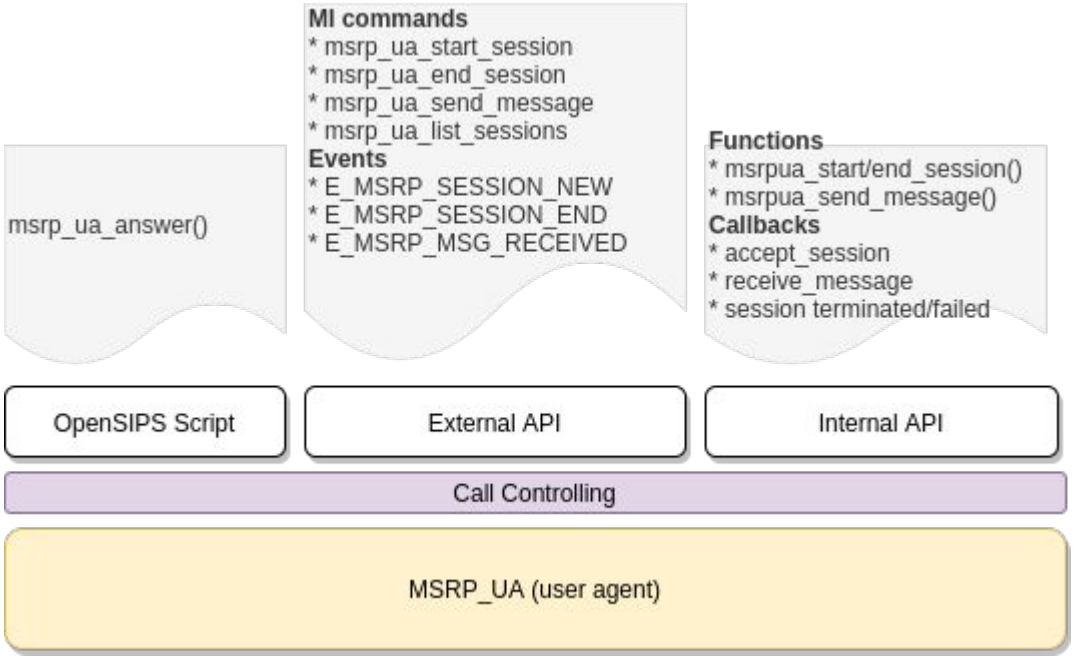
```
socket=msrp:10.0.0.14:2855

modparam("msrp_relay", "my_uri", "msrp://10.0.0.14:2855;tcp")
modparam("msrp_relay", "socket_route", "msrp_routing")

route[msrp_auth] {
     avp_db_query("SELECT ha1 FROM subscriber WHERE username='$var(username)'",
          "$avp(hash)");
     $var(password_hash) = $avp(hash);
}

route[msrp_routing] {
     xlog("MSRP request coming from $si:$sp on $socket_in socket\n");
     xlog("trying to go to $var(dst_schema)://$var(dst_host)\n");

     $socket_out = "msrp:1.2.3.4:9999";
}
```

MSRP User Agent

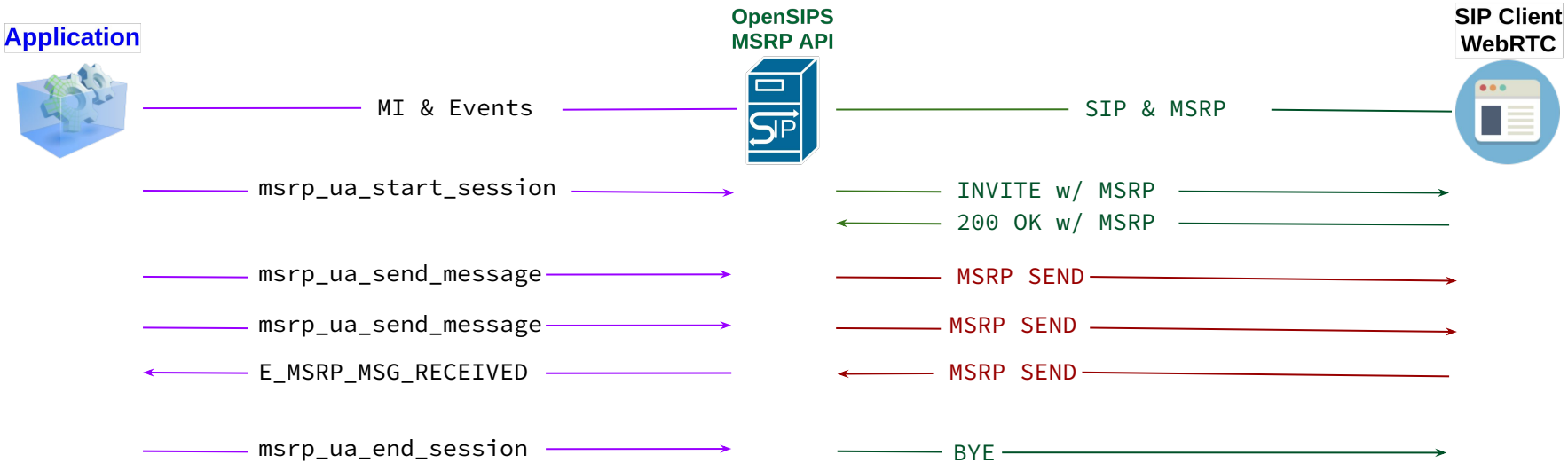
MSRP stack in OpenSIPS 3.3



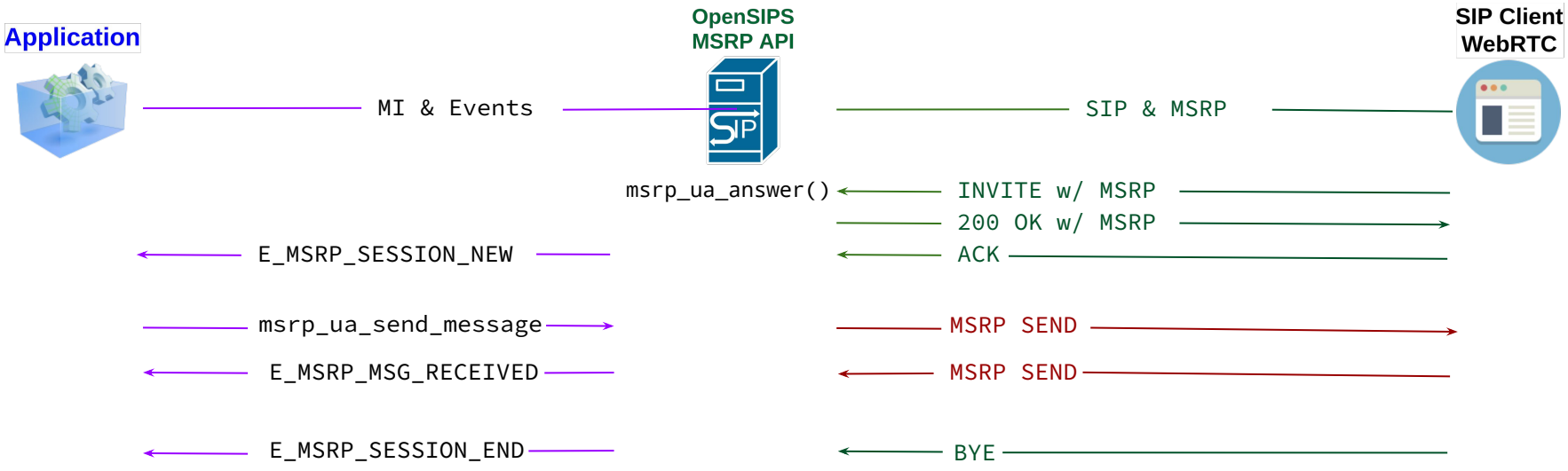
MSRP UA API


MI commands
* msrp_ua_start_session
* msrp_ua_end_session
* msrp_ua_send_message
* msrp_ua_list_sessions
Events
* E_MSRP_SESSION_NEW
* E_MSRP_SESSION_END
* E_MSRP_MSG_RECEIVED
Functions
* msrpua_start/end_session()
* msrpua_send_message()
Callbacks
* accept_session
* receive_message
* session terminated/failed
msrp_ua_answer()
OpenSIPS Script
External API
Internal API
Call Controlling
MSRP_UA (user agent)

Start A Session From An External App



Answer A Session From OpenSIPS



Unified Communication

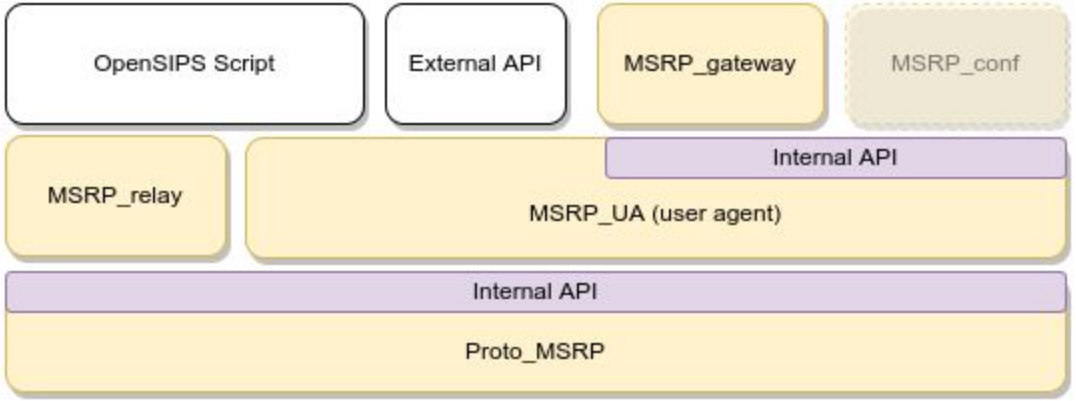
Supporting all SIP chat clients

Before UC, we need to Bridge / Gateway between:

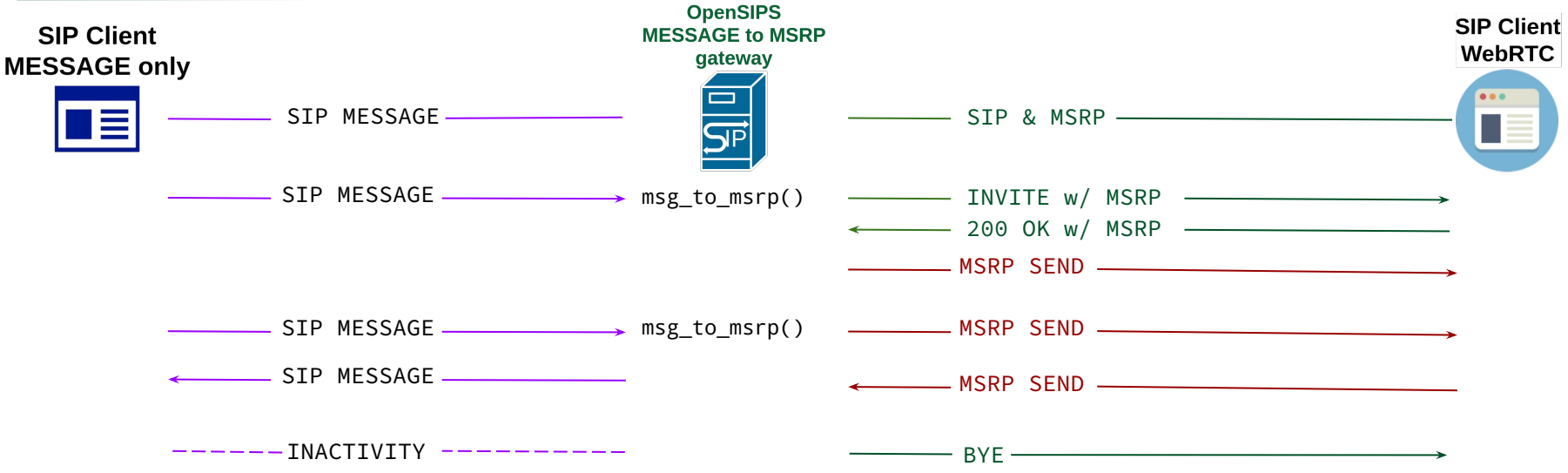
- SIP clients with Page Mode (SIP MESSAGE)
- MSRP-based ("Session Mode") Instant Messaging

MSRP Gateway

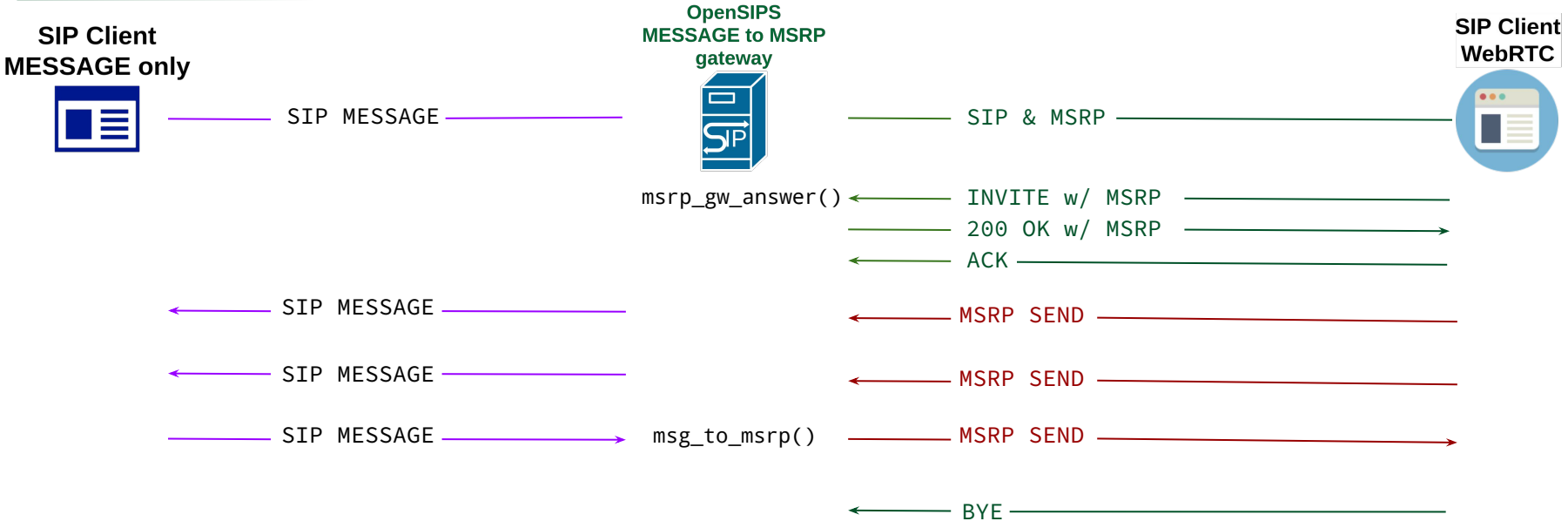
MSRP stack in OpenSIPS 3.3



Gatewaying From MESSAGE To MSRP



Gatewaying From MSRP Call To MESSAGE



Call Center: UC Enhancements

Call Center -> Contact Center

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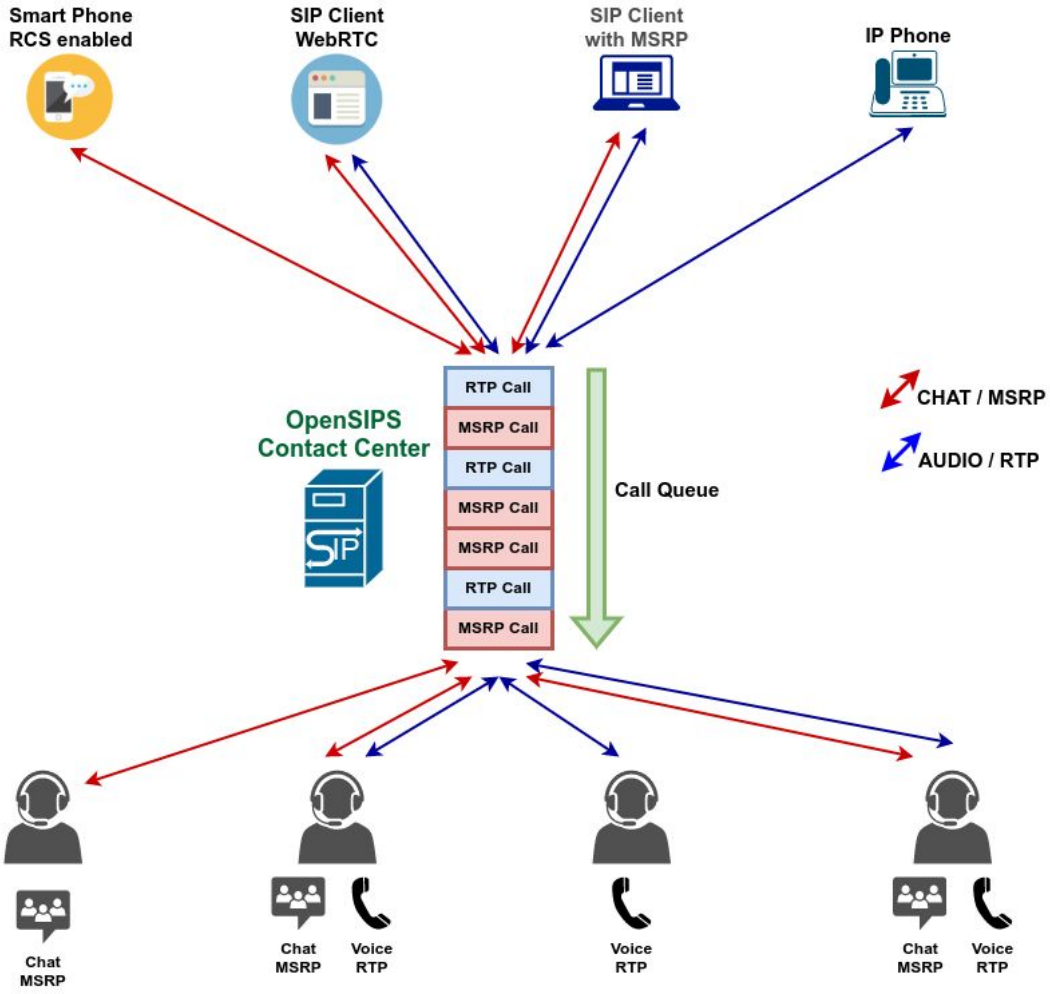
In addition to voice/video, a Contact Center may support Messaging/Chat, emails or tickets as communication channels between Customers and Agents.

1. Agents, beside skills, will have **multiple supported communication types**.
2. Certain communication types may support **multiple parallel channels** (like an agent may do 4 chats simultaneous)
3. An agent **cannot do different communication types** in the same time


Smart Phone
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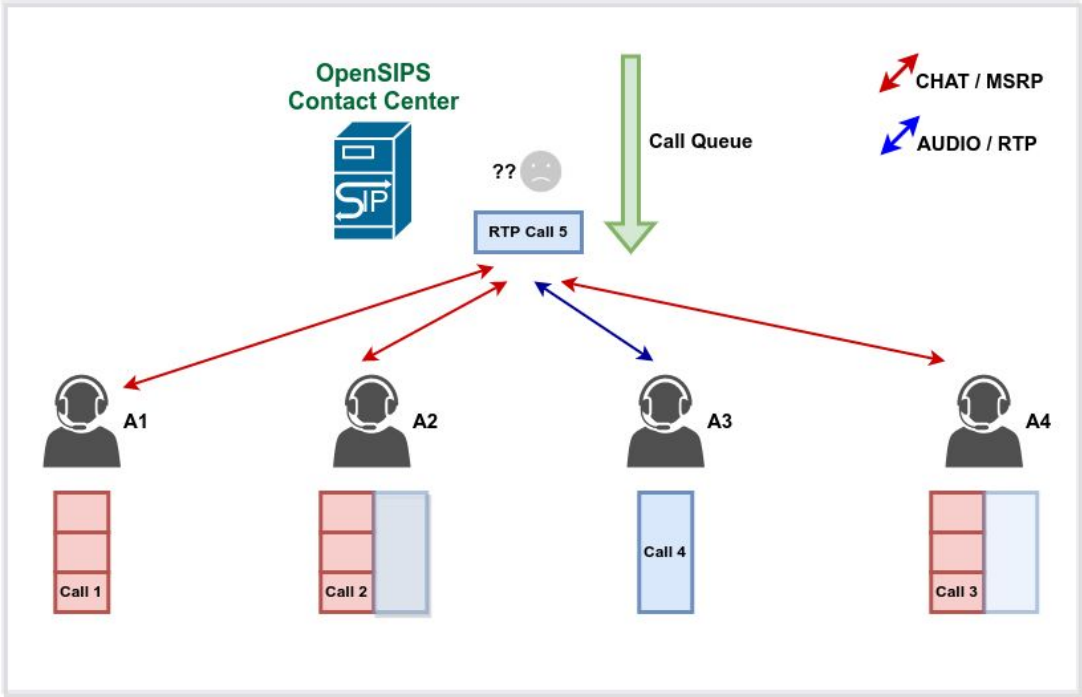
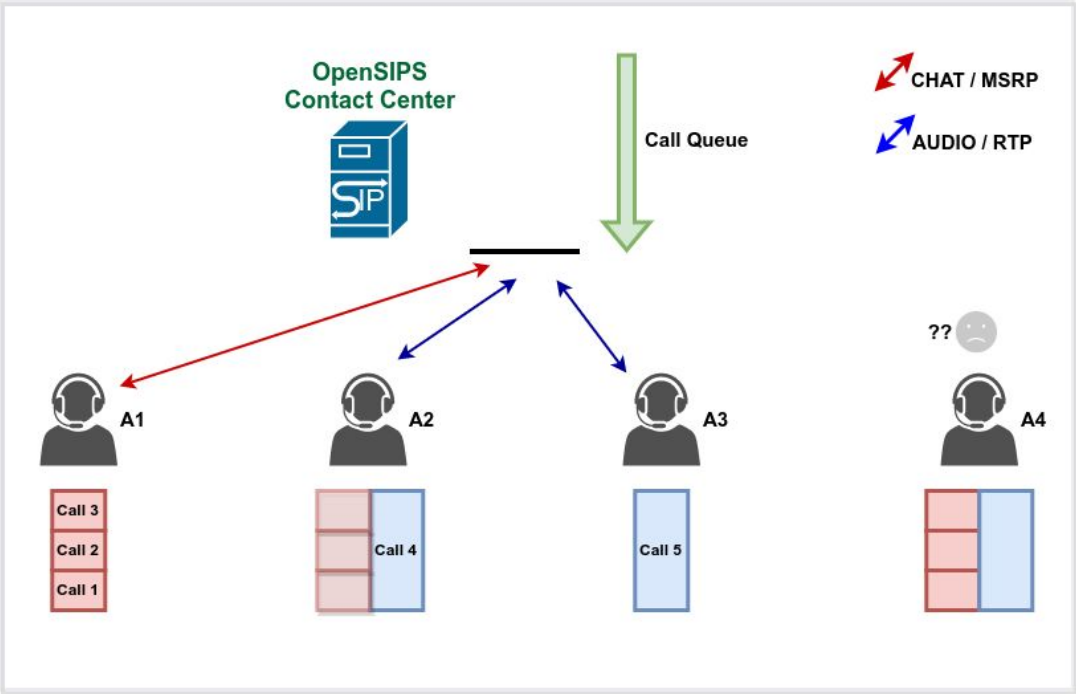
Contact Center
RTP Call
MSRP Call
RTP Call
MSRP Call
MSRP Call
RTP Call
MSRP Call
Call Queue
CHAT / MSRP
AUDIO / RTP
Chat
MSRP
Chat
MSRP
Voice
RTP
Voice
RTP
Chat
MSRP
Voice
RTP

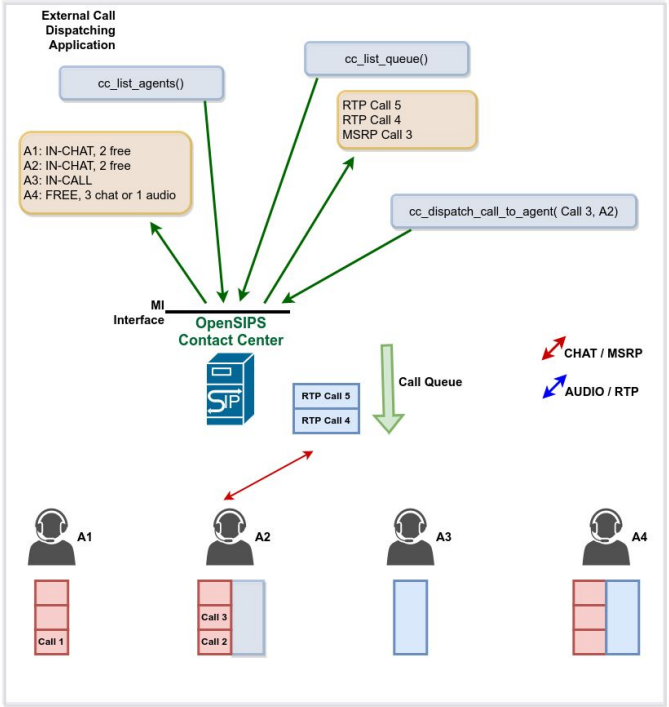
Call Distribution: “balancing” mode



Call Distribution: “full-load” mode



Call Distribution: DYI (external)



IMS

IMS - Diameter ++

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- OpenSIPS 3.2 introduced a first version of the support for DIAMETER protocol
- OpenSIPS 3.3 now offers a way of **building and sending arbitrary DIAMETER protocol requests**, from the opensips.cfg script

⇒ implement **custom DIAMETER based services**, not only Auth and Accounting

Status & Report support

Status/Report - the reports - example

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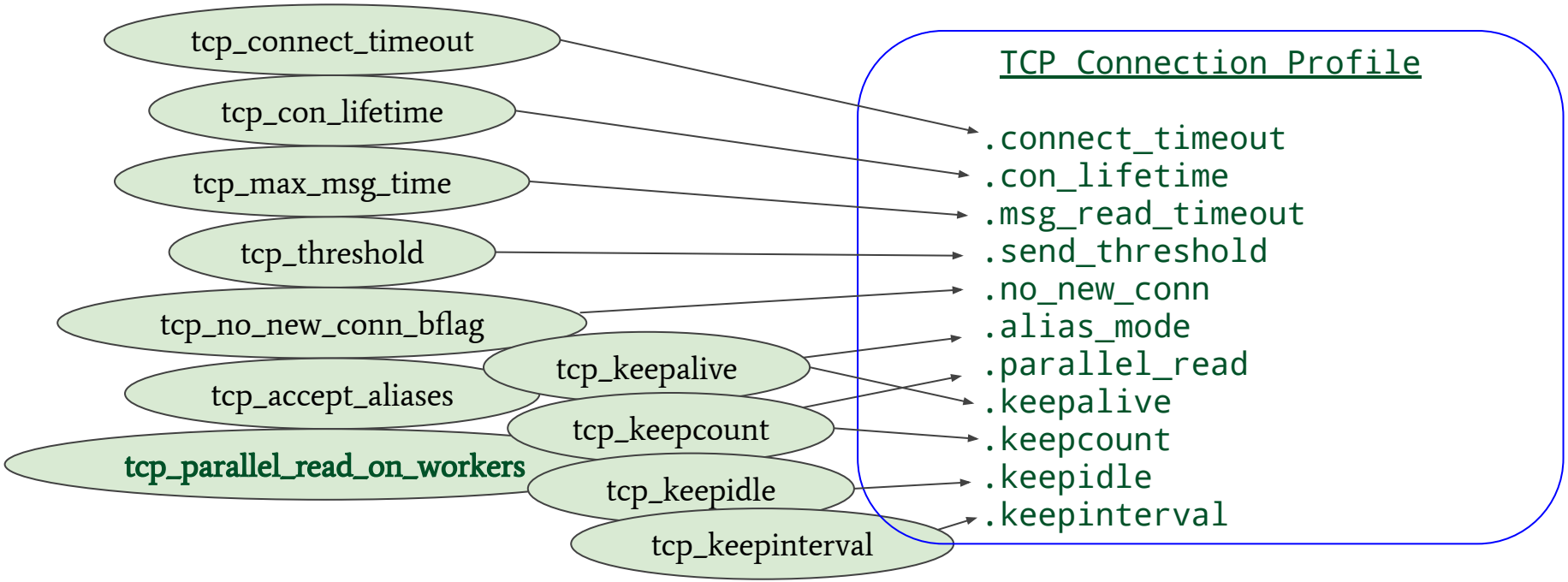
```
$ opensips-cli -x mi sr_list_reports drouting
[ {     "Name": "Default",
        "Reports": [
            {   "Timestamp": 1647526996,
                "Date": "Thu Mar 17 16:23:16 2022",
                "Log": "starting DB data loading"
            },
            {   "Timestamp": 1647526996,
                "Date": "Thu Mar 17 16:23:16 2022",
                "Log": "DB data loading successfully completed"
            },
            {   "Timestamp": 1647526996,
                "Date": "Thu Mar 17 16:23:16 2022",
                "Log": "2 gateways loaded (0 discarded), 2 carriers loaded (0 discarded), 1
rules loaded (0 discarded)"
            }
```

Enhanced TCP control (new “tcp_mgm” module)

TCP Connection Profile



DB Schema

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```
MariaDB [opensips]> desc tcp_mgm;
+-------------------+------------------+------+-----+---------+----------------+
| Field             | Type             | Null | Key | Default | Extra          |
+-------------------+------------------+------+-----+---------+----------------+
| id                | int(10) unsigned | NO   | PRI | NULL    | auto_increment |
| proto             | char(8)          | NO   |     | any     |                |
| remote_addr       | char(43)         | YES  |     | NULL    |                |
| remote_port       | int(10) unsigned | NO   |     | 0       |                |
| local_addr        | char(43)         | YES  |     | NULL    |                |
| local_port        | int(10) unsigned | NO   |     | 0       |                |
| priority          | int(11)          | NO   |     | 0       |                |
| attrs             | char(255)        | YES  |     | NULL    |                |
| connect_timeout   | int(10) unsigned | NO   |     | 100     |                |
| con_lifetime      | int(10) unsigned | NO   |     | 120     |                |
| msg_read_timeout  | int(10) unsigned | NO   |     | 4       |                |
| send_threshold    | int(10) unsigned | NO   |     | 0       |                |
| no_new_conn       | int(10) unsigned | NO   |     | 0       |                |
| alias_mode        | int(10) unsigned | NO   |     | 0       |                |
| parallel_read     | int(10) unsigned | NO   |     | 0       |                |
| keepalive         | int(10) unsigned | NO   |     | 1       |                |
| keepcount         | int(10) unsigned | NO   |     | 9       |                |
| keepidle          | int(10) unsigned | NO   |     | 7200    |                |
| keepinterval      | int(10) unsigned | NO   |     | 75      |                |
+-------------------+------------------+------+-----+---------+----------------+
```

Conn Profile

Credits

Take-Away Message

Be chat worry-free with OpenSIPS 3.3!

- Liviu Chircu
  - OpenSIPS Project: www.opensips.org
  - Email: liviu@opensips.org


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