

Abstract the SIP Handling Using the Call API



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FOSDEM

About Me



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



- Introduction
- Architecture
- Writing API Clients
- API Scenarios
- **Demo**



Introduction

- **Manage** SIP call flows from external applications (not a SIP UA!)
- Abstracts the handling of complex SIP scenarios
- Uses advanced in-dialog SIP handling in order to emulate the behaviour of a SIP B2BUA or UAC



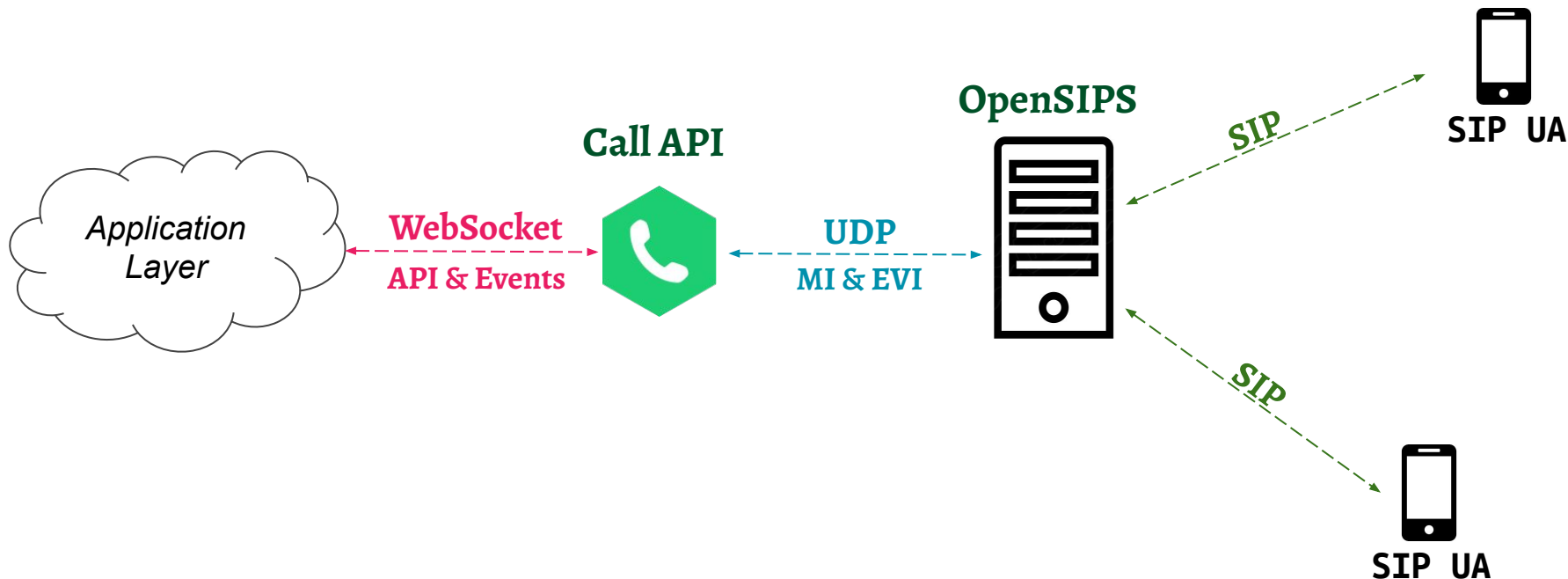
Call API - Implementation

- Stand-alone tool
- Written in Golang (1.14+)
- JSON-RPC over WebSocket
 - CLI tools are available
- Modular design
- Highly scalable
 - asynchronous design
 - efficient goroutines



Architecture

Call API - Interconnection Diagram



Call API - Application Interconnection

JSON-RPC Requests

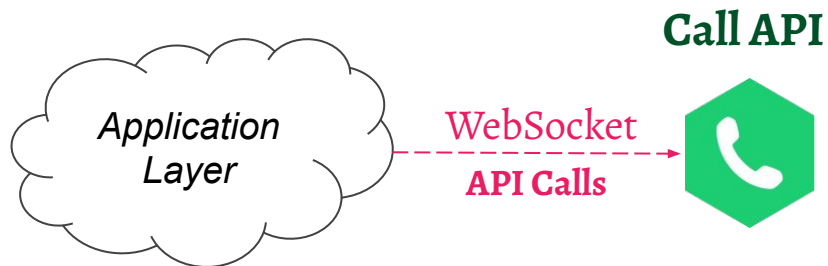
- Triggered from Application Layer
- Parameters are validated
- Replies are immediately sent

JSON-RPC Notifications

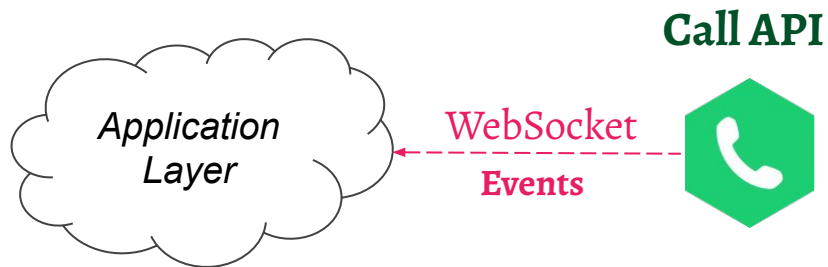
- Triggered from the Call API
- Carries useful payload data
- Updates regarding the status of the call (success, fail, etc.)



Call API - Application Interconnection



```
{  
  "method": "CallStart",  
  "params": {  
    "caller": "sip:alice@10.0.0.10",  
    "callee": "sip:bob@10.0.0.11"  
  },  
  "id": "831717ed97e5",  
  "jsonrpc": "2.0"  
}
```



```
{  
  "method": "CallStart",  
  "params": {  
    "cmd_id":  
      "b8179f1e-b4e4-4ac7-9990-4bf64f084178",  
    "status": "CallerAnswered",  
    "data": {  
      "caller": "sip:alice@10.0.0.10",  
      "callee": "sip:bob@10.0.0.11"  
    }  
  },  
  "jsonrpc": "2.0"  
}
```

Call API - OpenSIPS Interconnection

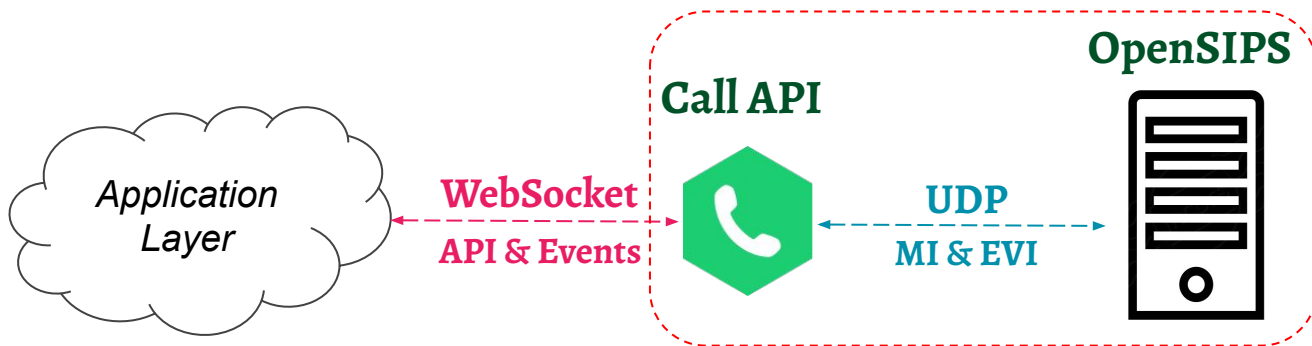


Management Interface

- MI datagrams
- Triggers MI commands
- Subscribes to different events

Event Interface

- Event datagram
- Sends asynchronous events



Call API - OpenSIPS Interconnection



Call API



UDP
MI Command

OpenSIPS



```
{
  "jsonrpc": "2.0",
  "id": 48,
  "method": "t_uac_dlg",
  "params": {
    "body": "v=0\r\no=click-to-dial 0 0 IN IP4
0.0.0.0\r\ns=session\r\nc=IN IP4 0.0.0.0\r\nnt=0 0\r\nnm=audio 9 RTP/AVP 0\r\nna=rtptime:0
PCMU/8000\r\n",
    "headers": "From:
\u003csip:liviufosdem.api-demo.org\u003e\r\nTo:
\u003csip:chili@fosdem.api-demo.org\u003e\r\nContent-
Type: application/sdp\r\nCSeq: 1
INVITE\r\nCall-Id: 9def6687-0b58-4c34-9199-aa77a9684941\r\n",
    "method": "INVITE",
    "ruri": "sip:liviufosdem.api-demo.org"
  }
}
```

Call API



UDP
EVI Event

OpenSIPS



```
{
  "jsonrpc": "2.0",
  "method": "E_CALL_TRANSFER",
  "params": {
    "callid": "f909267f-c5a8-4652-a0c0-d414bcdbe62a",
    "leg": "callee",
    "transfer_callid":
"ZDFjNmY2ZjAxYTAYzjg4NWQ5MTk4YzQ2YWZmOWMwZGI.",
    "destination": "sip:chili@192.168.0.199:5077",
    "state": "ok",
    "status": "200 OK"
  }
}
```

Tips on Writing API Clients



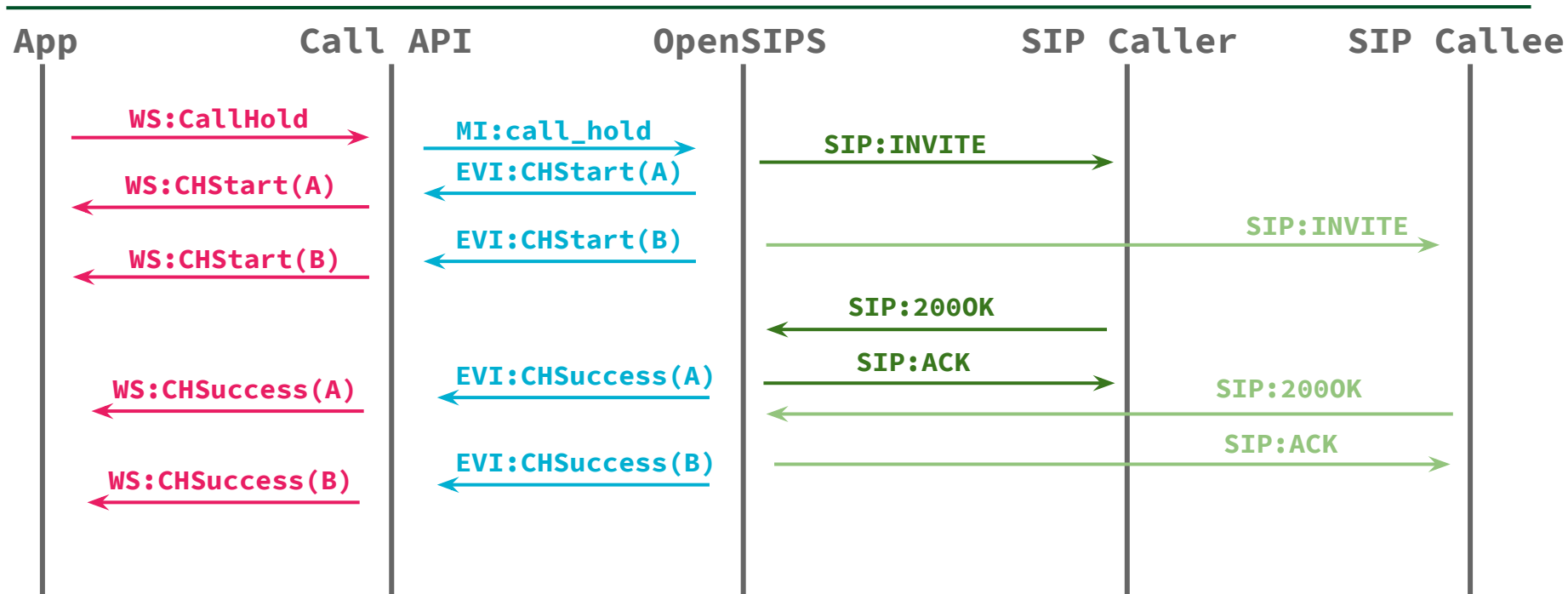
- your language needs WebSocket support
 - C, C++, Python, Java, Golang, JavaScript, Rust, Haskell, Erlang...
- JSON-RPC is trivial, may be easier to do by hand
- **concurrently re-use** a WebSocket connection!
- Example Go client:
github.com/OpenSIPS/call-api/tree/master/cmd/call-api-client
- What about REST + Webhook support?!
 - On the TODO list!

API Scenarios

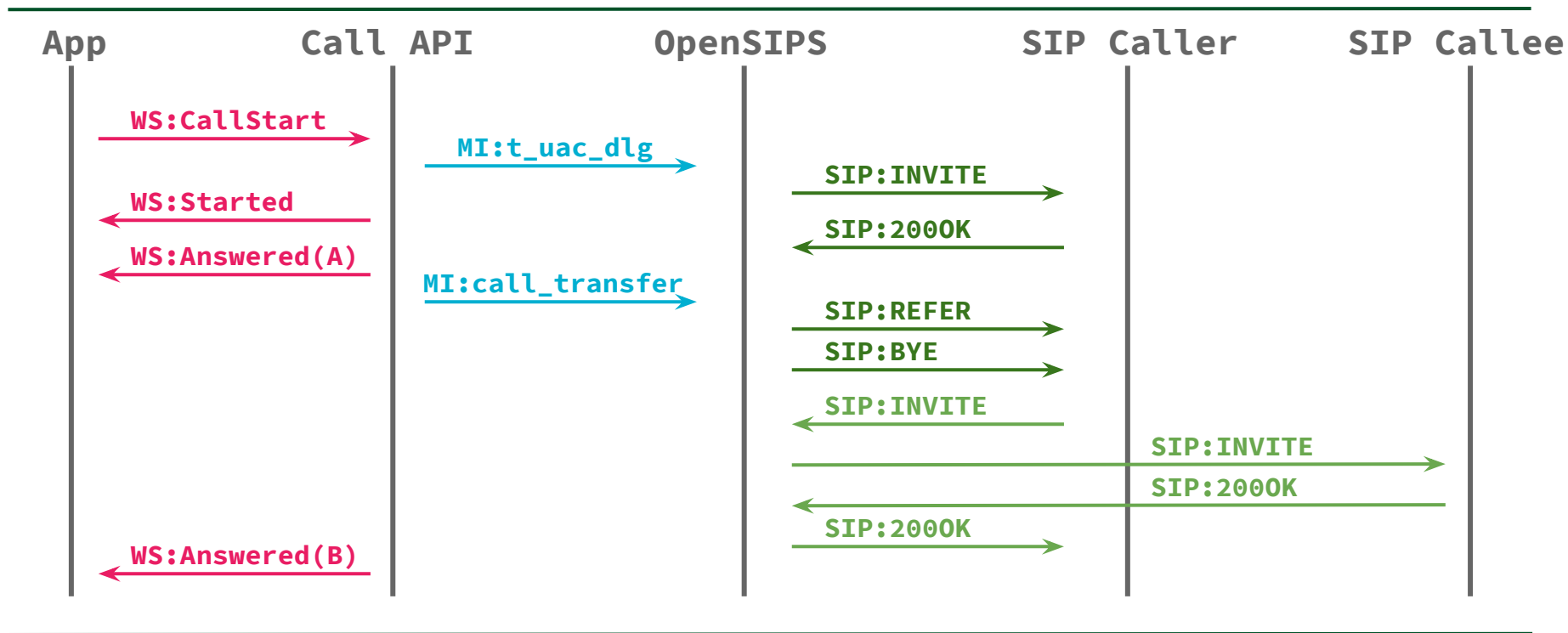
- **CallStart** - start a call
- CallEnd - terminate a call
- CallHold - put a call on hold
- CallUnhold - resume an on-hold call
- **CallBlindTransfer** - **unattended**
- CallAttendedTransfer



Call API - Call Hold



Call API - Call Start



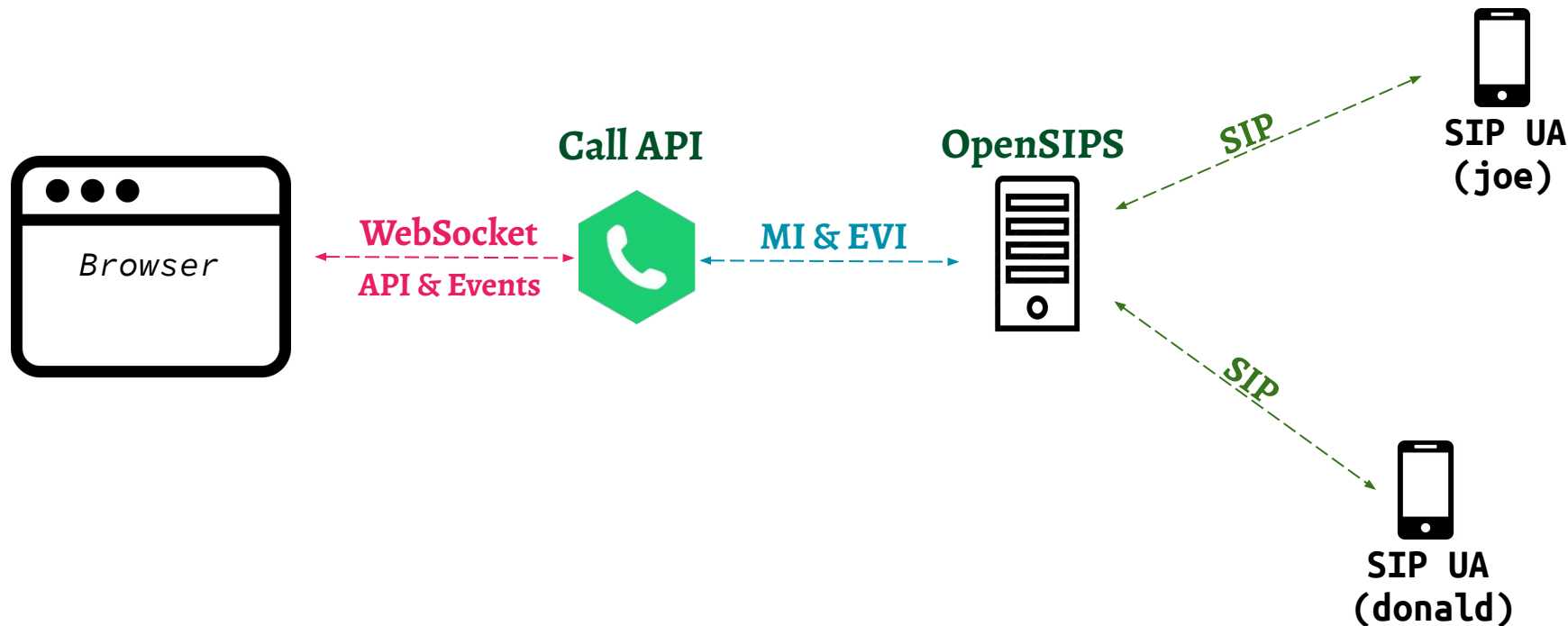
NEW CallOps Module



- Abstracts SIP signaling MI cmds into high-level primitives
 - `call_transfer`, `call_hold`, `call_unhold`
- NOT a B2BUA!
- Injects in-dialog requests
 - Re-INVITE for on-hold
 - REFER for transfer
- Intercepts replies and treats them accordingly
 - Triggers failure or success events based on them
- Commands can be triggered both through script and MI

DEMO

DEMO: Click-to-dial service



Call API - References



- Source Code

<https://github.com/OpenSIPS/call-api>

- Command Docs

<https://github.com/OpenSIPS/call-api/blob/master/docs/Commands.md>

- Call API Blog Post

<https://blog.opensips.org/2020/06/11/calls-management-using-the-new-call-api-tool/>

- OpenSIPS CallOps Module Docs

<https://opensips.org/docs/modules/3.1.x/callops.html>



Call API take-aways

Helps build class 5 services on top of OpenSIPS
Powerful. Intuitive. Open-source.

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