



**microbase**



**OPENSIPS**

**Microbase – OpenSIPs Summit 2015**

**Building an ITSP with OpenSIPs 2.1**

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# Microbase

Microbase is a communications software developer and supplier, with a leading role in the Greek market.



Microbase founded in 2003, from an engineering team with expertise in IT and communications on purpose to develop advanced telecommunications technology and added value solutions.



Based on two pillars, the first of software development and the second on design and implementation of telecommunication networks, created innovative products such as **Microbase CommPlatform** which is based on the well-known open source VoIP Platforms, **Asterisk** and **OpenSIPs**.



Furthermore, Microbase is the exclusive representative in Greece for the Telecommunications Platform **Exelysis Contact Center** and for the Security Platform for **Unified Communications UMLabs**.



# Products & Services



**IP PBX Solutions**  
(CommServer, CommGate, miniComm)



**Contact Center Solutions**  
(Exelysis Contact Center)



**Telecommunication Services**  
(ePhone, Virtual PBX, CallCenter On Demand, Premium Platform)



**Voice Portals**  
(Nuance)



**Unified Communications Security**  
(UM Labs, OpenSIPs)

# OpenSIPs In Action



## Building Carrier Grade Solutions

- SBC
- Proxy / Redirect Server
- Load Balancer
- Registrar



## Building Large IP PBX Solutions

- Registrar / Load balancer for Call Center Infrastructures
- Asterisk Large installations
- Distributed IP PBX Solutions
- Virtual PBX Infrastructures



## Securing IP PBX Solutions

- SBC Solutions
- TLS / SRTP
- Sanity / Fraud / Rate Checking

# Customer Base



Bold Ogilvy & Mather



# Carrier Project – The History

## Initial Infrastructure

- We 've been contacted to install and support a Net-Net 4000 Acme Packets Cluster
- Carrier was using a Teles Switch for Routing, Number Manipulation and Accounting
- Carrier was using Snom's Virtual PBX Solution

## Introducing OpenSIPs

- As the needs increase, cost of commercial solutions increases too.
- Complex Implementations are not easily implemented on commercial solutions
- OpenSIPs was an option but open source must always prove it self.

## Replacing Teles with OpenSIPs as a Proxy

- After testing and benchmarking OpenSIPs replaced Teles
- Main roles: Proxy, Manipulation, Permission, Accounting, Dynamic Routing.

# Carrier Project – The History

## Asterisk for Media Services

- Early Audio Messages
- Custom Customer Redirection Scenarios
- Customer Based Re-Routing Functionalities

## Acme Packets SBC Overload

- Acme Packets SBC was not able to handle more than 80 CPS
- Call center customers was not able to be served

## Introducing OpenSIPs at the edge

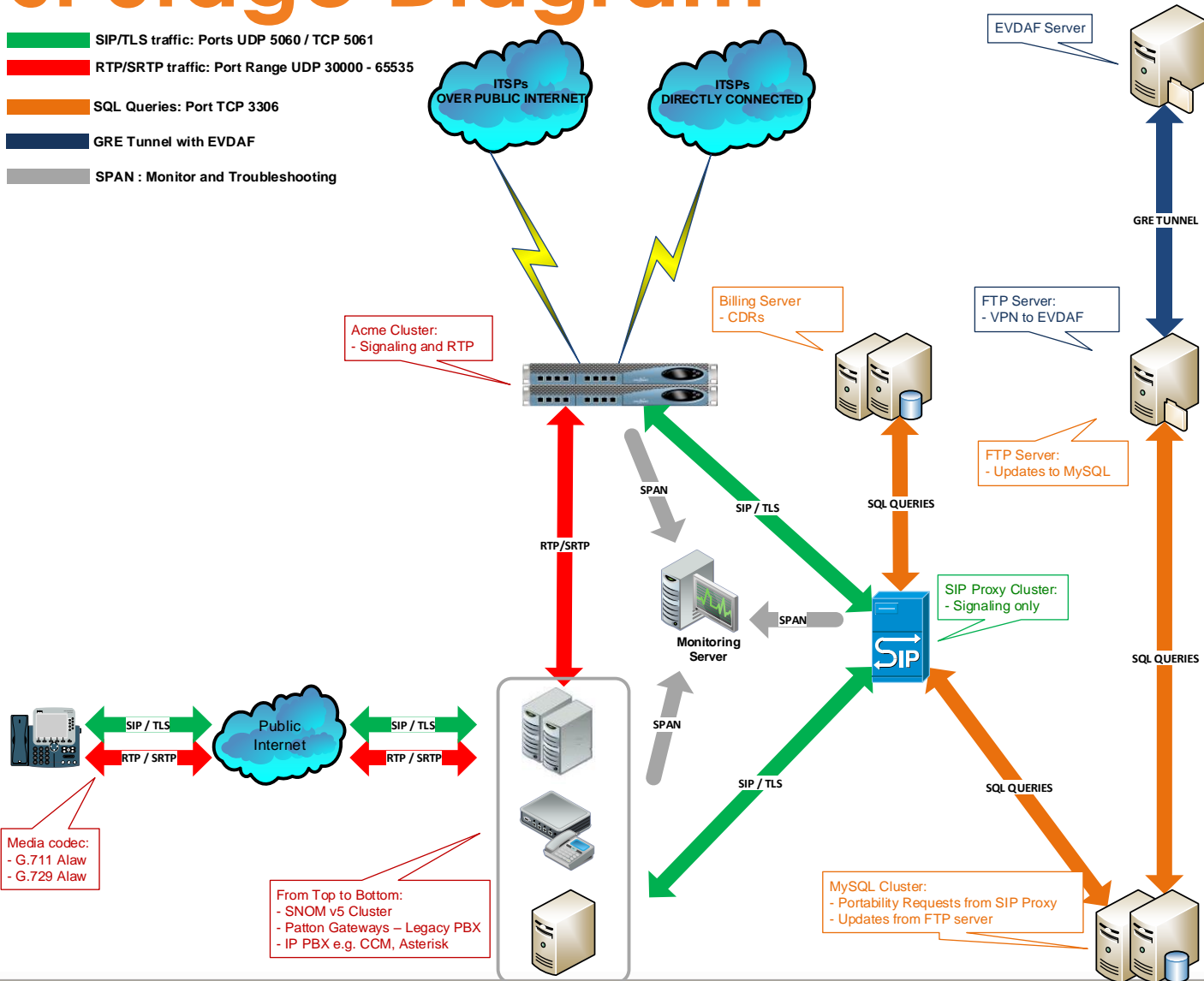
- Separate OpenSIPs Solution for Call Centers
- Direct Carrier Interconnection

## Final Step

- Acme Packets SBC replaced by OpenSIPs
- OpenSIPs SBC for Carrier Interconnection, Public Internet Access and Intranet Access
- OpenSIPs Proxy for Routing, Number Manipulation and Accounting

# First Stage Diagram

- █ SIP/TLS traffic: Ports UDP 5060 / TCP 5061
- █ RTP/SRTP traffic: Port Range UDP 30000 - 65535
- █ SQL Queries: Port TCP 3306
- █ GRE Tunnel with EVDAF
- █ SPAN : Monitor and Troubleshooting



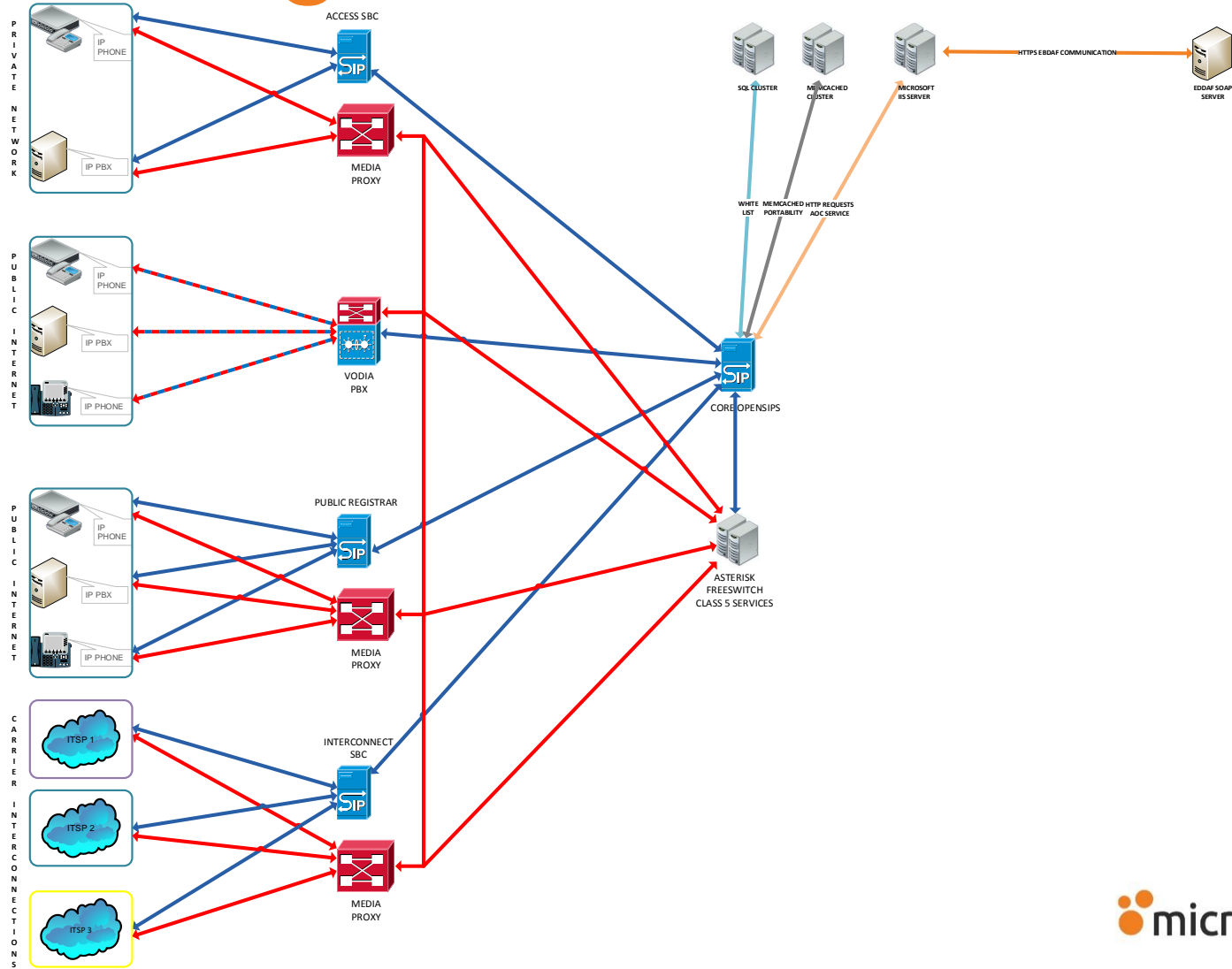
Media codec:  
 - G.711 Alaw  
 - G.729 Alaw

From Top to Bottom:  
 - SNOM v5 Cluster  
 - Patton Gateways – Legacy PBX  
 - IP PBX e.g. CCM, Asterisk

MySQL Cluster:  
 - Portability Requests from SIP Proxy  
 - Updates from FTP server



# Final Stage



# Design Overview

Design was based on OpenSIPs 2.1

Separate SBCs based on Interconnected Client (Carriers Interconnect SBC, Intranet Customers SBC, Internet Customers and Call Centers SBC)

Centralized Proxy Cluster for Accounting, Routing, Manipulations

High availability on Proxy with active - active clustering

External data High availability (MySQL Cluster, Memcacheddb Cluster, HTTP DB)

Enhanced Security with Fraud Detection, Sanity Checks etc.

# Features Implemented On SBCs

Topology Hiding – OpenSIPs 2.1 Topology Hiding Feature

DoS Attack Protection - Pike

Call/Rate Limits – Dialog Profiles / Ratelimit Features

Fraud Detection – OpenSIPs 2.1 Fraud Detection Feature

Custom Fraud Detection Logic

Resource Based Load Balancing – Load Balancer Feature

SIP UDP/TCP/TLS with SRTP – RTPEngine

# Features Implemented On Proxy

Topology Hiding

CLIP / CLIR Management

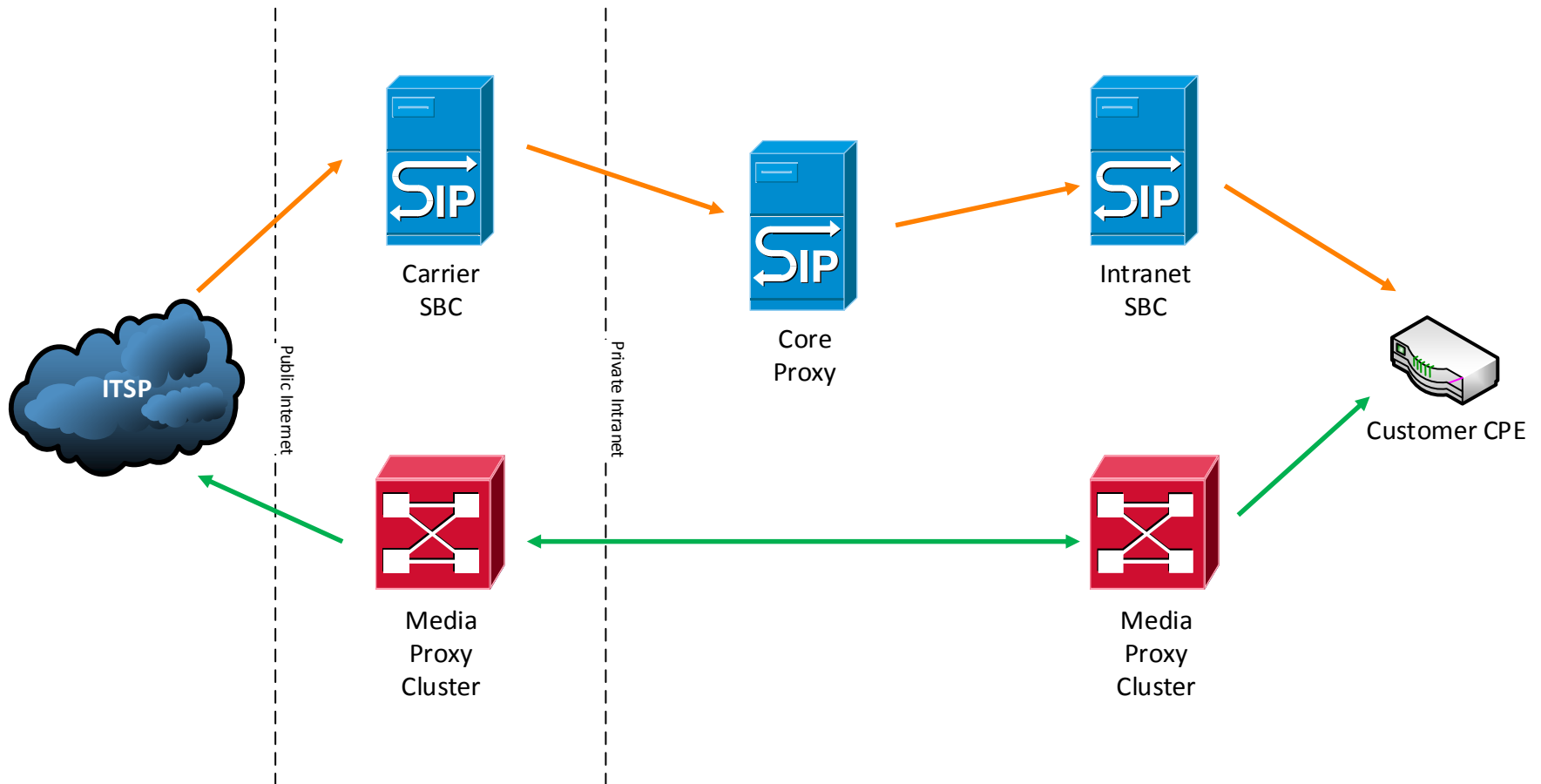
Number Portability Management

Advice Of Charge Implementation

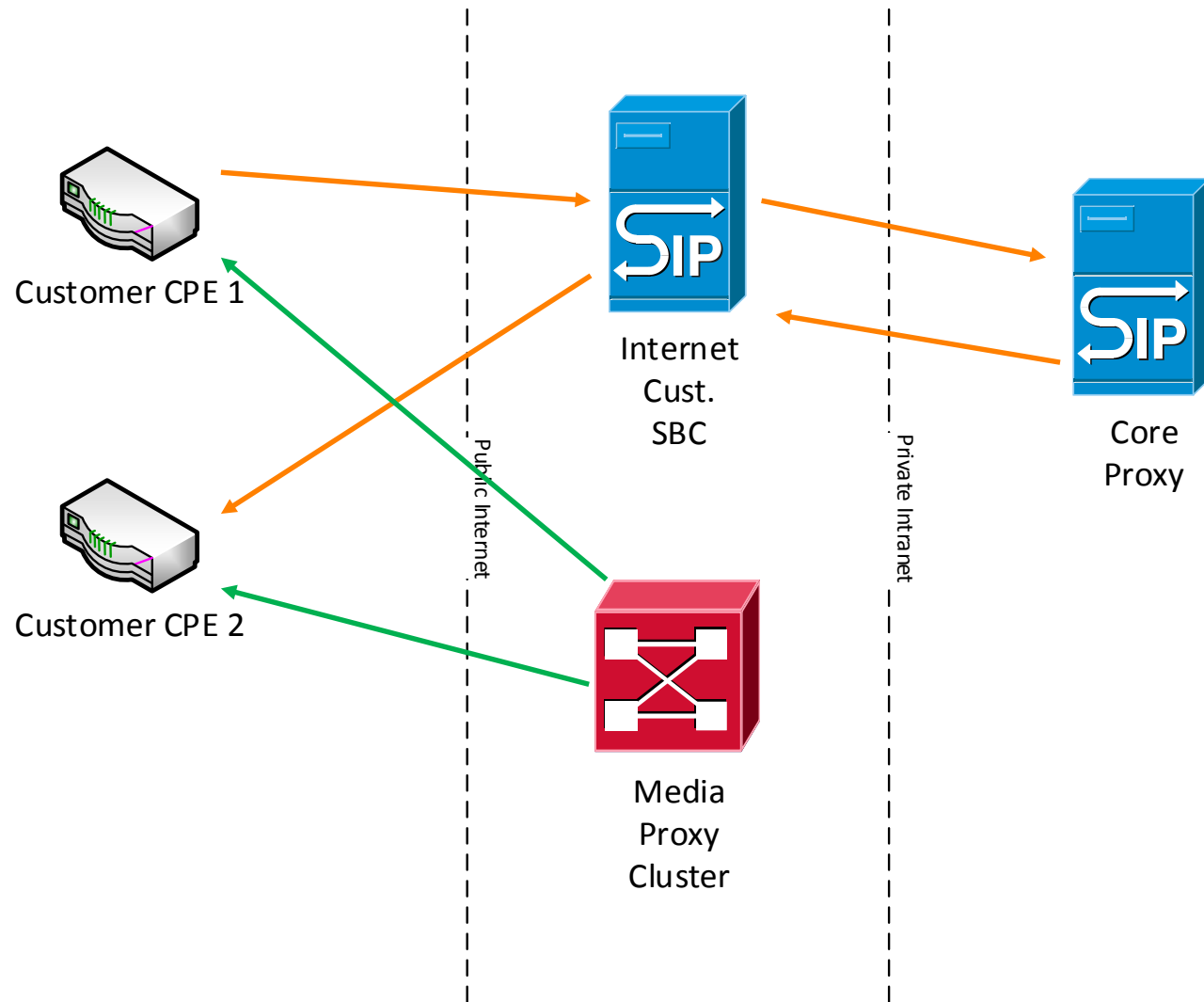
Dynamic Routing

Accounting

# Call Flow Inbound Call



# Call Flow Internet Client Call



# Performance Tests

```
----- Scenario Screen ----- [1-9]: Change Screen --
  Call-rate(length)   Port   Total-time   Total-calls   Remote-host
6350.0(0 ms)/1.000s  5090   374.67 s    1228185      :5060(UDP)

6363 new calls during 1.002 s period   0 ms scheduler resolution
197 calls (limit 19050)                 Peak was 423 calls, after 336 s
0 Running, 209359 Paused, 6961 Woken up
0 dead call msg (discarded)             0 out-of-call msg (discarded)
3 open sockets

                Messages   Retrans   Timeout   Unexpected-Msg
  INVITE ----->         1228185   0         0
    100 <-----          0         0         0
    180 <-----          0         0         0
    404 <-----         1227988   0         0
    ACK ----->         1227988   0
----- [+|-|*|/]: Adjust rate ---- [q]: Soft exit ---- [p]: Pause traffic -----
```

# OpenSIPs Scripting Hints

Keep it clean and easy to maintain

```
include_file "/etc/opensips/configs/sanity_check.cfg"
```

Use route to separate functionality

```
if(is_method("INVITE") && !has_totag())  
{  
    route(CHECK_IP_BLOCKED);  
    route(AUTH_CALL);  
    route(MANIPULATE);  
    route(NEW_USER_CALL);  
    route(RTP_FLAGS);  
    topology_hiding("C");  
    route(RELAY);  
    exit;  
}
```



# OpenSIPs Scripting Hints

Use Local or Remote Mem Caching to Speed thing Up

```
if(cache_fetch("local","passwd_$tu",$avp(authpass)))
{
    $avp(authuser) = $tU;

    $var(auth_code) = pv_www_authorize("");

    if ($var(auth_code)<0)
    {
        www_challenge("", "0");
        exit;
    }
}
```

# OpenSIPs Scripting Hints

Use NoSQL DBs like Redis, Casandra or MemCacheDB to store large data like portability routing prefixes and in more than one source for resilience.

```
if(!cache_fetch("memcached:first","$avp(num)",$avp(net))
{
    if(!cache_fetch("memcached:second","$avp(num)",$avp(net)))
    {
        $avp(net)="";
    }
}
```

# OpenSIPs Scripting Hints

Use firewall to allow and block IPs instead of OpenSIPs. In case a fraud, or abuse is detected instruct Firewall to block the IP causing the problem (Fail2Ban is an option)

## OpenSIPs Script

```
if (($ua=="friendly-scanner") || ($ua=~"sipcli"))
{
    xlog("Fraud: $si is BLOCKED\n");
    cache_store("local","block_$si","1",3600);
    exit;
}
```

## Fail2Ban Filter

[INCLUDES]

[Definition]

failregex = Fraud: <HOST> is BLOCKED

ignoreregex =

# OpenSIPs Scripting Hints

If a registration brute force attack is detected block but do not disappoint the hackers because they will keep trying.

```
if(cache_fetch("local","block_$si",$avp(blocked)))  
{  
    xlog("Fraud: $si is BLOCKED\n");  
    sl_send_reply("200", "OK");  
    exit;  
}
```

# RTPEngine vs RTPProxy

We decided to move from RTPProxy to RTPEngine for the following reasons

- Multi-threaded
- RTPEngine is using IP Tables module (kernel level) to handle RTP Traffic resulting in low-latency and low-CPU usage.
- Ability to bridge IPv6 and IPv4 traffic
- SRTP encryption / decryption (SRTP/RTP Bridging)
- Ready for WebRTC Support
- Produces CDRs

# Reasons for using OpenSIPs 2.1

- New Improved Design with Better Overall Performance
- New Very Useful Modules like
  - Fraud Detection Module
  - Async DB Operation
  - Topology Hiding
  - REST Client
- RTP Engine Support

# Conclusion

OpenSIPs is a greater solution for Carrier Grade Implementations

Its Stability, Scalability, Flexibility in conjunction with the Openness provided, makes it an ideal solution for Large Scale Installations.

New features of OpenSIPs 2.1 like Topology Hiding, Fraud Detections, Async Operations, WebRTC Support and other completes the puzzle of an already mature solution.



# Questions

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