



# **Vonage & OpenSIPS**

## **A Great Call**

**OpenSIPS Summit**  
**Amsterdam, NL**  
**May 2-5, 2017**



# OpenSIPS

High Performance SIP Router



# Supported Device Types

Mobile Device

Softphones

ATA's

IP Phones

SIP Trunks & PBX's



One Registrar To Rule Them All



# One Registrar To Rule Them All

## Mandatory Requirements

Secure  
Redundant  
Highly Available  
Scalable  
Monitoring



## Registrar Challenges

Logging - Delays introduced at load

TCP - Locking / internal table lookups at load

TLS - Device Compatibility / Diagnostics

Max Branches - Device location lookups

DNS Lookups - Internal to the network

Security - Never expose more information than necessary, Handle bad actors, Handle broken devices, software



# Registrations

Challenge

Logging - Delays introduced at load



# Registrations

Challenge

Logging - Delays introduced at load

Solution

Limit Logging – Log Level, Conditional Execution, Removal in Production





# Registrations

Challenge

TCP - Locking / Internal table lookups at load



# Registrations

## Challenge

TCP - Locking / Internal table lookups at load

## Solution

OpenSIPS timer settings, Kernel timer (sysctl) settings, Splitting workload (UDP/TCP/TLS), Exhaustive Load Testing



# Registrations

Challenge

TLS – Device Compatibility & Diagnostics

Wildcard Support (SAN), SRV Support, Captures over TLS connections



# Registrations

## Challenge

TLS – Device Compatibility & Diagnostics

Wildcard Support (SAN), SRV Support, Captures over TLS connections

## Solution

Device Certification Testing

OpenSIPS Logging, HEP from OpenSIPS, Wireshark (certs needed)

Exhaustive Load Testing



# Registrations

Challenge

Max Branches



# Registrations

Challenge

Max Branches

Solution

Recompile OpenSIPS source

Reduce the number of registrars needed to locate a user

Distributed DB/Cache store/fetch



# Registrations

Challenge

DNS Lookups – Under load DNS lookup time causes problems

Solution



# Registrations

## Challenge

DNS Lookups – Under load DNS lookup time causes problems

## Solution

OpenSIPS dns\_cache module to the rescue ...almost  
Name Server Cache Daemon (nscd)  
Remove all DNS lookups from the interior of the network





# Registrations

## Challenge

Security – Never expose more information than is absolutely necessary  
Handle Bad Actors, Handle broken devices/software



# Registrations

## Challenge

Security – Never expose more information than is absolutely necessary  
Handle Bad Actors, Handle broken devices/software

## Solution

Topology Hiding, Module, Ratelimit Module, Pike Module  
IPTables ratelimit, IPTables packet inspection



## Registrar Solutions

Limit Logging - Log Level, Conditional Execution, Removal in Production

TCP - OpenSIPS timer settings, Kernel timer (sysctl) settings, Split workload (UDP/TCP/TLS)

TLS - Wildcard (SAN) support, SRV support, Captures in OpenSIPS, HEP, Wireshark (with certs)

Max Branches - Split workload, Distributed DB/Cache, Patch OpenSIPS

DNS Lookups - dns\_cache module, Name Server Cache Daemon (nscd), Remove lookups from inside the network, Understand the good & bad of SRV

Security - Topology Hiding, Ratelimit module, Pike module, IPTables ratelimit, IPTables packet inspection



# INVITE

## Challenge

Ratelimit based on business logic, Size of messages, Large SDP Payloads, Multiple Audio/Video Codecs, Inconsistent Responses from Clients and/or Carriers



# INVITE

## Challenge

Ratelimit based on business logic, Size of messages, Large SDP Payloads, Multiple Audio/Video Codecs, Inconsistent Responses from Clients and/or Carriers

## Solution

Ratelimit module, Restrict message size, Remove Unsupported Codecs, Special Case Handling



# SUBSCRIBE

Challenge

Failure Routes – Response Codes returned to the client device



# SUBSCRIBE

## Challenge

Failure Routes – Response Codes returned to the client device

## Solution

Learn why t\_relay(0x04) is so important  
Understand all the negative responses returned to the client  
Understand how the client reacts to each particular negative response



# SUBSCRIBE

## Challenge

Ratelimit based on business logic, Volume of messages, Bad Actors





# SUBSCRIBE

## Challenge

Ratelimit based on business logic, Volume of messages, Bad Actors

## Solution

Ratelimit based on criteria such as IP, User-Agent or Event-type



# INTERNAL - CARRIER ROUTING

## Challenge

Every carrier has their own view as to how they interpret RFC3261



# INTERNAL - CARRIER ROUTING

## Challenge

Every carrier has their own view as to how they interpret RFC3261

## Solution

### Interop Testing

Do not expect the carrier to change the way they do things so be prepared to solve problems locally



# INTERNAL - FEATURES

Challenge

Server Feature Creep



# INTERNAL - FEATURES

Challenge

Server Feature Creep

Solution

Specialized “function specific” server



# INTERNAL - PERFORMANCE

Challenge

External DB Lookups



# INTERNAL - PERFORMANCE

Challenge

External DB Lookups

Solution

Performance gains by keeping tables in memory rather than performing and external DB query



# INTERNAL - PERFORMANCE

Challenge

Efficient lookups across the enterprise





# INTERNAL - PERFORMANCE

Challenge

Efficient lookups across the enterprise

Solution

Caching – local caches, regional caches, enterprise caches



# INTERNAL - ENHANCEMENTS

Challenge

Technology Upgrades

Solution

Migrate from Memcache to Redis where it makes sense

Migrate from SQL to NoSQL where it makes sense

Implement Patterns - PUB/SUB



# COMING ATTRACTIONS

NEXMO ([nexmo.com](http://nexmo.com))

Developer Access to the backend telephony infrastructure

Build fully featured voice applications such as recorded voice proxies, voice conferencing systems, lead distribution and customer support systems

With the Voice API you can initiate and control calls to and from the PSTN



# COMING ATTRACTIONS

Mid-Registrar

OpenSIPS module for scalable registration and call forking



# COMING ATTRACTIONS

DNS

Move all resolutions to the edge



# COMING ATTRACTIONS

TCP

Default protocol for mobile, possibly the entire enterprise



# COMING ATTRACTIONS

TLS

Across the enterprise



# COMING ATTRACTIONS

FreeSWITCH ([freeswitch.com](https://www.freeswitch.com))

Stable Server / Fantastic Feature Set





# COMING ATTRACTIONS

Homer ([sipcapture.org](http://sipcapture.org))

SIP Capture for jobs where Wireshark isn't suited



# COMING ATTRACTIONS

VoIP Monitor ([voipmonitor.org](http://voipmonitor.org))

A worthy tool to analyze calls



Vonage & OpenSIPS A Great Call

Thank You

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