Jan Janák, iptel.org

Outline

About iptel.org

- Started as a website focused on SIP and maintained by VoIP interest group in FhG FOKUS
- Established in 1999
- SIP Tutorial by Dorgham Sisalem and Jiri Kuthan
- Freely available SIP service based on 3rd party software
- Began developing SIP software for the SIP service in 2001, known under the name SIP Express Router
- Complemented later by SERWeb, RTPProxy, SEMS, MySTUN
- iptelorg GmbH spin-off founded by FhG FOKUS to provide commercial SER support, acquired by Tekelec in 2005.

iptel.org Goals

iptel.org continues as non-profit site sponsored by FhG FOKUS

Goals

- Promote VoIP based on open standards (SIP, RTP).
- Promote use of open source VoIP software.
- Provide freely available reference SIP service.
- Maintain website with documentation and tutorials on SIP based technology.
- Develop open source SIP server software.

- First working SER version commited by Andrei Pelinescu-Onciul on 4th September 2001
- Originally indended as simple routing engine for Cisco PSTN gw
- Two weeks later initial version of the configuration language was done
- First SER modules followed in beginning of 2002, mysql driver, registrar, authentication, and record routing
- Attending first SIPIt in 2002 with SER running on an PDA
- May 2002: IPv6 support
- August 2002: Sipsak was created by Nils Ohlmeier
- September 2002: First public version and also SERWeb was born
- December 2002: First external contribution, ENUM support by Juha Heinanen
- January 2003: First SEMS version by Raphael Coeffic

Commercial Deployments

- Tens of thousands installations world-wide estimated
- One SER fork: http://www.openser.org
- Used by many SIP vendors as de-facto reference implementation
- Powering some of Largest SIP Setups:

- Setups with 80k subscribers on single host exist

Academia

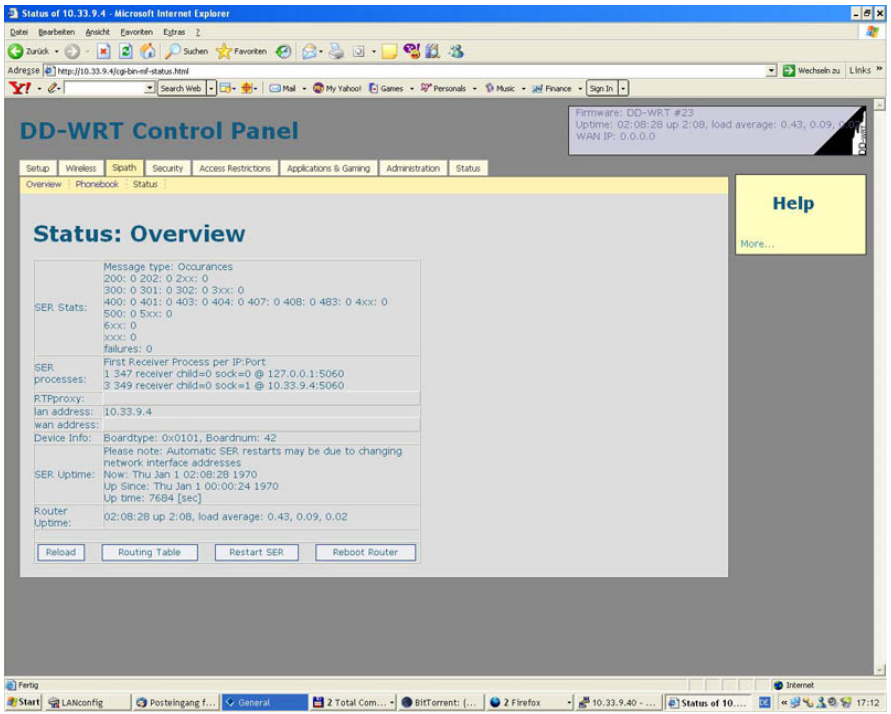
http://www.mit.edu/afs/athena/project/sip/sip.edu

- Used in Internet2 SIP.edu VoIP infrastructure
- SIP.edu actively contributed to SER
- SER got presence support from SIP.edu

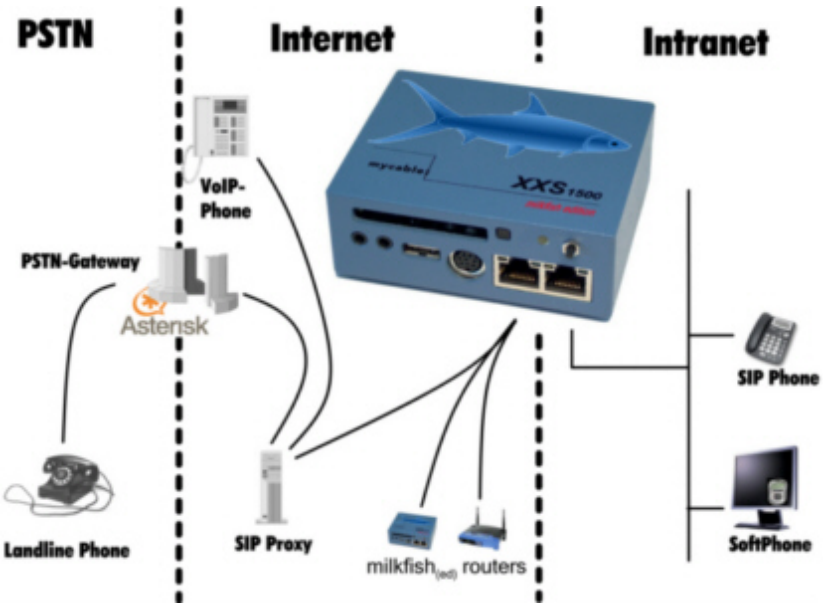
- Colorado State University
- UCLA
- University of Alaska
- ETH Zurich
- Columbia University
- Yale University
- MIT

Embedded Setups

Siemens Gigaset DD-WRT



Milkfish



http://www.milkfish.org

What is SER

- SIP Proxy Server
- Registrar
- Redirect server
- SIMPLE based presence server
- Transaction stateful

What is SER NOT

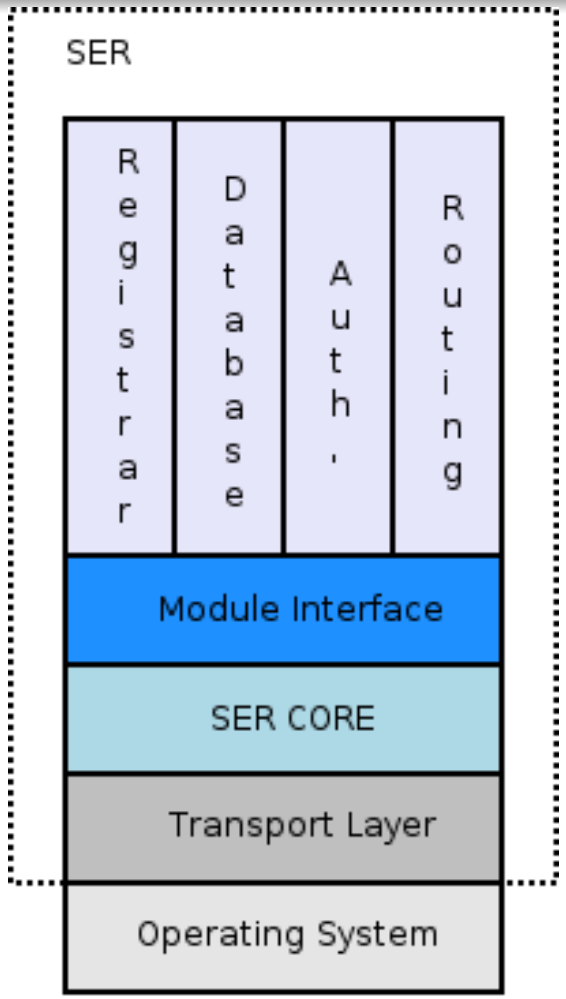
- Back-to-back User Agent
- Dialog Stateful
- PBX (Packet Branch Exchange)
- Media server
- PSTN Gateway

List of Features

- Written in ANSI C and optimized for speed
- Modular design
- Flexible configuration and routing language
- Supports MySQL, Postgres, LDAP, RADIUS
- Standard (RFC3261) compliant
- Web based administration interface
- NAT traversal capable
- Portable, runs on POSIX compliant systems

Development Model

- Lincesed under GPL
- Currently about 20 developers
- For core and core modules FhG FOKUS is exclusive (c) owner
- Anyone can freely contribute extensions and modules
- Changes to existing modules are subject to approval



Core Provides

- Transport management
- Memory management
- Module interface
- Essential functionality

Modules Provide

- Script functions
- Module parameters
- Special variables
- Management functions

Configuration File

```
debug=3
fork = yes
log_stderr=no

loadmodule "/usr/lib/ser/modules/sl.so"
loadmodule "/usr/lib/ser/modules/tm.so"
loadmodule "/usr/lib/ser/modules/rr.so"
loadmodule "/usr/lib/ser/modules/usrloc.so"
loadmodule "/usr/lib/ser/modules/registrar.so"

modparam("usrloc", "db_mode", 0)
modparam("rr", "enable_full_rr", yes)

route {
    if (!method == "REGISTER") record_route();
    if (loose_route()) {
        t_relay();
        break;
    }
    if (uri == myself) {
        if (method == "REGISTER") {
            save("location");
            break;
        }
        if (!lookup("location")) {
            sl_reply("404", "Not Found");
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Server Configuration

- Inspired by perl and C, tells SER what to do with SIP messages
- Generic server settings
- Modules to load
- Module configuration
- SIP message processing

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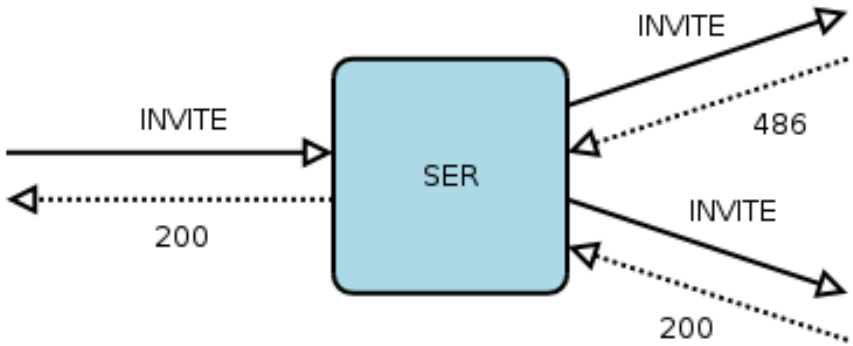

Server Processing

- SER is simple message forwarder
- SIP request arrives, execute route block
- Forwarding request 1st time, execute branch_route block
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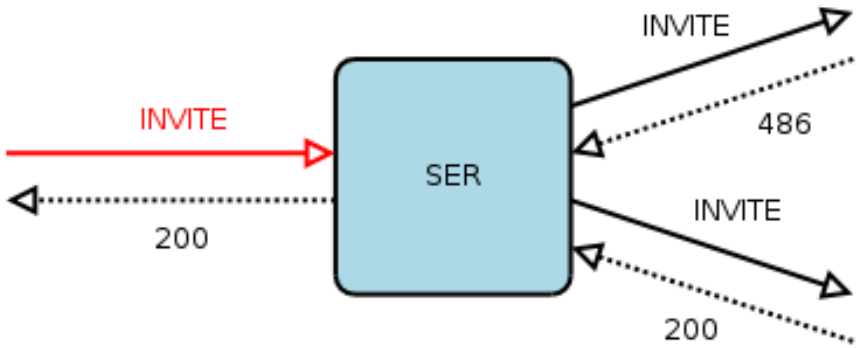

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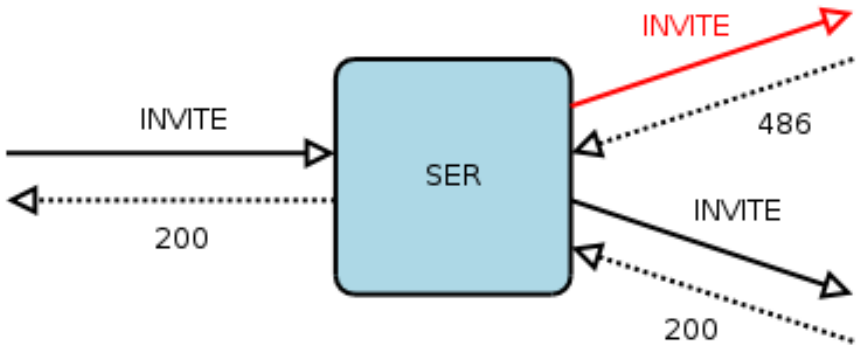

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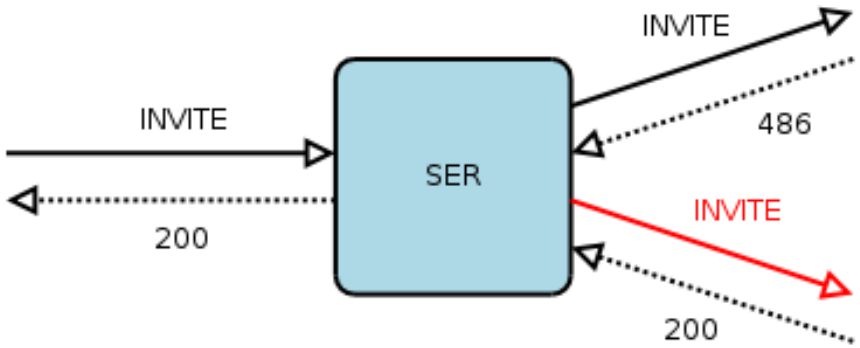

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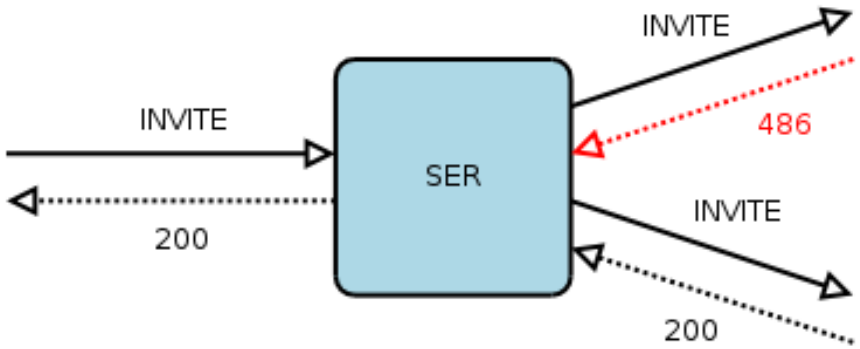
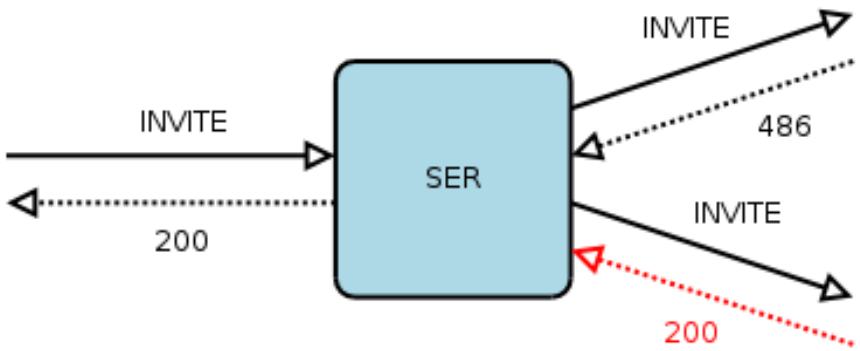


Server Processing

- Reply received, execute onreply_route block
- Reply received, execute onreply_route block again
- Reply forwarded upstream, execute failure_route

Overview of Operation



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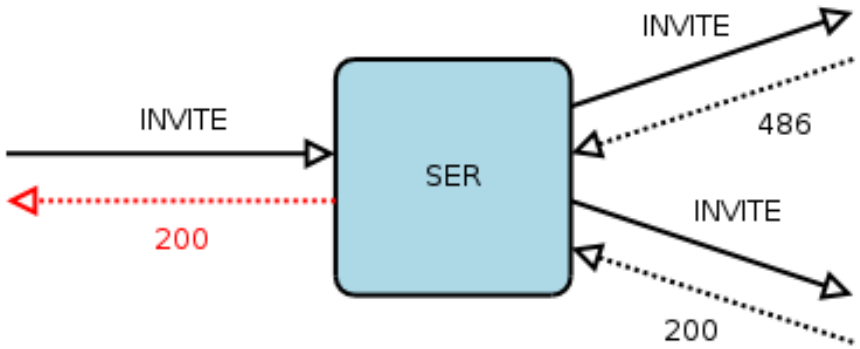

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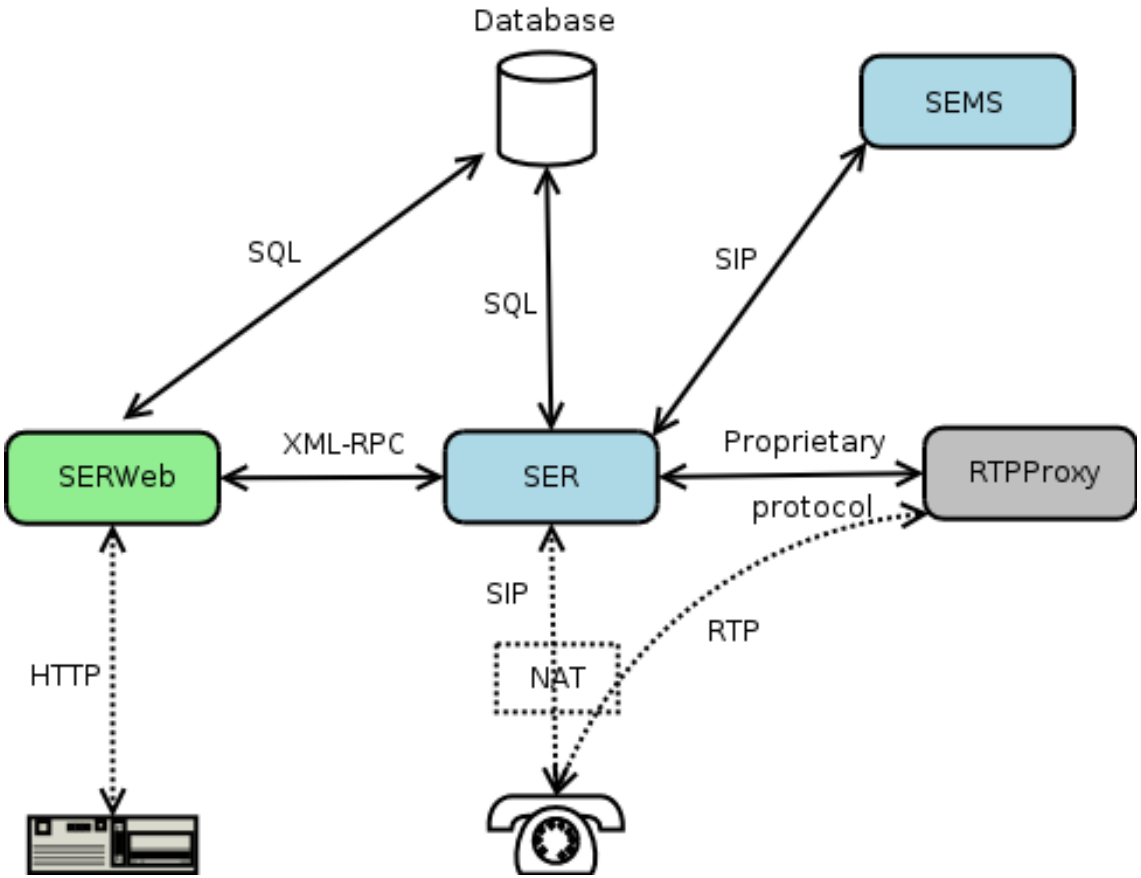
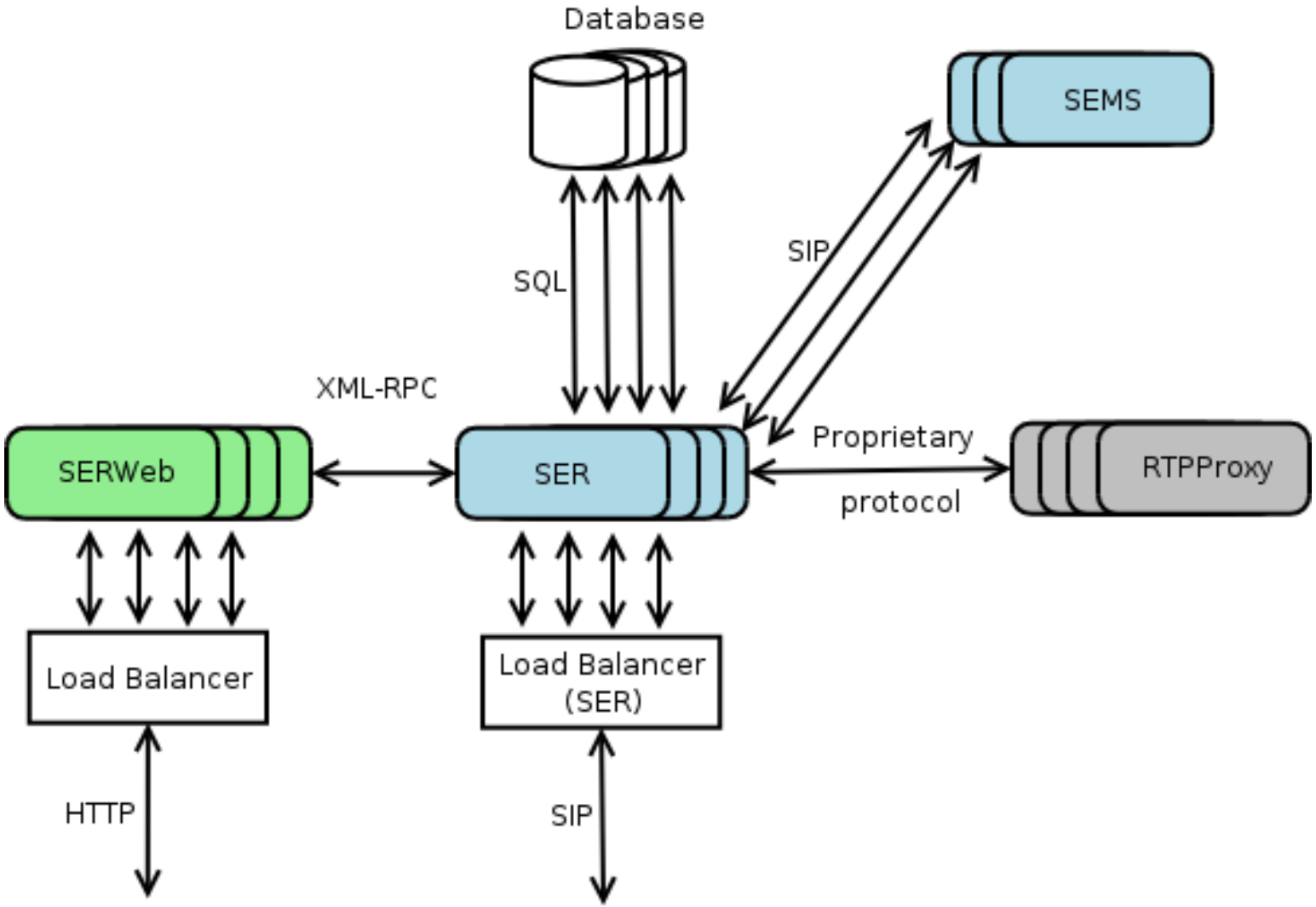

Database
SEMS
SQL
SQL
SIP
SERWeb
XML-RPC
SER
Proprietary
RTPProxy
protocol
SIP
RTP
HTTP
NAT

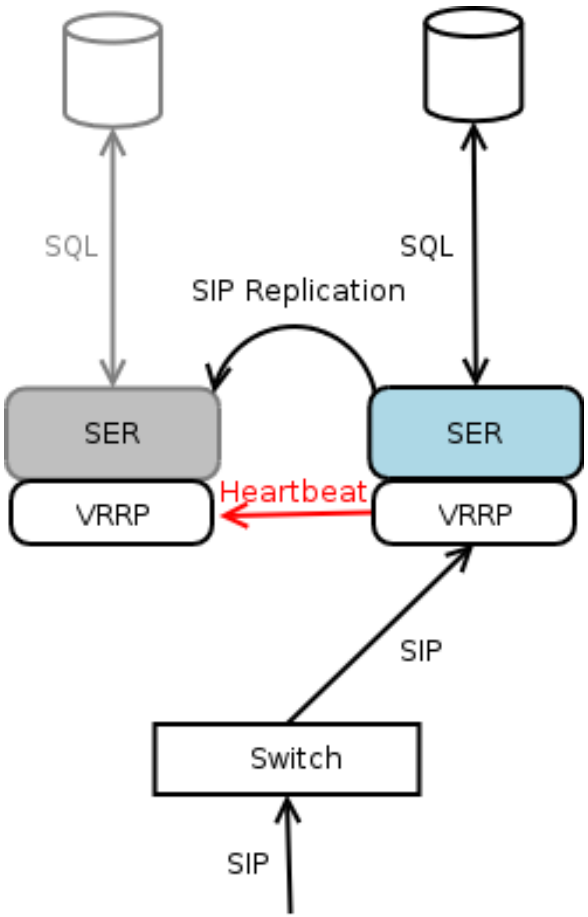
Adding More Boxes

- Necessary for 60k subcribers or more.
- SIP aware load balancer needed
- Each subscriber has a home proxy.
- Hashing based on From/Request-URI URI
- SER with dispatcher module can be used for this purpose.
- Provisioning applications can use the same loadbalancer to find out home proxy for subscriber.

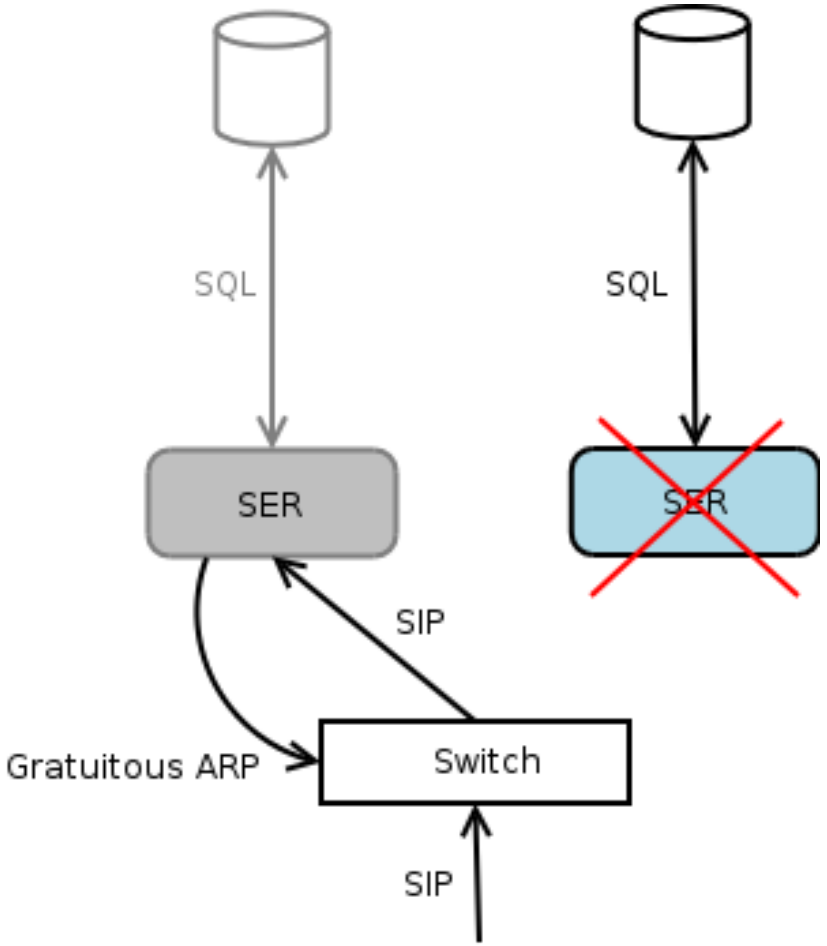
Adding More Boxes



Adding Yet More Boxes



- Master proxy sends heartbeat packets.
- Slave proxy is inactive while receiving heartbeat packets.
- Master proxy fails and stops sending heartbeat packets.
- Slave detects the failure and sends gratitious ARP responses to router.
- Gratitious ARP responses would map shared IP to slave.
- IP traffic to shared IP will be redirected to slave.


SQL
SQL
SER
SER
SIP
Gratuitous ARP
Switch
SIP

Summary
Highlights

- Works across NATs.
- No central back-end database required.
- Scalable up to millions of subscribers.
- Load balancing purely server side, no UA need to reconfigure UAs.
- No proprietary extensions, any RFC3261 conformant implementation works.

Thank You.