Kamailio for Building an IMS Core for VoLTE

Todays schedule

- Last year with Kamailio & IMS in review
- Basic IMS Infrastructure overview
- Installation of the network components
  - Proxy-CSCF (with SEMS for AMR)
  - Interrogating-CSCF
  - Serving-CSCF
  - Fraunhofer's OpenHSS (FhoSS)
- Walkthrough of HSS-Webinterface

Why VoLTE?

- Spectrum is limited
- Traditional 2G / 3G Networks use appr. 40% of the available spectrum for Voice
- With Voice-over-LTE it‘s down to 10%
- Cost of “pure” LTE networks are appr. 80% compared to 3G (5% compared to 2G)

Kamailio & IMS: Last year in review

- added support for RAVEL
- added (proper) support for 3GPP 23.228 annex U
- stability, stability, stability
- performance, performance, performance

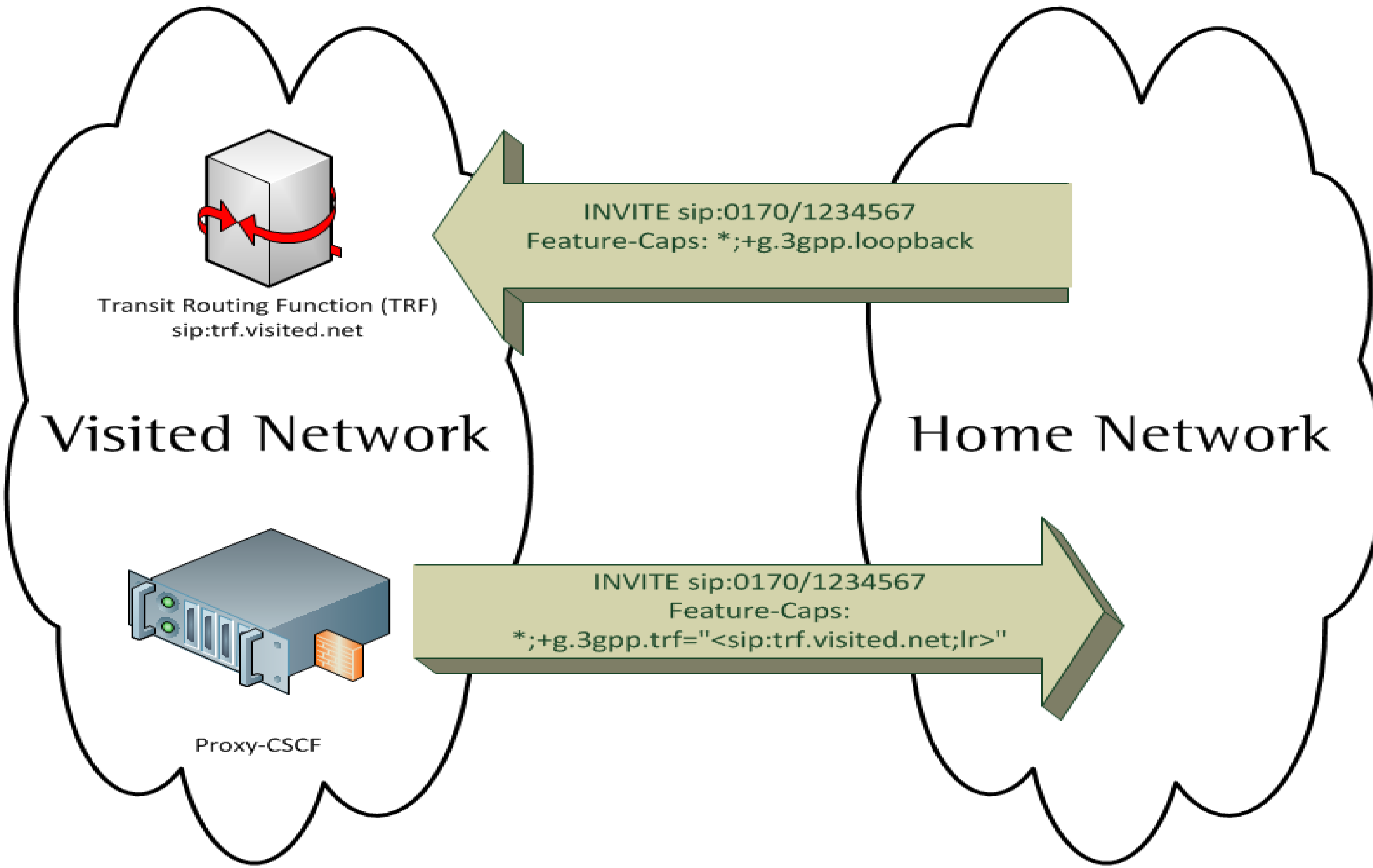
We‘ve been busy!

RAV-What????

- RAVEL describes a mechanism for using a local breakout in Roaming scenarios

RAVEL = Roaming Architecture for Voice over IMS with Local break-out

RAVEL



INVITE sip:0170/1234567
Feature-Caps: *;+g.3gpp.loopback
Transit Routing Function (TRF)
sip:trf.visited.net
Visited Network
Home Network
INVITE sip:0170/1234567
Feature-Caps:
*;+g.3gpp.trf="<sip:trf.visited.net;lr>"
Proxy-CSCF

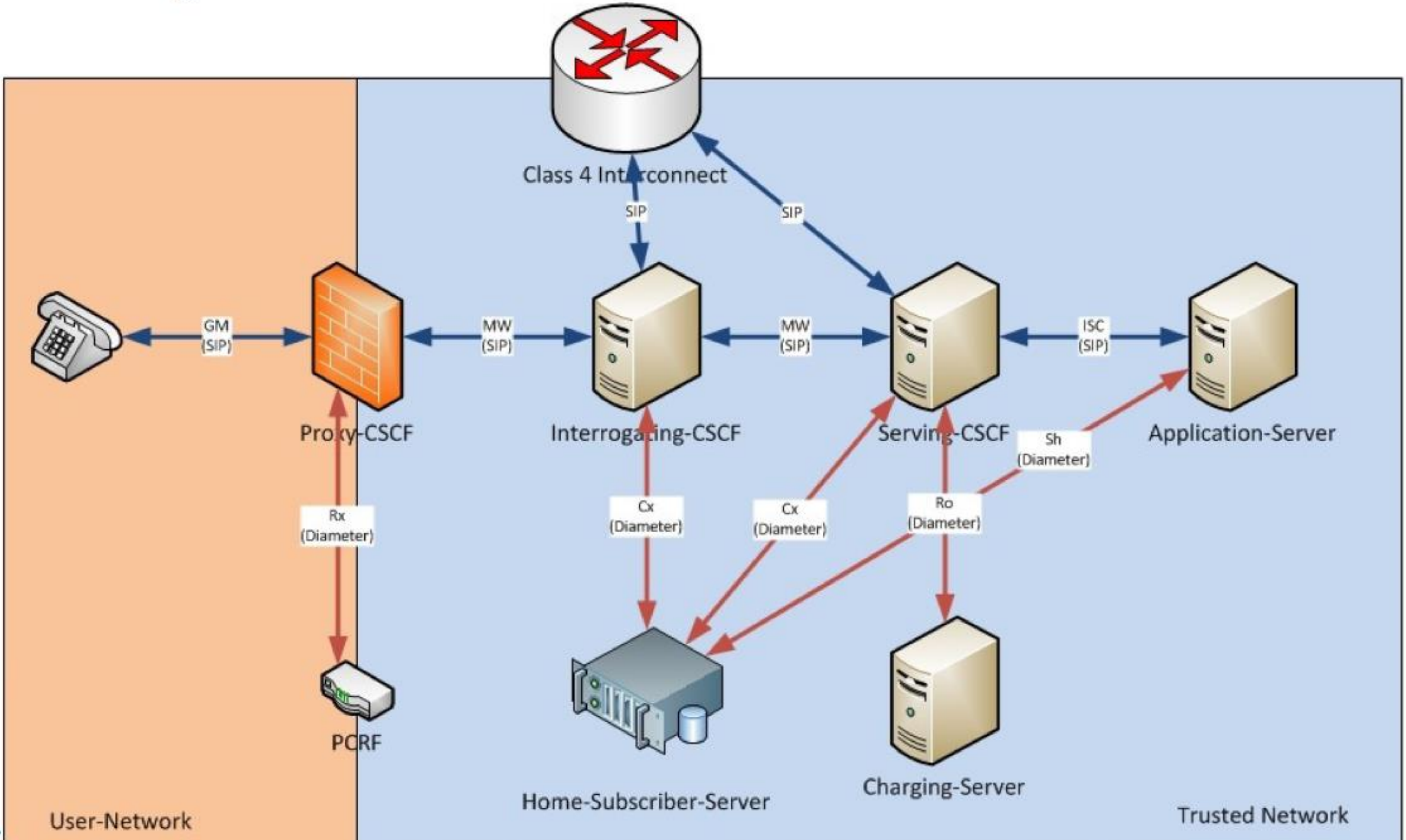
3GPP 23.228 annex U????

- Quite simple: It‘s WebRTC for IMS!!!

  (nothing more, nothing less)

- With IMS, Kamailio & VoLTE supports:
  - Voice over LTE (VoLTE)
  - Voice over Wifi (VoWIFI)
  - OTT Apps (both LTE and Wifi)
  - Fixed-Lines devices
  - WebRTC-Endpoints

Basic IMS Infrastructure overview



ng voice

Preparations: DNS / Bind

```
$ORIGIN mnc001.mcc001.3gppnetwork.org.
$TTL 1H
@                       5M IN SOA       localhost. root.localhost. (
                                        4               ; serial
                                        5M              ; refresh
                                        15M             ; retry
                                        1W              ; expiry
                                        5M )            ; minimum

                        6H IN NS        ns1.ng-voice.com.
                        6H IN NS        ns2.ng-voice.com.
ns1                         6H IN A         109.239.50.66
ns2                         6H IN A         109.239.50.67

;kamailio-ims.org.          5M IN NAPTR 10 10 "s" "SIPS+D2T"        ""      _sips._tcp.pcscf
kamailio-ims.org.           5M IN NAPTR 10 30 "s" "SIP+D2U"               ""
         _sip._udp.pcscf
kamailio-ims.org.           5M IN NAPTR 10 20 "s" "SIP+D2T"         ""      _sip._tcp.pcscf
```

Preparations: DNS / Bind (2)

```
pcscf   5M IN A          46.101.144.112
pcscf   5M IN NAPTR 10 10 "s" "SIP+D2T" ""    _sip._tcp.pcscf
pcscf   5M IN NAPTR 10 20 "s" "SIP+D2U" ""    _sip._udp.pcscf
_sip._tcp.pcscf          5M SRV 10 1 4060 pcscf
_sip._udp.pcscf          5M SRV 10 1 4060 pcscf

icscf   5M IN A          46.101.144.112
icscf   5M IN NAPTR 10 50 "s" "SIP+D2U" ""    _sip._udp.icscf
_sip._udp.icscf          5M SRV 20 0 5060 icscf

scscf   5M IN A          46.101.144.112
scscf   5M IN NAPTR 10 50 "s" "SIP+D2U" ""    _sip._udp.scscf
_sip._udp.scscf          5M SRV 10 0 6060 scscf

hss                      5M IN A       46.101.144.112
```

Basic Installation

Kamailio:

- Hint: Take the trunk version!
- HSS: OpenHSS from Fraunhofer is a good start, but it can be replaced with any other HSS (Kamailio is tested with Nokia-Siemens Networks (NSN), Ericsson, ZTE, Huawei, ...)
- Installation of the trunk version is described in the Kamailio Wiki
- SEMS with AMR-Codec is available here:https://github.com/ngvoice/sems-amr
  - Note: Usage of the AMR Codec requires patent licensing from Nokia, Ericsson and others

Configuring the Proxy-CSCF (1)

SIP Express Media Server (SEMS) – for AMR-NB

- Apply provided configurations
  (in the examples folder of Kamailio)
- Edit /etc/default/sems:
  - `RUN_SEMS="yes"`

Configuring the Proxy-CSCF (2)

Configure SIPWise' RTPEngine

- We need two instances of RTPEngine
  - for Originating traffic (MO)
  - for Terminating traffic (MT)
- Configs can be found in /etc/default/rtpengine

Configuring the Proxy-CSCF (3)

Configure Kamailio for use as a Proxy-CSCF:

- Add the SEMS-SBC to the dispatcher.list file
- Modify pcscf.cfg to fit to your needs (IP-Adresses, Hostnames, ...)
- Create the database for the Proxy-CSCF

Configuring the Interrogating-CSCF

- Modify icscf.cfg (Kamailio-Settings)
- Modify icscf.xml (Diameter-Connection)
- Create the database for the Interrogating-CSCF

Configuring the Serving-CSCF

- Modify scscf.cfg (Kamailio-Settings)
- Modify scscf.xml (Diameter-Connection)
- Create the database for the Serving-CSCF

Adding PSTN-Interconnects

- Inbound calls need to point to the I-CSCF
- Outbound gateways are defined in Dispatcher List on the Serving-CSCF
- ENUM is required for number to user mapping

Adding Applications

- The difficult/complex part is to add the proper rules
- Any SIP-Endpoint can be an application

Download: Configurations

All configurations, Zone-Files, etc.:

https://github.com/kamailio/kamailio

Check the examples folder, it‘s just been updated!