

# Diameter Processing with Kamailio

Kamailio World 2017



Let's make Kamailio great again!

...let's add Diameter!

# What is Diameter?

- Diameter is the double of the RADIUS
- Diameter is the evolution of RADIUS
- In IMS and Mobile Networks, Diameter is everywhere:
  - Home Subscriber Server – the central provisioning database (Cx-/Dx-Interfaces)
  - Policy & Charging (Rx, Ro, Rf-Interfaces)
  - Applications (Sh-Interfaces)

# Wtf?

Do you really want to do everything  
with Kamailio?

# Kamailio is a SIP-Router...

...why do you want to do Diameter?

# Kamailio is much more than SIP

- Kamailio has a very good Diameter Stack
- Kamailio has various Interfaces to other Systems, e.g.
  - RabbitMQ
  - Databases
  - No-SQL-Databases
  - REST
  - HTTP Server
  - ...

# Let's look at Diameter

IP-CAN SESSION UNAVAILABLE.cap

Datei Bearbeiten Ansicht Navigation Aufzeichnen Analyse Statistiken Telephonie Wireless Tools Hilfe



Anzeigefilter anwenden ... <Ctrl-/>

Ausdruck... +

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	10.53.24.33	10.53.24.97	TCP	1086	[TCP segment of a reassembled PDU]
2	0.000000	10.53.24.97	10.53.24.13	DIAMET...	506	cmd=User-Data Request(306) flags=RP-- appl=Diameter e2e4 Application(16777231) h2h=3270...
3	0.000020	10.53.24.13	10.53.24.97	DIAMET...	410	cmd=User-Data Answer(306) flags=-P-- appl=Diameter e2e4 Application(16777231) h2h=32700...

> Frame 3: 410 bytes on wire (3280 bits), 410 bytes captured (3280 bits)  
> Ethernet II, Src: 00:00:00\_00:00:00 (00:00:00:00:00:00), Dst: 00:00:00\_00:00:00 (00:00:00:00:00:00)  
> Internet Protocol Version 4, Src: 10.53.24.13, Dst: 10.53.24.97  
> Stream Control Transmission Protocol, Src Port: 2001 (2001), Dst Port: 2001 (2001)

## Diameter Protocol

Version: 0x01

Length: 348

> Flags: 0x40, Proxyable

Command Code: 306 User-Data

ApplicationId: Diameter e2e4 Application (16777231)

Hop-by-Hop Identifier: 0x32700147

End-to-End Identifier: 0x0147ad4a

[\[Request In: 2\]](#)

[Response Time: 0.000020000 seconds]

AVP: Session-Id(263) l=72 f=-M- val=pcrf105.epc.mnc003.mcc231.3gppnetwork.org;486648717;126;3525;327

AVP Code: 263 Session-Id

> AVP Flags: 0x40

AVP Length: 72

Session-Id: pcrf105.epc.mnc003.mcc231.3gppnetwork.org;486648717;126;3525;327

AVP: Vendor-Specific-Application-Id(260) l=56 f=-M-

AVP Code: 260 Vendor-Specific-Application-Id

> AVP Flags: 0x40

AVP Length: 56

Vendor-Specific-Application-Id: 0000010a4000000c000028af0000010a4000000c00000f3e...

> AVP: Vendor-Id(266) l=12 f=-M- val=10415

> AVP: Vendor-Id(266) l=12 f=-M- val=3902

> AVP: Vendor-Id(266) l=12 f=-M- val=13019

> AVP: Auth-Application-Id(258) l=12 f=-M- val=Diameter e2e4 Application (16777231)

AVP: Result-Code(268) l=12 f=-M- val=DIAMETER\_SUCCESS (2001)

AVP: Auth-Session-State(277) l=12 f=-M- val=NO\_STATE\_MAINTAINED (1)

AVP: Origin-Host(264) l=48 f=-M- val=spr101.epc.mnc003.mcc231.3gppnetwork.org

AVP: Origin-Realm(296) l=41 f=-M- val=epc.mnc003.mcc231.3gppnetwork.org

AVP: User-Name(1) l=23 f=-M- val=231030000010101

AVP: Unknown(39342) l=60 f=V-- vnd=3902 val=00009986c000001000000f3e000400040000999c80000020...

code=260 (diameter.Vendor-Specific-Application-Id), 48 Bytes

Pakete: 8 · Angezeigt: 8 (100.0%) · Ladezeit: 0:0.129 | Profil:Default

# Introducing the IMS-Diameter-Server

- Based on Kamailio
- You define in the Kamailio-Script what to do with the Request – it's up to you!
- Diameter is translated to JSON and back
- It allows you to:
  - Process Requests and generate answer
  - Send Requests to a Diameter Peer



# Doing Diameter in Kamailio Script

- Requests go to an Event-Route:
  - `event_route[diameter:request]`
- We've got the following Variables:
  - `$diameter_application` – the application ID
  - `$diameter_command` – the Command Code
  - `$diameter_request` – the Diameter-Payload
  - `$diameter_response` – here goes the answer
- Send a request:
  - `diameter_request(<appid>, <command>, <diameter-payload>)`

# What can you build with it?

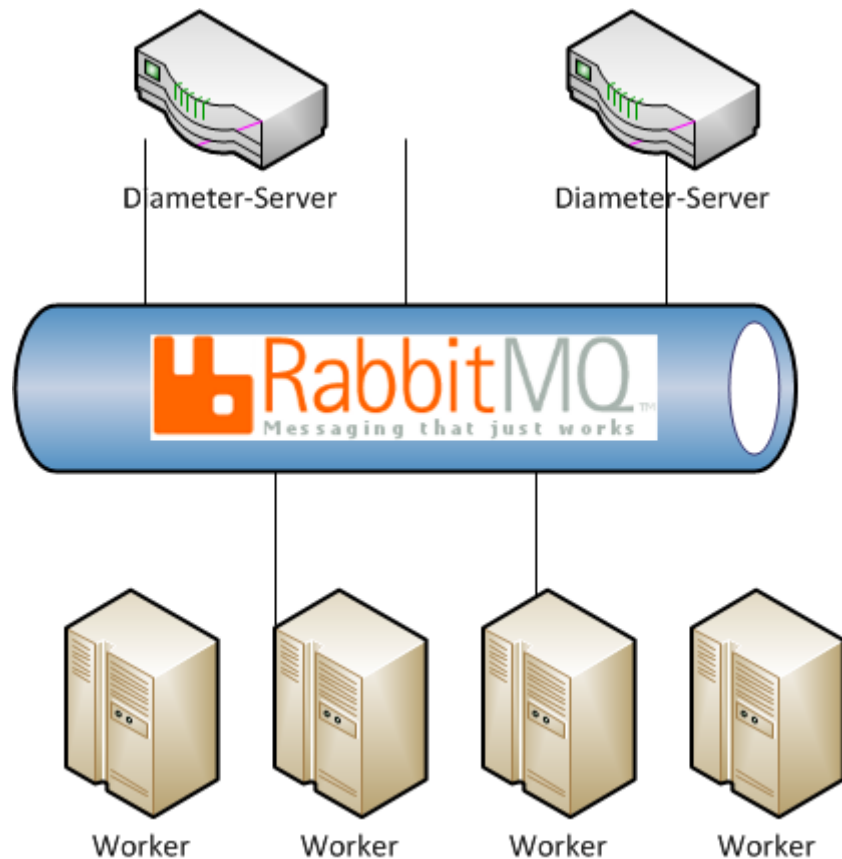
- A Home-Subscriber Server (HSS)
- A Policy & Charging Rules Function (PCRF)
- Diameter Routing-Agent (DRA)
- Online- or Offline Charging Server (OCS)
- Sh-Client – for Applications

## Any Diameter Application!

# History on our HSS-Servers

- Initially we used the OpenHSS from Fraunhofer
  - This works, but it's not the fastest solution
- Later we replaced it with Jboss / Mobicents / JDiameter
  - This was much faster
  - Install and forget, don't touch the system
  - Never open-source, it had too many „Todos“

# The Kamailio HSS Server



- Diameter-Gateway
  - of course Kamailio!
- Worker Processes
  - Implemented in PHP
  - Flexible and easy to adapt
  - Scale up? Add more workers
  - Extremely fast

# Roadmap

## IMS\_diameter\_server:

- Add native TLS
- Add native SCTP
- Homer Integration

## Applications:

- Add Sh to the HSS
- Implement a PCRF Simulator (Rx-Testing)
- Deep Integration into our Amarisoft Lab Femto-Cell (HSS)

## Mid-Term:

- Migrate OCS to the IMS\_diameter\_server Architecture

# It's all open-source!

- You'll find all components on GitHub\*:
- <https://github.com/ngvoice>

\*) Shortly: We will push it later this week.



Thank you!

Contact: [info@ng-voice.com](mailto:info@ng-voice.com)