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LREProxy:

Light RTP Relaying Sessions in Kernel-Space

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Introduction:

This is new module for Kamailio.

- What is LREProxy?
- What is the main purpose of designing this module?
- Why I decided to make this module for Kamailio?
- What challenges led to the design of this module?
- And somthings else ...

What is LREProxy:

- The LREProxy is Kernel RTP engine for relaying RTP packets crossing NIC in your network.

- The LREProxy architecture is composed of two different layers.

  - **LREP_Controlling Layer (LREP_CL)**
    - The first layer is developed as User-Space application

  - **LREP_Transport Stateful Layer (LREP_TSL)**
    - The second layer is developed in Kernel-Space as a main decision point for RTP admission controller and Quickpath selector.

Challenges:

- Designing large networks has specific challenges.
- Most of these challenges are related to network design and topology.

Some challenges are:

- Topology of your network
- Security
- High Availability
- Redundancy
- **Resources**
  - **For edge nodes take more effort to handle.**

Current Solution:

- There are some sulotions for challenges:

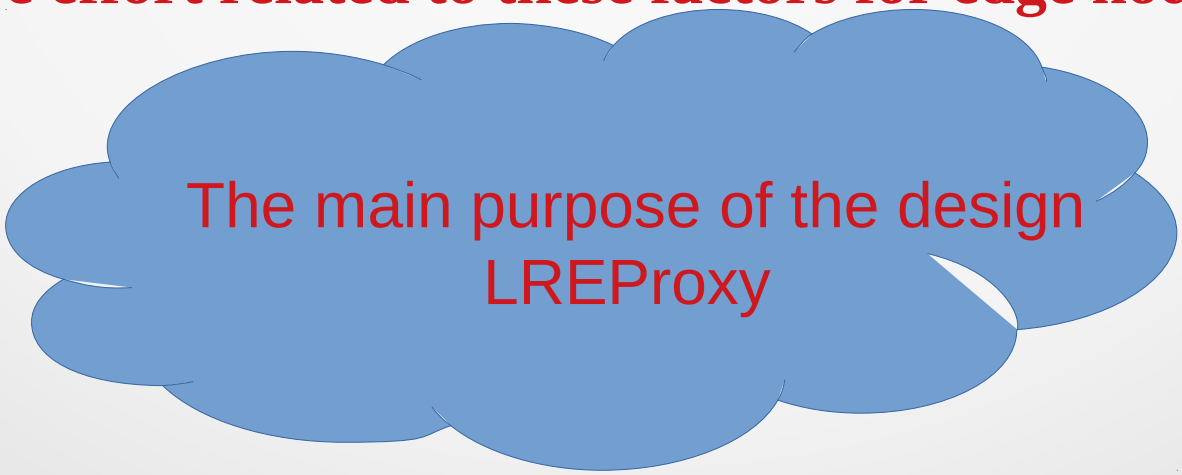
- Redundancy (Signaling layer – Transport Layer)
  - Active – Active
  - Active – Passive
- NFV techniques
- High- Availability
  - Reliable service
  - Failover servcie
- Resources
  - Openstack
  - AWS
  - ...

Does not reduce resource consumption

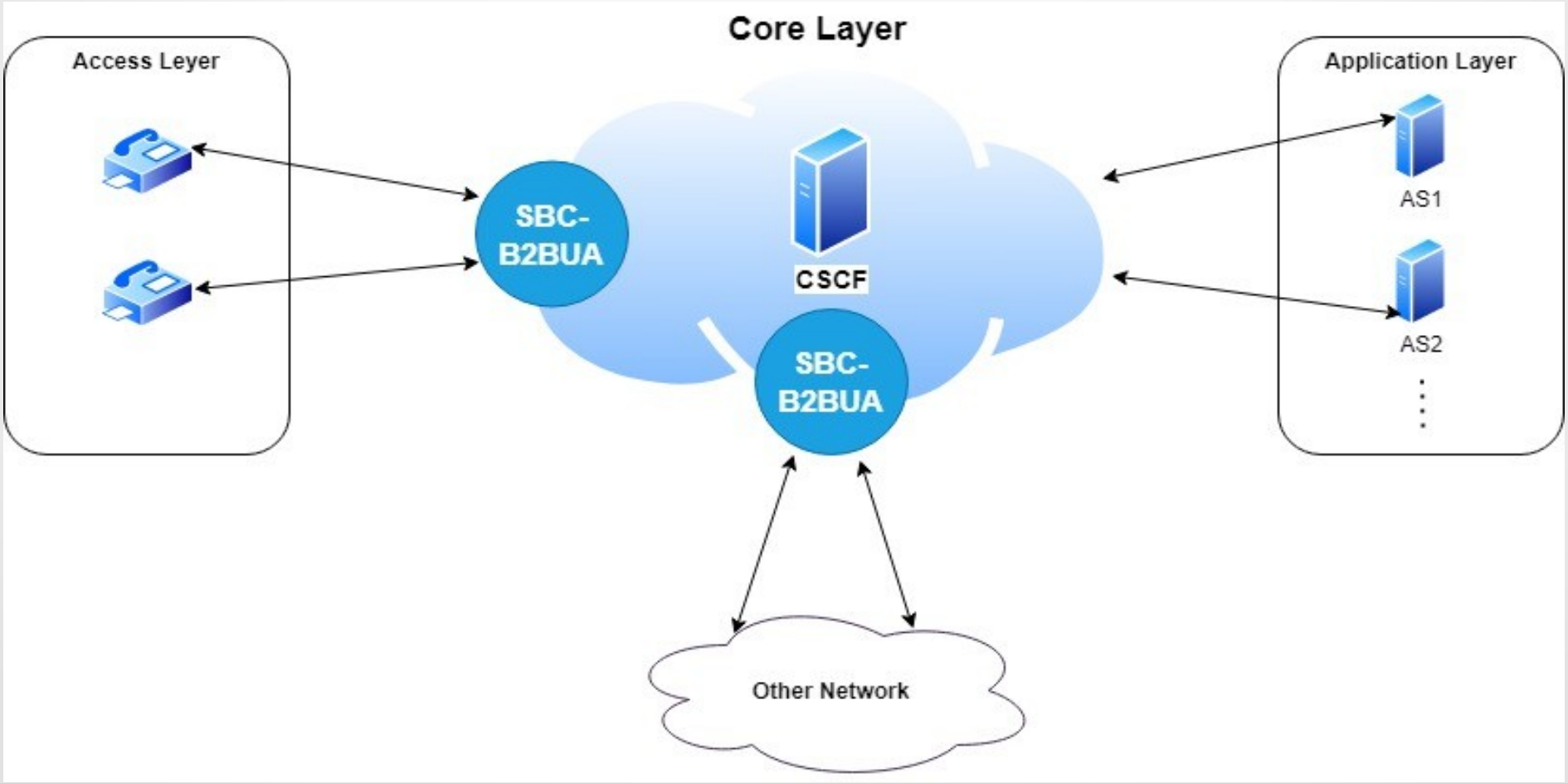
Purpose of design:

- Two important factors that increase the consumption of resources in a network are:
  - CPS (Call per second)
  - RTP relaying crossing NIC (SBC-B2BUA)

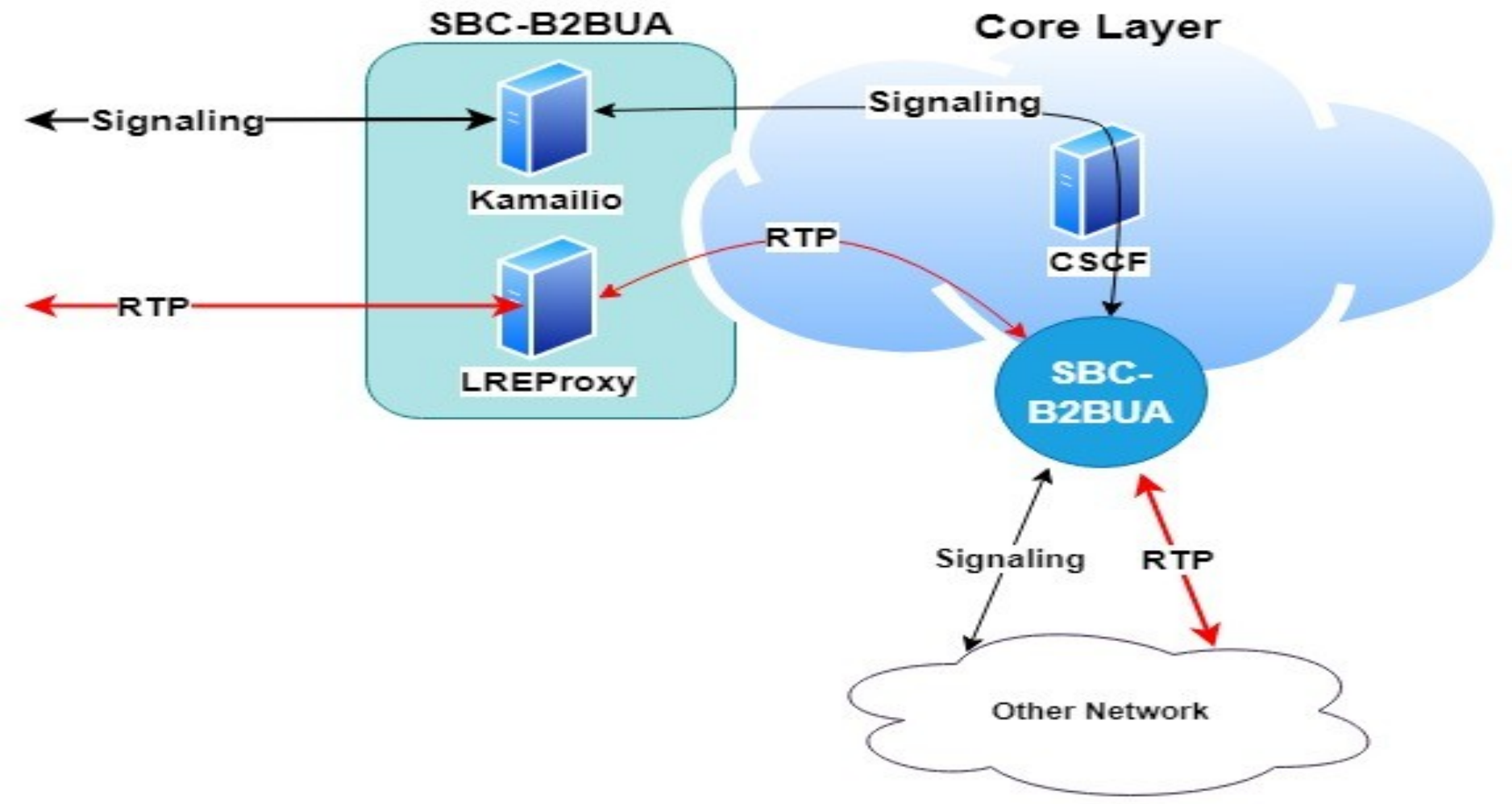
- **Take more effort related to these factors for edge nodes in network.**



System of Model:

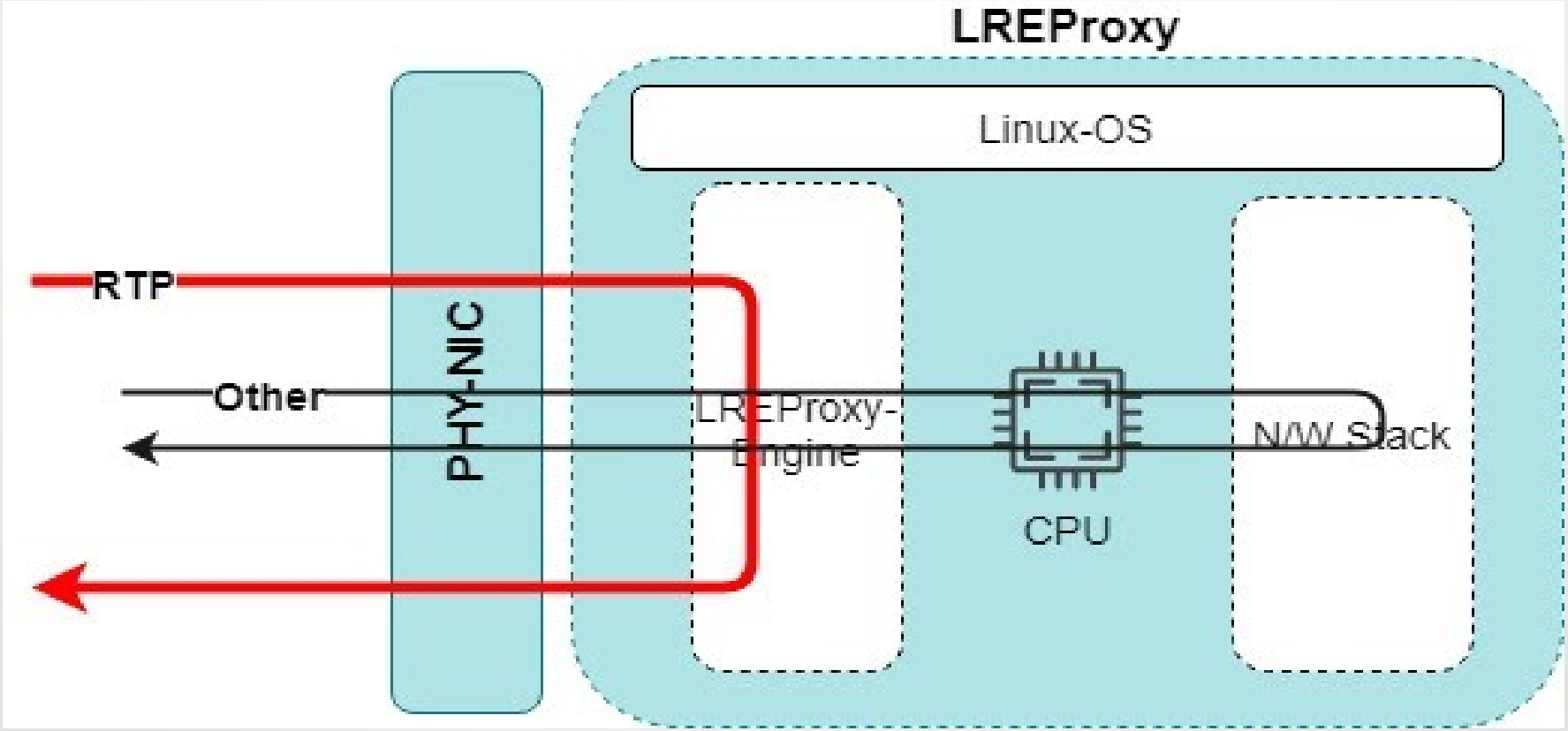


SoM in Detail:



Architecture of LREProxy:

- Software based application specific fastpath forwarding
- The CPU does not use for forwarding.



Forwarding Methods:

- There are 3 way for forwarding Control&data plan Traffic.
- https://www.embedded.com/accelerating-network-packet-processing-in-linux/

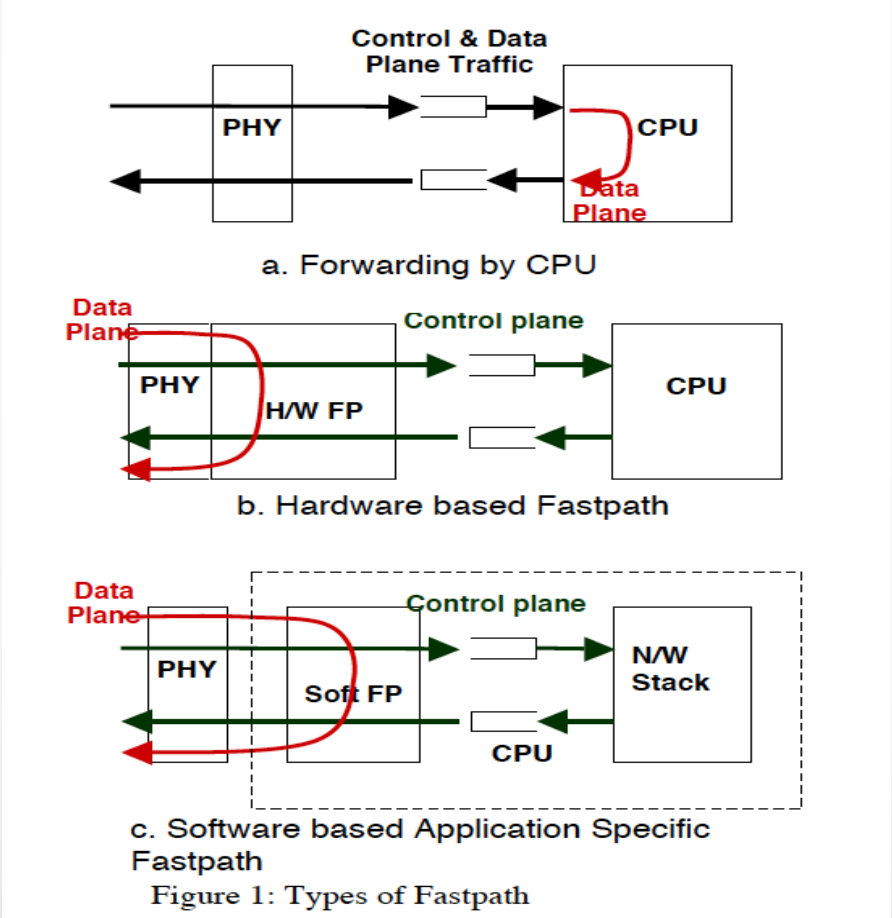
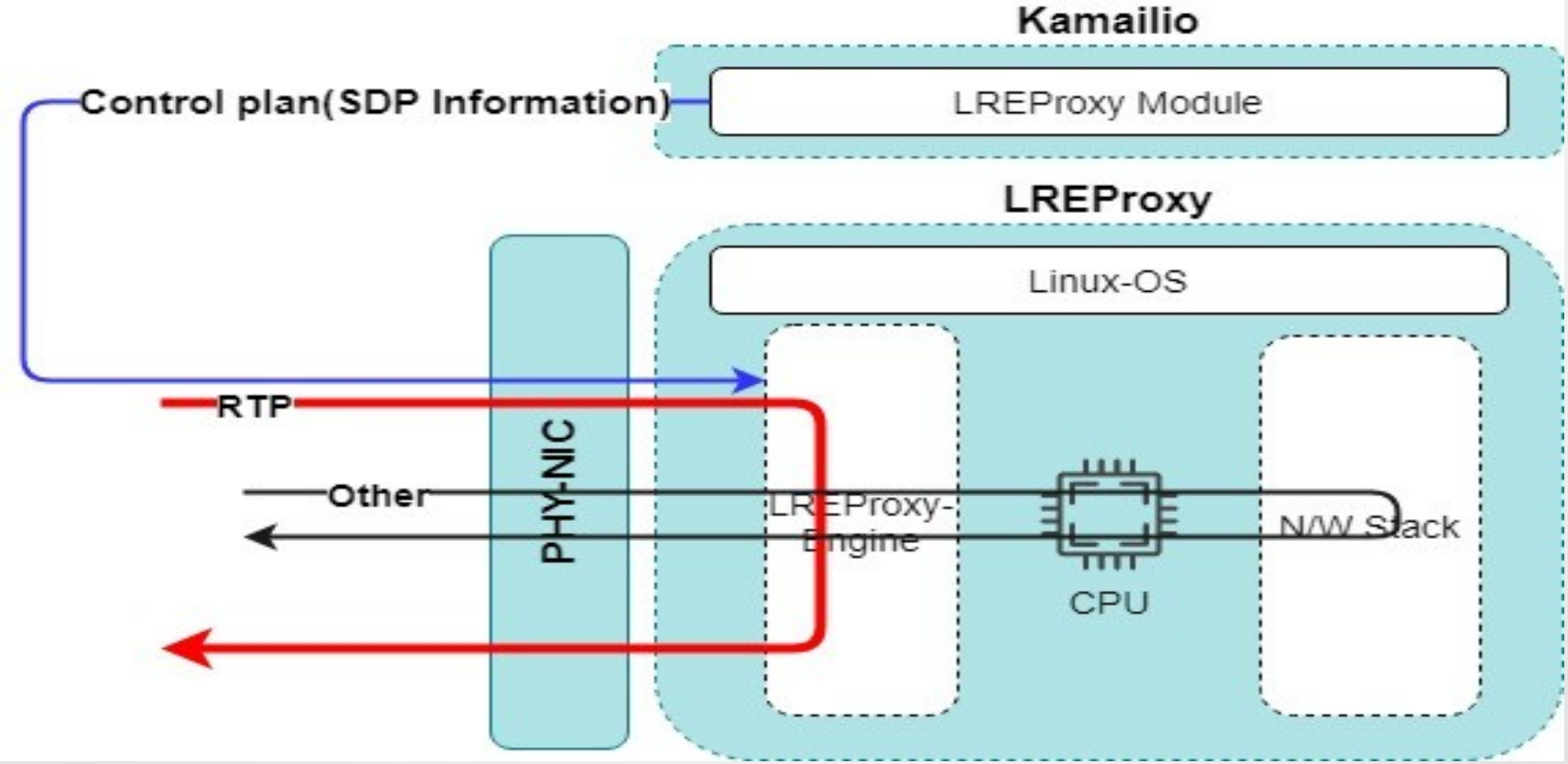


Figure 1: Types of Fastpath

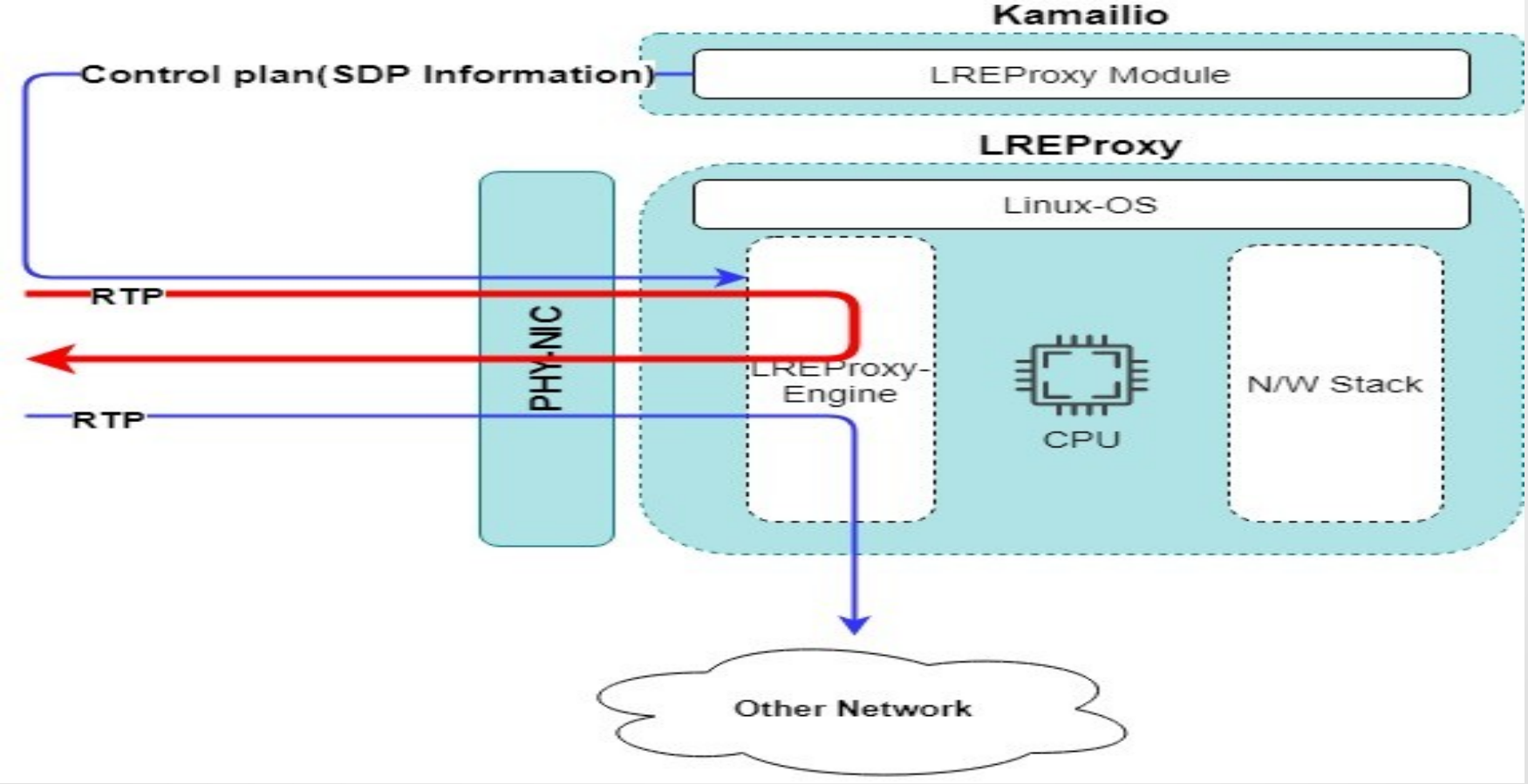
LREProxy in Detail:

- The first layer **gets all information about creating new sessions**, **active sessions and tear-down sessions** which is gotten from **SDP body** during **signaling plan** and relay them to the **LREP-Transport Stateful Layer (LREP-TSL)** for hashing**.**



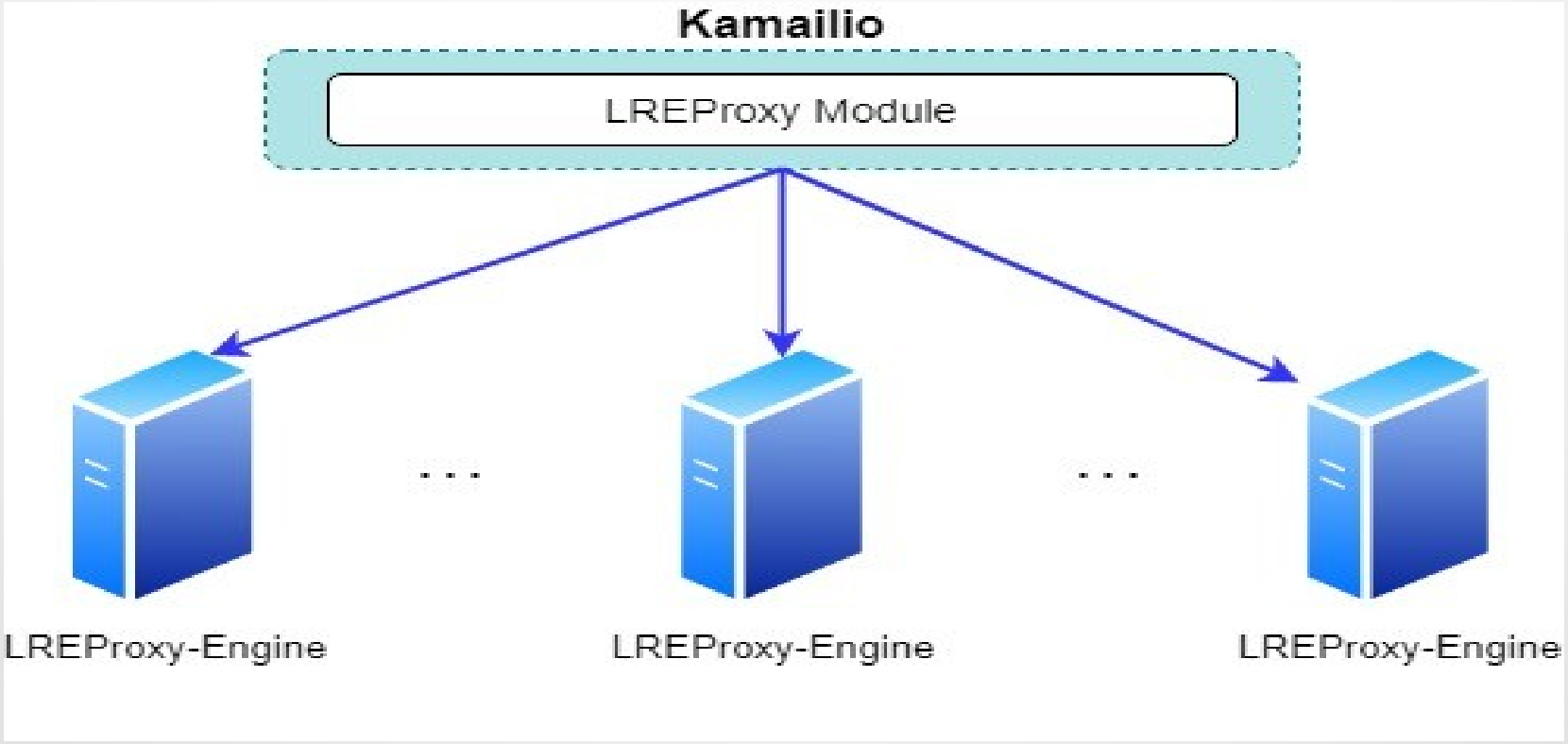
LREProxy in Detail:

- The **second layer** is developed in **Kernel-Space** as a **main decision point for RTP admission controller**
- and **Quickpath selector** to where a received packet should be **forwarded with power of NF_INET_PREROUTING in Netfilter hook.**



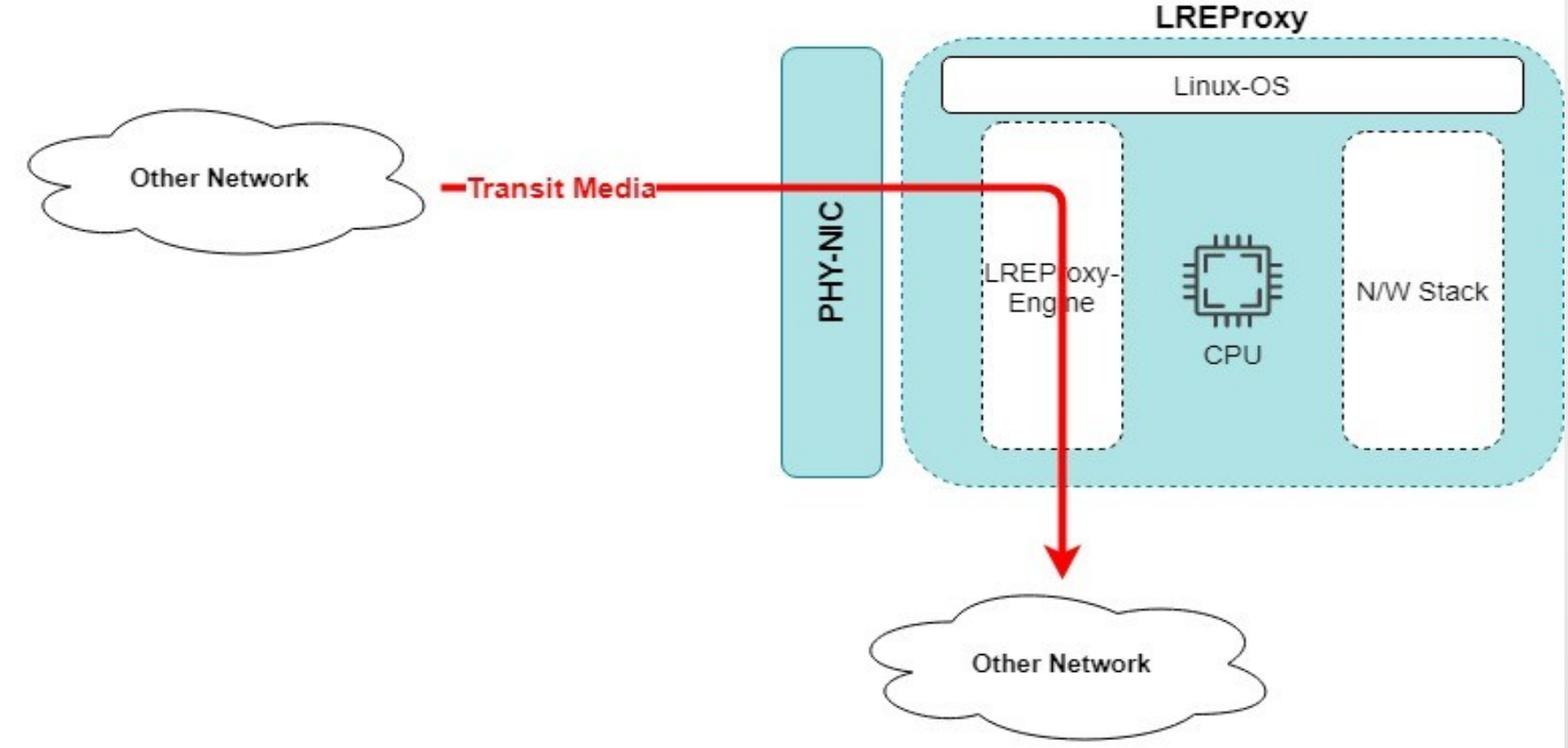
LREProxy & Redundancy:

- The LREP_CL and LREP-TSL could be run as independence functions on different machines.
- We could have one LREP_CL with multiple LREP-TSL on different machines. The LREP_CL could works with all LREP-TSL with different strategies.
- It possibles to do not lose sessions when a LREProxy engine crashes. (under development)

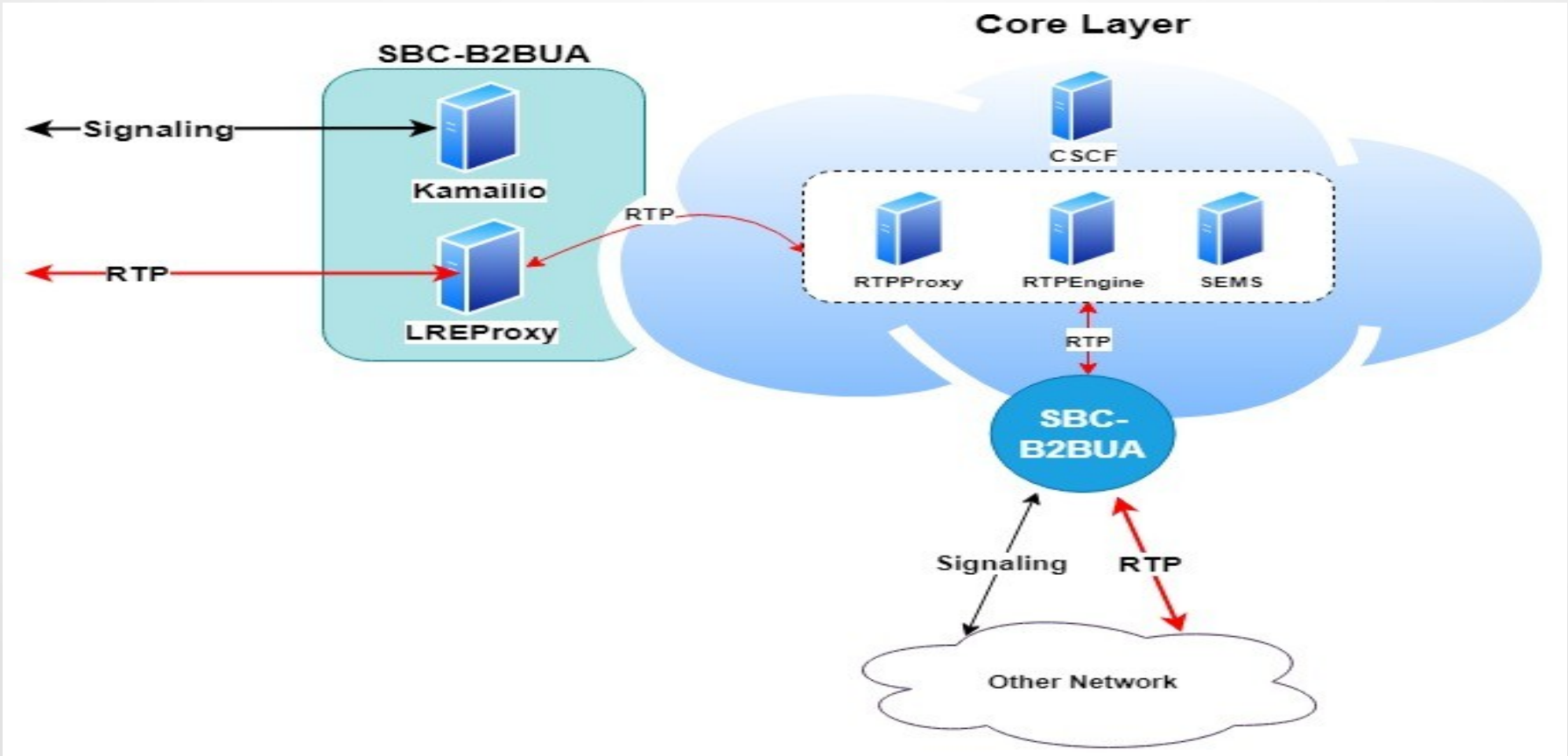


LREProxy & IMS Transit Media:

- The LREProxy could work as ingress node in IMS Transport layer for Transit-Media.



LREProxy & RTPEngine, RTPProxy, SEMS

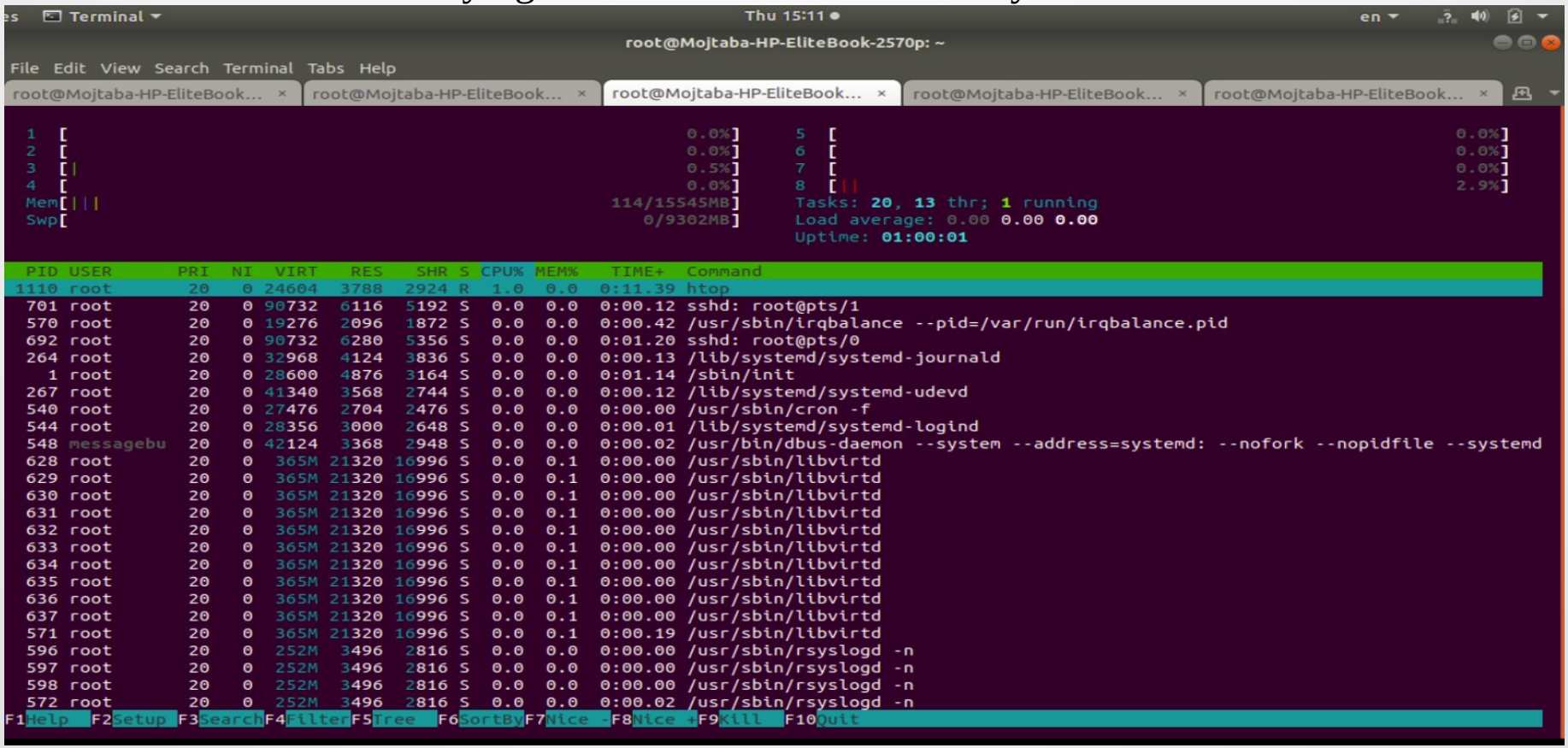


LREProxy: Pros & Cons

- Changing SDP parameter is done by Kamailio, not by LREProxy engine.It lead to all child processes(threads) in Kamailio do it itself.
- Forwarding packet in NF_INET_PREROUTING hook.
- NAT Travelsal for endpoint.
- Support audio only. (video support is under development).
- Suppport RTCP.
- Enable forwarding in sysctl's conf file:
  - net.ipv4.ip_forward=1
- Does not support transcoding.
- Could make anchor for target RTP for Lawful interception (under development)

LREProxy Resources in Peak:

- In practical experiment, the maximum SIP sessions calls with Sipp is limited to our servers for making calls and generating RTP media.
- The RTP traffic over SIP sessions are selected from different voice codecs during our test.
- The 20000 concurrent relaying RTP sessions with LREProxy in one server.



LREProxy & IEEEExplore

- https://ieeexplore.ieee.org/document/9303608

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Improve Performance of RTP Relaying Sessions in IMS Transport Layer With LREProxy

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***Abstract*—The IP Multimedia Subsystem is an architectural network for delivering IP multimedia services and data. The IMS network has built on three layers which allows for the convergence of different access networks. Each layer in IMS is consisting of various elements and protocols that consequently process signaling or media flow to specific application service. While the Call Session Control Function (CSCF) is the main route decision of the IMS network, the most significant of resources are used by routing and delivering media flow in Transport data layer in IMS network. With raising of request for service in IMS, the usage of resource have been increased. The ingress and egress nodes in IMS network are critical points and could potentially being bottleneck because they have to transmit huge signaling and media packets from and to IMS network. In this paper, we focused on Transport data layer on Edge-Border IMS network to manage and optimize its resources. We propose a new model of proxy that is called Light-RTP-Engine-Proxy (LREProxy). Also we implement our proposed paper as new module for Kamailio, Open Source SIP Server. We demonstrate how to use this module, the usage of resources in IMS network especially Edge-Border and IMS-Transit network have been significantly decreased.**

***Keywords*—IMS/NGN, CSCFs, ATGW, MGCF, I-BGW, TrGW, Transport-Layer, MMTEL, TAS**

I. Introduction

IP Multimedia Subsystem have introduced by 3 rd Generation Partnership Project[1]. It is a completely new open network structure for providing IP multimedia services in next gneration networks (NGN). It supports real-time communications like as voice, video, Instance Message(IM).

IMS provides three distributed horizontal layers for supporting of multimedia data and control them (Fig.1).

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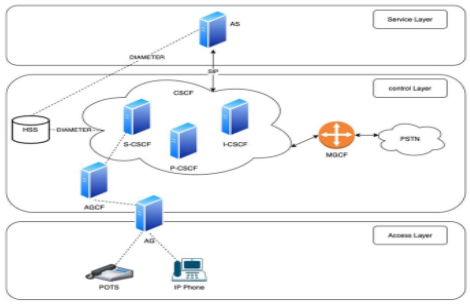

Fig. 1. The IMS Core Network. (*Three layers*)

All SIP servers are placed in the Session and Control layer in Fig.1. The main protocol for controlling sessions and signaling is Session Initiation Protocol (SIP) [2]. The SIP is simplicity Text Style Protocol in application layer for creating, modifying and terminating communication.

The SIP protocol cooperates with some other protocols such as the Session Description Protocol (SDP) which use to describe streaming media

Thank you