IPSec Support And VoLTE Components Updates

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KAMAILIO

About Me

- C/C++ developer since 2005
- Previous experience
  - Parking & Access control systems
  - Gambling industry
- Current – Telecom industry since 2013
  - Leading Core Network team since March 2019
  - Integrating VoLTE using Kamailio SIP server
    - Myself
    - VoIP engineer
    - QA/Telecom engineer

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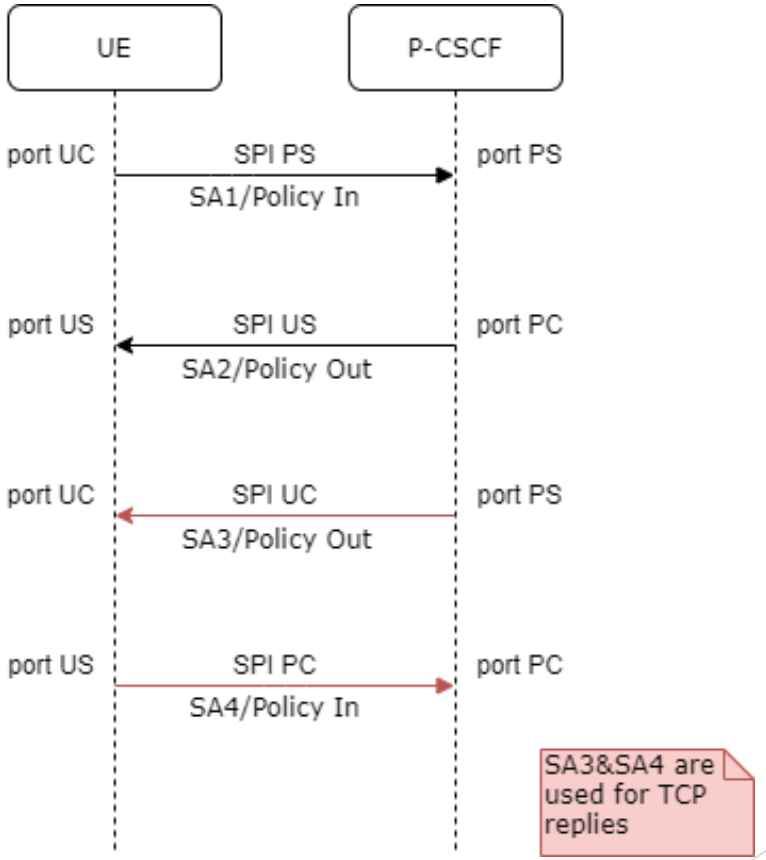
New features

- IPSec supported algorithms:
  - Sha1(default) and md5 - parsed from REGISTER msg
  - Encapsulating Security Payload
- IPv6
  - Improvements in ims_registrar/usrloc_pcscf modules
- TCP support
  - IPv4 and/or IPv6 listen interfaces
  - 4 SAs and policies



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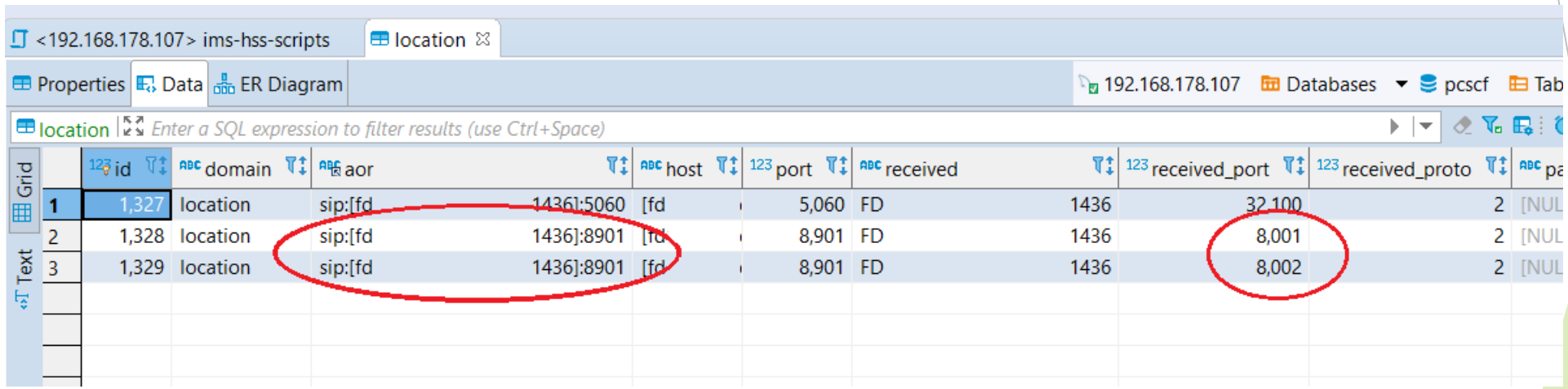
New features

- Extended P-CSCF location table
  - New match key – received_port column – because of Re-Registration
  - New columns – port_pc, port_ps, t_port_pc, t_port_ps



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Improvements

- S-CSCF
  - Single NOTIFY to the subscribers after Re-Registration
  - Single Contact in 200OK reply for UE Re-Registration
  - List all contacts in NOTIFY body when a contact expires
  - Delete expired contact from the DB after expiration

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NOTIFY body with terminated contact

```
<?xml
<reginfo
    xmlns="urn:ietf:params:xml:ns:reginfo"
    version="3"
    state="full">
  <registration
      aor="sip:[redacted]3gppnetwork.org"
      id="0x7f349d894d28"
      state="active">
    <contact
        id="0x7f349d8951b0"
        state="terminated"
        event="expired"
        expires="0"
        q="1.000">
      <uri>
      <unknown-param
      <unknown-param
      <unknown-param
      <unknown-param
      <unknown-param
      </contact>
    <contact
        id="0x7f349d88b0b0"
        state="active"
        event="registered"
        expires="269"
        q="1.000">
      <uri>
      <unknown-param
      <unknown-param
      <unknown-param
      <unknown-param
      <unknown-param
      </contact>
    </registration>
```

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IPSec in Kamailio IMS deployments

- **kamailio.cfg**

```
…
tcp_reuse_port=yes
…
 #ims registrar pcscf module is bound to the ims ipsec pcscf module.
 loadmodule "ims_ipsec_pcscf"
 loadmodule "ims_registrar_pcscf"
…
modparam("ims_ipsec_pcscf", "ipsec_listen_addr6", "fd14::211:2eff:feec:d4be")
modparam("ims_ipsec_pcscf", "ipsec_listen_addr", "192.168.1.11")
modparam("ims_ipsec_pcscf", "ipsec_client_port", 5100) # Send from this port to UE server port
modparam("ims_ipsec_pcscf", "ipsec_server_port", 6100) # Receive on this port from UE client port
modparam("ims_ipsec_pcscf", "ipsec_reuse_server_port", 1) # by default is 1, can be skipped here
modparam("ims_ipsec_pcscf", "ipsec_max_connections", 2)
modparam("ims_ipsec_pcscf", "ipsec_spi_id_start", 100) # by default is 100, can be skipped here
modparam("ims_ipsec_pcscf", "ipsec_spi_id_range", 4) # by default is 1000, can be skipped here
…
```

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IPSec in Kamailio IMS deployments

- tcp_reuse_port=yes
  - Must be always set to “yes” when TCP is used
  - https://www.kamailio.org/wiki/cookbooks/5.3.x/core#tcp_reuse_port
  - Allows reuse of TCP ports. This means, for example, that the same TCP ports on which Kamailio is listening on, can be used as source ports of new TCP connections when acting as an UAC. Kamailio must have been compiled in a system implementing SO_REUSEPORT (Linux > 3.9.0, FreeBSD, OpenBSD, NetBSD, MacOSX). This parameter takes effect only if also the system on which Kamailio is running on supports SO_REUSEPORT.
- ipsec_reuse_server_port
  - If set to 1 – reuse the old P-CSCF server port during Re-Registration. Only a new P-CSCF client port will be distributed.

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IPSec in Kamailio IMS deployments

- ipsec_forward()
  - IPSEC_SEND_FORCE_SOCKET(0x01) - Useful for IPSec and TCP. If set to 1 - send requests through an existing IPSec tunnel when TCP is used. In combination with tcp_reuse_port=yes
  - IPSEC_REVERSE_SEARCH(0x02)– helps to use the newest SAs for Requests to the UE (contact aliases are disabled)
  - onreply_route[REGISTER_reply] & onreply_route[MO_reply]
    - ipsec_forward(“location”,”1”);
  - route[REQINIT]
    - ipsec_forward(“location”,”3”);
- ipsec_create()
  - IPSEC_CREATE_DELETE_UNUSED_TUNNELS(0x01) - delete unused tunnels before each registration – is a must to be used when contact aliases are disabled.
  - onreply_route[REGISTER_reply]
    - if (t_check_status("401")) { ipsec_create("location","1") }

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IPSec in Kamailio IMS deployments

- Exclude contact alias
  - **kamailio.cfg**

```
route {
...
} else {
        force_rport();
#!ifdef WITH_CONTACT_ALIAS
        if(is_method("INVITE|SUBSCRIBE|UPDATE|REGISTER")) {
            add_contact_alias();
        }
#!endif
...
}
...
# Handle requests within SIP dialogs
route[WITHINDLG] {
    if (has_totag()) {
#!ifdef WITH_CONTACT_ALIAS
      if(!isdsturiset()) {
          handle_ruri_alias();
      }
#!endif
...
```

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IPSec in Kamailio IMS deployments

- Exclude contact alias
  - **rtp.cfg**

```
 76 route[NATMANAGE] {
...
    if ((is_reply() && ($T_req($tt) != $null)) || (is_request() && has_totag())) {
        if(!check_route_param("rm=") && !isflagset(FLT_RTP)) {
            return;
        }
#!ifdef WITH_CONTACT_ALIAS
        if (is_request()) {
            if (isflagset(FLT_MOBILE_ORIG) && is_direction("downstream")) {
                add_contact_alias();
            } else if (!isflagset(FLT_MOBILE_ORIG) && is_direction("upstream")) {
                add_contact_alias();
            }
        } else {
            if (!isflagset(FLT_MOBILE_ORIG) && is_direction("downstream")) {
                add_contact_alias();
            } else if (isflagset(FLT_MOBILE_ORIG) && is_direction("upstream")) {
                    add_contact_alias();
            }
        }
#!endif
    }
#!ifdef WITH_CONTACT_ALIAS
    else {
        if (is_reply() && !isflagset(FLT_MOBILE_ORIG)) {
            add_contact_alias();
        }
    }
#!endif
...
```

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IPSec with TCP and 2 connections

```
tcp        0      0 192.168.1.11:5100       0.0.0.0:*               LISTEN      14626/kamailio
tcp        0      0 192.168.1.11:5101       0.0.0.0:*               LISTEN      14626/kamailio
tcp        0      0 192.168.1.11:6100       0.0.0.0:*               LISTEN      14626/kamailio
tcp        0      0 192.168.1.11:6101       0.0.0.0:*               LISTEN      14626/kamailio
tcp        0      0 192.168.1.11:5060       0.0.0.0:*               LISTEN      14626/kamailio
tcp6       0      0 fd14::211:2eff:fee:5100 :::*                    LISTEN      14626/kamailio
tcp6       0      0 fd14::211:2eff:fee:5101 :::*                    LISTEN      14626/kamailio
tcp6       0      0 fd14::211:2eff:fee:6100 :::*                    LISTEN      14626/kamailio
tcp6       0      0 fd14::211:2eff:fee:6101 :::*                    LISTEN      14626/kamailio
tcp6       0      0 fd14::211:2eff:fee:5060 :::*                    LISTEN      14626/kamailio
```

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Thank you for your attention!

Q&A

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