DNS Proxy Integration

Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
Added support for randomization of P-CSCF addresses from DNS.	2021.01.0
First introduced.	Pre-2020.02.0

Feature Description

The Domain Name System (DNS) is a network of servers that translates numeric IP addresses into readable, hierarchical Internet addresses, and vice-versa. The DNS Proxy allows you to configure one or more proxy servers for resolving the host names. The DNS queries are sent to the configured DNS servers through the DNS proxy servers for resolving host names to their IP addresses.

The DNS proxy feature is integrated in the SMF network function.

Randomization of P-CSCF Addresses from DNS

The SMF service supports random selection of resolved hosts. If a DNS resolution yielded a set of IP addresses for a host and if the **randomize-answers** CLI is enabled in the DNS Proxy profile configuration, the DNS lookup selects IP addresses randomly. The selection of addresses is based on pseudo-random permutation of integers that ensure randomization.

Every DNS query for a particular host gives different sets of IP addresses when the **randomize-answers** CLI is enabled. This is applicable for both IPv4 and IPv6 addresses.

The selection method is either round-robin or randomized for the DNS Proxy profile.

Example:

For a DNS lookup to get a subset of five IP addresses with **randomize-answers** enabled.

Host1 = { "1.1.1.1", "2.2.2.2", "3.3.3.3", "4.4.4.4", "5.5.5.5", "6.6.6.6", "7.7.7.7", "8.8.8.8", "9.9.9.9", "10.10.10.10" }

First lookup: *[5.5.5.5 1.1.1.1 9.9.9.9 2.2.2.2 7.7.7.7]*

Second lookup: *[8.8.8.8 6.6.6.6 2.2.2.2 3.3.3.3 9.9.9.9]*

Third lookup: *[7.7.7.7 5.5.5.5 2.2.2.2 4.4.4.4 9.9.9.9]*

How it Works

The DNS Proxy feature is integrated in the SMF cluster. For sending the list of host names to resolve the DNS Proxy server, the SMF Client Library calls the smfdnsclnt.DNSLookupRequest() Request. The DNS Proxy server forwards the request to the Open source DNS package for host name to IP address resolution.
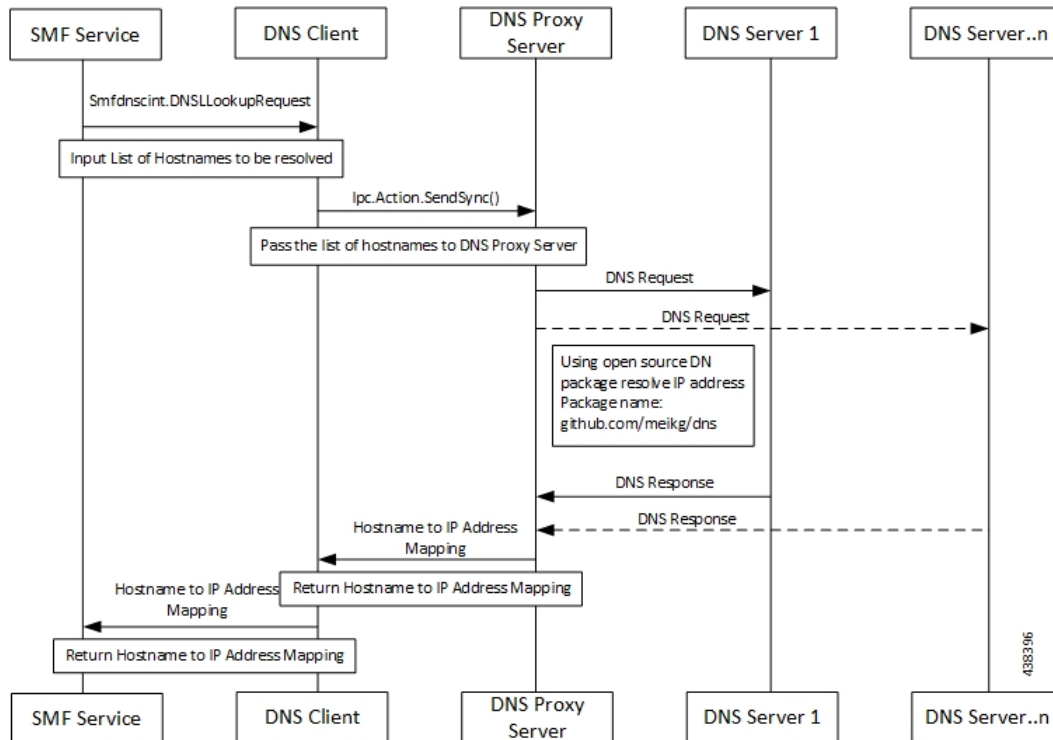
Figure 1: DNS Proxy Integration in SMF
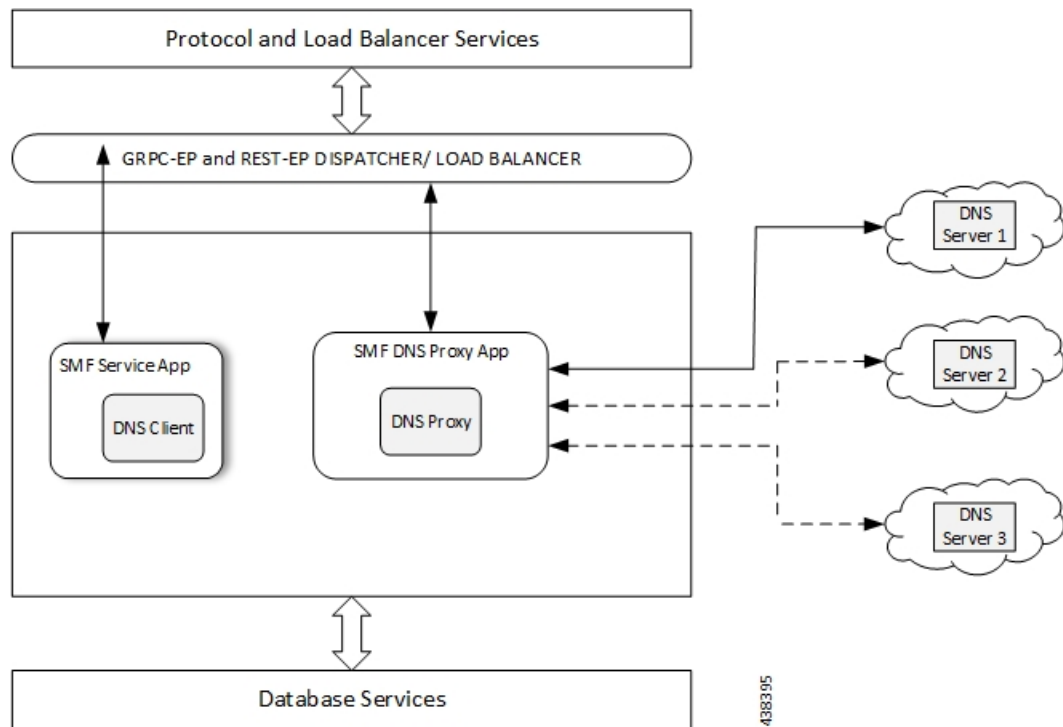
Call Flows

The following call flow illustrates the communication between the DNS client and the Proxy server.

Figure 2: DNS Client and Proxy Server Communication Call Flow

Configuring the DNS Proxy Feature

This section describes how to configure the DNS Proxy feature.

Configuring the DNS Proxy feature involves the following steps:

1. Configuring DNS Proxy Replica

2. Configuring DNS Proxy

3. Configuring P-CSCF Server Addresses

Configuring DNS Proxy Replica

Use the following sample configuration to configure the DNS proxy replica.

```
config
    instance instance-id gr_instance_id
        endpoint dns-proxy replicas replica_value
        commit
```

NOTES:

- **endpoint dns-proxy replicas** *replica_value*: Specify the number of replicas of the DNS proxy pod per node.

replica_value must be an integer.

- **commit**: Saves the configuration.

Configuring DNS Proxy

Use the following sample configuration to configure the DNS Proxy feature for SMF.

```
config
  profile dns-proxy
     cache-ttl dns_response_ttl_value
     query-type { ipv4v6 | ipv4 | ipv6 }
     randomize-answers
     round-robin-answers
     servers dns_server_name
        ip server_ip_address
        port server_port
        priority server_priority
        protocol { tcp | udp }
     timeout dns_timeout_value
     commit
```

NOTES:

- **profile dns-proxy**: Enter the DNS Proxy Configuration mode.

- **cache-ttl** *dns_response_ttl_value*: Specify the TTL value of DNS responses in cache, in seconds. *dns_response_ttl_value* must be an integer in the range of 60-86400.

- **query-type**: Specify the DNS query type.

- **randomize-answers**: Enable DNS for fetching addresses by the randomized selection method.

- **round-robin-answers**: Enable DNS for fetching addresses by the round-robin selection method.

- **servers** *dns_server_name*: Specify the name of the DNS server. For example, serv1.

    - **ip** *server_ip_address*: Specify the IP address of the DNS server.

    - **port** *server_port*: Specify the port of the DNS server.

      server_port must be an integer in the range of 1-65535.

    - **priority** *server_priority*: Specify the priority of the DNS server.

      server_priority must be an integer in the range of 1-100.

    - **protocol**: Specify the protocol type for the DNS server as TCP or UDP.

- **timeout** *dns_timeout_value*: Specify the DNS timeout value, in milliseconds.

  dns_timeout_value must be an integer.

- **commit**: Saves the configuration.

Configuring P-CSCF Server Addresses

This section describes how to configure IPv4, IPv6, and IPv4v6 addresses for primary, secondary, and tertiary P-CSCF servers.

Configuring P-CSCF Server IPv4 Addresses

Use the following sample configuration to configure the IPv4 address of the primary, secondary, and tertiary P-CSCF servers.

```
config
  profile pcscf pcscf_profile_name
    v4-list
      precedence precedence_value
        primary server_ipv4_address
        secondary server_ipv4_address
        tertiary server_ipv4_address
        end
```

NOTES:

- **precedence** *precedence_value*: Specify the precedence value. *precedence_value* must be an integer in the range of 1-64. This precedence value is used for the round-robin selection of P-CSCF server. The lower the precedence, the higher the priority.

- **primary** *server_ipv4_address*: Specify the IPv4 address of the primary P-CSCF server in dotted-decimal notation.

- **secondary** *server_ipv4_address*: Specify the IPv4 address of the secondary P-CSCF server in dotted-decimal notation.

- **tertiary** *server_ipv4_address*: Specify the IPv4 address of the tertiary P-CSCF server in dotted-decimal notation.

Configuring P-CSCF Server IPv6 Addresses

Use the following sample configuration to configure the IPv6 address of the primary, secondary, and tertiary P-CSCF servers.

```
config
  profile pcscf pcscf_profile_name
    v6-list
      precedence precedence_value
        primary server_ipv6_address
        secondary server_ipv6_address
        tertiary server_ipv6_address
        end
```

NOTES:

- **precedence** *precedence_value*: Specify the precedence value. *precedence_value* must be an integer in the range of 1-64. This precedence value is used for the round-robin selection of P-CSCF server. The lower the precedence, the higher the priority.

- **primary** *server_ipv6_address*: Specify the IPv6 address of the primary P-CSCF server in colon-separated hexadecimal notation.

- **secondary** *server_ipv6_address*: Specify the IPv6 address of the secondary P-CSCF server in colon-separated hexadecimal notation.

- **tertiary** *server_ipv6_address*: Specify the IPv6 address of the tertiary P-CSCF server in colon-separated hexadecimal notation.

Configuring P-CSCF Server IPv4v6 Addresses

Use the following sample configuration to configure the IPv4v6 address of the primary, secondary, and tertiary P-CSCF servers.

```
config
   profile pcscf pcscf_profile_name
      v4v6-list
         precedence precedence_value
            primary ipv4 server_ipv4_address ipv6 server_ipv6_address
            secondary { [ ipv4 server_ipv4_address ] [ ipv6 server_ipv6_address ]
}
            tertiary { [ ipv4  server_ipv4_address ] [ ipv6 server_ipv6_address ] }

            end
```

NOTES:

- **precedence** *precedence_value*: Specify the precedence value. *precedence_value* must be an integer in the range of 1-64. This precedence value is used for the round-robin selection of P-CSCF server. The lower the precedence, the higher the priority.

- **primary ipv4** *server_ipv4_address* **ipv6** *server_ipv6_address*: Specify the IPv4 and IPv6 address of the primary P-CSCF server in dotted-decimal notation and colon-separated hexadecimal notation respectively.

- **secondary { [ipv4** *server_ipv4_address* **] [ipv6** *server_ipv6_address* **] }**: Specify the IPv4 and IPv6 address of the secondary P-CSCF server in dotted-decimal notation and colon-separated hexadecimal notation respectively.

- **tertiary { [ipv4** *server_ipv4_address* **] [ipv6** *server_ipv6_address* **] }**: Specify the IPv4 and IPv6 address of the tertiary P-CSCF server in dotted-decimal notation and colon-separated hexadecimal notation respectively.

Verifying DNS Proxy Feature Configuration

This section describes how to verify the DNS Proxy feature configuration.

Use the **show running-config profile dns-proxy** command to confirm the configuration of DNS Proxy feature.

The following is an example output of **show running-config profile dns-proxy** command with configuration for two DNS servers, serv1 and serv2.

```
show running-config profile dns-proxy profile1
   query-type ipv4
   timeout 5
   servers serv1
```

```
          round-robin-answers
          servers serv1
          ip 10.105.227.227
          port 53
          protocol tcp
          priority 1
          exit
          servers serv2
          ip 10.105.227.228
          port 20
          protocol udp
          priority 2
          randomise-answers
          exit
       exit
```