

Dynamic APN and IP Pool Support

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Revision History

Note Revision history details are not provided for features introduced before release 21.24.

Revision Details	Release
First introduced	Pre 21.24

Feature Description

The Dynamic APN and IP Pool Support feature enables the following functionality:

- Addition of an IP pool in an APN that previously had no IP pool configurations.
- Modification or removal of an existing IP pool configuration in an APN and adding a different one.
- Deletion or removal of existing IP pool configurations in an APN.

This feature supports dynamic configuration changes of the APN IP pools and groups and allocates the chunk to the User Plane (UP) without Sx reassociation.

How It Works

This section provides a brief of how the Dynamic APN and IP Pool Support feature works.

The Demux conveys the dynamically added APN and IP pool configuration to the VPN Manager. This information ensures the allocation of resources without Sx link breakage. The Control Plane (CP) then pushes the configuration to the User Plane via the Sx-Association Update message.

Dynamically Triggering APN IP Pool Addition Request

You can add APN and IP pools associated to new or existing APNs dynamically. During runtime, the new APNs and IP pools are added to the configuration. The configuration update occurs without causing any break in the Sx association between CP and UP,

The Dynamic APN and IP Pool Support feature also supports the following functionality:

- Addition of new IP pools or UP groups to existing APNs
- Addition of new APN to existing UP groups

This feature supports the following scenarios:

Operation on APN	Operation on IP Pool/Group	Operation on UP Group	Impact on existing calls
Addition of new APN	New pool or new group	New UP group (not registered)	No impact
Addition of new APN	New pool or new group	Existing UP group (already few UP registered)	No impact
Addition of new APN	Defaults pool	Existing UP group (already few UP registered)	No impact
Existing APN	Remove existing IP pool or group and add new IP pool or group	Existing UP group (already few UP registered)	No further allocation from the removed IP pool. No impact on calls.
Existing APN	Remove existing IP pool or group and add new IP pool or group	Default UP group	No further allocation from the removed IP pool. No impact on calls.
Existing APN	Remove existing IP pool or group from APN	Default UP group	No further allocation from the removed IP pool. No impact on calls.
Removing APN	Pass the new set of IP pools or groups to VPNMgr-C for each impacted UP	Existing UP group (already few UP registered)	All existing calls associated to that APN aren’t affected but no new calls are connected.

Dynamic Addition of APN and IP Pools

Note This feature only works if there are registered UPs to the context. There needs to be a prior association of the Userplanes with the context.

After the newly added UP registration is successful, the VPN manager pushes the IP chunk information to the UP from the pool.

- The CP Sx-demux receives the trigger from the CLI for adding, modifying, or deleting a new APN or IP pools.
- The Sx-C demux on the CP determines the list of impacted UPs. It passes on the information for each impacted UP to the VPN manager at the CP using the Modify APN IP Pool Request.
- The VPN manager allocates the IP chunks and replies with a success or failure to the Sx-C demux.
- The new APN or IP pool is applied to the existing configuration. Use the "show config" CLI command to view the configuration.
- The addition of a new IP pool name or UP group to an existing APN does not affect the existing calls on that APN.
- Any IP pool (either IPv4 or IPv6) can be added to APN dynamically and can be modified (deleted and a new IP pool is added) in the same run. This change does not impact the existing calls in any way. The changed configuration applies only after the new calls to the APN are made.
- If any calls are running on a specific APN, any attempt to deleting that APN throws an error.
- Only APN that have no calls running can be deleted. The IP pools chunks associated to this APN are available for use to other APNs.

Passing of Allocated Chunks Information to the UP

- On receiving an Sx Association Update Request or Response message, the proprietary or custom IE pushes the IP chunk information to the UP.
- The S1-U demux on the UP passes on this information to the VPN manager on the UP
- The VPN manager receives the BGP routes, which it announces on a per chunk basis.

Limitations

The Dynamic APN and IP Pool Support feature has the following limitations:

- Any operation on IP pools and UP group associated to existing APN is not supported in this release.
- Multiple UPs won't be able to access the same IP pool as a part of this release.
- If a new UP_GROUP is added against an APN without configuring any new IP pool, then the calls start landing on the new UP_GROUP rather than the default one. This causes the calls to get aborted.

Configuring Dynamic APN and IP Pool Support

This section describes how to configure the Dynamic APN and IP Pool Support feature.

Follow this sequence of commands to add a new APN (addition of the IP pool is optional).

- Create a new IP pool. For more informattion, see the **ip address** *ip_ pool_name* CLI command in the *Command Reference Guide*.

  To add an IP pool to an IP pool group, use the **ip pool** *ip_pool_name* **static group-name** *ip_pool_group_name* CLI command. For more information, see the *Command Reference Guide*.

- Add a new APN and associate the new IP pool to this APN. For more informattion, see the **apn** *apn_name* CLI command in the *Command Reference Guide*.

  To add an IP Pool group to the APN, use the **ip address pool name** *ip_pool_group_name* CLI command. For more information, see the *Command Reference Guide*.



Note If there is a newly formed User Plane (UP) group along with a new APN or IP pool then, UP should be associated at the end. If it is already associated, re-associate it. This avoids any IP pool chunk allocation related issue.

- Push the configuration to the User Plane.
- Update the IP pool information to the VPN manager.
- Run an attach call.

Updating the APN Configuration

Use the following command in Exec mode to update the VPN manager with the APN configuration changes.

To update all the configured APNs to the VPN manager:

```
update ip-pool apn all
end
```

To update a specific APN configuration to the VPN manager:

```
update ip-pool apn name apn_name
end
```

NOTES:

- This CLI command triggers the SX_ASSOCIATION_UPDATE towards the UP and transfers all the allocated IP pool chunks for the newly added IP pools.

Example

The following CLI command updates a specific APN configuration to the VPN manager:

```
update ip-pool apn name cisco.com
```

Verifying Dynamic APN and IP Pool Support

Use the following command to verify the Dynamic APN and IP Pool Support feature.

show config apn intershat

The following is a sample output of the show command:

```
config
  context ingress
    apn intershat
      pdp-type ipv4 ipv6
      bearer-control-mode mixed
      selection-mode subscribed sent-by-ms chosen-by-sgsn
      ims-auth-service ims-ggsn-auth
      ip access-group acl4-1 in
      ip access-group acl4-1 out
      ip context-name egress
      ip address pool name ipv4-test
      ipv6 access-group acl6-1 in
      ipv6 access-group acl6-1 out
      active-charging rulebase prepaid
    exit
  #exit
end
```