



UPF Ingress Interfaces

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Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	5G-UPF
Applicable Platform(s)	VPC-SI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	<i>UCC 5G UPF Configuration and Administration Guide</i>

Revision History

Table 2: Revision History

Revision Details	Release
Added support for IP separation per interface to allow separate networks for N3 and N9 interfaces.	2023.02.0
First introduced.	2020.02.0

Feature Description

UPF supports the GTP-U ingress interface to initiate the user plane service. The user plane service associates with the GTP-U service using the **associate gtpu-service** CLI command in User Plane Service configuration mode.

The UPF supports different GTP-U ingress interfaces to allow a separate network for N3 interface and N9, S5u, and S8u interfaces. The N9, S5u, and S8u interfaces share the same public IP.



Note UPF does not support multiple GTP-U service selection for single call.

The supported GTP-U ingress interfaces include:

- N3—N3 is the interface between gNodeB and UPF.
- N9—The N9 interface connects two UPFs. It is the interface between intermediate I-UPF and UPF session anchor connecting different PLMN.
- S5u—S5u is similar to the N9 interface that connects two UPFs. It is the interface between intermediate I-UPF and UPF session anchor.
- S8u—S8u is an inter-PLMN variant of the S5u interface.

UPF Ingress Interface Type Configuration

Configuring UPF Ingress Interface Type

To configure the UPF ingress interface type, use the following configuration:

To enable **upf-ingress** CLI, you need the **require upf** CLI on the UPF. However, to enable the **require upf** CLI, you need the UPF license.

```

configure
  context context_name
    user-plane-service service_name
      [ no ] associate gtpu-service gtpu_service_name upf-ingress
  interface-type [ n9 | s5u | s8u | n3 ]
end

```

NOTES:

- **associate gtpu-service gtpu_service_name**: Associate the GTP-U service with the user plane service.
- **upf-ingress**: Configure the interface type as UPF ingress.
- **interface-type [n9 | s5u | s8u | n3]**: Configure the desired GTP-U ingress interface type.
- If the N3 GTP-U ingress service is not present, then UPF uses the default interface.
- If the configuration for N9, S5u, or S8u interfaces is not present, then UPF performs the following actions:

- UPF looks to use the N9 interface first followed by the S5u and S8u interfaces.
- If there is no GTP-U service, then UPF uses the default interface.

Configuration Example

The following is an example configuration:

```
associate gtpu-service n3-ingress upf-ingress
associate gtpu-service n3-ingress upf-ingress interface-type n3
associate gtpu-service n9-ingress upf-ingress interface-type n9
associate gtpu-service s5-ingress upf-ingress interface-type s5
associate gtpu-service s8-ingress upf-ingress interface-type s8
```

Configuring Echo Response for N9 Interface

The echo response in a GTP-U service provides the availability of peer UPF.

The following is a sample echo response configuration for the N9 interface in hUPF:

```
gtpu-service n9-ingress
  echo-interval 60
  echo-retransmission-timeout 1
  bind ipv4-address 60.60.41.5 bearer-type all
exit
```

The following is a sample echo response configuration for the N9 interface in vUPF:

```
gtpu-service n9-egress
  echo-interval 60
  echo-retransmission-timeout 1
  bind ipv4-address 60.60.42.5 bearer-type all
exit
```

Configuration for Separating N3 and N9 BGP Routes

The following is a sample configuration to separate the N3 and N9 BGP routes for hUPF.

```
config
context SAEGW
  ip vrf mpls-vrf-1
  #exit
  ip vrf mpls-vrf-2
  #exit
  mpls bgp forwarding
  bfd-protocol
  #exit
  ip prefix-list name up seq 15 permit 50.50.17.4/32
  ip prefix-list name up seq 20 permit 50.50.17.5/32
  ip prefix-list name up seq 25 permit 50.50.17.6/32
  ip prefix-list name up seq 40 permit 50.50.17.7/32
  ip prefix-list name n9-up1 seq 50 permit 60.60.17.5/32
  ip prefix-list name n9-up1 seq 55 permit 60.60.17.6/32
  route-map up_routes1 permit 10
    match ip address prefix-list n9-up1
  #exit
  route-map up_routes permit 10
    match ip address prefix-list up
  #exit
```

```

router bgp 61435
  maximum-paths ebgp 4
  neighbor 20.14.35.100 remote-as 65000
  neighbor 20.14.35.100 ebgp-multihop
  neighbor 20.14.35.100 update-source 20.14.35.98
  neighbor 2001:4888:121:1435::1 remote-as 65000
  neighbor 2001:4888:121:1435::1 ebgp-multihop
  neighbor 2001:4888:121:1435::1 update-source 2001:4888:121:1435::2
  neighbor 20.14.40.100 remote-as 65000
  neighbor 20.14.40.100 ebgp-multihop
  neighbor 20.14.40.100 update-source 20.14.40.98
  address-family ipv4
    neighbor 20.14.35.100 max-prefix 8192 threshold 50
    neighbor 20.14.35.100 route-map up_routes out
    neighbor 20.14.35.100 send-community extended
    neighbor 20.14.40.100 max-prefix 8192
    neighbor 20.14.40.100 route-map up_routes1 out
    neighbor 20.14.40.100 send-community extended
    redistribute connected
    redistribute static
  #exit
  address-family ipv6
    neighbor 2001:4888:121:1435::1 activate
    redistribute connected
    redistribute static
  #exit
#exit
interface SxC loopback
  ip address 50.50.17.4 255.255.255.255
#exit
interface SxC-ipv6 loopback
  ipv6 address 2001:4888:50:50::17/128
#exit
interface gn-1
  ip address 20.14.35.98 255.255.255.0
  ipv6 address 2001:4888:121:1435::2/64 secondary
#exit
interface gn-2
  ip address 20.14.36.98 255.255.255.0
  ipv6 address 2001:4888:121:1436::2/64 secondary
#exit
interface gn-n9-ingress
  ip address 20.14.40.98 255.255.255.0
#exit
interface n9-ingress-hupf loopback
  ip address 60.60.17.5 255.255.255.255
#exit
interface pgw-gtpu loopback
  ip address 50.50.17.5 255.255.255.255
#exit
interface sgw-gtpu-egress loopback
  ip address 50.50.17.6 255.255.255.255
#exit
interface sgw-gtpu-ingress-phazr loopback
  ip address 60.60.17.6 255.255.255.255
#exit
subscriber default
exit
aaa group default
#exit
gtpu group default
  gtpu limit-secondary-rat-usage 32
#exit
gtpu-service SxC

```

```

    echo-interval 60
    echo-retransmission-timeout 1
    bind ipv4-address 50.50.17.4 ipv6-address 2001:4888:50:50::17 bearer-type all
exit
gtpu-service n9-ingress
    bind ipv4-address 60.60.17.5 bearer-type all
exit
gtpu-service pgw-gtpu
    bind ipv4-address 50.50.17.5 bearer-type all
exit
gtpu-service sgw-gtpu-egress
    bind ipv4-address 50.50.17.6 bearer-type all
exit
gtpu-service sgw-gtpu-ingress-phazr
    echo-interval 60
    echo-retransmission-timeout 1
    bind ipv4-address 60.60.17.6 bearer-type all
exit
sx-service sx-svc
    instance-type userplane
    bind ipv4-address 50.50.17.4 ipv6-address 2001:4888:50:50::17
    sxa max-retransmissions 5
    sxa retransmission-timeout-ms 1000
    sxb max-retransmissions 5
    sxb retransmission-timeout-ms 1000
    sxab max-retransmissions 5
    sxab retransmission-timeout-ms 1000
    sx-protocol heartbeat retransmission-timeout 15
    sx-protocol heartbeat max-retransmissions 3
    sx-protocol association debug-mode debug-reattempt-timeout 1
    no sx-protocol compression
exit
user-plane-service user_plane_svc
    associate gtpu-service pgw-gtpu upf-ingress
    associate gtpu-service n9-ingress upf-ingress interface-type n9
    associate gtpu-service sgw-gtpu-ingress-phazr sgw-ingress
    associate gtpu-service sgw-gtpu-egress sgw-egress
    associate gtpu-service SxC cp-tunnel
    associate sx-service sx-svc
    associate fast-path service
    associate control-plane-group SAEGW
    associate userplane-load-control-profile LCP
    associate userplane-overload-control-profile OLCP
exit

```

The following is a sample configuration to separate the N3 and N9 BGP routes for vUPF.

```

context SAEGW
    router bgp 61441
        neighbor 20.14.41.100 remote-as 65000
        neighbor 20.14.41.100 ebgp-multihop
        neighbor 20.14.41.100 update-source 20.14.41.98
        neighbor 2001:4888:121:1441::1 remote-as 65000
        neighbor 2001:4888:121:1441::1 ebgp-multihop
        neighbor 2001:4888:121:1441::1 update-source 2001:4888:121:1441::2
        address-family ipv4
            redistribute connected
            redistribute static
        #exit
        address-family ipv6
            neighbor 2001:4888:121:1441::1 activate
            redistribute connected
            redistribute static
        #exit
    #exit

```

```

interface SxC loopback
 ip address 50.50.18.4 255.255.255.255
#exit
interface SxC-ipv6 loopback
 ipv6 address 2001:4888:50:50::18/128
#exit
interface gn-1
 ip address 20.14.41.98 255.255.255.0
 ipv6 address 2001:4888:121:1441::2/64 secondary
#exit
interface gn-2
 ip address 20.14.42.98 255.255.255.0
 ipv6 address 2001:4888:121:1442::2/64 secondary
#exit
interface n9-egress loopback
 ip address 50.50.18.8 255.255.255.255
#exit
interface pgw-gtpu loopback
 ip address 50.50.18.5 255.255.255.255
#exit
interface pgw-gtpu-ipv6 loopback
 ipv6 address 2001:4888:50:50::18:5/128
#exit
interface sgw-gtpu-egress loopback
 ip address 50.50.18.6 255.255.255.255
#exit
interface sgw-gtpu-egress-ipv6 loopback
 ipv6 address 2001:4888:50:50::18:6/128
#exit
interface sgw-gtpu-ingress-phazr loopback
 ip address 50.50.18.7 255.255.255.255
#exit
interface sgw-gtpu-ingress-phazr-ipv6 loopback
 ipv6 address 2001:4888:50:50::18:7/128
#exit
subscriber default
exit
aaa group default
#exit
gtpu group default
 gtpu limit-secondary-rat-usage 32
#exit
gtpu-service SxC
 echo-interval 60
 echo-retransmission-timeout 1
 bind ipv4-address 50.50.18.4 ipv6-address 2001:4888:50:50::18 bearer-type all
exit
gtpu-service n9-egress
 bind ipv4-address 50.50.18.8 bearer-type all
exit
gtpu-service pgw-gtpu
 bind ipv4-address 50.50.18.5 ipv6-address 2001:4888:50:50::18:5 bearer-type all
exit
gtpu-service sgw-gtpu-egress
 bind ipv4-address 50.50.18.6 ipv6-address 2001:4888:50:50::18:6 bearer-type all
exit
gtpu-service sgw-gtpu-ingress-phazr
 echo-interval 60
 echo-retransmission-timeout 1
 bind ipv4-address 50.50.18.7 ipv6-address 2001:4888:50:50::18:7 bearer-type all
exit
sx-service sx-svc
 instance-type userplane
 bind ipv4-address 50.50.18.4 ipv6-address 2001:4888:50:50::18

```

```

sxa max-retransmissions 5
sxa retransmission-timeout-ms 1000
sxb max-retransmissions 5
sxb retransmission-timeout-ms 1000
sxab max-retransmissions 5
sxab retransmission-timeout-ms 1000
sx-protocol heartbeat retransmission-timeout 15
sx-protocol heartbeat max-retransmissions 3
sx-protocol association debug-mode debug-reattempt-timeout 1
no sx-protocol compression
exit
user-plane-service user_plane_svc
associate gtpu-service pgw-gtpu upf-ingress
associate gtpu-service n9-egress upf-egress
associate gtpu-service sgw-gtpu-ingress-phazr sgw-ingress
associate gtpu-service sgw-gtpu-egress sgw-egress
associate gtpu-service SxC cp-tunnel
associate sx-service sx-svc
associate fast-path service
associate control-plane-group SAEGW
associate userplane-load-control-profile LCP
associate userplane-overload-control-profile OLCF
exit
ip route 0.0.0.0 0.0.0.0 20.14.41.100 gn-1
ip igmp profile default
#exit
#exit

```



Note For RCM UPF, add all the IP prefix-lists in day 0.5 configuration.

Verifying the UPF Ingress Interface Type Configuration

To verify the configuration, use the following command:

- [show user-plane-service all, on page 7](#)

show user-plane-service all

The **show user-plane-service all** command displays user-plane service information.

The following is a sample output of this command:

```

show user-plane-service all
Service name                : user-plane-service
Service-Id                  : 7
Context                      : EPC2-UP
Status                       : NOT STARTED
UPF Ingress GTPU Service     : sx-gtpu-service
UPF Ingress N3 Interface Type GTPU Service: n3-ingress
UPF Ingress N9 Interface Type GTPU Service: n9-ingress
UPF Ingress S5U Interface Type GTPU Service: s5u-ingress
UPF Ingress S8U Interface Type GTPU Service: s8u-ingress
UPF Egress GTPU Service      : Not defined
SGW Ingress GTPU Service     : SGW-Ingress
SGW Egress GTPU Service      : SGW-Egress
Control Plane Tunnel GTPU Service : control_gtpu
Sx Service                   : sxu

```

```
show user-plane-service all
```

```
Control Plane Group      : g1  
Fast-Path service       : Disabled
```

NOTES:

- The UPF configures only one of the interface types, **pgw-ingress** or **upf-ingress** in a single user plane service.