

Starting Open5Gs, GNB and UE

Starting open5gs services:

```
cloud@open5gs: ~  
cloud@open5gs:~$ sudo systemctl start open5gs-mmed  
[sudo] password for cloud:  
cloud@open5gs:~$ sudo systemctl start open5gs-sgwud  
cloud@open5gs:~$ sudo systemctl start open5gs-upfd  
cloud@open5gs:~$ sudo systemctl start open5gs-sgwcd  
cloud@open5gs:~$ sudo systemctl start open5gs-pcrfd  
cloud@open5gs:~$ sudo systemctl start open5gs-amfd  
cloud@open5gs:~$ sudo systemctl start open5gs-nrfd  
cloud@open5gs:~$ sudo systemctl start open5gs-smfd  
cloud@open5gs:~$ sudo systemctl start open5gs-upfd  
cloud@open5gs:~$ echo "open 5Gs services."  
open 5Gs services.  
cloud@open5gs:~$ sudo systemctl status open5gs-upfd  
● open5gs-upfd.service - Open5GS UPF Daemon  
   Loaded: loaded (/lib/systemd/system/open5gs-upfd.service; enabled; vendor preset: enabled)  
   Active: active (running) since Sun 2025-06-01 16:16:59 UTC; 2 days ago  
     Process: 8685 ExecReload=/bin/kill -HUP $MAINPID (code=exited, status=0/SUCCESS)  
    Main PID: 1950 (open5gs-upfd)  
       Tasks: 2 (limit: 19043)  
      Memory: 31.9M  
         CPU: 4.795s  
    CGroup: /system.slice/open5gs-upfd.service  
            └─1950 /usr/bin/open5gs-upfd -c /etc/open5gs/upf.yaml  
  
Jun 03 06:24:09 open5gs open5gs-upfd[1950]: 06/03 06:24:09.859: [gtp] INFO: gtp_connect() [127.0.0.4]:2152 (../lib/gtp/path.c:6  
Jun 03 06:24:09 open5gs open5gs-upfd[1950]: 06/03 06:24:09.859: [upf] INFO: UE F-SEID[UP:0x5c1 CP:0x7b0] APN[internet] PDN-Type  
Jun 03 06:24:09 open5gs open5gs-upfd[1950]: 06/03 06:24:09.865: [gtp] INFO: gtp_connect() [127.0.0.1]:2152 (../lib/gtp/path.c:6  
Jun 03 06:28:05 open5gs open5gs-upfd[1950]: 06/03 06:28:05.801: [upf] INFO: [Removed] Number of UPF-sessions is now 0 (../src/upf  
Jun 03 06:28:06 open5gs open5gs-upfd[1950]: 06/03 06:28:06.048: [upf] INFO: [Added] Number of UPF-Sessions is now 1 (../src/upf  
Jun 03 06:28:06 open5gs open5gs-upfd[1950]: 06/03 06:28:06.048: [upf] INFO: UE F-SEID[UP:0x7b7 CP:0xcfc0] APN[internet] PDN-Type  
Jun 03 06:57:32 open5gs open5gs-upfd[1950]: 06/03 06:57:32.245: [upf] INFO: [Removed] Number of UPF-sessions is now 0 (../src/upf  
Jun 04 00:00:06 open5gs systemd[1]: Reloading Open5GS UPF Daemon...  
Jun 04 00:00:06 open5gs open5gs-upfd[1950]: 06/04 00:00:06.187: [app] INFO: SIGHUP received (../src/main.c:59)  
Jun 04 00:00:06 open5gs systemd[1]: Reloaded Open5GS UPF Daemon.  
  
cloud@open5gs:~$ sudo systemctl status open5gs-amfd  
● open5gs-amfd.service - Open5GS AMF Daemon  
   Loaded: loaded (/lib/systemd/system/open5gs-amfd.service; enabled; vendor preset: enabled)  
   Active: active (running) since Sun 2025-06-01 16:16:59 UTC; 2 days ago  
     Process: 8700 ExecReload=/bin/kill -HUP $MAINPID (code=exited, status=0/SUCCESS)  
    Main PID: 1932 (open5gs-amfd)  
       Tasks: 2 (limit: 19043)  
      Memory: 43.9M  
         CPU: 8.852s  
    CGroup: /system.slice/open5gs-amfd.service  
            └─1932 /usr/bin/open5gs-amfd -c /etc/open5gs/amf.yaml  
  
Jun 04 04:16:59 open5gs open5gs-amfd[1932]: 06/04 04:16:59.905: [amf] INFO: [982964ee-4031-41f0-a3b0-136744f28d14] Need to upda  
Jun 04 04:16:59 open5gs open5gs-amfd[1932]: 06/04 04:16:59.905: [amf] INFO: [98295bb6-4031-41f0-a3b0-136744f28d14] Need to upda  
Jun 04 04:16:59 open5gs open5gs-amfd[1932]: 06/04 04:16:59.905: [amf] INFO: [98296200-4031-41f0-a3b0-136744f28d14] Need to upda  
Jun 04 04:16:59 open5gs open5gs-amfd[1932]: 06/04 04:16:59.908: [sbi] INFO: [98294d38-4031-41f0-a3b0-136744f28d14] Subscription  
Jun 04 04:16:59 open5gs open5gs-amfd[1932]: 06/04 04:16:59.909: [sbi] INFO: [982952c4-4031-41f0-a3b0-136744f28d14] Subscription  
Jun 04 04:16:59 open5gs open5gs-amfd[1932]: 06/04 04:16:59.909: [sbi] INFO: [982955f8-4031-41f0-a3b0-136744f28d14] Subscription  
Jun 04 04:16:59 open5gs open5gs-amfd[1932]: 06/04 04:16:59.909: [sbi] INFO: [982964ee-4031-41f0-a3b0-136744f28d14] Subscription  
Jun 04 04:16:59 open5gs open5gs-amfd[1932]: 06/04 04:16:59.910: [sbi] INFO: [98296200-4031-41f0-a3b0-136744f28d14] Subscription
```

```
cloud@open5gs: ~  
cloud@open5gs:~$ ls  
Desktop  google-chrome-stable_current_amd64.deb  ns-allinone-3.44  Public  stopOpen5gs.sh  Videos  
Documents  index.html  ns-allinone-3.44.tar.bz2  snap  Templates  
Downloads  Music  Pictures  startOpen5gs.sh  UERANSIM  
cloud@open5gs:~$ sudo cat /etc/open5gs/amf.yaml  
[sudo] password for cloud:  
logger:  
  file:  
    path: /var/log/open5gs/amf.log  
    level: debug # fatal|error|warn|info(default)|debug|trace  
  
global:  
  max:  
    ue: 1024 # The number of UE can be increased depending on memory size.  
  # peer: 64  
  
amf:  
  sbi:  
    server:  
      - address: 127.0.0.5  
        port: 7777  
    client:  
      nrf:  
        # uri: http://127.0.0.10:7777  
      scp:  
        # uri: http://127.0.0.200:7777  
  ngap:  
    server:  
      - address: 127.0.0.5  
  metrics:  
    server:  
      - address: 127.0.0.5  
        port: 9090  
  guami:  
    - plmn_id:  
        mcc: 999  
        mnc: 70  
      amf_id:  
        region: 2  
        set: 1  
  tai:  
    - plmn_id:  
        mcc: 999  
        mnc: 70  
      tac: 1  
  plmn_support:  
    - plmn_id:  
        mcc: 999  
        mnc: 70  
      s_nssai:  
        - sst: 1  
  security:  
    integrity_order : [ NIA2, NIA1, NIA0 ]  
    ciphering_order : [ NEA0, NEA1, NEA2 ]  
  network_name:
```

Starting GNB:

```
cloud@open5gs: ~/UERANSIM/build
cloud@open5gs: ~$ ls
Desktop  google-chrome-stable_current_amd64.deb  ns-allinone-3.44  Public  stopOpen5gs.sh  Videos
Documents  index.html  ns-allinone-3.44.tar.bz2  snap  Templates
Downloads  Music  Pictures  startOpen5gs.sh  UERANSIM

cloud@open5gs:~$ cd UERANSIM/build/
cloud@open5gs:~/UERANSIM/build$ ./nr-gnb -c ../config/open5gs-gnb.yaml
UERANSIM v3.2.6
[2025-06-04 04:22:51.882] [sctp] [info] Trying to establish SCTP connection... (127.0.0.5:38412)
[2025-06-04 04:22:51.886] [sctp] [info] SCTP connection established (127.0.0.5:38412)
[2025-06-04 04:22:51.886] [sctp] [debug] SCTP association setup ascId[11]
[2025-06-04 04:22:51.887] [ngap] [debug] Sending NG Setup Request
[2025-06-04 04:22:51.905] [ngap] [debug] NG Setup Response received
[2025-06-04 04:22:51.905] [ngap] [info] NG Setup procedure is successful

[2025-06-04 04:23:42.640] [rrc] [debug] UE[1] new signal detected
[2025-06-04 04:23:42.641] [rrc] [info] RRC Setup for UE[1]
[2025-06-04 04:23:42.642] [ngap] [debug] Initial NAS message received from UE[1]
[2025-06-04 04:23:42.671] [ngap] [debug] Initial Context Setup Request received
[2025-06-04 04:23:42.895] [ngap] [info] PDU session resource(s) setup for UE[1] count[1]
[2025-06-04 04:24:21.144] [rrc] [debug] UE[2] new signal detected
[2025-06-04 04:24:21.145] [rrc] [info] RRC Setup for UE[2]
[2025-06-04 04:24:21.146] [ngap] [debug] Initial NAS message received from UE[2]
[2025-06-04 04:24:21.166] [ngap] [debug] UE Context Release Command received
[2025-06-04 04:24:21.166] [rrc] [info] Releasing RRC connection for UE[1]
[2025-06-04 04:24:21.179] [ngap] [debug] Initial Context Setup Request received
[2025-06-04 04:24:21.399] [ngap] [info] PDU session resource(s) setup for UE[2] count[1]
```

Starting UE:

```
cloud@open5gs: ~/UERANSIM/build
cloud@open5gs: ~/UERANSIM/build$ ./nr-ue -c ../config/open5gs-ue.yaml
UERANSIM v3.2.6
[2025-06-04 04:23:42.640] [nas] [info] UE switches to state [MM-DEREGISTERED/PLMN-SEARCH]
[2025-06-04 04:23:42.641] [rrc] [debug] New signal detected for cell[1], total [1] cells in coverage
[2025-06-04 04:23:42.641] [nas] [info] Selected plmn[999/70]
[2025-06-04 04:23:42.641] [rrc] [info] Selected cell plmn[999/70] tac[1] category[SUITABLE]
[2025-06-04 04:23:42.641] [nas] [info] UE switches to state [MM-DEREGISTERED/PS]
[2025-06-04 04:23:42.641] [nas] [info] UE switches to state [MM-DEREGISTERED/NORMAL-SERVICE]
[2025-06-04 04:23:42.641] [nas] [debug] Initial registration required due to [MM-DEREG-NORMAL-SERVICE]
[2025-06-04 04:23:42.641] [nas] [debug] UAC access attempt is allowed for identity[0], category[M0_sig]
[2025-06-04 04:23:42.641] [nas] [debug] Sending Initial Registration
[2025-06-04 04:23:42.641] [nas] [info] UE switches to state [MM-REGISTER-INITIATED]
[2025-06-04 04:23:42.641] [rrc] [debug] Sending RRC Setup Request
[2025-06-04 04:23:42.642] [rrc] [info] RRC connection established
[2025-06-04 04:23:42.642] [rrc] [info] UE switches to state [RRC-CONNECTED]
[2025-06-04 04:23:42.642] [nas] [info] UE switches to state [CM-CONNECTED]
[2025-06-04 04:23:42.651] [nas] [debug] Authentication Request received
[2025-06-04 04:23:42.651] [nas] [debug] Received SQN [00000000201]
[2025-06-04 04:23:42.651] [nas] [debug] SQN-MS [000000000000]
[2025-06-04 04:23:42.658] [nas] [debug] Security Mode Command received
[2025-06-04 04:23:42.658] [nas] [debug] Selected integrity[2] ciphering[0]
[2025-06-04 04:23:42.672] [nas] [debug] Registration accept received
[2025-06-04 04:23:42.672] [nas] [info] UE switches to state [MM-REGISTERED/NORMAL-SERVICE]
[2025-06-04 04:23:42.672] [nas] [debug] Sending Registration Complete
[2025-06-04 04:23:42.672] [nas] [info] Initial Registration is successful
[2025-06-04 04:23:42.672] [nas] [debug] Sending PDU Session Establishment Request
[2025-06-04 04:23:42.672] [nas] [debug] UAC access attempt is allowed for identity[0], category[M0_sig]
[2025-06-04 04:23:42.873] [nas] [debug] Configuration Update Command received
[2025-06-04 04:23:42.896] [nas] [debug] PDU Session Establishment Accept received
[2025-06-04 04:23:42.896] [nas] [info] PDU Session establishment is successful PSI[1]
[2025-06-04 04:23:42.896] [app] [error] TUN interface could not be setup. Permission denied. Please run the UE with 'sudo'
[2025-06-04 04:24:21.167] [rrc] [debug] RRC Release received
[2025-06-04 04:24:21.167] [nas] [info] UE switches to state [CM-IDLE]
```

```
cloud@open5gs: ~/UERANSIM/build
cloud@open5gs: ~/UERANSIM/build$ ./nr-ue -c ../config/open5gs-ue.yaml
UERANSIM v3.2.6
[2025-06-04 04:24:21.144] [nas] [info] UE switches to state [MM-DEREGISTERED/PLMN-SEARCH]
[2025-06-04 04:24:21.144] [rrc] [debug] New signal detected for cell[1], total [1] cells in coverage
[2025-06-04 04:24:21.144] [nas] [info] Selected plmn[999/70]
[2025-06-04 04:24:21.144] [rrc] [info] Selected cell plmn[999/70] tac[1] category[SUITABLE]
[2025-06-04 04:24:21.145] [nas] [info] UE switches to state [MM-DEREGISTERED/PS]
[2025-06-04 04:24:21.145] [nas] [info] UE switches to state [MM-DEREGISTERED/NORMAL-SERVICE]
[2025-06-04 04:24:21.145] [nas] [debug] Initial registration required due to [MM-DEREG-NORMAL-SERVICE]
[2025-06-04 04:24:21.145] [nas] [debug] UAC access attempt is allowed for identity[0], category[M0_sig]
[2025-06-04 04:24:21.145] [nas] [debug] Sending Initial Registration
[2025-06-04 04:24:21.145] [nas] [info] UE switches to state [MM-REGISTER-INITIATED]
[2025-06-04 04:24:21.145] [rrc] [debug] Sending RRC Setup Request
[2025-06-04 04:24:21.145] [rrc] [info] RRC connection established
[2025-06-04 04:24:21.145] [rrc] [info] UE switches to state [RRC-CONNECTED]
[2025-06-04 04:24:21.145] [nas] [info] UE switches to state [CM-CONNECTED]
[2025-06-04 04:24:21.158] [nas] [debug] Authentication Request received
[2025-06-04 04:24:21.158] [nas] [debug] Received SQN [00000000221]
[2025-06-04 04:24:21.158] [nas] [debug] SQN-MS [000000000000]
[2025-06-04 04:24:21.164] [nas] [debug] Security Mode Command received
[2025-06-04 04:24:21.164] [nas] [debug] Selected integrity[2] ciphering[0]
[2025-06-04 04:24:21.180] [nas] [debug] Registration accept received
[2025-06-04 04:24:21.180] [nas] [info] UE switches to state [MM-REGISTERED/NORMAL-SERVICE]
[2025-06-04 04:24:21.180] [nas] [debug] Sending Registration Complete
[2025-06-04 04:24:21.180] [nas] [info] Initial Registration is successful
[2025-06-04 04:24:21.180] [nas] [debug] Sending PDU Session Establishment Request
[2025-06-04 04:24:21.180] [nas] [debug] UAC access attempt is allowed for identity[0], category[M0_sig]
[2025-06-04 04:24:21.382] [nas] [debug] Configuration Update Command received
[2025-06-04 04:24:21.399] [nas] [debug] PDU Session Establishment Accept received
[2025-06-04 04:24:21.399] [app] [error] TUN interface could not be setup. Permission denied. Please run the UE with 'sudo'
[2025-06-04 04:24:21.400] [nas] [info] PDU Session establishment is successful PSI[1]
```

Checking Status of UPFD and AMFD :

```
cloud@open5gs: ~/UERANSIM/build
cloud@open5gs: ~ x cloud@open5gs: ~ x cloud@open5gs: ~/... x cloud@open5gs: ~/... x cloud@open5gs: ~/... x cloud@open5gs: ~/... x
cloud@open5gs:~/UERANSIM/build$ sudo systemctl status open5gs-amfd
[sudo] password for cloud:
● open5gs-amfd.service - Open5GS AMF Daemon
   Loaded: loaded (/lib/systemd/system/open5gs-amfd.service; enabled; vendor preset: enabled)
   Active: active (running) since Sun 2025-06-01 16:16:59 UTC; 2 days ago
     Process: 8700 ExecReload=/bin/kill -HUP $MAINPID (code=exited, status=0/SUCCESS)
    Main PID: 1932 (open5gs-amfd)
       Tasks: 2 (limit: 19043)
      Memory: 55.9M
         CPU: 8.906s
    CGroup: /system.slice/open5gs-amfd.service
            └─1932 /usr/bin/open5gs-amfd -c /etc/open5gs/amf.yaml

Jun 04 04:24:43 open5gs open5gs-amfd[1932]: 06/04 04:24:43.129: [amf] INFO: [81d42328-3f69-41f0-a3b0-136744f28d14] Need to upda
Jun 04 04:24:43 open5gs open5gs-amfd[1932]: 06/04 04:24:43.129: [amf] INFO: [81d43020-3f69-41f0-a3b0-136744f28d14] Need to upda
Jun 04 04:24:43 open5gs open5gs-amfd[1932]: 06/04 04:24:43.129: [amf] INFO: [81d49baa-3f69-41f0-a3b0-136744f28d14] Need to upda
Jun 04 04:24:43 open5gs open5gs-amfd[1932]: 06/04 04:24:43.131: [sbi] INFO: [81d41efa-3f69-41f0-a3b0-136744f28d14] Subscription
Jun 04 04:24:43 open5gs open5gs-amfd[1932]: 06/04 04:24:43.132: [sbi] INFO: [81d432fa-3f69-41f0-a3b0-136744f28d14] Subscription
Jun 04 04:24:43 open5gs open5gs-amfd[1932]: 06/04 04:24:43.132: [sbi] INFO: [81d41b3a-3f69-41f0-a3b0-136744f28d14] Subscription
Jun 04 04:24:43 open5gs open5gs-amfd[1932]: 06/04 04:24:43.132: [sbi] INFO: [81d43020-3f69-41f0-a3b0-136744f28d14] Subscription
Jun 04 04:24:43 open5gs open5gs-amfd[1932]: 06/04 04:24:43.132: [sbi] INFO: [81d497c2-3f69-41f0-a3b0-136744f28d14] Subscription
Jun 04 04:24:43 open5gs open5gs-amfd[1932]: 06/04 04:24:43.132: [sbi] INFO: [81d42328-3f69-41f0-a3b0-136744f28d14] Subscription
Jun 04 04:24:43 open5gs open5gs-amfd[1932]: 06/04 04:24:43.132: [sbi] INFO: [81d49baa-3f69-41f0-a3b0-136744f28d14] Subscription
lines 1-21/21 (END)
[1]+  Stopped                  sudo systemctl status open5gs-amfd
cloud@open5gs:~/UERANSIM/build$ sudo systemctl status open5gs-upfd
● open5gs-upfd.service - Open5GS UPF Daemon
   Loaded: loaded (/lib/systemd/system/open5gs-upfd.service; enabled; vendor preset: enabled)
   Active: active (running) since Sun 2025-06-01 16:16:59 UTC; 2 days ago
     Process: 8685 ExecReload=/bin/kill -HUP $MAINPID (code=exited, status=0/SUCCESS)
    Main PID: 1950 (open5gs-upfd)
       Tasks: 2 (limit: 19043)
      Memory: 31.9M
         CPU: 4.807s
    CGroup: /system.slice/open5gs-upfd.service
            └─1950 /usr/bin/open5gs-upfd -c /etc/open5gs/upf.yaml

Jun 03 06:28:06 open5gs open5gs-upfd[1950]: 06/03 06:28:06.048: [upf] INFO: UE F-SEID[UP:0x7b7 CP:0xcfc0] APN[internet] PDN-Type
Jun 03 06:57:32 open5gs open5gs-upfd[1950]: 06/03 06:57:32.245: [upf] INFO: [Removed] Number of UPF-sessions is now 0 (./src/up
Jun 04 00:00:06 open5gs systemd[1]: Reloading Open5GS UPF Daemon...
Jun 04 00:00:06 open5gs open5gs-upfd[1950]: 06/04 00:00:06.187: [app] INFO: SIGHUP received (./src/main.c:59)
Jun 04 00:00:06 open5gs systemd[1]: Reloaded Open5GS UPF Daemon.
Jun 04 04:23:42 open5gs open5gs-upfd[1950]: 06/04 04:23:42.885: [upf] INFO: [Added] Number of UPF-Sessions is now 1 (./src/upf
Jun 04 04:23:42 open5gs open5gs-upfd[1950]: 06/04 04:23:42.885: [upf] INFO: UE F-SEID[UP:0x102 CP:0x672] APN[internet] PDN-Type
Jun 04 04:24:21 open5gs open5gs-upfd[1950]: 06/04 04:24:21.149: [upf] INFO: [Removed] Number of UPF-sessions is now 0 (./src/up
Jun 04 04:24:21 open5gs open5gs-upfd[1950]: 06/04 04:24:21.395: [upf] INFO: [Added] Number of UPF-Sessions is now 1 (./src/upf
Jun 04 04:24:21 open5gs open5gs-upfd[1950]: 06/04 04:24:21.395: [upf] INFO: UE F-SEID[UP:0x622 CP:0x3a0] APN[internet] PDN-Type
lines 1-21/21 (END)
[2]+  Stopped                  sudo systemctl status open5gs-upfd
cloud@open5gs:~/UERANSIM/build$
```