

The following are the steps we followed to install Open5gs, setup MongoDB as database and setup UERANSIM.

Simulate and test a 5G core network environment using Open5GS, where all the core network functions (HSS, AMF, SMF, UPF) work together to provide end-to-end connectivity for User Equipment (UE).

Brief Summary of Steps we have done:

1. **Installed MongoDB:**
 - MongoDB was installed and set up as the database for Open5GS.
 - Verified MongoDB is running on `localhost` (default port `27017`).
2. **Installed Open5GS:**
 - All Open5GS components (HSS, AMF, SMF, UPF) were installed.
3. **Configured `smf.yaml`:**
 - Set up **Session Management Function (SMF)**:
 - IP: `127.0.0.4`
 - PFCP client points to UPF at `127.0.0.7`.
 - Defined session subnets and DNS settings.
4. **Configured `amf.yaml`:**
 - Configured **Access and Mobility Management Function (AMF)**:
 - IP: `127.0.0.5`
 - MCC: `404` (India), MNC: `10`.
 - NGAP server IP and GUAMI/TAI values set.
5. **Configured `upf.yaml`:**
 - Configured **User Plane Function (UPF)**:
 - IP: `127.0.0.7`.
 - PFCP linked to SMF at `127.0.0.4`.
 - Session subnets and GTP-U settings added.
6. **Configured `hss.yaml`:**
 - Configured **Home Subscriber Server (HSS)**:
 - MongoDB URI: `mongodb://127.0.0.6:27017`.
 - MCC: `404`, MNC: `10`.
7. **Unified MCC/MNC Across All Files:**
 - MCC (`404`) and MNC (`10`) set in all configuration files (`amf.yaml`, `smf.yaml`, `upf.yaml`, and `hss.yaml`).
8. **Restarted Open5GS Services:**
 - Restarted Open5GS services to apply configuration changes.

Installed MongoDB and libssl1.1 (Without libssl1.1 MongoDB can't be installed)

```
sathvika@sathvika-virtual-machine:~/Documents/Sg$ sudo dpkg -i libssl1.1_1.1.1f-1ubuntu2_amd64.deb
[sudo] password for sathvika:
Selecting previously unselected package libssl1.1:amd64.
(Reading database ... 180069 files and directories currently installed.)
Preparing to unpack libssl1.1_1.1.1f-1ubuntu2_amd64.deb ...
Unpacking libssl1.1:amd64 (1.1.1f-1ubuntu2) ...
Setting up libssl1.1:amd64 (1.1.1f-1ubuntu2) ...
Processing triggers for libc-bin (2.35-0ubuntu3.6) ...
sathvika@sathvika-virtual-machine:~/Documents/Sg$ sudo apt install -y mongodb-org
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  mongodb-database-tools mongodb-mongosh mongodb-org-database mongodb-org-database-tools-extra mongodb-org-mongos mongodb-org-server mongodb-org-shell mongodb-org-tools
The following NEW packages will be installed:
  mongodb-database-tools mongodb-mongosh mongodb-org mongodb-org-database mongodb-org-database-tools-extra mongodb-org-mongos mongodb-org-server mongodb-org-shell mongodb-org-tools
0 upgraded, 9 newly installed, 0 to remove and 249 not upgraded.
Need to get 161 MB of archives.
After this operation, 516 MB of additional disk space will be used.
Get:1 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/5.0/multiverse amd64 mongodb-database-tools amd64 100.10.0 [46.5 MB]
Get:2 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/5.0/multiverse amd64 mongodb-mongosh amd64 2.3.3 [54.1 MB]
Get:3 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/5.0/multiverse amd64 mongodb-org-shell amd64 5.0.30 [14.9 MB]
Get:4 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/5.0/multiverse amd64 mongodb-org-server amd64 5.0.30 [26.6 MB]
Get:5 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/5.0/multiverse amd64 mongodb-org-mongos amd64 5.0.30 [18.9 MB]
Get:6 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/5.0/multiverse amd64 mongodb-org-database-tools-extra amd64 5.0.30 [7,752 B]
Get:7 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/5.0/multiverse amd64 mongodb-org-database amd64 5.0.30 [3,540 B]
Get:8 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/5.0/multiverse amd64 mongodb-org-tools amd64 5.0.30 [2,896 B]
Get:9 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/5.0/multiverse amd64 mongodb-org amd64 5.0.30 [2,932 B]
Fetched 161 MB in 16s (10.3 MB/s)
Selecting previously unselected package mongodb-database-tools.
(Reading database ... 180079 files and directories currently installed.)
Preparing to unpack .../0-mongodb-database-tools_100.10.0_amd64.deb ...
Unpacking mongodb-database-tools (100.10.0) ...
Selecting previously unselected package mongodb-mongosh.
Preparing to unpack .../1-mongodb-mongosh_2.3.3_amd64.deb ...
```

Started MongoDB service:

```
sathvika@sathvika-virtual-machine:~/Documents/Sg$ sudo systemctl start mongod
sathvika@sathvika-virtual-machine:~/Documents/Sg$ sudo systemctl enable mongod
Created symlink /etc/systemd/system/multi-user.target.wants/mongod.service → /lib/systemd/system/mongod.service.
sathvika@sathvika-virtual-machine:~/Documents/Sg$ sudo systemctl status mongod
● mongod.service - MongoDB Database Server
   Loaded: loaded (/lib/systemd/system/mongod.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2024-11-27 19:29:13 IST; 17s ago
     Docs: https://docs.mongodb.org/manual
   Main PID: 6659 (mongod)
   Memory: 77.4M
     CPU: 483ms
   CGroup: /system.slice/mongod.service
           └─6659 /usr/bin/mongod --config /etc/mongod.conf

Nov 27 19:29:13 sathvika-virtual-machine systemd[1]: Started MongoDB Database Server.
Nov 27 19:29:13 sathvika-virtual-machine mongod[6659]: {"t":{"$date":"2024-11-27T13:59:13.402Z"},"s":"I", "c":"CONTROL", "ld":7484500, "ctx":"","msg":"Environment variable MONGODB_CONFIG_OVERRIDE_NOFOC
```

Installed open5gs

```
sathvika@sathvika-virtual-machine:~/Documents/Sg$ sudo add-apt-repository ppa:open5gs/latest
PPA publishes dbgshyn, you may need to include 'main/debug' component
Repository: 'deb https://ppa.launchpadcontent.net/open5gs/latest/ubuntu/ jammy main'
Description:
Open5GS is a C-language Open Source Implementation of 5G Core and EPC, i.e. the core network of NR/LTE network (Release-17)
More info: https://launchpad.net/~open5gs+archive/ubuntu/latest
Adding repository.
Press [ENTER] to continue or Ctrl-c to cancel.
Found existing deb entry in /etc/apt/sources.list.d/open5gs-ubuntu-latest-jammy.list
Adding deb entry to /etc/apt/sources.list.d/open5gs-ubuntu-latest-jammy.list
Found existing deb-src entry in /etc/apt/sources.list.d/open5gs-ubuntu-latest-jammy.list
Adding disabled deb-src entry to /etc/apt/sources.list.d/open5gs-ubuntu-latest-jammy.list
Adding key to /etc/apt/trusted.gpg.d/open5gs-ubuntu-latest.gpg with fingerprint CA542085D893C03492F35E1EACC46E8E238249B1
Hit:1 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/5.0 InRelease
Get:2 http://security.ubuntu.com/ubuntu jammy-security InRelease [129 kB]
Hit:3 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Hit:4 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:5 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease
Hit:6 https://ppa.launchpadcontent.net/open5gs/latest/ubuntu jammy InRelease
Fetched 129 kB in 7s (19.8 kB/s)
Reading package lists... Done
sathvika@sathvika-virtual-machine:~/Documents/Sg$ sudo apt update
Hit:1 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://security.ubuntu.com/ubuntu jammy-security InRelease
Hit:3 https://repo.mongodb.org/apt/ubuntu focal/mongodb-org/5.0 InRelease
Hit:4 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:5 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease
Hit:6 https://ppa.launchpadcontent.net/open5gs/latest/ubuntu jammy InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
249 packages can be upgraded. Run 'apt list --upgradable' to see them.
sathvika@sathvika-virtual-machine:~/Documents/Sg$ sudo apt install open5gs
Reading package lists... Done
Building dependency tree... 50%
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libbson-1.0-0 libmicrohttpd12 libmongoc-1.0-0 libmongocrypt0 libncp1 libnfs4.0 open5gs-amf open5gs-ausf open5gs-bsf open5gs-common open5gs-hss open5gs-mme open5gs-nrf open5gs-ns
  open5gs-pcrf open5gs-scp open5gs-sepp open5gs-sgwcn open5gs-sgwu open5gs-smf open5gs-udm open5gs-udr open5gs-upf
Suggested packages:
  lksctp-tools
```

```
sathvika@sathvika-virtual-machine:~/Documents/Sg$ which open5gs-mmed
/usr/bin/open5gs-mmed
sathvika@sathvika-virtual-machine:~/Documents/Sg$
```

Insert Default Subscriber Data into MongoDB

```
sathvik@sathvika-virtual-machine: ~/Documents/5g$ mongo --eval "db = connect('localhost/open5gs'); db.subscribers.drop(); db.subscribers.insert({ inst: '001010000000001', key: '46585CE8B199B49FAA5F0A2EE238A6BC', opc: 'E8ED289DEBA952E4283B54E8BE6183CA', anf: '8000', sqn: '000000000000', pdn: [{ apn: 'Internet' } ]});"
MongoDB shell version v5.0.30
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("0eba0784-fb66-4ac3-8b5e-40efed7f4b7c") }
MongoDB server version: 5.0.30
connecting to: mongodb://localhost/open5gs
Implicit session: session { "id" : UUID("4cabe5e9-8912-41db-b677-2b4e7060195a") }
MongoDB server version: 5.0.30
writeResult({ "nInserted" : 1 })
sathvik@sathvika-virtual-machine: ~/Documents/5g$
```

Verify Subscriber Data

```
sathvik@sathvika-virtual-machine: ~/Documents/5g$ mongo
MongoDB shell version v5.0.30
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("56f018f4-1c67-428f-8ac8-59ef6f2a3eba") }
MongoDB server version: 5.0.30
=====
Warning: the "mongo" shell has been superseded by "mongosh",
which delivers improved usability and compatibility. The "mongo" shell has been deprecated and will be removed in
an upcoming release.
For installation instructions, see
https://docs.mongodb.com/mongodb-shell/install/
=====
Welcome to the MongoDB shell.
For interactive help, type "help".
For more comprehensive documentation, see
https://docs.mongodb.com/
Questions? Try the MongoDB Developer Community Forums
https://community.mongodb.com
---
The server generated these startup warnings when booting:
2024-11-27T19:29:13.504+05:30: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See http://dochub.mongodb.org/core/prodnotes-filesystem
2024-11-27T19:29:13.662+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
---
> use open5gs
switched to db open5gs
> db.subscribers.find().pretty()
{
  "_id" : ObjectId("674726eccc9b899b184897d"),
  "inst" : "001010000000001",
  "key" : "46585CE8B199B49FAA5F0A2EE238A6BC",
  "opc" : "E8ED289DEBA952E4283B54E8BE6183CA",
  "anf" : "8000",
  "sqn" : "000000000000",
  "pdn" : [
    {
      "apn" : "Internet"
    }
  ]
}
```

Configure Network Functions

```
bye
sathvik@sathvika-virtual-machine: ~/Documents/5g$ cd /etc/open5gs
sathvik@sathvika-virtual-machine: /etc/open5gs$ sudo nano anf.yaml
sathvik@sathvika-virtual-machine: /etc/open5gs$ sudo systemctl restart open5gs-anf
Failed to restart open5gs-anf.service: Unit open5gs-anf.service not found.
sathvik@sathvika-virtual-machine: /etc/open5gs$ sudo systemctl list-units --type=service | grep open5gs
open5gs-anfd.service                                loaded active running Open5GS AMF Daemon
open5gs-ausfd.service                               loaded active running Open5GS AUSF Daemon
open5gs-bsfd.service                                loaded active running Open5GS BSF Daemon
open5gs-hssd.service                                loaded active running Open5GS HSS Daemon
open5gs-mme.service                                 loaded active running Open5GS MME Daemon
open5gs-nrfd.service                                loaded active running Open5GS NRF Daemon
open5gs-nssfd.service                               loaded active running Open5GS NSSF Daemon
open5gs-pcfd.service                                loaded active running Open5GS PCF Daemon
open5gs-pcrfd.service                               loaded active running Open5GS PCRF Daemon
open5gs-scpd.service                                loaded active running Open5GS SCP Daemon
open5gs-seppd.service                               loaded active running Open5GS SEPP Daemon
open5gs-sgwcd.service                               loaded active running Open5GS SGW-C Daemon
open5gs-sgwud.service                               loaded active running Open5GS SGW-U Daemon
open5gs-smfd.service                                loaded active running Open5GS SMF Daemon
open5gs-udnd.service                                loaded active running Open5GS UDM Daemon
open5gs-udrfd.service                               loaded active running Open5GS UDR Daemon
open5gs-udrfd.service                               loaded active running Open5GS UDRF Daemon
sathvik@sathvika-virtual-machine: /etc/open5gs$ sudo systemctl restart open5gs-anfd.service
sathvik@sathvika-virtual-machine: /etc/open5gs$ sudo systemctl status open5gs-anfd.service
● open5gs-anfd.service - Open5GS AMF Daemon
   Loaded: loaded (/lib/systemd/system/open5gs-anfd.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2024-11-27 19:45:38 IST; 8s ago
     Main PID: 9754 (open5gs-anfd)
        Tasks: 2 (limit: 4551)
       Memory: 6.4M
          CPU: 15ms
      CGroup: /system.slice/open5gs-anfd.service
              └─9754 /usr/bin/open5gs-anfd -c /etc/open5gs/anf.yaml

Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (../lib/sbl/nnrf-handler.c:949)
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: [13d2e526-acca-41ef-8924-615f5750b66d] Subscription created until 2024-11-28T19:45:38.77
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (../lib/sbl/nnrf-handler.c:949)
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: [13d2e8d2-acca-41ef-8924-615f5750b66d] Subscription created until 2024-11-28T19:45:38.77
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (../lib/sbl/nnrf-handler.c:949)
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: [13d2f494-acca-41ef-8924-615f5750b66d] Subscription created until 2024-11-28T19:45:38.77
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (../lib/sbl/nnrf-handler.c:949)
```

Verify Other Open5GS Services

If any service is failed to start then restart using
sudo systemctl restart open5gs*

```
sathvikas@sathvika-virtual-machine: /etc/open5gs$ sudo systemctl restart open5gs-anfd.service
sathvikas@sathvika-virtual-machine: /etc/open5gs$ sudo systemctl status open5gs-anfd.service
● open5gs-anfd.service - Open5GS AMF Daemon
   Loaded: loaded (/lib/systemd/system/open5gs-anfd.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2024-11-27 19:45:38 IST; 8s ago
     Main PID: 9754 (open5gs-anfd)
        Tasks: 2 (limit: 4551)
       Memory: 6.4M
          CPU: 15ms
     CGroup: /system.slice/open5gs-anfd.service
            └─9754 /usr/bin/open5gs-anfd -c /etc/open5gs/anf.yaml

Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (../lib/sbi/nrnf-handler.c:949)
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: [13d2e520-acca-41ef-8924-615f5756b66d] Subscription created until 2024-11-28T19:45:38.773447+05:30 [duration:8
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (../lib/sbi/nrnf-handler.c:949)
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: [13d2e6d2-acca-41ef-8924-615f5756b66d] Subscription created until 2024-11-28T19:45:38.773540+05:30 [duration:8
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (../lib/sbi/nrnf-handler.c:949)
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: [13d2f494-acca-41ef-8924-615f5756b66d] Subscription created until 2024-11-28T19:45:38.773877+05:30 [duration:8
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (../lib/sbi/nrnf-handler.c:949)
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: [13d2f8c2-acca-41ef-8924-615f5756b66d] Subscription created until 2024-11-28T19:45:38.773947+05:30 [duration:8
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (../lib/sbi/nrnf-handler.c:949)
Nov 27 19:45:38 sathvika-virtual-machine open5gs-anfd[9754]: 11/27 19:45:38.775: [sbl] INFO: [13d2fbc4-acca-41ef-8924-615f5756b66d] Subscription created until 2024-11-28T19:45:38.774027+05:30 [duration:8

sathvikas@sathvika-virtual-machine: /etc/open5gs$ sudo systemctl status open5gs-pcfd
● open5gs-pcfd.service - Open5GS PCF Daemon
   Loaded: loaded (/lib/systemd/system/open5gs-pcfd.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2024-11-27 19:30:49 IST; 15min ago
     Main PID: 8308 (open5gs-pcfd)
        Tasks: 2 (limit: 4551)
       Memory: 6.3M
          CPU: 104ms
     CGroup: /system.slice/open5gs-pcfd.service
            └─8308 /usr/bin/open5gs-pcfd -c /etc/open5gs/pcf.yaml

Nov 27 19:31:00 sathvika-virtual-machine open5gs-pcfd[8308]: 11/27 19:31:00.564: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (../lib/sbi/nrnf-handler.c:949)
Nov 27 19:31:00 sathvika-virtual-machine open5gs-pcfd[8308]: 11/27 19:31:00.564: [sbl] INFO: [085eba20-acca-41ef-8924-615f5756b66d] Subscription created until 2024-11-28T19:31:00.563794+05:30 [duration:8
Nov 27 19:31:02 sathvika-virtual-machine open5gs-pcfd[8308]: 11/27 19:31:02.491: [sbl] INFO: [02f3d1c2-acca-41ef-8609-2f79fe48aa06] (NRF-notify) NF registered (../lib/sbi/nrnf-handler.c:1133)
Nov 27 19:31:02 sathvika-virtual-machine open5gs-pcfd[8308]: 11/27 19:31:02.491: [sbl] INFO: [02f3d1c2-acca-41ef-8609-2f79fe48aa06] (NRF-notify) NF Profile updated [type:UDR] (../lib/sbi/nrnf-handler.c:1
Nov 27 19:31:02 sathvika-virtual-machine open5gs-pcfd[8308]: 11/27 19:31:02.491: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (../lib/sbi/context.c:2195)
Nov 27 19:31:02 sathvika-virtual-machine open5gs-pcfd[8308]: 11/27 19:31:02.491: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (../lib/sbi/context.c:1934)
Nov 27 19:31:03 sathvika-virtual-machine open5gs-pcfd[8308]: 11/27 19:31:03.577: [sbl] INFO: [03996c22-acca-41ef-a906-95bd09a369d] (NRF-notify) NF registered (../lib/sbi/nrnf-handler.c:1133)
Nov 27 19:31:03 sathvika-virtual-machine open5gs-pcfd[8308]: 11/27 19:31:03.577: [sbl] INFO: [03996c22-acca-41ef-a906-95bd09a369d] (NRF-notify) NF Profile updated [type:BSF] (../lib/sbi/nrnf-handler.c:1
Nov 27 19:31:03 sathvika-virtual-machine open5gs-pcfd[8308]: 11/27 19:31:03.577: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.15:8805] (../lib/sbi/context.c:2195)
Nov 27 19:31:03 sathvika-virtual-machine open5gs-pcfd[8308]: 11/27 19:31:03.577: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.15:7777] (../lib/sbi/context.c:1934)

● open5gs-upfd.service - Open5GS UPF Daemon
   Loaded: loaded (/lib/systemd/system/open5gs-upfd.service; enabled; vendor preset: enabled)
```

```
● open5gs-upfd.service - Open5GS UPF Daemon
   Loaded: loaded (/lib/systemd/system/open5gs-upfd.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2024-11-27 19:30:50 IST; 15min ago
     Main PID: 8470 (open5gs-upfd)
        Tasks: 2 (limit: 4551)
       Memory: 26.1M
          CPU: 86ms
     CGroup: /system.slice/open5gs-upfd.service
            └─8470 /usr/bin/open5gs-upfd -c /etc/open5gs/upf.yaml

Nov 27 19:30:50 sathvika-virtual-machine systemd[1]: Started Open5GS UPF Daemon.
Nov 27 19:30:50 sathvika-virtual-machine open5gs-upfd[8470]: Open5GS daemon v2.7.2
Nov 27 19:30:50 sathvika-virtual-machine open5gs-upfd[8470]: 11/27 19:30:50.914: [app] INFO: Configuration: '/etc/open5gs/upf.yaml' (../lib/app/ogs-init.c:133)
Nov 27 19:30:50 sathvika-virtual-machine open5gs-upfd[8470]: 11/27 19:30:50.914: [app] INFO: File Logging: '/var/log/open5gs/upf.log' (../lib/app/ogs-init.c:136)
Nov 27 19:30:50 sathvika-virtual-machine open5gs-upfd[8470]: 11/27 19:30:50.955: [metrics] INFO: metrics_server() [http://127.0.0.7]:9090 (../lib/metrics/prometheus/context.c:299)
Nov 27 19:30:50 sathvika-virtual-machine open5gs-upfd[8470]: 11/27 19:30:50.955: [pfcp] INFO: pfcp_server() [127.0.0.7]:8805 (../lib/pfcp/path.c:30)
Nov 27 19:30:50 sathvika-virtual-machine open5gs-upfd[8470]: 11/27 19:30:50.955: [gtp] INFO: gtp_server() [127.0.0.7]:2152 (../lib/gtp/path.c:30)
Nov 27 19:30:50 sathvika-virtual-machine open5gs-upfd[8470]: 11/27 19:30:50.956: [app] INFO: UPF initialize..done (../src/upf/app.c:31)
Nov 27 19:30:53 sathvika-virtual-machine open5gs-upfd[8470]: 11/27 19:30:53.757: [pfcp] INFO: ogs_pfcp_connect() [127.0.0.4]:8805 (../lib/pfcp/path.c:61)
Nov 27 19:30:53 sathvika-virtual-machine open5gs-upfd[8470]: 11/27 19:30:53.757: [upf] INFO: PFPC associated [127.0.0.4]:8805 (../src/upf/pfcp-sm.c:184)

● open5gs-udrd.service - Open5GS UDR Daemon
   Loaded: loaded (/lib/systemd/system/open5gs-udrd.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2024-11-27 19:30:51 IST; 15min ago
     Main PID: 8505 (open5gs-udrd)
        Tasks: 2 (limit: 4551)
       Lines 1-47
```

```
● open5gs-upfd.service - Open5GS UPF Daemon
   Loaded: loaded (/lib/systemd/system/open5gs-upfd.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2024-11-27 20:31:29 IST; 13s ago
     Main PID: 10216 (open5gs-upfd)
        Tasks: 2 (limit: 4551)
       Memory: 25.7M
          CPU: 66ms
     CGroup: /system.slice/open5gs-upfd.service
            └─10216 /usr/bin/open5gs-upfd -c /etc/open5gs/upf.yaml

Nov 27 20:31:29 sathvika-virtual-machine systemd[1]: Started Open5GS UPF Daemon.
Nov 27 20:31:29 sathvika-virtual-machine open5gs-upfd[10216]: Open5GS daemon v2.7.2
Nov 27 20:31:30 sathvika-virtual-machine open5gs-upfd[10216]: 11/27 20:31:29.999: [app] INFO: Configuration: '/etc/open5gs/upf.yaml' (../lib/app/ogs-init.c:133)
Nov 27 20:31:30 sathvika-virtual-machine open5gs-upfd[10216]: 11/27 20:31:29.999: [app] INFO: File Logging: '/var/log/open5gs/upf.log' (../lib/app/ogs-init.c:136)
Nov 27 20:31:30 sathvika-virtual-machine open5gs-upfd[10216]: 11/27 20:31:30.084: [metrics] INFO: metrics_server() [http://127.0.0.7]:9090 (../lib/metrics/prometheus/context.c:299)
Nov 27 20:31:30 sathvika-virtual-machine open5gs-upfd[10216]: 11/27 20:31:30.084: [pfcp] INFO: pfcp_server() [127.0.0.7]:8805 (../lib/pfcp/path.c:30)
Nov 27 20:31:30 sathvika-virtual-machine open5gs-upfd[10216]: 11/27 20:31:30.084: [gtp] INFO: gtp_server() [127.0.0.7]:2152 (../lib/gtp/path.c:30)
Nov 27 20:31:30 sathvika-virtual-machine open5gs-upfd[10216]: 11/27 20:31:30.091: [app] INFO: UPF initialize..done (../src/upf/app.c:31)
Nov 27 20:31:30 sathvika-virtual-machine open5gs-upfd[10216]: 11/27 20:31:30.336: [pfcp] INFO: ogs_pfcp_connect() [127.0.0.4]:8805 (../lib/pfcp/path.c:61)
Nov 27 20:31:30 sathvika-virtual-machine open5gs-upfd[10216]: 11/27 20:31:30.336: [upf] INFO: PFPC associated [127.0.0.4]:8805 (../src/upf/pfcp-sm.c:184)

● open5gs-udrd.service - Open5GS UDR Daemon
   Loaded: loaded (/lib/systemd/system/open5gs-udrd.service; enabled; vendor preset: enabled)
   Active: active (running) since Wed 2024-11-27 20:31:29 IST; 13s ago
     Main PID: 10214 (open5gs-udrd)
        Tasks: 2 (limit: 4551)
       Lines 1-47
```

Verify Subscriber data in MongoDB

Ensure your HSS is properly connected to the MongoDB database and has subscriber data.

1. Access the MongoDB shell:

bash

mongo

2. Switch to the Open5GS database:

javascript

```
use open5gs
```

- ### 3. Verify the subscriber data:

javascript

```
db.subscribers.find().pretty()
```

Install UERANSIM:

```
> exit
bye
~shvika@shvika-virtual-machine:~/etc/opensgs$ sudo apt update
Get:1 http://security.ubuntu.com/ubuntu jammy-security InRelease [129 kB]
Hit:2 http://in.archive.ubuntu.com/ubuntu jammy InRelease
Get:3 http://in.archive.ubuntu.com/ubuntu jammy-updates InRelease [128 kB]
Hit:4 https://repo.mongodb.org/apt/ubuntu focal/mongodbg-org/5.0 InRelease
Hit:5 https://ppa.launchpadcontent.net/opensgs/lates/ubuntu Jammy InRelease
Hit:6 http://security.ubuntu.com/ubuntu jammy-security/main amd64 Packages [1,956 kB]
Get:7 http://in.archive.ubuntu.com/ubuntu jammy-backports InRelease [127 kB]
Get:8 http://in.archive.ubuntu.com/ubuntu jammy-updates/main amd64 DEP-11 Metadata [103 kB]
Get:9 http://in.archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 DEP-11 Metadata [212 B]
Get:10 http://in.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 DEP-11 Metadata [356 kB]
Hit:11 http://in.archive.ubuntu.com/ubuntu jammy-security/main i386 Packages [567 kB]
Get:12 http://security.ubuntu.com/ubuntu jammy-security/main amd64 DEP-11 Metadata [43.3 kB]
Get:13 http://security.ubuntu.com/ubuntu jammy-security/restricted amd64 DEP-11 Metadata [208 B]
Get:14 http://security.ubuntu.com/ubuntu jammy-security/universe i386 Packages [647 kB]
Get:15 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [957 kB]
Get:16 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 DEP-11 Metadata [125 kB]
Get:17 http://security.ubuntu.com/ubuntu jammy-security/multiverse amd64 DEP-11 Metadata [208 B]
Get:18 http://in.archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 DEP-11 Metadata [940 B]
Get:19 http://in.archive.ubuntu.com/ubuntu jammy-backports/main amd64 DEP-11 Metadata [5,324 B]
Get:20 http://in.archive.ubuntu.com/ubuntu jammy-backports/restricted amd64 DEP-11 Metadata [212 B]
Get:21 http://in.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 DEP-11 Metadata [17.7 kB]
Get:22 http://in.archive.ubuntu.com/ubuntu jammy-backports/multiverse amd64 DEP-11 Metadata [212 B]
Fetched 5,593 kB in 3s (1,946 KB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
250 packages can be upgraded. Run 'apt list --upgradable' to see them.
~shvika@shvika-virtual-machine:~/etc/opensgs$ sudo apt install -y git build-essential cmake libboost-all-dev
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
autoconf automake autotools-dev binutils-binutils-x86-64-linux-gnu cmake-data dh-elpa-helper dpkg-dev fakeroot g++ g++-11 gcc gcc-11 gfortran gfortran-11 glibc-manual
libc-devtools-java libc-common libalgorithm-diff-perl libalgorithm-diff-xs-perl libalgorithm-merge-perl basical libboost-atomic1.74-dev libboost-atomic1.74-dev libboost-chrono1.74-dev
libboost-chrono1.74-dev libboost-chrono1.74.0 libboost-container-dev libboost-container1.74.0 libboost-context-dev libboost-context1.74.0 libboost-coroutine-dev libboost-coroutine1.74.0
libboost-date-time-dev libboost-date-time1.74.0 libboost-devel libboost-devel1.74.0 libboost-fiber-dev libboost-fiber1.74.0 libboost-filesystem-dev libboost-filesystem1.74.0 libboost-flie
libboost-graph-dev libboost-graph-parallel-dev libboost-graph-parallel1.74.0 libboost-graph-parallel1.74.0 libboost-graph1.74.0 libboost-graph1.74.0 libboost-lstmstreams-dev
libboost-lstmstreams1.74.0 libboost-lstmstreams1.74.0 libboost-localize-dev libboost-localize1.74.0 libboost-log-dev libboost-log1.74.0 libboost-log1.74.0 libboost-math-compat1.74.0
libboost-math-compat1.74.0 libboost-math-dev libboost-math1.74.0 libboost-math1.74.0 libboost-mpi-dev libboost-mpi-python1.74.0 libboost-mpi1.74.0 libboost-mpi1.74.0 libboost-nowide1.74.0
libboost-nowide1.74.0 libboost-numpy-dev libboost-numpy1.74.0 libboost-numpy1.74.0 libboost-program-options-dev libboost-program-options1.74.0 libboost-program-options1.74.0
libboost-python-dev libboost-python1.74.0 libboost-pythoni1.74.0 libboost-pythoni1.74.0 libboost-random-dev libboost-random1.74.0 libboost-random1.74.0 libboost-reexch
```



```
sathvika@sathvika-virtual-machine:~/etc/opensg$ git clone https://github.com/aligungr/UERANSIM.git
fatal: could not create work tree dir 'UERANSIM': Permission denied
sathvika@sathvika-virtual-machine:~/etc/opensg$ cd -
sathvika@sathvika-virtual-machine:~/Documents/Sg/UERANSIM$ cd
sathvika@sathvika-virtual-machine:~/Documents/Sg/UERANSIM$ make
rm -fr logs # Old version log files
mkdir -p build
rm -fr build/*
# cmake -DCMAKE_BUILD_TYPE=Debug -G "CodeBlocks - Unix Makefiles" . -B cmake-build-debug
cmake -DCMAKE_BUILD_TYPE=Release -G "CodeBlocks - Unix Makefiles" . -B cmake-build-release
-- The C compiler identification is GNU 11.4.0
-- The CXX compiler identification is GNU 11.4.0
-- Detecting C compiler ABI info
-- Detecting C compiler features
-- Check for working C compiler: /usr/bin/cc - skipped
-- Detecting C compile features
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler features
-- Check for working CXX compiler: /usr/bin/c++ - skipped
-- Detecting CXX compile features
-- Configuring done
-- Generating done
-- Build files have been written to: /home/sathvika/Documents/Sg/UERANSIM/cmake-build-release
# cmake --build cmake-build-debug --target all
cmake --build cmake-build-release --target all
gmake[1]: Entering directory '/home/sathvika/Documents/Sg/UERANSIM/cmake-build-release'
gmake[2]: Entering directory '/home/sathvika/Documents/Sg/UERANSIM/cmake-build-release'
gmake[3]: Entering directory '/home/sathvika/Documents/Sg/UERANSIM/cmake-build-release'
gmake[3]: Leaving directory '/home/sathvika/Documents/Sg/UERANSIM/cmake-build-release'
gmake[3]: Entering directory '/home/sathvika/Documents/Sg/UERANSIM/cmake-build-release'
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/ANY.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/BIT_STRING.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/BOOLEAN.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/INTEGER.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/NULL.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/NativeEnumerated.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/NativeInteger.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/OBJECT_IDENTIFIER.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/OCTET_STRING.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/OPEN_TYPE.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/PrintableString.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/asn_SEQUENCE_OF.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/asn_SET_OF.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/asn_application.c.o
```

Install SCTP Library

```
[ 93%] Building CXX object src/lib/CMakeFiles/common-lib.dir/rlic/encoder.cpp.o
[ 93%] Building CXX object src/lib/CMakeFiles/common-lib.dir/rlic/entity_am.cpp.o
[ 93%] Building CXX object src/lib/CMakeFiles/common-lib.dir/rlic/entity_tn.cpp.o
[ 93%] Building CXX object src/lib/CMakeFiles/common-lib.dir/rlic/entity_um.cpp.o
[ 93%] Building CXX object src/lib/CMakeFiles/common-lib.dir/rlic/func.cpp.o
[ 93%] Building CXX object src/lib/CMakeFiles/common-lib.dir/rlic/rlic.cpp.o
[ 93%] Building CXX object src/lib/CMakeFiles/common-lib.dir/rlic/test.cpp.o
[ 93%] Building CXX object src/lib/CMakeFiles/common-lib.dir/rlic/utils.cpp.o
[ 93%] Building CXX object src/lib/CMakeFiles/common-lib.dir/rlic/rlic_base.cpp.o
[ 93%] Building CXX object src/lib/CMakeFiles/common-lib.dir/rlic/rlic_pdu.cpp.o
[ 93%] Building CXX object src/lib/CMakeFiles/common-lib.dir/rlic/rlic_encode.cpp.o
[ 93%] Building CXX object src/lib/CMakeFiles/common-lib.dir/rlic/rlic_rrc.cpp.o
[ 94%] Building CXX object src/lib/CMakeFiles/common-lib.dir/sctp/client.cpp.o
[ 94%] Building CXX object src/lib/CMakeFiles/common-lib.dir/sctp/internal.cpp.o
/home/sathvika/Documents/Sg/UERANSIM/src/lib/sctp/internal.cpp:17:10: fatal error: netinet/sctp.h: No such file or directory
17 | #include <netinet/sctp.h>
    |
compilation terminated.
gmake[3]: *** [src/lib/CMakeFiles/common-lib.dir/build.make:720: src/lib/CMakeFiles/common-lib.dir/sctp/internal.cpp.o] Error 1
gmake[3]: Leaving directory '/home/sathvika/Documents/Sg/UERANSIM/cmake-build-release'
gmake[2]: *** [CMakeFiles/Makefile2:487: src/lib/CMakeFiles/common-lib.dir/all] Error 2
gmake[2]: Leaving directory '/home/sathvika/Documents/Sg/UERANSIM/cmake-build-release'
gmake[1]: *** [Makefile:91: all] Error 2
gmake[1]: Leaving directory '/home/sathvika/Documents/Sg/UERANSIM/cmake-build-release'
make: *** [makefile:12: build] Error 2
sathvika@sathvika-virtual-machine:~/Documents/Sg/UERANSIM$ ls -l build/
total 0
sathvika@sathvika-virtual-machine:~/Documents/Sg/UERANSIM$ sudo apt install libsctp-dev
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  libsctp-dev
0 upgraded, 1 newly installed, 0 to remove and 239 not upgraded.
Need to get 51.1 kB of archives.
After this operation, 228 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu jammy/main amd64 libsctp-dev amd64 1.0.19+dfsg-1build1 [51.1 kB]
Fetched 51.1 kB in 1s (60.9 kB/s)
Selecting previously unselected package libsctp-dev:amd64.
(Reading database ... 212085 files and directories currently installed.)
Preparing to unpack .../libsctp-dev_1.0.19+dfsg-1build1_amd64.deb ...
Unpacking libsctp-dev:amd64 (1.0.19+dfsg-1build1) ...
Setting up libsctp-dev:amd64 (1.0.19+dfsg-1build1) ...
Processing triggers for man-db (2.10.2-1) ...
sathvika@sathvika-virtual-machine:~/Documents/Sg/UERANSIM$
```


Clean and Rebuild UERANSIM

```
Setting up libscpt-dev:amd64 (1.0.19+dfsg-1build1) ...
Processing triggers for man-db (2.10.2-1) ...
sathvika@sathvika-virtual-machine:~/Documents/5g/UERANSIM$ make clean
make: *** No rule to make target 'clean'.  Stop.
sathvika@sathvika-virtual-machine:~/Documents/5g/UERANSIM$
sathvika@sathvika-virtual-machine:~/Documents/5g/UERANSIM$ make clean
make: *** No rule to make target 'clean'.  Stop.
sathvika@sathvika-virtual-machine:~/Documents/5g/UERANSIM$ rm -rf cmake-build-release
sathvika@sathvika-virtual-machine:~/Documents/5g/UERANSIM$ mkdir cmake-build-release
sathvika@sathvika-virtual-machine:~/Documents/5g/UERANSIM$ cd cmake-build-release
sathvika@sathvika-virtual-machine:~/Documents/5g/UERANSIM/cmake-build-release$ cmake ..
-- The C compiler identification is GNU 11.4.0
-- The CXX compiler identification is GNU 11.4.0
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Check for working C compiler: /usr/bin/cc - skipped
-- Detecting C compile features
-- Detecting C compile features - done
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Check for working CXX compiler: /usr/bin/c++ - skipped
-- Detecting CXX compile features
-- Detecting CXX compile features - done
-- Configuring done
-- Generating done
-- Build files have been written to: /home/sathvika/Documents/5g/UERANSIM/cmake-build-release
sathvika@sathvika-virtual-machine:~/Documents/5g/UERANSIM/cmake-build-release$ make
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/ANY.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/BIT_STRING.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/BOOLEAN.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/INTEGER.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/NULL.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/NativeEnumerated.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/NativeInteger.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/OBJECT_IDENTIFIER.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/OCTET_STRING.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/OPEN_TYPE.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/PrintableString.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/asn_SEQUENCE_OF.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/asn_SET_OF.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/asn_application.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/asn_bit_data.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/asn_codecs_prim.c.o
[ 1%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/asn_internal.c.o
[ 1%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/asn_random_fill.c.o
[ 1%] Building C object src/asn/asn1c/CMakeFiles/asn-asn1c.dir/asn_decoder.c.o
```

Step 1: Manually Clean the Build Directory

1. Navigate to the UERANSIM directory:


```
bash
```

 Copy code

```
cd ~/Documents/5g/UERANSIM
```

2. Remove the existing build directory:

```
bash
```

 Copy code


```
rm -rf cmake-build-release
```

Step 2: Install SCTP Development Library

Ensure the SCTP library is installed (if you haven't already):

```
bash

sudo apt install libsctp-dev
```


 Copy code

Step 3: Rebuild UERANSIM

1. Create a new build directory:

```
bash


mkdir cmake-build-release
```

 Copy code

2. Navigate to the new build directory:

```
bash


cd cmake-build-release
```

 Copy code

3. Run `cmake` to configure the build:

```
bash


cmake ..
```

 Copy code

4. Run `make` to build the project:

```
bash

make
```

 Copy code



Step 4: Verify the Build

After the build is complete, check for the `nr-ue` and `nr-gnb` executables in the `build/` directory:

```
bash
```

[Copy code](#)

```
ls -l
```

You should see:

```
text
```

[Copy code](#)

```
nr-ue
```

```
nr-gnb
```

```
sathvika@sathvika-virtual-machine:~/Documents/Sg/UEANSIM$ sudo apt install libsctp-dev
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  libsctp-dev
0 upgraded, 1 newly installed, 0 to remove and 239 not upgraded.
Need to get 51.1 kB of archives.
After this operation, 220 kB of additional disk space will be used.
Get:1 http://in.archive.ubuntu.com/ubuntu jammy/main amd64 libsctp-dev amd64 1.0.19+dfsg-1build1 [51.1 kB]
Fetched 51.1 kB in 1s (60.9 kB/s)
Selecting previously unselected package libsctp-dev:amd64.
(Reading database ... 212085 files and directories currently installed.)
Preparing to unpack .../libsctp-dev_1.0.19+dfsg-1build1_amd64.deb ...
Unpacking libsctp-dev:amd64 (1.0.19+dfsg-1build1) ...
Setting up libsctp-dev:amd64 (1.0.19+dfsg-1build1) ...
Processing triggers for man-db (2.10.2-1) ...
sathvika@sathvika-virtual-machine:~/Documents/Sg/UEANSIM$ make clean
make: *** No rule to make target 'clean'. Stop.
sathvika@sathvika-virtual-machine:~/Documents/Sg/UEANSIM$
sathvika@sathvika-virtual-machine:~/Documents/Sg/UEANSIM$ make clean
make: *** No rule to make target 'clean'. Stop.
sathvika@sathvika-virtual-machine:~/Documents/Sg/UEANSIM$ rm -rf cmake-build-release
sathvika@sathvika-virtual-machine:~/Documents/Sg/UEANSIM$ mkdir cmake-build-release
sathvika@sathvika-virtual-machine:~/Documents/Sg/UEANSIM$ cd cmake-build-release
sathvika@sathvika-virtual-machine:~/Documents/Sg/UEANSIM/cmake-build-release$ cmake ..
-- The C compiler identification is GNU 11.4.0
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Check for working C compiler: /usr/bin/cc - skipped
-- Detecting C compile features
-- Detecting C compile features - done
-- Detecting CXX compiler ABI info
-- Detecting CXX compiler ABI info - done
-- Check for working CXX compiler: /usr/bin/c++ - skipped
-- Detecting CXX compile features
-- Detecting CXX compile features - done
-- Configuring done
-- Generating done
-- Build files have been written to: /home/sathvika/Documents/Sg/UEANSIM/cmake-build-release
sathvika@sathvika-virtual-machine:~/Documents/Sg/UEANSIM/cmake-build-release$ make
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asnic.dir/ANY.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asnic.dir/BIT_STRING.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asnic.dir/BOOLEAN.c.o
[ 0%] Building C object src/asn/asn1c/CMakeFiles/asn-asnic.dir/INTEGER.c.o
```

```
[ 98%] Building CXX object src/ue/ChakeFiles/ue.dir/nas/usim/sqm_mng.cpp.o
[ 98%] Building CXX object src/ue/ChakeFiles/ue.dir/nas/usim/uslm.cpp.o
[ 98%] Building CXX object src/ue/ChakeFiles/ue.dir/nts.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rts/ctl_task.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rts/task.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rts/udp_task.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rcc/access.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rcc/cells.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rcc/channel.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rcc/connection.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rcc/failures.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rcc/handler.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rcc/idle.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rcc/nas.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rcc/sap.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rcc/state.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rcc/sysinfo.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/rcc/task.cpp.o
[ 99%] Building CXX object src/ue/ChakeFiles/ue.dir/timer.cpp.o
[100%] Building CXX object src/ue/ChakeFiles/ue.dir/tun/config.cpp.o
[100%] Building CXX object src/ue/ChakeFiles/ue.dir/tun/task.cpp.o
[100%] Building CXX object src/ue/ChakeFiles/ue.dir/tun/tun.cpp.o
[100%] Building CXX object src/ue/ChakeFiles/ue.dir/types.cpp.o
[100%] Building CXX object src/ue/ChakeFiles/ue.dir/ue.cpp.o
[100%] Linking CXX static library libue.a
[100%] Built target ue
[100%] Building CXX object ChakeFiles/nr-ue.dir/src/ue.cpp.o
[100%] Linking CXX executable nr-ue
[100%] Built target nr-ue
[100%] Building CXX object ChakeFiles/devbnd.dir/src/binder.cpp.o
[100%] Linking CXX shared library libdevbnd.so
[100%] Built target devbnd
[100%] Building CXX object ChakeFiles/nr-cli.dir/src/cli.cpp.o
[100%] Linking CXX executable nr-cli
[100%] Built target nr-cli
sathvika@sathvika-virtual-machine:~/Documents/5g/UERANSIM/cmake-build-release$ ls -l
total 21852
-rw-rw-r-- 1 sathvika sathvika 13865 Nov 27 23:07 CMakeCache.txt
drwxrwxr-x 8 sathvika sathvika 4096 Nov 27 23:11 CMakeFiles
-rw-rw-r-- 1 sathvika sathvika 3222 Nov 27 23:07 cmake_install.cmake
-rwxrwxr-x 1 sathvika sathvika 15248 Nov 27 23:11 libdevbnd.so
-rw-rw-r-- 1 sathvika sathvika 12242 Nov 27 23:07 Makefile
-rwxrwxr-x 1 sathvika sathvika 1032128 Nov 27 23:11 nr-cli
-rwxrwxr-x 1 sathvika sathvika 10644880 Nov 27 23:10 nr-gnb
-rwxrwxr-x 1 sathvika sathvika 10640720 Nov 27 23:11 nr-ue
drwxrwxr-x 8 sathvika sathvika 4096 Nov 27 23:07 src
```

Next Step: Configure UE and gNodeB


Now, you need to configure the UE and gNodeB (RAN) to interact with your Open5GS setup.

Step 1: Create the gNodeB Configuration

1. Navigate to the `config` directory inside the UERANSIM folder:

```
bash


cd ~/Documents/5g/UERANSIM/config
```

 Copy code

2. Create a new configuration file for the gNodeB:


```
bash

nano ueransim-gnb.yaml
```

 Copy code


1. Open a new terminal window.
2. Navigate to the `cmake-build-release` directory:

```
bash  
  
cd ~/Documents/5g/UERANSIM/cmake-build-release
```

 Copy code

3. Start the gNodeB:


```
bash  
  
./nr-gnb -c ../config/ueransim-gnb.yaml
```

 Copy code

Start UE:


1. Open another terminal window.
2. Navigate to the `cmake-build-release` directory:

```
bash  
  
cd ~/Documents/5g/UERANSIM/cmake-build-release
```

 Copy code

3. Start the UE:

```
bash  
  
./nr-ue -c ../config/ueransim-ue.yaml
```


 Copy code

Expected Results

1. gNodeB Logs:

- Should show successful NGAP connection with the AMF.
- Example:

text


 Copy code

NGSetup Response received

2. UE Logs:

- Should show successful registration with the AMF and session establishment.
- Example:

text

 Copy code

Registration Accept
PDU Session Establishment Accept

```
sathvika@sathvika-virtual-machine:~/Documents/5g$ sudo systemctl restart open5gs*
sathvika@sathvika-virtual-machine:~/Documents/5g$ nano ~/Documents/5g/UERANSIM/config/ueransim-ue.yaml
sathvika@sathvika-virtual-machine:~/Documents/5g$ sudo nano /etc/open5gs/amf.yaml
sathvika@sathvika-virtual-machine:~/Documents/5g$ sudo systemctl restart open5gs*
sathvika@sathvika-virtual-machine:~/Documents/5g$ ./nr-gnb -c ../config/ueransim-gnb.yaml
bash: ./nr-gnb: No such file or directory
sathvika@sathvika-virtual-machine:~/Documents/5g$ cd ~/Documents/5g/UERANSIM/cmake-build-release
sathvika@sathvika-virtual-machine:~/Documents/5g/UERANSIM/cmake-build-release$ ./nr-gnb -c ../config/ueransim-gnb.yaml
UERANSIM v3.2.6
[2024-11-30 10:02:49.336] [sctp] [info] Trying to establish SCTP connection... (127.0.0.5:38412)
[2024-11-30 10:02:49.345] [sctp] [info] SCTP connection established (127.0.0.5:38412)
[2024-11-30 10:02:49.345] [sctp] [debug] SCTP association setup ascId[22]
[2024-11-30 10:02:49.345] [ngap] [debug] Sending NG Setup Request
[2024-11-30 10:02:49.350] [ngap] [debug] NG Setup Response received
[2024-11-30 10:02:49.350] [ngap] [info] NG Setup procedure is successful
```

Logs:

```
sathvik@sathvika-virtual-machine: /Downloads/UBUNTU$ sudo nano /etc/opensgs/anf.yaml
sathvik@sathvika-virtual-machine: /Downloads/UBUNTU$ sudo systemctl restart opensgs
sathvik@sathvika-virtual-machine: /Downloads/UBUNTU$ sudo journalctl -u opensgs-anf -f
Dec 01 05:25:45 sathvika-virtual-machine opensgs-anf[4078]: 12/01 05:25:45.135: [sbl] INFO: [96b5590c-af76-41ef-99b4-0f2c1bb0c3b9] (NRF-notify) NF Profile updated [type:UDM] (.../lib/sbl/nnrf-handler.c:47)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-anf[4078]: 12/01 05:25:45.135: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.12:80] (.../lib/sbl/context.c:2195)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-anf[4078]: 12/01 05:25:45.135: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.12:7777] (.../lib/sbl/context.c:1934)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-anf[4078]: 12/01 05:25:45.136: [sbl] WARNING: [96b5590c-af76-41ef-99b4-0f2c1bb0c3b9] (NRF-notify) NF has already been added [type:UDM] (.../lib/sbl/nnrf-handler.c:1133)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-anf[4078]: 12/01 05:25:45.136: [sbl] INFO: [96b5590c-af76-41ef-99b4-0f2c1bb0c3b9] (NRF-notify) NF Profile updated [type:UDM] (.../lib/sbl/nnrf-handler.c:47)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-anf[4078]: 12/01 05:25:45.136: [sbl] WARNING: NF EndPoint(addr) updated [127.0.0.12:80] (.../lib/sbl/context.c:2195)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-anf[4078]: 12/01 05:25:45.136: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.12:80] (.../lib/sbl/context.c:2195)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-anf[4078]: 12/01 05:25:45.136: [sbl] WARNING: NF EndPoint(addr) updated [127.0.0.12:7777] (.../lib/sbl/context.c:1934)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-anf[4078]: 12/01 05:25:45.136: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.12:7777] (.../lib/sbl/context.c:1934)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-anf[4078]: 12/01 05:25:45.136: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.12:7777] (.../lib/sbl/context.c:1934)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-anf[4078]: 12/01 05:25:45.136: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.12:7777] (.../lib/sbl/context.c:1934)
^C
sathvik@sathvika-virtual-machine: /Downloads/UBUNTU$ sudo journalctl -u opensgs-smfd -f
Dec 01 05:25:45 sathvika-virtual-machine opensgs-smfd[4891]: 12/01 05:25:45.136: [sbl] INFO: [96b5590c-af76-41ef-99b4-0f2c1bb0c3b9] (NRF-notify) NF Profile updated [type:UDM] (.../lib/sbl/nnrf-handler.c:47)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-smfd[4891]: 12/01 05:25:45.136: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.12:80] (.../lib/sbl/context.c:2195)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-smfd[4891]: 12/01 05:25:45.136: [sbl] WARNING: [96b5590c-af76-41ef-99b4-0f2c1bb0c3b9] (NRF-notify) NF has already been added [type:UDM] (.../lib/sbl/nnrf-handler.c:1133)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-smfd[4891]: 12/01 05:25:45.136: [sbl] INFO: [96b5590c-af76-41ef-99b4-0f2c1bb0c3b9] (NRF-notify) NF Profile updated [type:UDM] (.../lib/sbl/nnrf-handler.c:47)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-smfd[4891]: 12/01 05:25:45.136: [sbl] WARNING: NF EndPoint(addr) updated [127.0.0.12:80] (.../lib/sbl/context.c:2195)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-smfd[4891]: 12/01 05:25:45.136: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.12:80] (.../lib/sbl/context.c:2195)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-smfd[4891]: 12/01 05:25:45.136: [sbl] WARNING: NF EndPoint(addr) updated [127.0.0.12:7777] (.../lib/sbl/context.c:1934)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-smfd[4891]: 12/01 05:25:45.136: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.12:7777] (.../lib/sbl/context.c:1934)
Dec 01 05:25:45 sathvika-virtual-machine opensgs-smfd[4891]: 12/01 05:25:45.136: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.12:7777] (.../lib/sbl/context.c:1934)
^C

sathvik@sathvika-virtual-machine: /Downloads/UBUNTU/config$ sudo systemctl status opensgs-udmd
● opensgs-udmd.service - OpenSGS UDM Daemon
   Loaded: loaded (/lib/systemd/system/opensgs-udmd.service; enabled; vendor preset: enabled)
   Active: active (running) since Sun 2024-12-01 05:44:46 IST; 14mn ago
     Main PID: 5361 (opensgs-udmd)
        Tasks: 2 (limit: 4551)
       Memory: 4.9M
          CPU: 42ms
     CGroup: /system.slice/opensgs-udmd.service
            └─5361 /usr/bin/opensgs-udmd -c /etc/opensgs/udm.yaml

Dec 01 05:44:46 sathvika-virtual-machine opensgs-udmd[5361]: 12/01 05:44:46.550: [sbl] INFO: [459b6f22-af79-41ef-be3a-bb2acd9b2cc1] Subscription created until 2024-12-02T05:44:46.549432+05:30 [duration: 1h]
Dec 01 05:44:46 sathvika-virtual-machine opensgs-udmd[5361]: 12/01 05:44:46.550: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (.../lib/sbl/nnrf-handler.c:949)
Dec 01 05:44:46 sathvika-virtual-machine opensgs-udmd[5361]: 12/01 05:44:46.550: [sbl] INFO: [459b6f22-af79-41ef-be3a-bb2acd9b2cc1] Subscription created until 2024-12-02T05:44:46.549432+05:30 [duration: 1h]
Dec 01 05:44:46 sathvika-virtual-machine opensgs-udmd[5361]: 12/01 05:44:46.671: [sbl] INFO: [45ab3754-af79-41ef-809d-df54d4874d78] (NRF-notify) NF registered (.../lib/sbl/nnrf-handler.c:1133)
Dec 01 05:44:46 sathvika-virtual-machine opensgs-udmd[5361]: 12/01 05:44:46.672: [sbl] INFO: [45ab3754-af79-41ef-809d-df54d4874d78] (NRF-notify) NF Profile updated [type:SEPP] (.../lib/sbl/nnrf-handler.c:1133)
Dec 01 05:44:46 sathvika-virtual-machine opensgs-udmd[5361]: 12/01 05:44:46.672: [sbl] INFO: NF EndPoint(addr) setup [127.0.1.250:7777] (.../lib/sbl/context.c:2195)
Dec 01 05:44:57 sathvika-virtual-machine opensgs-udmd[5361]: 12/01 05:44:57.653: [sbl] INFO: [45a87a1e-af79-41ef-b1e0-3d2d24127f6f] (NRF-notify) NF registered (.../lib/sbl/nnrf-handler.c:1133)
Dec 01 05:44:57 sathvika-virtual-machine opensgs-udmd[5361]: 12/01 05:44:57.653: [sbl] INFO: [45a87a1e-af79-41ef-b1e0-3d2d24127f6f] (NRF-notify) NF Profile updated [type:UDM] (.../lib/sbl/nnrf-handler.c:1133)
Dec 01 05:44:57 sathvika-virtual-machine opensgs-udmd[5361]: 12/01 05:44:57.653: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.20:80] (.../lib/sbl/context.c:2195)
Dec 01 05:44:57 sathvika-virtual-machine opensgs-udmd[5361]: 12/01 05:44:57.653: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.20:7777] (.../lib/sbl/context.c:1934)

sathvik@sathvika-virtual-machine: /Downloads/UBUNTU/config$ sudo systemctl status opensgs-ausfd
● opensgs-ausfd.service - OpenSGS AUSF Daemon
   Loaded: loaded (/lib/systemd/system/opensgs-ausfd.service; enabled; vendor preset: enabled)
   Active: active (running) since Sun 2024-12-01 05:44:46 IST; 14mn ago
     Main PID: 5357 (opensgs-ausfd)
        Tasks: 2 (limit: 4551)
       Memory: 4.8M
          CPU: 41ms
     CGroup: /system.slice/opensgs-ausfd.service
            └─5357 /usr/bin/opensgs-ausfd -c /etc/opensgs/ausf.yaml

Dec 01 05:44:46 sathvika-virtual-machine opensgs-ausfd[5357]: 12/01 05:44:46.536: [sbl] INFO: [45995ea8-af79-41ef-be3a-bb2acd9b2cc1] Subscription created until 2024-12-02T05:44:46.535779+05:30 [duration: 1h]
Dec 01 05:44:46 sathvika-virtual-machine opensgs-ausfd[5357]: 12/01 05:44:46.536: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.10:7777] (.../lib/sbl/nnrf-handler.c:949)
Dec 01 05:44:46 sathvika-virtual-machine opensgs-ausfd[5357]: 12/01 05:44:46.536: [sbl] INFO: [45995ea8-af79-41ef-be3a-bb2acd9b2cc1] Subscription created until 2024-12-02T05:44:46.535957+05:30 [duration: 1h]
Dec 01 05:44:46 sathvika-virtual-machine opensgs-ausfd[5357]: 12/01 05:44:46.548: [sbl] INFO: [459a30c6-af79-41ef-ac88-69aa280364b3] (NRF-notify) NF registered (.../lib/sbl/nnrf-handler.c:1133)
Dec 01 05:44:46 sathvika-virtual-machine opensgs-ausfd[5357]: 12/01 05:44:46.548: [sbl] INFO: [459a30c6-af79-41ef-ac88-69aa280364b3] (NRF-notify) NF Profile updated [type:UDM] (.../lib/sbl/nnrf-handler.c:1133)
Dec 01 05:44:46 sathvika-virtual-machine opensgs-ausfd[5357]: 12/01 05:44:46.548: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.12:80] (.../lib/sbl/context.c:2195)
Dec 01 05:44:46 sathvika-virtual-machine opensgs-ausfd[5357]: 12/01 05:44:46.548: [sbl] INFO: NF EndPoint(addr) setup [127.0.0.12:7777] (.../lib/sbl/context.c:1934)
Dec 01 05:44:46 sathvika-virtual-machine opensgs-ausfd[5357]: 12/01 05:44:46.669: [sbl] INFO: [45ab3754-af79-41ef-809d-df54d4874d78] (NRF-notify) NF registered (.../lib/sbl/nnrf-handler.c:1133)
Dec 01 05:44:46 sathvika-virtual-machine opensgs-ausfd[5357]: 12/01 05:44:46.669: [sbl] INFO: [45ab3754-af79-41ef-809d-df54d4874d78] (NRF-notify) NF Profile updated [type:SEPP] (.../lib/sbl/nnrf-handler.c:1133)
Dec 01 05:44:46 sathvika-virtual-machine opensgs-ausfd[5357]: 12/01 05:44:46.669: [sbl] INFO: NF EndPoint(addr) setup [127.0.1.250:7777] (.../lib/sbl/context.c:2195)
```