

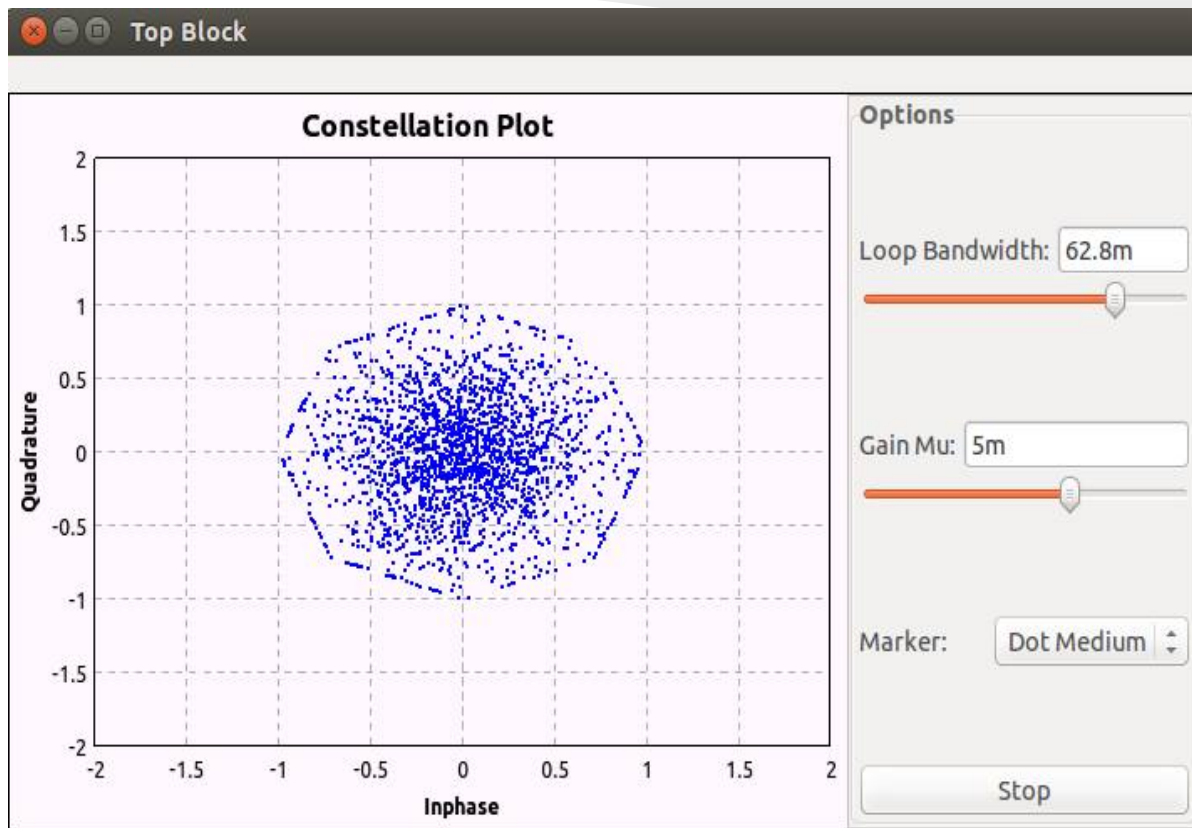
# SDR in ORBIT: LTE-U

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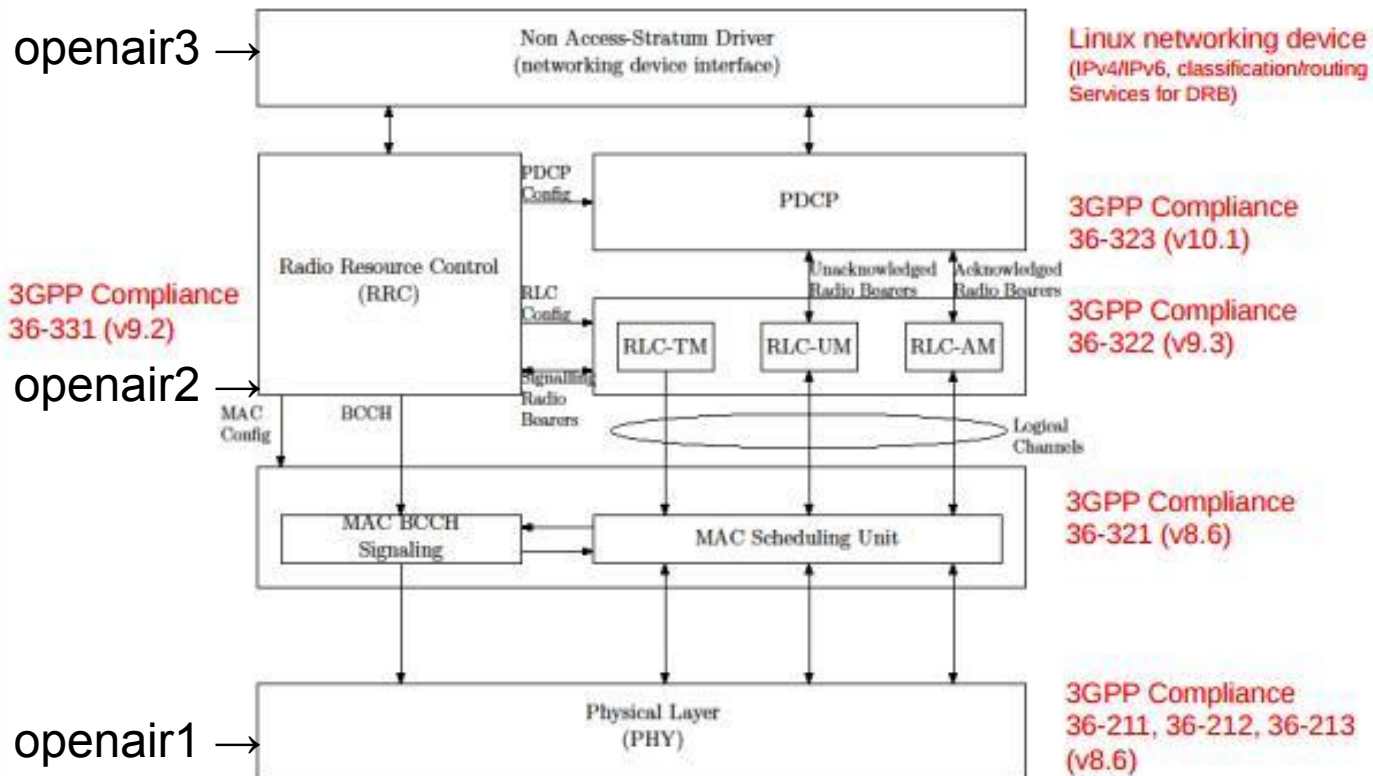
# UE not functioning

```
root@node1-2: ~
root@node1-1: ~ x root@node1-2: ~ x
rx_max_num_samps 2044
tx_max_num_samps 2044
RX Channel 0
Actual RX sample rate: 7.680000MSps...
Actual RX frequency: 2.660000GHz...
Actual RX gain: 30.000000...
Actual RX bandwidth: 56.000000M...
Actual RX antenna: RX2...
TX Channel 0
Actual TX sample rate: 7.680000MSps...
Actual TX frequency: 2.660000GHz...
Actual TX gain: 20.000000...
Actual TX bandwidth: 56.000000M...
Actual TX antenna: TX/RX...
Device timestamp: 0.001710...
Done
[MAC][I][l2_init] [MAIN] MAC_INIT_GLOBAL_PARAM IN...
[MAC][I][mac_init_global_param] [MAIN] CALLING RLC_MODULE_INIT...
[MAC][I][mac_init_global_param] [MAIN] RLC_MODULE_INIT OK, malloc16 for
xface...
[MAC][I][mac_init_global_param] [MAIN] malloc16 OK, mac_rlc_xface @ 0x3
[MAC][I][mac_init_global_param] [MAIN] RLC interface setup and init
[PDCP][I][pdcp_layer_init] PDCP layer has been initialized
[MAC][I][mac_init_global_param] [MAIN] Init Global Param Done
[MAC][I][l2_init] [MAIN] init eNB MAC functions
[MAC][I][l2_init] [MAIN] init UE MAC functions
[MAC][I][l2_init] [MAIN] PHY Frame configuration
[MAC][I][mac_top_init] [MAIN] Init function start:Nb_UE_INST=1
[MAC][I][ue_init_mac] [UE0] Applying default macMainConfig
[MAC][I][mac_top_init] [MAIN] Init function start:Nb_eNB_INST=0
[MAC][I][mac_top_init] [MAIN] calling RRC
[RRC][I][fill_ue_capability] Allocating 408 bytes for UE_EUTRA_Capabili
lte-softmodem: /root/trunk/openair2/RRC/LITE/MESSAGES/asn1_msg.c:2428:
apability: Assertion `dec_rval.code == RC_OK' failed.
Aborted (core dumped)
root@node1-2:~#
```

# Constellation Plot



# OpenAirLTE PHY/MAC Protocol Stack



# Network Layer

- Defines how *internetworks* function: *how to get data from one computer to another, even if it is on a remote network?*
  - **Logical Addressing** *label messages with network destination location*
  - **Routing** *handle incoming packets, determine their final destination*
  - **Datagram Encapsulation** *encapsulates messages by placing them into packets, with network layer header*
  - **Fragmentation and Reassembly** *split up the oversized packets*
  - **Error Handling and Diagnostics**

# OpenAir3

- Open-source software suite for cellular, MESH network
- Provides scripts and adaptations for networking suite
- Contains OAI-MME (Mobility Management Entity), which is responsible for authentication of the mobile devices

# OpenAir3 (cont')

- **MME's functions, as the main control node in LTE**
  - **Network Access Control** *manage authorization for UEs, allow to gain IP connectivity*
  - **Radio Resource Management** *decide radio resource management strategy (RRM)*
  - **Mobility Management** *provide seamless inter-working with multiple use cases such as Inter-eNB*
  - **Roaming Management** *support outbound/inbound roaming subscriber*
  - **UE Reach-ability** *manage communication with the UE and HSS*
  - **Tracking Area Management** *Allocate tracking area identity list to UE*
  - **Lawful Intercept**
  - **Load Balancing Between S-GWs**

# Next Week

- Continue to work on UE (receiver)
- Figure out the way to transmit specific data
- Redo previous weeks experiment in Time Delay Duplex (TDD) with varying bandwidths