Open Radio Access Network

Chuxu Song

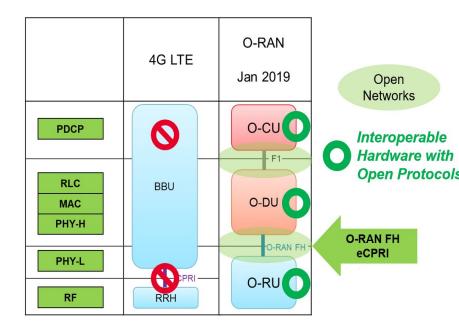
Project motivation

Previous version

- Each vandor have their own hardware and system •
- Big companies monopolize the industry
- High cost

ORAN

- .
- Virtualization of RAN components COTS(Commercial Off-The-Shelf) hardware •





Closed Interfaces and Proprietary Hardware / Protocols

5G Structure

Core network:

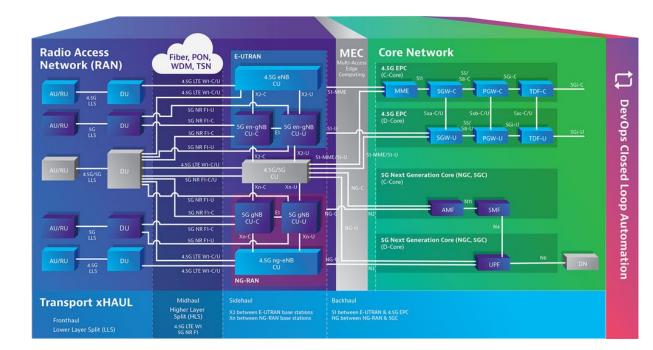
- Provide multiple function
- •

Gnodb:

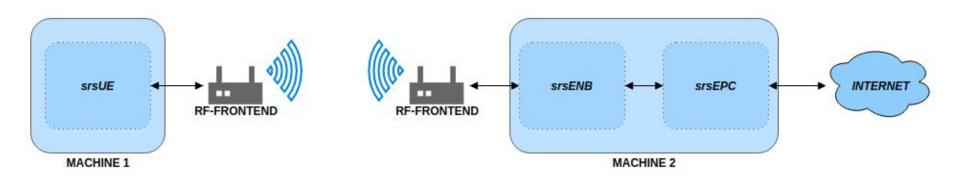
- Basestation
- Transmit radio signal

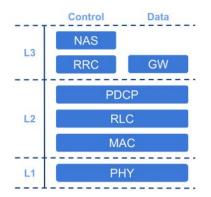
UE:

• User equipment

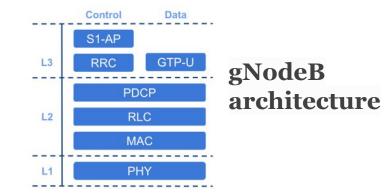








UE architecture



Data collection

Internal ethernet packet trace

Apply	a display filter	<ctrl-></ctrl->				•	xpression
No.	Time	Source	Destination	Protocol	Length Info		
	49.624678346		10.10.0.10	SSH		Encrypted packet (len=11684)	
	49.624689447		10.10.21.4	UDP		53225 Len=1472	
	49.624714562		10.10.21.4	TCP		22 [ACK] Seq=175645 Ack=88453401 Win=5110 Len=0 TSval=615450772 TSecr=2007410078	
	49.624737084		10.10.21.4	UDP		53225 Len=1472	
	49.624772943		10.10.21.4	TCP		22 [ACK] Seq=175645 Ack=88462189 Win=5078 Len=0 TSval=615450772 TSecr=2007410078	
	49.624784566		10.10.21.4	UDP		53225 Len=1472	
	49.624831831		10.10.21.4	UDP		53225 Len=1472	
	49.624879322		10.10.21.4	UDP		53225 Len=1472	
	49.624927777		10.10.21.4	UDP		53225 Len=1472	
	49.624973848		10.10.21.4	UDP		53225 Len=1472	
	49.625025085		10.10.21.4	UDP		53225 Len=1472	
	49.625068553		10.10.21.4	UDP		53225 Len=1472	
	49.625087791 49.625095128		10.10.23.11 10.10.23.11	UDP		49153 Len=1472 49153 Len=1472	
	49.625101088		10.10.23.11	UDP		49153 Len=1472 49153 Len=1472	
			bits), 1514 bytes ca				
	terface id: 0 (bits, isi4 bytes to	ipeureu (a	LILL DICS ON		
		e: Ethernet (1)					
		30, 2022 15:06:43.5	87346848 UTC				
		his packet: 0.000000					
		01603.587346040 seco					
LT i	ime delta from	previous captured fr	ame: 0.000005309 seco	inds]			
			rame: 0.000005309 sec				
			49,623102322 seconds				
Fra	ame Number: 491	13451					
Fra	ame Length: 151	4 bytes (12112 bits)					
		1514 bytes (12112 bit	s)				
[Fi	rame is marked:	False]					
	rame is ignored						
		me: eth:ethertype:ip	:udp:data]				
[Co	oloring Rule Na	ame: UDP]					
0000 00	80 2f 27 0e e	7 98 03 9b 3b 81 db 0	18 00 45 00 ···/'····	·:E-			
		0 40 11 f2 e8 0a 0a 3					
		1 05 c8 45 fc 27 09		F			
		0 50 79 9d 70 07 80 I					
0040 f5	6 b0 fe 20 f5 al	0 f6 30 02 90 f6 90 i					
		0 0d 80 06 d0 05 b0					
		0 02 80 0c 00 08 50		· · · P · · · ·			
		0 06 90 fd 10 f8 90					
		0 ff d0 ee 70 fa a0		·p····			
		0 00 b0 fd 10 f9 c0					
		0 ee 30 fc 20 ed 40 0 fc a0 05 40 00 50 0		.@.P			
		0 08 b0 fb 50 0f 70	5/ 60 TT 90 ····p··	PPPP			
		9 f7 e0 fa e0 fd f0 i		- p - p			
		0 07 c0 f4 b0 ff a0		····P·D			
		0 09 40 f3 e0 01 20					
		0 05 b0 0f a0 fe 40 :					

Attaching UE...

	Found Cell: Mode=FDD, PCI=1, PRB=50, Ports=1, CP=Normal, CF0=1.5 KHz Found PLMN: Id=31014. TAC=7													
	Could not find Home PLMN Id=00101, trying to connect to PLMN Id=31014													
Rand	Random Access Transmission: seq=27, tti=4021, ra-rnti=0x2													
RRC	RRC Connected													
	Random Access Complete. c-rnti=0x47, ta=1													
	Network attach successful. IP: 172.16.0.3													
Soft	Software Radio Systems RAN (srsRAN) 4/8/2022 2:35:10 TZ:0													
t														
Ente		o stop						-DL				u		
		Signal		cfo			iter	brate	bler	ta us		buff	brate	bler
сс 0	pci 1	rsrp -64	pl 64	1.4k	mcs 0	snr 24	0.0	0.0	0%	0.5	mcs 0	0.0	0.0	0%
õ	1	-64	64	1.4k	0	24	0.0	0.0	0%	0.5	0	0.0	0.0	0%
õ	ĩ	-64	64	1.5k	i õ	24	0.0	0.0	0%	0.5	ŏ	0.0	0.0	0%
õ		-64	64	1.5k	ŏ	24	0.0	0.0	0%	0.5	ŏ	0.0	0.0	0%
ō	ĩ	-64	64	1.4k	ō	24	0.0	0.0	0%	0.5	ō	0.0	0.0	0%
Θ	1	-67	67	1.4k	i o	21	0.0	0.0	0%	0.5	0	0.0	0.0	0%
Θ		-64	64	1.4k	i o	24	0.0	0.0	0%	0.5	i 0	0.0	0.0	0%
0		-64	64	1.5k	j o	24	0.0	0.0	0%	0.5	0	0.0	0.0	0%
Θ		-64	64	1.4k		24	0.0	0.0	0%	0.5	0	0.0	0.0	0%
Ο		-64	64	1.5k	0	24	0.0	0.0	0%	0.5	0	0.0	0.0	0%
Θ		-64	64	1.5k	0	24	0.0	0.0	0 %	0.5		0.0	0.0	0%
	Signal					DLDL					ULUL			
cc	pci	rsrp	pl	cfo	mcs	snr	iter	brate	bler	ta_us	mcs	buff	brate	bler
0	1 1	-64 -64	64 64	1.5k 1.5k	0	24 24	0.0	0.0	0% 0%	0.5	0	0.0	0.0	0% 0%
0	1	-64	64	1.5K	0 0	24	0.0	0.0	0%	0.5	0	0.0	0.0	0%
o		-64	64	1.4k	i õ	24	0.0	0.0	0%	0.5	i õ	0.0	0.0	0%
õ	1	-68	68	1.4k	ŏ	21	0.0	0.0	0%	0.5	ŏ	0.0	0.0	0%
ō	1	-64	64	1.5k	ō	24	0.0	0.0	0%	0.5	ō	0.0	0.0	0%
o		-64	64	1.5k	i õ	24	0.0	0.0	0%	0.5	ō	0.0	0.0	0%
Θ		-64	64	1.5k	j o	24	0.0	0.0	0%	0.5	0	0.0	0.0	0%
Θ		-64	64	1.5k		24	0.0	0.0	0 %	0.5		0.0	0.0	0%
٥		-64	64	1.5k	j 0	24	0.0	0.0	0%	0.5	j 0	0.0	0.0	0%
0	1	-64	64	1.5k	0	24	0.0	0.0	0%	0.5	0	0.0	0.0	0%

Future Plan

- Problem:
- Gnb and UE connection are very unstable 🛄 😭
- UE sent context release requests
- solution:
- Upgrade logfile level
- Observe internal interface



