# EXata学习(08): LTE场景(2) Step by Step

目标:完全按照例子场景重现 LTE 业务场景

参考: ~\Scalable\exata\5.1\scenarios\Ite\2Cell\_1Node\2Cell\_1Node\_TM3\_OLSM

工具: EXata 5.1

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### 1. 创建配置场景

- 。 创建一个空白场景, 命名为myLTE;
- 设置Channel Properties:两个Channel, 2.4 GHz; Pathloss Model: Two-Ray; Fading: Rayleigh;
  Gaussian Component File选定例子场景中的default.fading;
- 保存为Portable: File-》Save as Portable,保存为myLTE.config。这样,default.fading将自动在场景目录
  下保存一个副本。后面涉及到附加文件的,均需要如此保存。

### 2. 创建网络拓扑

## a. 添加节点

i. 按照下图的顺序和大致位置添加 5 个 default device。



ii. 按照节点类型进行命名。并选择合适的ICON加以区分,1和2作为eNB,3和4作为 UE;5作为 SGWMME。如下图所示,记得Save as Portable,这样ICON文件也会自动在本地添加副本。



# b. 构建子网

iii. 添加无线子网,并加入两个eNB和2个UE。添加一个 Hub,连接eNB1、eNB2和SGWMME,注意观察 网络地址和节点IP地址,可以发现子网网络地址与子网中IP地址默认按建立和连接的顺序进行分配。菜 单View-》Display Setting,显示 IP 地址。网络如下图:



# c. Run 和 Play

目前应能正常 Run 和 Play,只是各接口按默认协议通信。



# 3. 配置网络协议

### a. 配置SGWMME

■ 最简单,可以全部采用默认配置,也可以在这里调整接口速率和延时。

### b. 配置eNB

#### i. Node Configuration

 Network Layer: 默认。Routing Protocol: Routing IPv4:None; Specifi Static Routing: Yes, 并指定Static Route File为例子场景的static-route文件。记得Save as Portable,必要时修改文件 名为myLTE.routes-static。重复上述步骤。

Default Device Properties (Defau	t Device 1)	? ×
General Node Configuration	interfaces	🖽 Help
Mobility and Placement	Routing	Protocol
Routing Protocol	Property	Value
Router Properties Transport Laver	Routing Protocol IPv4	None 🗾 🔳
MPLS Application Layor	Enable IP Forwarding	Yes
Network Management	[-] Specify Static Routes	Yes 💌 🔳
- User Behavior Model	Static Route File	F:/ex/myLTE/myLTE.routes-static 4
OS Resource Model  External Interface Properties	Specify Default Routes	No
Faults	Enable Multicast	No
Statistics Database	Configure Default Gateway	No
····· Packet Tracing	Enable HSRP Protocol	No

#### ii. Interfaces

 选择LTE无线接口(这里是Interface 0): Physical Layer: 添加Listening和Listenable Channels; 设定Radio Type和Station Type: eNB; 设定2收2发(注意: 这个与 MAC 层 Transmission Mode有关)。在Packet Reception Model选择Ber-based model需要指定 BER Table文件,需事先复制29个上行和29个下行 BER Table文件到场景目录下,这里选定一个文件, 然后Save as Portable即可。

Default Device Properties (Defaul	t Device 1)	?	×		
General Node Configuration I	nterfaces	ці н	elp		
□ Interface 0	Physic	al Layer	]		
MAC Layer	Property	Value			
Network Layer  Routing Protocol	Listenable Channels	channel0,channel1			
- Faults File Statistics	Listening Channels	channel0,channel1			
Interface 1	[-] Radio Type	LTE PHY 👤			
	[-] Station Type	evolved Node B			
	DL Channel Index	0			
	UL Channel Index	1			
	Transmission Power (dBm)	23			
	Number of Transmission Antennas	2 .			
	Number of Reception Antennas	2 .			
	Control Signals Overhead for Uplink	0			
	[-] Packet Reception Model	BER-based Reception Model			
	BER Table[0]	F:/ex/myLTE/DL_BER_MCS0.ber 1			
	BER Table[1]	DL_BER_MCS1.ber			
	BER Table[2]	DL_BER_MCS2.ber			
	BER Table[3]	DL_BER_MCS3.ber			
	BER Table[4]	DL_BER_MCS4.ber			
	BER Table[5]	DL_BER_MCS5.ber			
	BER Table[6]	DL_BER_MCS6.ber			
	BER Table[7]	DL_BER_MCS7.ber	-		
A Find	Ap	OK Cancel Add To Ba	tch		

• MAC Layer: MAC Protocol: LTE MAC; Station Type: eNB; 还要注意MAC: Transmission Mode选择 Transmission Diversity..., 与2收2fa天线吻合。

							_
Interface 0  Physical Layer		MAC	Layer				
MAC Layer	Property			Valu	e		
Routing Protocol	[-] MAC Protocol		LTE MAC				4
Faults File Statistics	[-] Station Type		evolved Node	В		<b>_</b>	4
⊡ Interface 1	RRC : Measurement Filtering C	oeffi	40				
	RLC : Max Retransmission Thre	shold	8				
	RLC : Threshold Number of PD	Us f	16				
	RLC : Threshold Number of By	tes	250				
	RLC : t-PolRetransmit Timer Po	eriod	100		milli-seco	onds	•
	RLC : t-Reordering Timer Perio	d	100		milli-seco	onds	-
	RLC : t-StatusProhibit Timer P	eriod	12		milli-seco	onds	-
	MAC : Backoff Period		10		milli-seco	onds	•
	MAC : Initial Received Target P	ow	-90				
	MAC : Power Ramping Step (d	B)	2				
	MAC : Maximum Number of Pre	eam	4				
	MAC : RA Response Window S	ize	10				
	MAC : PRACH Configuration In	dex	14				
	MAC : Periodic BSR Timer (TT)	)	1				_
	MAC : eNB Scheduler Type		Round Robin				•
	MAC : Transmission Mode		Transmission D	) iversity / C	)pen Loop :	Spat 💌	
	MAC : Target BLER		0.01				_
	MAC : PF Filter Coefficient		36				_
	MAC : PF Scheduler UL RB Allo	cati	1				_
	MAC Propagation Delay		1		micro-se	econds	•
	Enable Promiscuous Mode		No				•
	Enable LLC		No				•
	Configure MAC Address		No				-

- 同样方法,配置eNB2.
- 此时,Run&Play,<mark>提示有错</mark>,应该是终端无线接口不一致导致的。

Assertion (plcp != NULL) failed in file ...\libraries\wireless\src\phy\_802\_11.cpp:1389

### c. 配置终端

Plcp header not found

# i. Node Configuration:

全部默认。

### ii. Interfaces

 Physical Layer: Listenable和Listening Channels全选; Radio Type: LTE Phy; Station Type: eNB 【特别奇怪】; 天线: 1发2收。

Default Device Properties (Defau	It Device 3)		?	×
General Node Configuration	Interfaces			Help
⊡ Interface 0	Physical Layer			•
MAC Layer	Property	Value		
Network Layer  Routing Protocol	Listenable Channels	channel0, channel1		
Faults	Listening Channels	channel0, channel1		
	[-] Radio Type	LTE PHY	- 4	
	[-] Station Type	evolved Node B	- 4	
	DL Channel Index	0		
	UL Channel Index	1		
	Transmission Power (dBm)	23		
	Number of Transmission transmission	power in dBm	-	
	Number of Reception Antennas	2	- 4	
	Control Signals Overhead for Uplink	0		
	[-] Packet Reception Model	BER-based Reception Model	-	
	BER Table[0]	DL_BER_MCS0.ber		
	BER Table[1]	DL_BER_MCS1.ber		
	BER Table[2]	DL_BER_MCS2.ber		
	BER Table[3]	DL_BER_MCS3.ber		
	BER Table[4]	DL_BER_MCS4.ber		
	BER Table[5]	DL_BER_MCS5.ber		
	BER Table[6]	DL_BER_MCS6.ber		
	BER Table[7]	DL_BER_MCS7.ber		
	BER Table[8]	DL_BER_MCS8.ber		
	BER Table[9]	DL_BER_MCS9.ber		
	BER Table[10]	DL_BER_MCS10.ber		
	BER Table[11]	DL_BER_MCS11.ber		
	BER Table[12]	DL_BER_MCS12.ber		
]	BER Table[13]	DL_BER_MCS13.ber		-
k Find	Ap	oply OK Cancel	Add To I	Batch

• MAC Layer: MAC Protocol: LTE MAC; Station Type: UE【这里是正确的】

?	$\times$
?	$\times$

General Node Configuration	Interfaces	🚇 Help				
⊡ Interface 0	MAC Layer					
MAC Layer	Property	Value				
	[-] MAC Protocol	LTE MAC				
Faults File Statistics	[-] Station Type	User Equipment				
	RRC : Wait Time before RRC CONNE	10 milli-seconds 💌				
	RRC : Wait Time before RRC Reconfi	10 milli-seconds 💌				
	MAC : UE Scheduler Type	Simple Scheduler				
	MAC Propagation Delay	1 micro-seconds 💌				
	Enable Promiscuous Mode	No				
	Enable LLC	No				
	Configure MAC Address	No				

- 对两个UE进行相同配置。
- 至此,RUN正常, Play出错, 提示"EPC subnet should be specified to send EPC app". 说明EPC 核心网(即wired Subnet) 没有正常配置。

# d. 配置子网

- i. 无线子网Wireless Subnet:参考各UE的参数来配置无线子网,本来应先配置Wireless Subnet,各UE应该能够自动更新。
- ii. 有线子网Wired Subnet: General页卡: Is EPC Subnet:Yes,并指定EPC SGWMME Node ID, 这里为 5.

	General Properties	
Property	Value	
2D Icon	hub.png	
3D Icon	hub.3ds	
Scale Factor for 3D Icon (percent)	100	
-] MAC Protocol	802.3	•
802.3 Bandwidth	100 Mbps	T
802.3 Mode	Half-Duplex	T
802.3 Propagation Delay	2.5 micro-seconds	•
Enable Promiscuous Mode	No	•
Enable LLC	No	•
[-] Network Protocol	IPv4	T
IPv4 Network Address	190 .0 .2 .0	
IPv4 Subnet Mask	255 .255 .00	
IP Fragmentation Unit (bytes)	2048	
Enable Explicit Congestion Notification	No	•
Enable Fixed Communications	No	•
[-] Is EPC Subnet	Yes	4
EPC SGWMME Node ID	5	4
EPC SGWMME Interface Index	0	_

# 4. 添加应用

a. 在3-4之间添加一个CBR业务: 配置参数如下

#### **CBR** Properties

General

🚇 Help

General Properties						
Property	Value	Value				
Source	3					
Destination	4					
Items to Send	0					
Item Size (bytes)	512					
Interval	0.1	seconds 💌				
Start Time	1	seconds				
End Time	0	seconds 💌				
[-] Priority	Precedence					
Precedence Value	0					
Enable RSVP-TE	No					
Enable MDP	No					
Session Name	[Optional]					

### b. Run&Play, 成功。可以看到 UE[3] → UE[4]的 CBR 流量通过附着的 eNB之间进行。



○ 在互联网侧添加一个host[6],并在UE[4],添加一个 CBR 业务从指向 Host[6];观察运行结果。



• 运行结果:结果正常。

