

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\lte\2Cell_1Node\2Cell_1Node_TM3_OLSM

工具：EXata 5.1

Nov 16, 2022

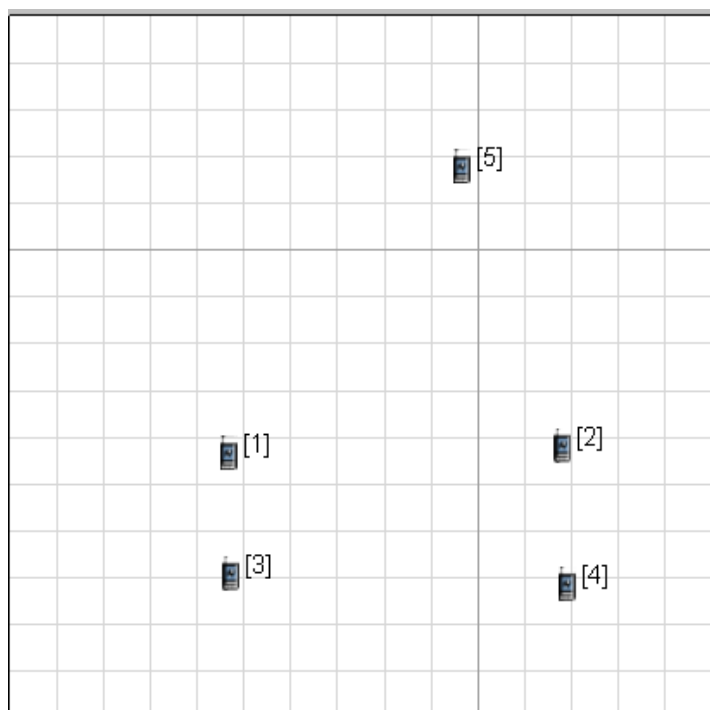
1. 创建配置场景

- 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。

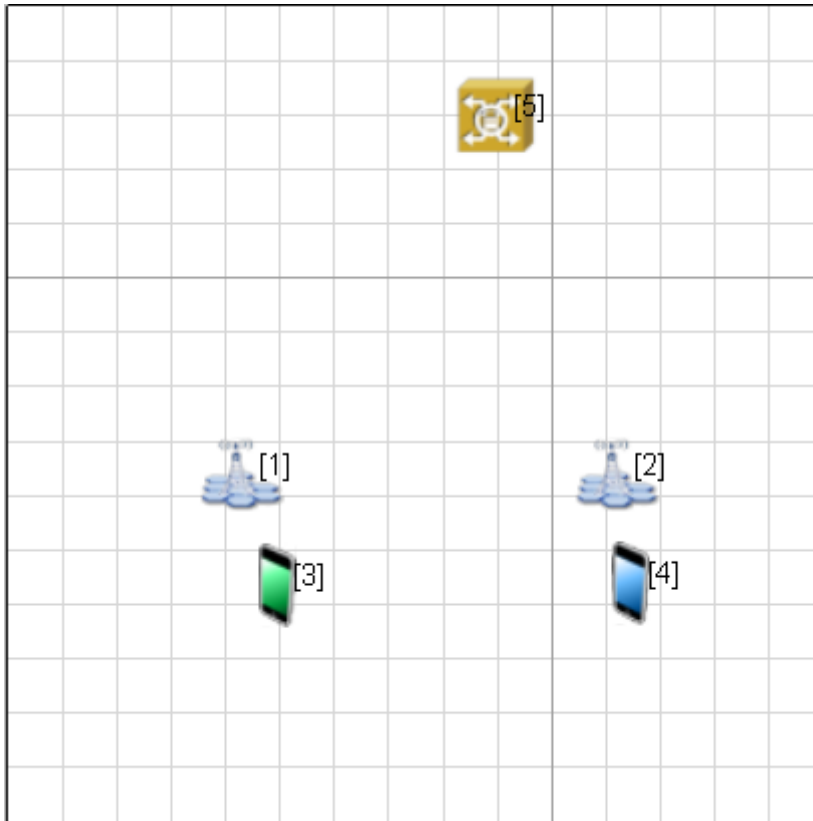
2. 创建网络拓扑

a. 添加节点

- 按照下图的顺序和大致位置添加 5 个 default device。

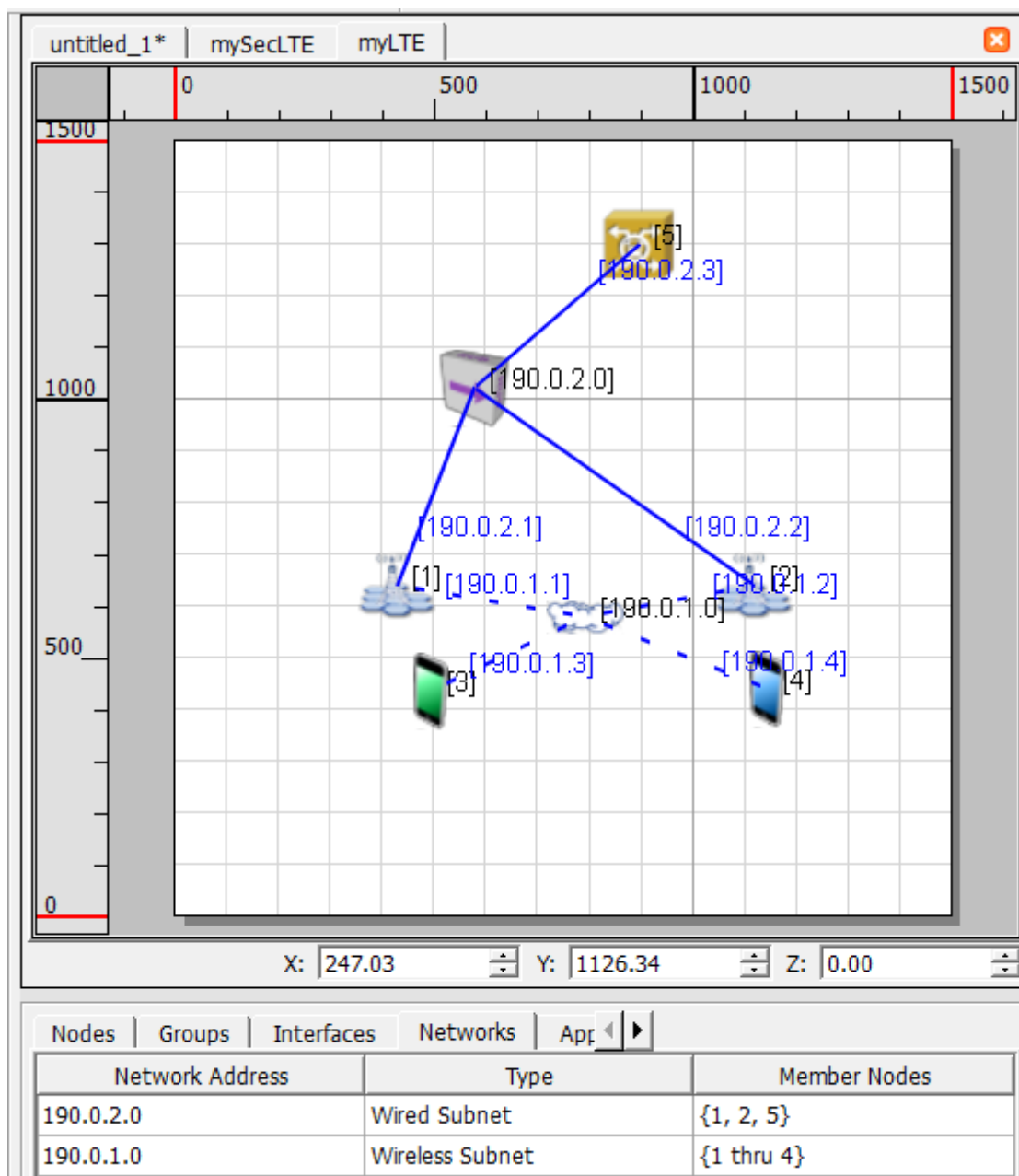


- 按照节点类型进行命名。并选择合适的ICON加以区分，1和2作为eNB，3和4作为 UE；5作为 SGWMME。如下图所示，记得Save as Portable，这样ICON文件也会自动在本地添加副本。



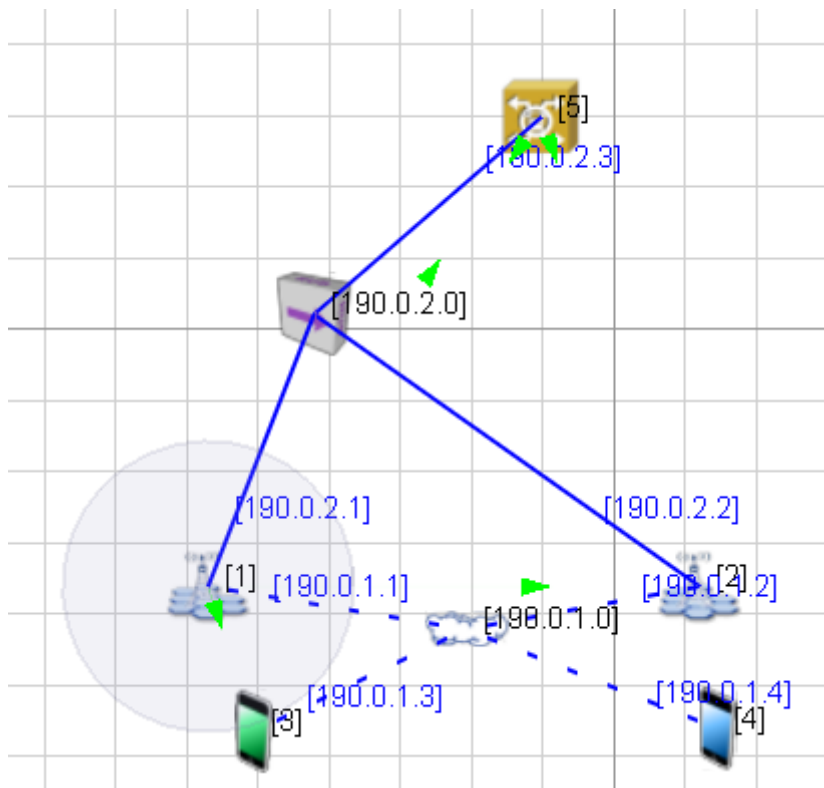
b. 构建子网

- 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

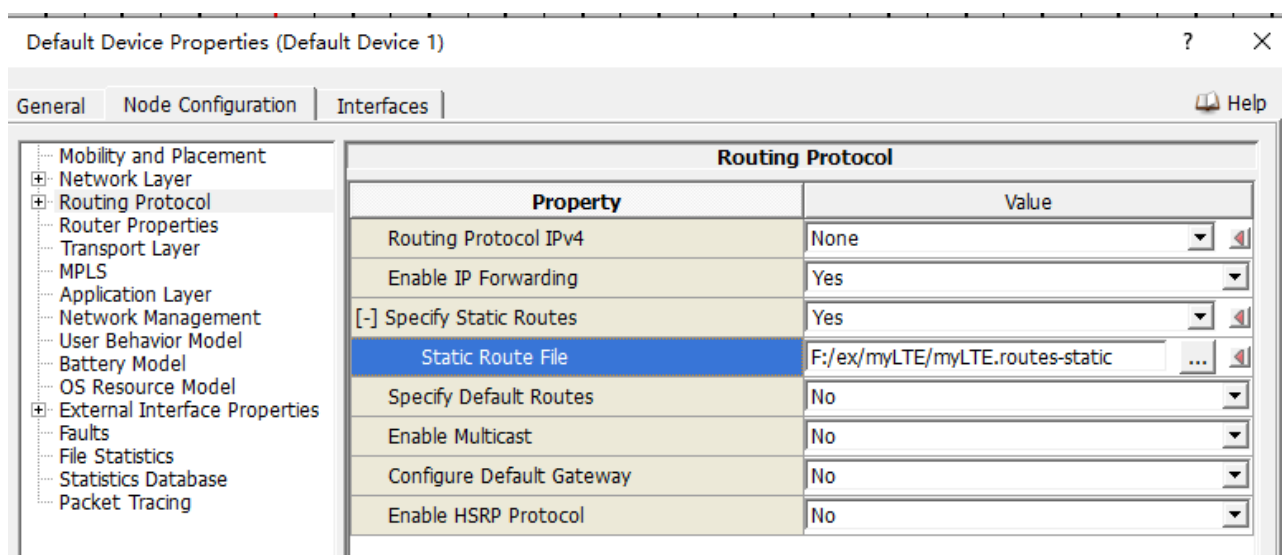
a. 配置SGWMME

- 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; Specify 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。



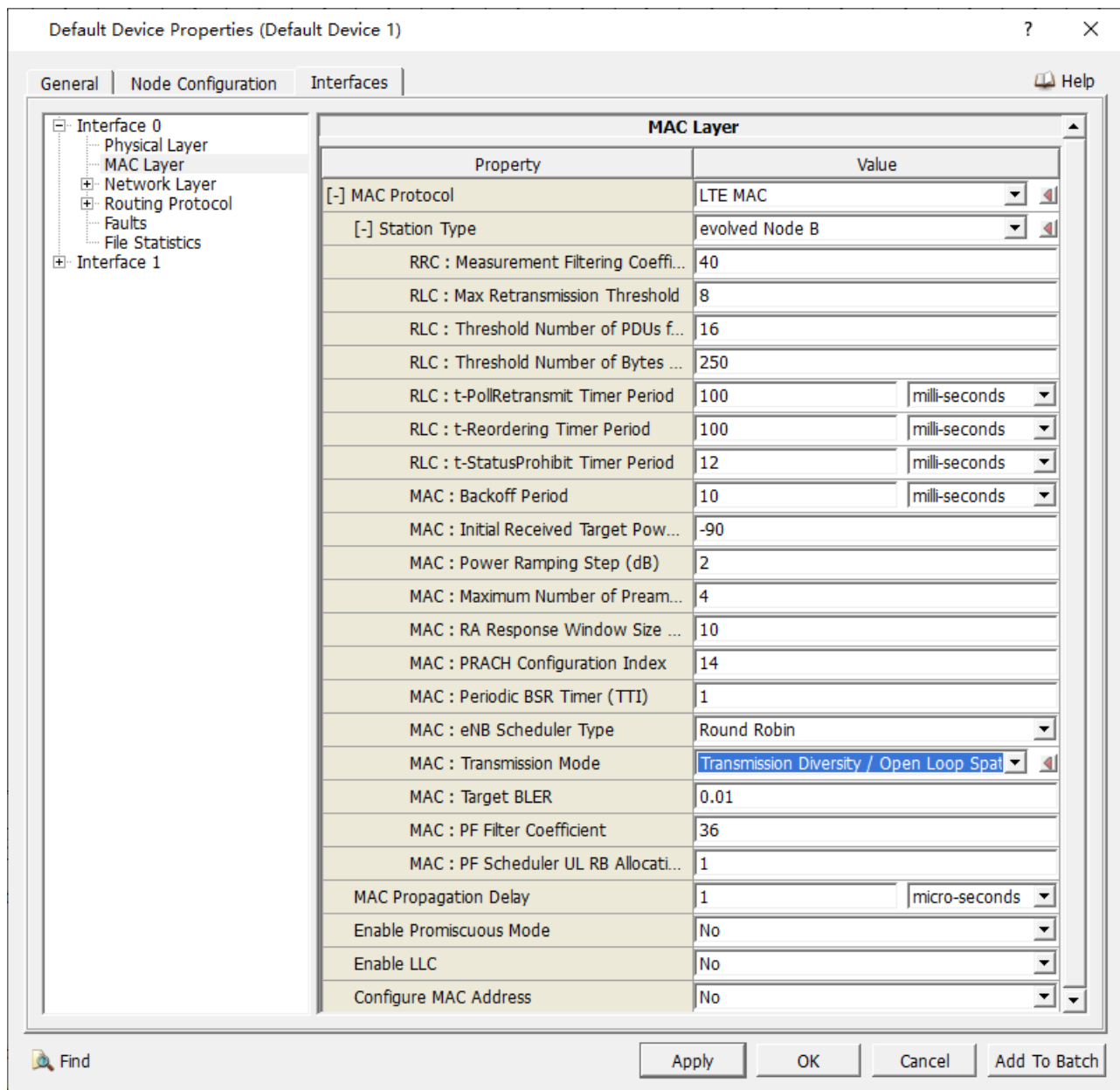
ii. Interfaces

- 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。

Property	Value
Listenable Channels	channel0,channel1
Listening Channels	channel0,channel1
[-] 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
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

- 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。



- 同样方法，配置eNB2.
- 此时，Run&Play，提示有错，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
Plcp header not found
```

c. 配置终端

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 (Default Device 3)

General | Node Configuration | Interfaces | Help

Interface 0

- Physical Layer
- MAC Layer
- Network Layer
- Routing Protocol
- Faults
- File Statistics

Physical Layer

Property	Value
Listenable Channels	channel0,channel1
Listening Channels	channel0,channel1
[-] Radio Type	LTE PHY
[-] Station Type	evolved Node B
DL Channel Index	0
UL Channel Index	1
Transmission Power (dBm)	23
Number of Transmission	transmission power in dBm
Number of Reception Antennas	2
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

Find Apply OK Cancel Add To Batch

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

Default Device Properties (Default Device 3)

General | Node Configuration | Interfaces | Help

Interface 0

- Physical Layer
- MAC Layer
- Network Layer
- Routing Protocol
- Faults
- File Statistics

MAC Layer

Property	Value
[-] MAC Protocol	LTE MAC
[-] 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.

Wired Subnet Properties (Wired Subnet 190.0.2.0) ? X

General Routing Protocol Router Properties ARP File Statistics Help

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 ▾
802.3 Mode	Half-Duplex ▾
802.3 Propagation Delay	2.5 micro-seconds ▾
Enable Promiscuous Mode	No ▾
Enable LLC	No ▾
[-] Network Protocol	IPv4 ▾
IPv4 Network Address	190 . 0 . 2 . 0
IPv4 Subnet Mask	255 . 255 . 255 . 0
IP Fragmentation Unit (bytes)	2048
Enable Explicit Congestion Notification	No ▾
Enable Fixed Communications	No ▾
[-] Is EPC Subnet	Yes ▾
EPC SGWMME Node ID	5 ▴ ▾
EPC SGWMME Interface Index	0

Find Apply OK Cancel Add To Batch

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

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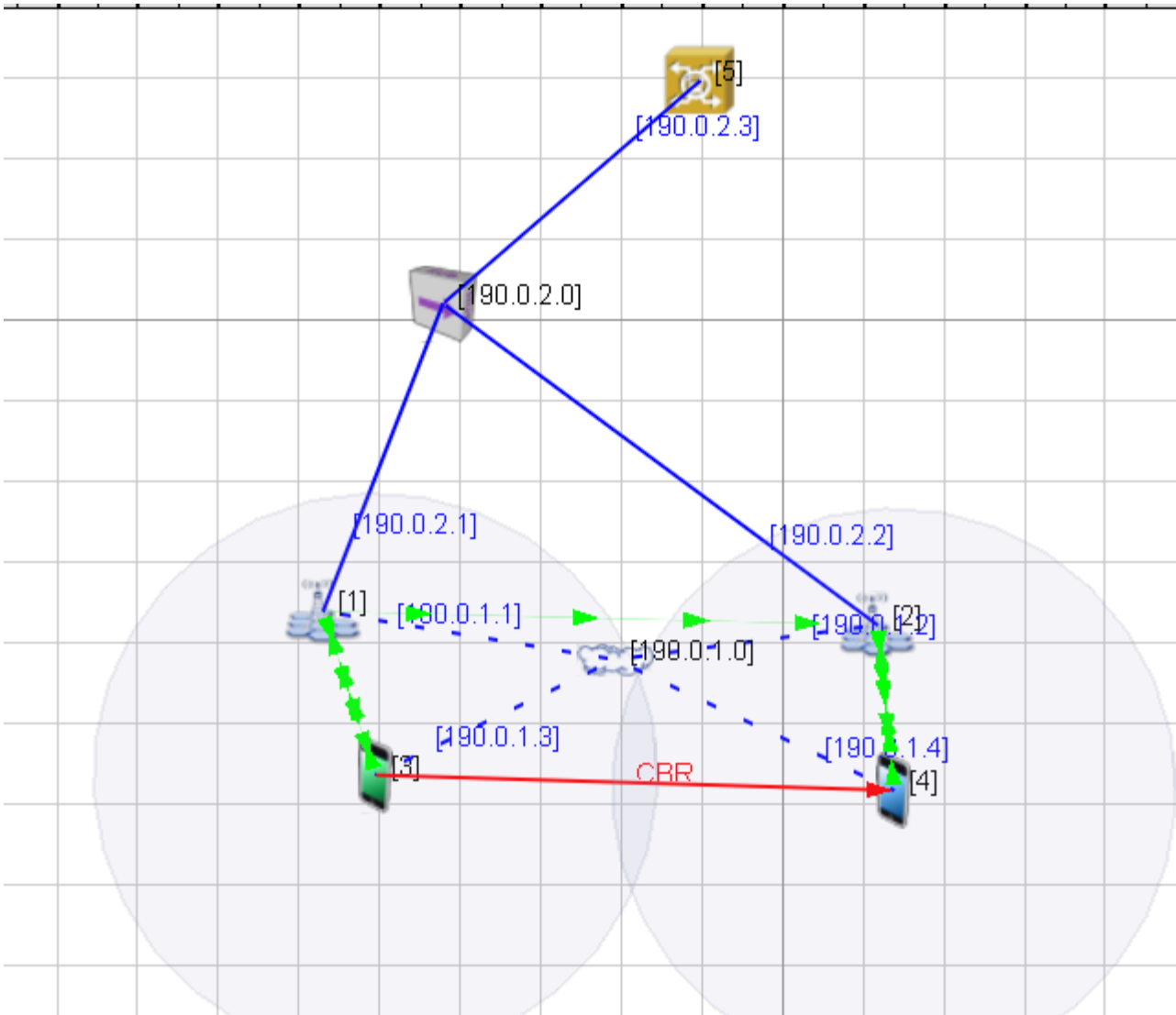
General

Help

General Properties

Property	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]

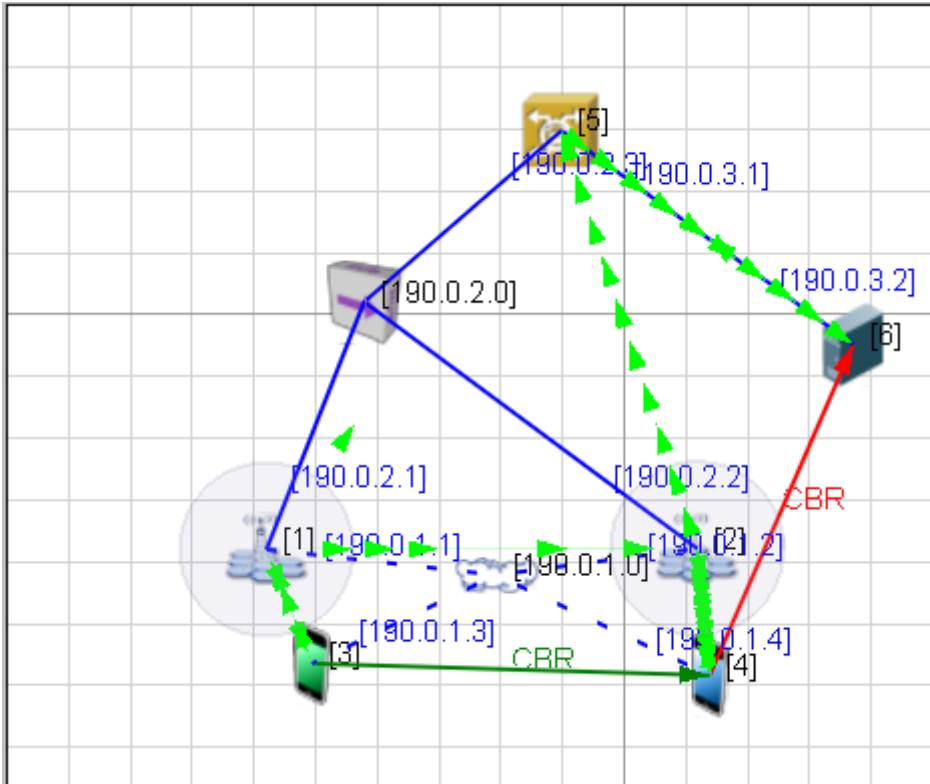
b. Run&Play, 成功。可以看到 UE[3] → UE[4]的 CBR 流量通过附着的 eNB之间进行。



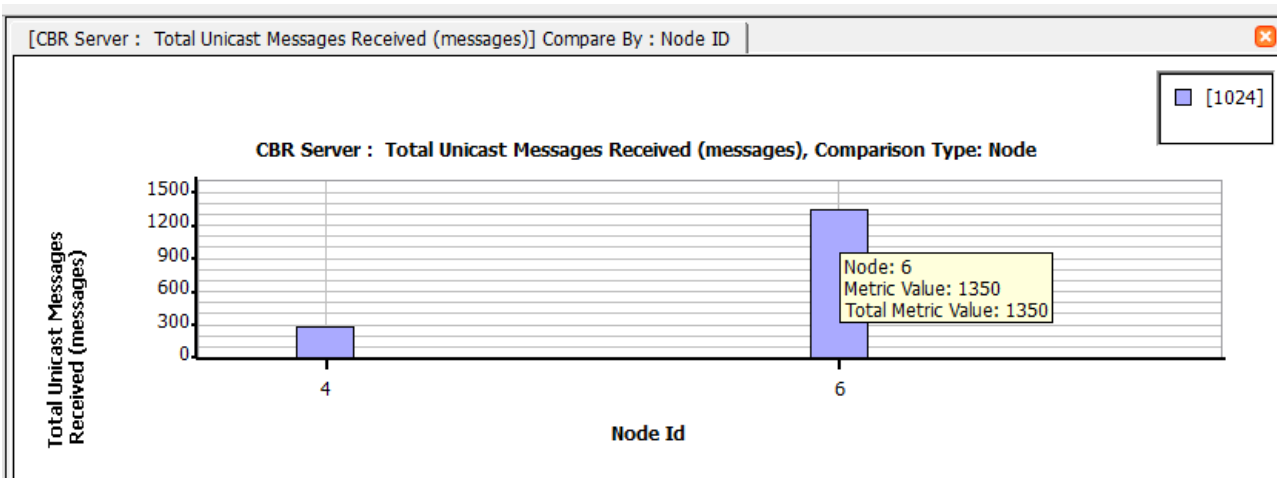
c. 可以通过 Analyzer 进行业务分析。

5. 拓展

- 在 Internet 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。



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