教育部「5G行動寬頻人才培育跨校教學聯盟計畫」
5G行動網路協定與核網技術聯盟中心

課程: 5G系統層模擬技術

第六週：實驗二 網路拓樸Topology GUI及Serving cell assignment的觀察與分析

國立中正大學 National Chung Cheng University

大綱(1/2)

- 實驗目的
- 技術介紹
  - Generate Macro Cell Topology
  - Generate InHOffice Macro Cell Topology
  - Map Resolution
  - Find Nearest Node For Pixels
    - Wrap Around
  - Common UE Generation Method
- 實驗步驟
- 實驗紀錄與問題討論

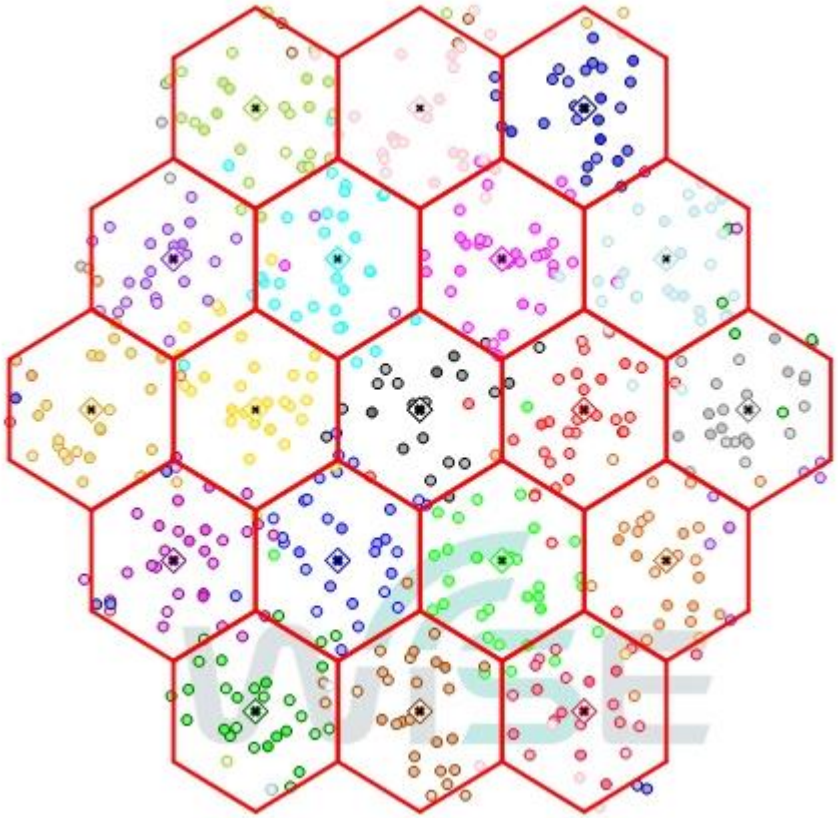
實驗目的

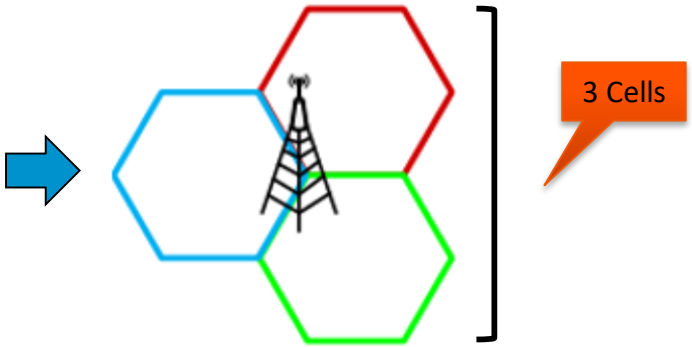
- 瞭解3GPP 標準文件中之Topology
- 瞭解SLS 基本Topology程式架構

技術介紹

- A Common Topology

19 Node





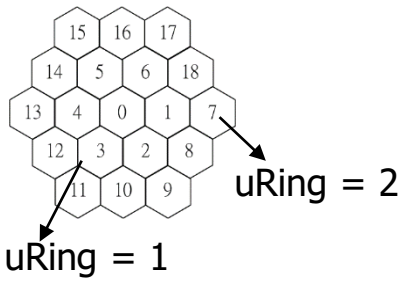
3 Cells

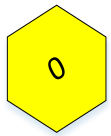
◇ :BS

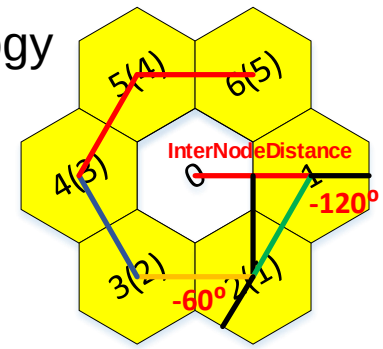
• :UE

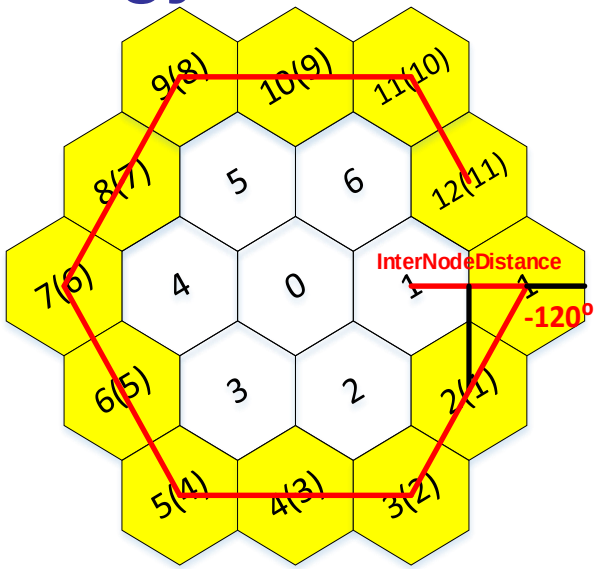
Generate Macro Cell Topology

- Purpose:
  - Generate a Macro cell topology









sin(-120) = -sin(120) = -sin(180-60) = -sin(60)
cos(-120) = cos(120) = cos(180-60) = -cos(60)
sin(-180) = 0
cos(-180) = -1
sin(-240) → sin(120) = sin(60)
cos(-240) → cos(120) = -60cos(60)

Generate InHOffice Macro Cell Topology(1/2)

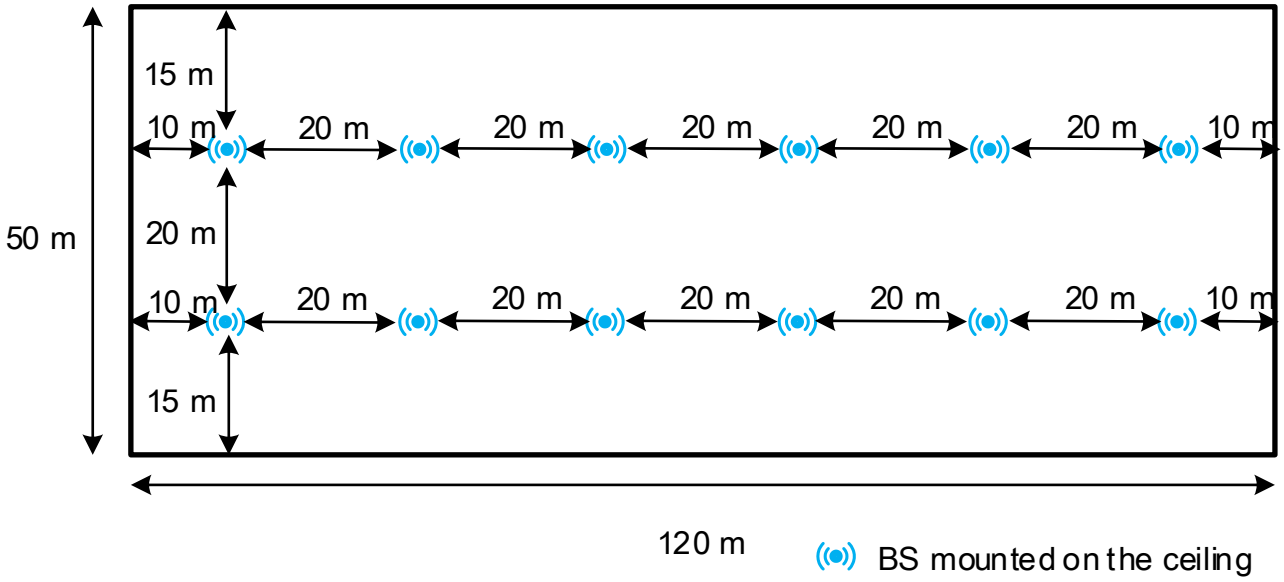
- Purpose:
  - Generate a InH office Macro cell topology of TR 38.900

Evaluation parameters for indoor-office scenarios

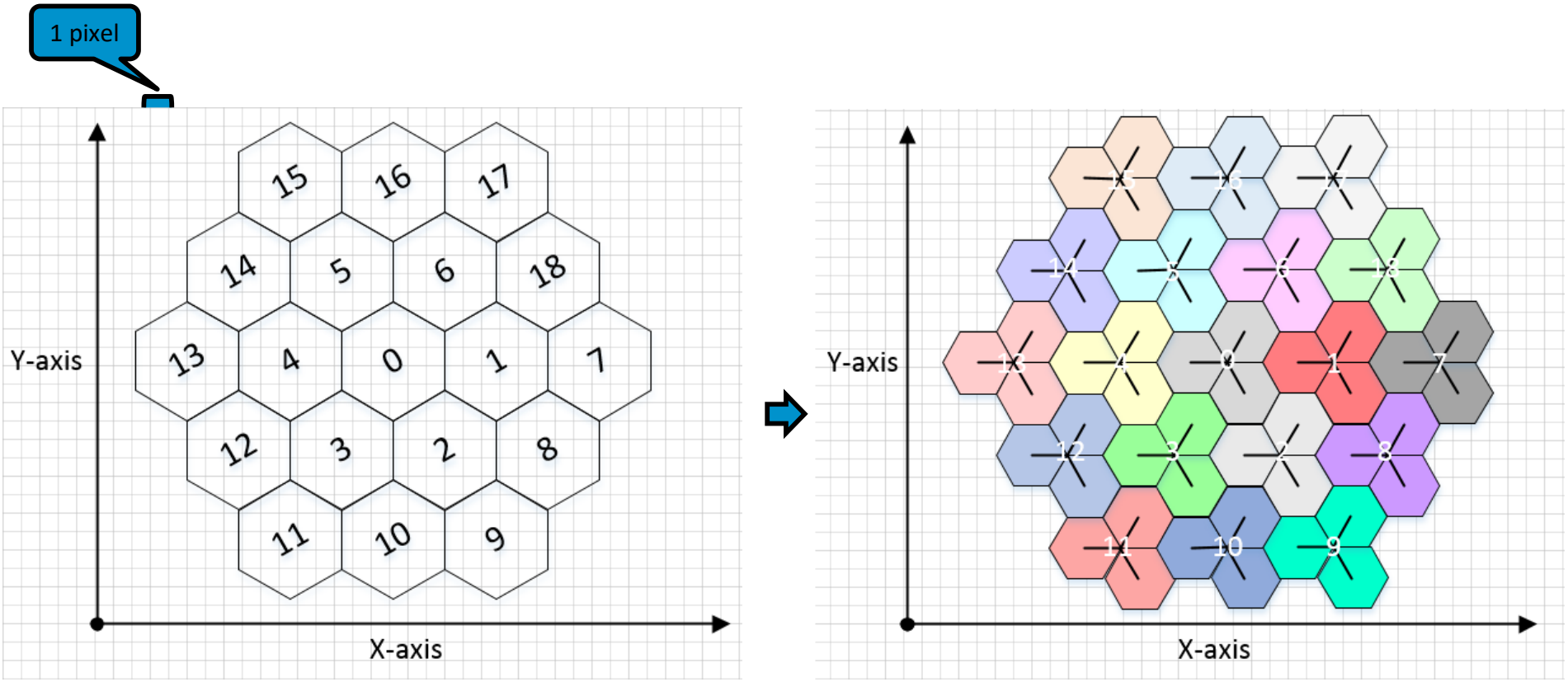
Parameters		Indoor – office open office	Indoor – office mixed office
Layout	Room size (WxLxH)	120mx50mx3m	
	ISD	20m	
BS antenna height		3 m (ceiling)	
UT location	LOS/NLOS	LOS and NLOS	
	Height	1 m	
UT mobility (horizontal plane only)		3 km/h	
Min. BS - UT distance (2D)		0	
UT distribution (horizontal)		Uniform	

Generate InHOffice Macro Cell Topology(2/2)

- Purpose:
  - Generate a InH office Macro cell topology of TR 38.802
  - 12 BSs , One-Sector

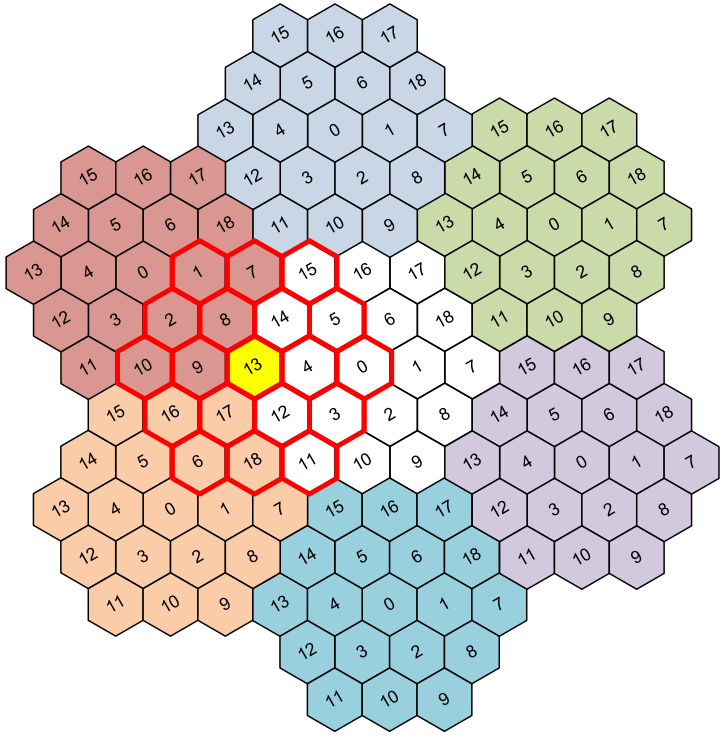


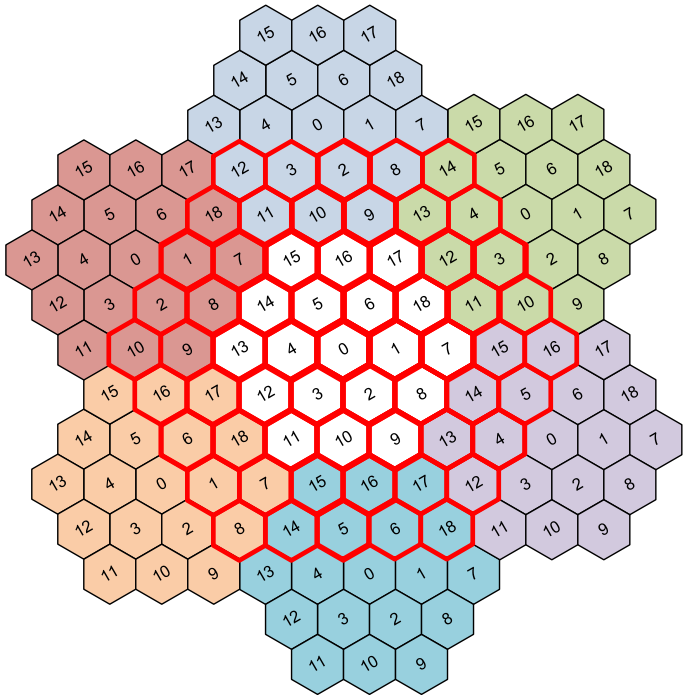
Map Resolution



Find Nearest Node For Pixels

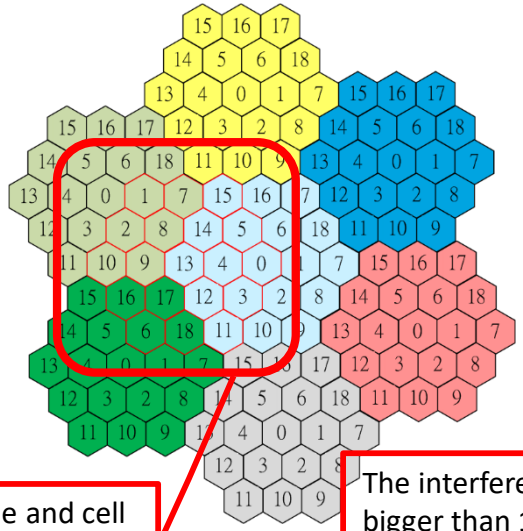
- Purpose:
  - Based on locations, assign location (x, y) to the cell with the nearest distance.
  - Based on location, assign each node to the neighbor nodes

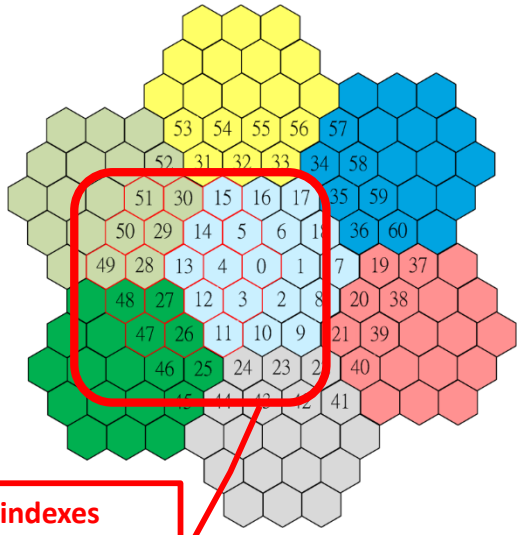




Wrap Around

- **GetWrappingIndex(size_t uIndex, size_t uRing)**
  - Purpose:
    - Get the node index after wrapping

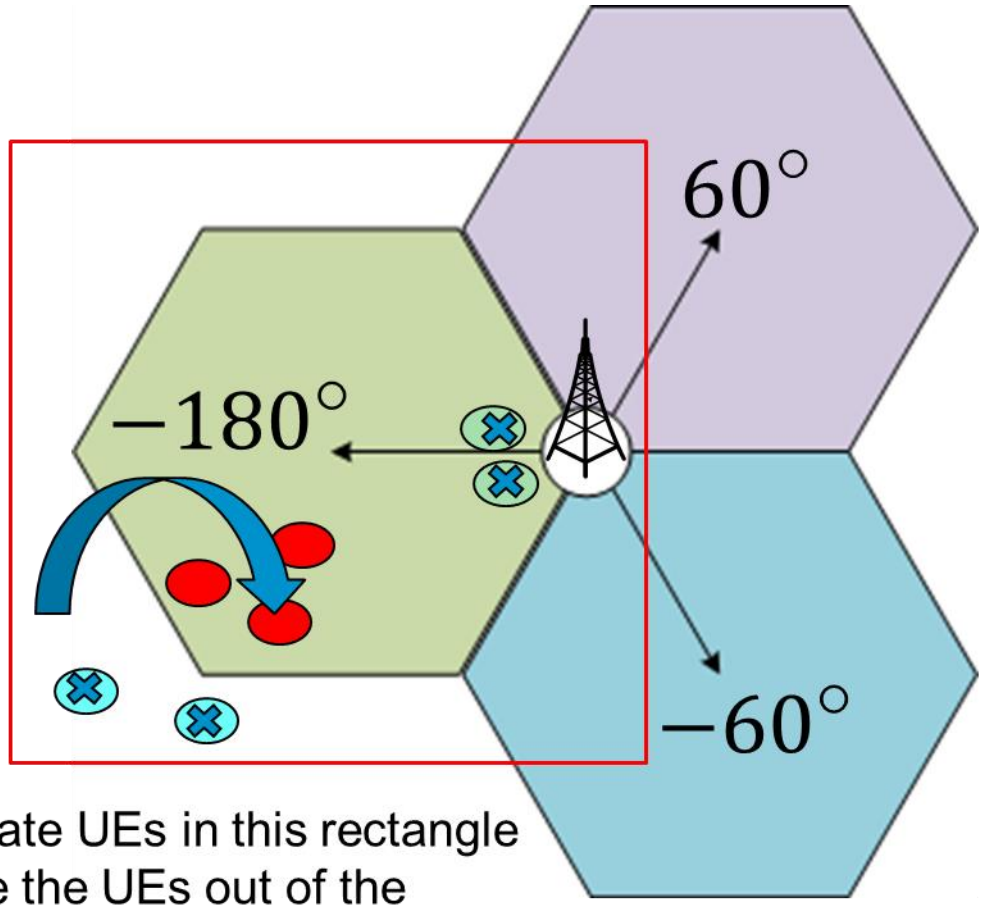




Each Node and cell should be modeled in the center of a 19 node topology

The interference from the nodes with **indexes** bigger than 18 will be modeled by the interference from the nodes with indexes smaller than or equal to 18 but with real relative distances

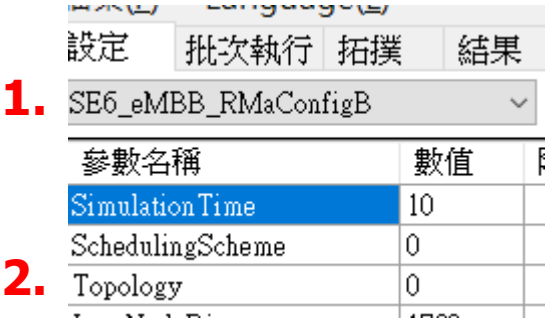
Common UE Generation Method

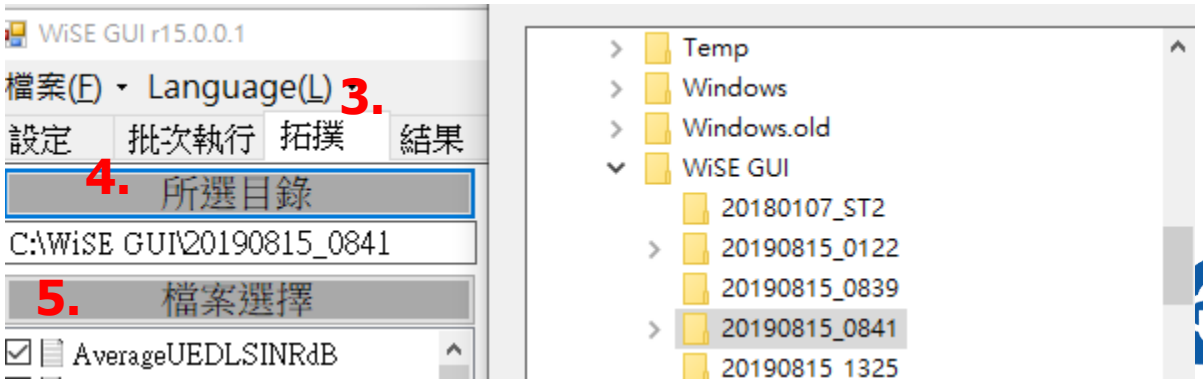


Randomly generate UEs in this rectangle area, but remove the UEs out of the hexagon area

實驗步驟(1/2)

1. 選定模擬場景
2. 設定topology，開始執行
3. 執行完畢後，點選拓樸
4. 選擇路徑
5. 點選檔案選擇(全打勾)
6. 按下繪製後即可出現拓樸以及相關資訊

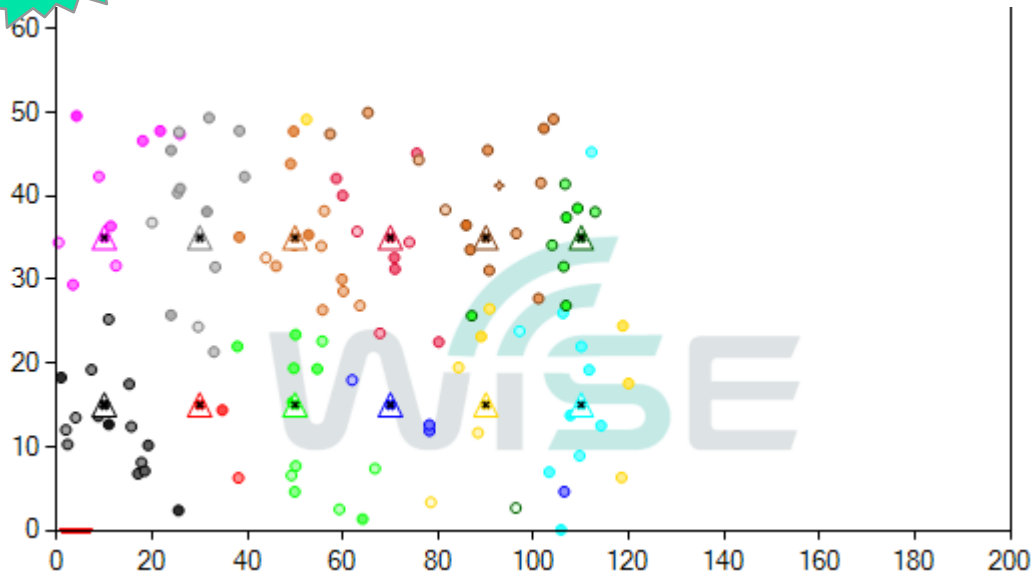




實驗步驟(2/2)

7. 請觀察不同場景的拓樸結果，並詳細說明
8. 點選任一UE，觀察相關資訊並行細說明

OK!



Simulation information	
Simulation Scenario	User
System Mode	NR
Highest MCS	256QAM
Duplexing Mode	FDD
Node Number	12
Cell Number	12
UE Number	120
Simulation Time (tti)	50

UE wideband information	
Serving Cell type	Macro
(Node ID, Cell ID)	(10, 0)
Height	1.5 (m)
Penetration Loss	0.00 (dB)
Coupling Loss	-64.32 (dB)
UE type	indoor
UE LOS	NLOS

實驗紀錄與問題討論

- 請詳細說明Wrap Around
- 請觀察不同場景的拓樸結果，並詳細說明
- 點選任一UE，觀察相關資訊並詳細說明

參考資料

[1]3GPP TR 38.802 V14.2.0 (2017-09), 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Study on New Radio Access Technology Physical Layer Aspects (Release 14)

[2]3GPP TR 36.814 V9.2.0 (2017-03), 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Further advancements for E-UTRA physical layer aspects (Release 9)

[3]3GPP TR 38.900 V15.0.0 (2018-06), 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Study on channel model for frequency spectrum above 6 GHz(Release 15)