

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
第十四週：實驗四 排程、HARQ重傳、CSI回報的觀察



Outline

- 實驗目的
- OLLA(Outer Loop Link Adaptation)
- 實驗步驟
- 實驗紀錄與問題討論



實驗目的

- 了解排程以及HARQ的運行模式
- 瞭解CSI 回報之相關參數對無線通訊系統的影響



OLLA(1/2)

- ◆ The adaptive modulation and coding (AMC) process carried out in the link adaptation (LA) is a crucial part of current wireless communication systems. This technique allows to increase the data rate that can be reliably transmitted and has been adopted as a core feature in cellular standards.
- ◆ In the LTE and LTE-A downlink AMC procedure , the UE has to suggest to the BS an appropriate modulation and coding scheme (MCS) to be used in the next transmission in order to keep the block error rate (BLER) below a target.
- ◆ The proposed MCS is signaled from the UE by means of a CQI. Typically, each CQI is associated with a particular SINR interval; hence, MCSs are selected by mapping the estimated instantaneous SINR into its corresponding SINR interval, defined by an upper and a lower threshold



OLLA(2/2)

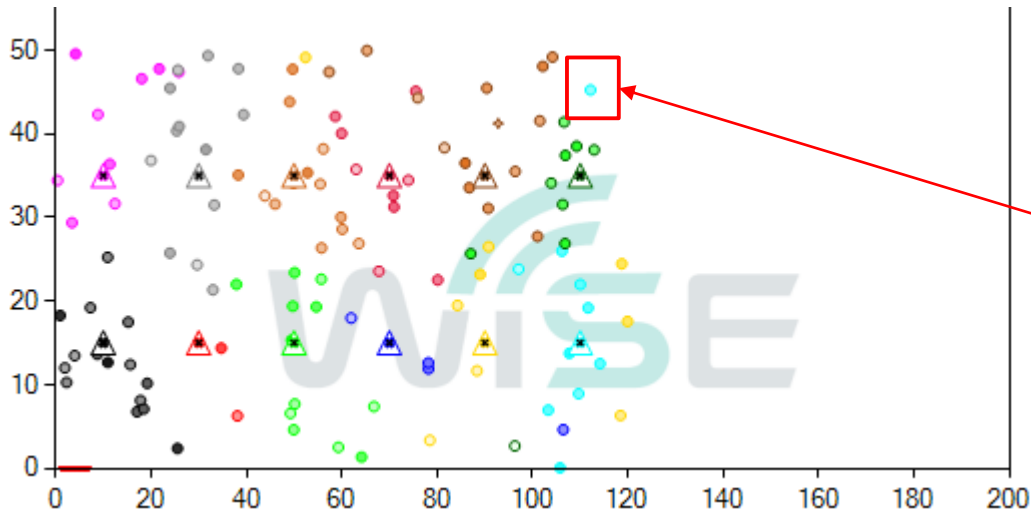
- ◆ A static selection of the values for the AMC thresholds does not perform well in practical implementations as link conditions are inherently variant. It is usual to adjust these thresholds by means of the well-known outer loop link adaptation (OLLA) technique.
- ◆ OLLA modifies the SINR thresholds by an offset which can be positive (making the MCS selection more robust) or negative (when the CQI selection was too strict). This offset is continuously updated based on the reliability of the received data blocks so that the average BLER is kept as close as possible to a predefined target.



實驗步驟(1/3)

- Step 1. 先選定好模擬場景，調整Scheduling Scheme參數

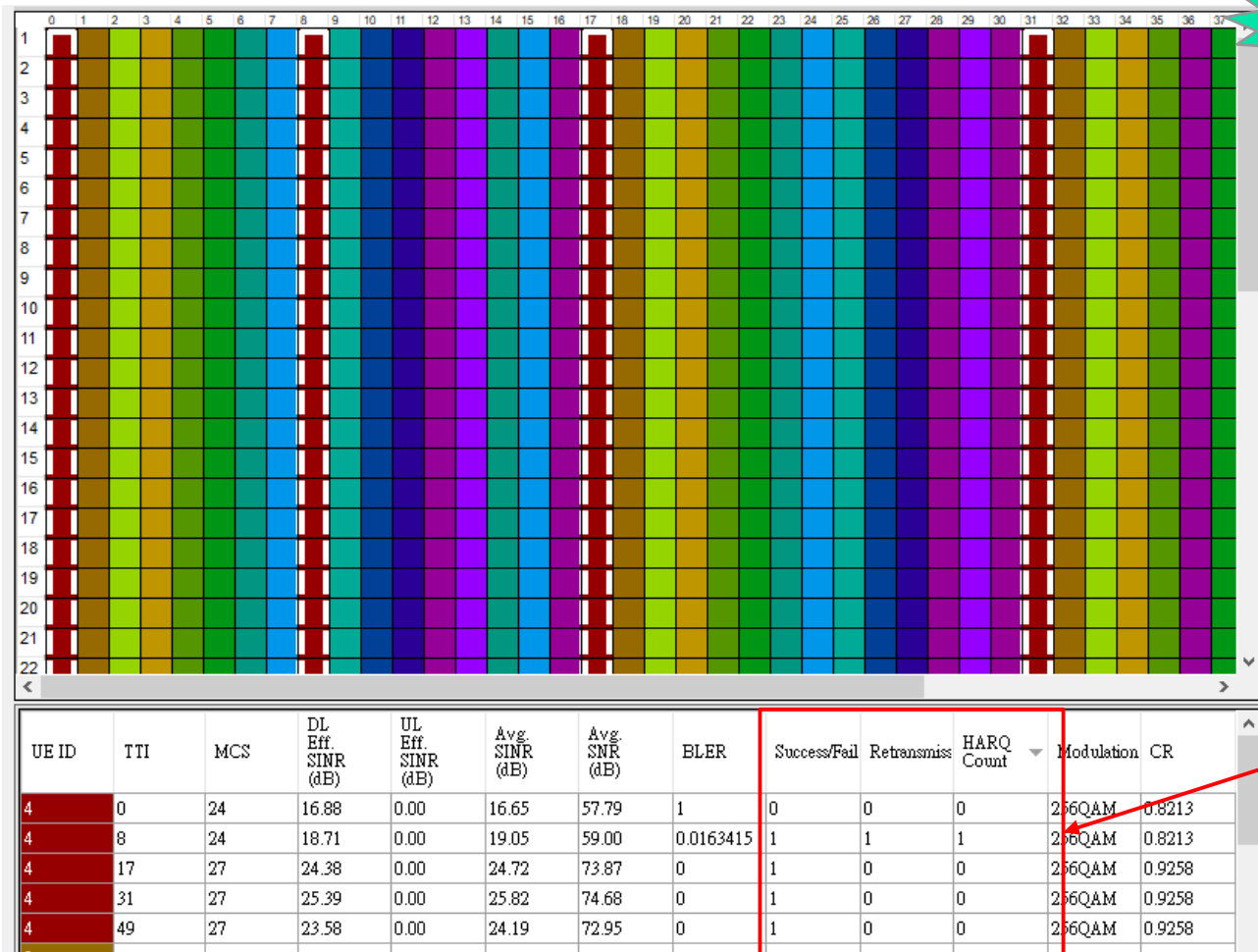
SimulationTime	10											Simulation time (Frame)
SchedulingScheme	0											Round Robin = 0, Sub-band PF UL and DL = 4
Topology	0											TR36814_HexagonalMacroOnly = 0, TR38900_
InterNodeDistance	500											The distance between the nodes (meters)
UENumPerMacroCell	10											The number of the UEs of each macro cell
UEIndoorProbability	0.8											The probability that a UE is indoor



Step 2. 模擬結束後，點一下任一 UE

實驗步驟(2/3)

- Step 3. 觀察不同Scheduling Scheme的排程模式
- Step 4. 觀察HARQ的重傳機制，包含重傳時間、次數



OK!

UE被schedule到的
狀況
佔了多少時間(橫軸)、
Resource Block(縱
軸)

任一UE傳送是否成
功以及第幾次重傳

實驗步驟(3/3)

● Step 5. 觀察CSI Feedback

OK!

Feedback information

TTI	15
Wideband CQI	14
RI	2
+ Subband CQI	
+ Subband PMI	

CSI相關資訊

- Subband CQI	
Subband 1	13
Subband 2	14
Subband 3	14
Subband 4	13
Subband 5	14
Subband 6	14
Subband 7	14

Subband CQI及PMI
可以展開觀看詳細數
值

- Subband PMI	i11	i12	i2	i13	p
Subband 1	11	22	0	0	0
Subband 2	11	22	0	0	0
Subband 3	11	22	0	0	0
Subband 4	11	22	0	0	0
Subband 5	11	22	1	0	0
Subband 6	11	22	2	0	0
Subband 7	11	22	0	0	0



實驗紀錄與問題討論

- 請觀察以下的參數調整對系統之影響，並將觀察結果做詳細說明
 1. 觀察不同Scheduling Scheme的排程模式
 2. 觀察HARQ的重傳機制，包含重傳時間、次數
- 觀察CSI Feedback，並將觀察結果做詳細說明

