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| Lab 06 |  |
| *6* | *LTE in MatLab* |
| **Advanced Wireless Lab** |
| TLEN 5830 |  |
| Advanced Wireless Lab |  |

**Overview:** This lab exercise deals with the LTE Downlink Resource Grid. MATLAB LTE System Toolbox is utilized for generating the downlink signals.

**Introduction**

[Data structures](https://www.mathworks.com/help/lte/gs/data-structures.html) is the main feature of the LTE System Toolbox and ‘[eNodeB](https://www.mathworks.com/help/lte/ref/ltecellrs.html#inputarg_enb)’ (enb) is one of important ones. You will be using the ‘enb’ to specify the features of the frames ranging from the type of cyclic prefix to MIB.

The ‘enb’ can also be initialized to [Reference Measurement Channels](https://www.mathworks.com/help/lte/examples/parameterization-for-waveform-generation-and-simulation.html) (RMC). The RMC are of form R.x where x is an integer. Each reference channel contains a unique set of ports, modulation, cell-specific reference signal (CRS) antenna ports, resource blocks.

**Ex: enb = lteRMCDL('R.0');**

1. Generate a blank resource grid for the Bandwidth of 20 MHz with extended prefix, 2 CRS antenna ports & for Reference Channel R.6 .

Paste a screenshot of the Resource Grids of the two antenna ports in both cases. Observe the structure of the ‘enb’ in the latter case and mention the ‘cell wide parameters’ in the report.

1. Map the reference signals to the resource grid.
   1. Mention the ‘enb’ structure properties you defined. Explain the role of Sub-frame Number. What is the default duplex mode?
   2. Paste the screenshots of the resource grid.
   3. Explain the functionalities of the Cell Specific Reference Signals.
2. Add the PSS, SSS signals & PCFICH, PDCCH channels to the resource grid (similar to above).
   1. Explain the role of each signal and channel.
   2. Describe the various indices functions you have come across till now.
   3. Explain Linear Indices, Subscripts, and Index base in a couple of sentences.
   4. Paste the screenshot of the final resource grid.

NOTE - *Map each Signal/Channel individually, as each may require different ‘enb’ parameters. Finally include all of them in a same .m file.*