

## Project 9 — CRAN 1

A cellular system is composed of a central processing unit (BBU),  $N$  remote radios (RRH) and  $N$  cells. Each RRH serves one and only one cell. An application server (AS) generates data packets having one of the cells as destination. The target cell is uniformly taken from the available ones. Each data packet has size  $s$ , and a new packet is generated every  $t$  seconds, where  $s$  and  $t$  are random variables to be described later. The BBU has an interface towards the RRHs and communicates with only one of them at a time. at a speed of  $C$  bytes/s. The BBU receives data packets from the server and forwards them to the proper RRH. If the BBU interface with the RRHs is busy, data packets are queued and served using a FIFO policy. When the BBU receives data packets from the AS, the communication between BBU and RRHs can happen in one of the following two modes.

- a) The BBU forwards the packet to the correct RRH which forwards it to its cell.
- b) The BBU compresses the data packet, thus reducing its size by  $X\%$ . Such operation takes  $S$  seconds, where  $S$  is given by  $S = X * 70\text{ms}$ . Up to 2 data packets can be compressed in parallel. If both compressing processes are busy, incoming data packets are queued and served using a FIFO policy. Packets are then decompressed as soon as they reach the RRH and are forwarded to the cell. These last operations are assumed to be instantaneous.

Measure at least the end-to-end delay of data packets for various values of  $S$  for both methods and compare the results.

At least the following two scenarios have to be evaluated:

- Exponential distribution of  $t$  and  $s$ ;
- Lognormal distribution of  $s$ , exponential distribution of  $t$ .

In all cases, it is up to the team to calibrate the scenarios so that meaningful results are obtained.

Project deliverables:

- a) Documentation (according to the standards set during the lectures)
- b) Simulator code
- c) Presentation (up to 10 slides maximum)