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Titre Thèse	Versatile *in situ* platform for 5G physical layer evaluation.		
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Résumé du sujet : If 5G is to begin soon, we are still far from having solved all the main challenges in a single network [1-2]. Indeed Mobile Broadband (MB) [3], Ultra Reliable Low Latency (URLL) [4-5] and Massive Machine Type (MMT) communications [6] have very different constraints that cannot be optimized simultaneously. In the IoT context, other problems arise. For instance, low rates are associated to short packet transmissions. Recent proposed Physical layers suggest the use of non-orthogonal multiple access [7], giving rise to a dynamic interference exhibiting non Gaussian statistics. Recently, new mathematical approaches have been tried and are still under study to derive fundamental limits about these networks. Stochastic geometry is certainly one of the recent successes in this area, giving rather simple expressions of some important design parameters, for instance outage probability. The surprising thing however is that these expressions do not necessarily give any insights in order to optimize the different layers of the network and its architecture [8]. We have limits, but no clue on how to reach them.

The challenges that we will address pertain to the realization of reliable, easy-to-deploy, autonomous sensing nodes. The first objective is to deploy a versatile platform. As far as we know, there is no versatile in situ testbeds. Either they are deployed for specific application [9], [10] and/or in controlled environment [11]; or for research on specific layers [12] (or usually the Physical layer is fixed); or on specific component of the IoT chain like the gateway in [13]. Our objective is to be able to deploy any application with any technological solution in an environment where non-initiated users can interact with the IoT network. This is allowed by the expertise gathered in IRCICA but also in the University of Lille on all the scientific components needed for an IoT network and to the wish of Lilliad learning center to be both a unique center to attract students but also researchers and to be a visible center with active research activities.

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