Proposition de recherche doctorale

Schémas Spatiaux Avancés pour la Future Usine Intelligente avec Livraison Asymétriques de Données Élevées

Advanced Spatial Schemes for Future Smart Factory Using Asymmetric High Data Delivery

Mots clés :
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- Domaine scientifique principal : Sciences et technologies de l'information et de la communication

Résumé du projet de recherche (Langue 1)

The smart factory applications are among the B5G targets, due to their extreme requirements in terms of data flow capacity, data rate, latency, reliability and/or security, but also due to major societal and economic impacts. Beyond 5G or 6G, aims at providing ubiquitous connectivity and intelligence in factory environments with perfectly secured data and high-level guaranteed quality of service [1]. The current 5G new radio (NR) network is not yet capable of meeting all the demanding design needs of existing and emerging industrial requirements, such as achieving ultra-high rate and reliability. Thus, huge signal bandwidths (20 GHz bandwidth) will be exploited together with high spectral-efficiency techniques using new signal dimensions to reach >100 Gbps B5G data rates [2]. In that sense, novel dimensions for indexation modulation (IM) will be developed. Besides, the combination of multi-user MIMO with adaptive IM will allow for reducing the reliability loss factor. This PhD will focus on the development of new techniques providing broadband high data-rate (up to 100+ Gbps) and reliable connectivity in sub-THz band. The first focus is on the development of new dimensions for modulation indexation and bits virtualization beyond the spatial-, time-, and frequency-domain indices (IM– [3]) for allowing high-data-rate point-to-point and point–to multipoint connections. The use of adaptive IM in multi-user MIMO will be explored to accommodate the asymmetry downlink rate delivery in the multi-points factory connections [4].

Informations complémentaires (Langue 1)

This PhD proposal is an explorative research proposal challenging the overall concept of making effective the beyond 5G communications or services. The focus is to explore “how advanced Spatial schemes in sub-THz communications?” can accommodate the practical requirements of future smart factories. Therefore, the main researches targeted in this PhD are: i) Elaborate advanced spatial mechanisms for broadband ultra-high rate device-to-device connectivity and broadband ultra-reliability, ii) Development of multi-user spatial multiplexing schemes with adaptive IM strategies reducing the reliability loss factor for future smart factories, iii) Accommodate the asymmetry downlink rate delivery in link-to-multi-points and multi-point-to multi-point factory connections guarantying B5G reliability constraints.