A 28 GHz Beamforming Technique for 5G Advanced Communication Systems

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Abstract— This paper describes a new approach of enabling nano-area, which is realized with advancing 5G NR radio access technologies and digital/hybrid beamforming in 5G NR FR2, here we call 'mmWave' band, including 28 GHz band. 5G has adopted mmWave in earnest to handle rapidly increasing telecommunication traffic, however, due to its extreme distance attenuation characteristics, mmWave is mainly for a relatively small area that has a large amount of traffic or a large number of terminals (high density). We call such an area as "nano-area". Beamforming technique is indispensable to compensate for the distance attenuation even in the nano-area. This research advances the beamforming and beam management methods for 5G to accommodate as many UEs as possible while keeping latency low. We devise underlying technologies for realizing the advanced beamforming and evaluate them by performing experiments and simulations for their implementation.

Keywords— 5G NR, mmWave, digital beamforming, hybrid beamforming, SDR, nano-area

(Pt8)First A. Author (M'76–SM'81–F'87) and the other authors must include biographies. This author became a Member (M) of IEEE in 1976, a Senior Member (SM) in 1981, and a Fellow (F) in 1987. The first paragraph may contain a place and/or date of birth (list place, then date). Next, the author's educational background is listed. The degrees should be listed with type of degree in what field, which institution, city, state, and country, and year degree was earned. The author's major field of study should be lower-cased.

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