Intelligent reflecting surfaces: Performance analysis, extensions, potential challenges and open research issues

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The intelligent information society, which is globally data driven, highly inspired and digitized, will be developed in coming few years. The next sixth-generation (6G) wireless networks are the main elements to enable this research study, which will offer full dimensional wireless connectivity and incorporate all features to facilitate full-vertical applications. Recent researchers have focused on intelligent reflecting surface (IRS) with wirelessly control capabilities in future 6G networks. Specifically, IRS can smartly alter the wavefronts e.g., frequency, amplitude, phase and polarization thereby collectively achieving fine-grained three-dimensional (3D) passive beamforming to enhance signaling or nulling by using massive tunable components without any signal transmission using radio-frequency (RF) chains and suppressing interference at one or more designated receivers. IRS is a novel technique which can tune wireless communication to boost energy and spectrum efficiencies. IRS has the capability to dynamically alter the wireless channel to improve the system performance by intelligently reconfiguring signal propagation by leveraging cost-efficient passive reflecting elements incorporated on a planar surface. IRS has also received significant attention as it can reduce the physical size, hardware complexity and cost of traditional large arrays. It is anticipated that the IRS-assisted wireless hybrid network containing both active and passive elements will be most emerging to enable a cost-effective and sustainable capacity growth. Motivated by the potentials of this revolutionizing technology, here I present an overview of IRS including the system hardware design, working principle, comparison with recent notions, IRS-assisted future 6G wireless networks and reasons that why IRS necessitates to reconsider the existing conventional communication model employed in wireless networks. Besides, this study discusses performance analysis and application scenarios of IRS. At last, several challenges and open research issues of IRS-assisted wireless networks have been investigated along with forecasting a future roadmap on standardization of IRS.

Biography

Syed Agha Hassnain Mohsan has completed his BS and MS in Electrical Engineering from CUI, Pakistan. Currently, he is pursuing PhD (Final Year) from Ocean College, Zhejiang University. He has published more than 20 papers in reputed journals and international conferences. He has been serving as reviewer in reputed journals and Technical Program Committee member of internal conferences.