Chipless RFID, an emerging technology

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Radiofrequency identification (RFID) is an established technique for automatic data captures exploiting reflected electromagnetic waves by scatters, usually called tags or transponders. In the last decades, roughly since the mid-1960s, very effective integrated circuit-based tags have been developed and implemented in numerous applications from the most simple like the electronic surveillance article to the more sophisticated like the Internet of Things. Even if conventional RFID is a well developed and broadly used technology worldwide, the need for an all-passive solution is highly desirable for certain applications that require low-cost, mechanical robustness and ability to be implemented in severe environments.

This special issue is devoted to chipless RFID, a now vibrant and emerging field intensively investigated for a decade. The early concept of chipless technology began in the electromagnetic and radar community during the 1940s. The first RFID tag ever developed is the famous device known as the “thing” designed by Leon Theremin. Such a device served as a spying microphone for many years. Nowadays, numerous research projects, dedicated to chipless technology, are conducted by several groups worldwide. Chipless technologies exhibit many advantages; they are fundamentally wireless and battery-less

devices, and can be a fully passive technology, which potentially means an infinite lifetime. More recently, sensing properties of the chipless device have been demonstrated, which open the door to new paradigms and ubiquitous applications. One more remarkable property of chipless is its compatibility with green technologies and solutions. However, chipless technology is still in its infancy, and many scientific challenges are facing its development. Several groups worldwide are contributing to the development of chipless RFID in terms of technology process, coding capacity, miniaturization, electromagnetic signature, sensing capabilities....

Given the importance and the enabling character of RFID technology, in particular chipless, *Annals of Telecommunications* organized this special issue on these topics, from the perspective of engineering science. This special issue on chipless RFID is twofold: first, a review of the state of the art of the chipless technology and its main applications; second, recent developments and novel and advanced concepts under consideration. While this special issue does not pretend to report all the developments on that technology, we hope that it gives you a fresh taste of the very exciting progress that is being made in the field of chipless RFID.

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