Backwards Compatible Improvement of the EPCglobal Class 1 Gen 2 Standard

**Abstract:**

Radio Frequency Identification (RFID) systems with dense tag populations face the problem of tag collisions, i.e. simultaneous replies of multiple transponders in a single slot. State-of-the-art RFID readers can use two methods for resolving this collision problem. The first method bases on Dynamic Frame Slotted ALOHA (DFSA) for optimizing the frame length, which results in a reduced number of collisions. The second and more efficient method resolves collisions on the physical layer, e.g. by means of multi-antenna algorithms. However, the well-known EPCglobal Class 1 Gen 2 standards only allows for a single tag acknowledgement, even if the physical layer is able to identify multiple collided tags. This results in an overall reduced performance. For overcoming this drawback, we propose a system that has the capability to acknowledge multiple tags within a single slot, resulting in a significantly increased performance. Our proposal offers the benefit that it is backwards compatible with existing EPCglobal Class 1 Gen 2 tags and readers. Hence, our improved tags can be read by conventional readers without affecting the performance. Furthermore, existing tags can be read simultaneously with our improved tags by optimized readers. Using our approach, we are able to increase the maximum reading efficiency compared to state-of-the-art systems by a factor of approx. 5. This can be translated into a bulk reading time reduction of 50%, which is a significant improvement w.r.t. state-of-the-art systems.