Radio Frequency Identification (RFID) technology uses radio frequency waves to automatically identify people or objects. The main RFID systems consist of fast capturing radio frequency tags and networked electromagnetic readers. RFID technology is currently emerging as an important technology for advancing a wide range of applications. It has the potential to improve the efficiency of business processes by providing automatic identification and data capture. The current interest in RFID technology has grown rapidly and can now be certified by CompTIA RFID+ certification.
Managing Tag Collision in RFID Data Streams using Smart Tag Anti-Collision Techniques

In order to validate the knowledge and skills of professionals who work with RFID technology. In the modern world, RFID technology is used in different applications such as distribution and retail packaging, security, library system, defence and military, health care, and baggage and passenger tracing at the airport.

Chip-based RFID systems are mainly comprised of the following components:

- Chipped-Tag, which has a microchip attached to an antenna that transmits and responds to radio signals of a particular frequency. Chipped-Tag types are separated into three categories known as Passive Tag, Semi-Passive Tag, and Active Tag. In this chapter, we focus on passive tag, which does not have its own power source, and has no battery on-board. The tag obtains power from radio waves received from the reader. Passive Tags are small and light weight, and their functionalities are limited due to power source. Due to a lack of enough power, it cannot support an active transmitter to communicate with the reader. Passive tags are well suited in applications for which tags are not reusable, because of their low cost.

- Reader, which sends and receives RFID data to and from tags via antennas. Readers come in multiple formats, which can be separated into three main categories: Fixed readers, Handheld readers, and Vehicle-mount readers.

- Middleware, which pre-processes the RFID data and converts it into a meaningful Data.

- Application software, which is a specific component that resides on host computer.

In traditional RFID systems where chipped-tags are presented, there are several methods of identification. The most common is to store a serial number that uniquely identifies a person or object such as Electronic Product Code (EPC). All EPC numbers contain strings of binary numbers, which provide a unique identity for every physical object. All data captured by RFID readers before any further process are known as dirty data. In order to improve efficiency of database, dirty data must be filtered at the earlier stage soon after they were captured. The filtering of RFID data streams is known as filtering at the edge, where data are still meaningless and easier to eliminate. The main issue that usually arises in RFID data streams is the data stream errors. There are four typical errors, which include unreliable reads, noises, missed reads, and duplications/redundancies.

Several techniques for filtering RFID data have been proposed in literatures. However, these techniques only filter specific kind of errors generated. Therefore, the amount of wrong data is still recorded into the database. The most common errors are missed reads, which usually happen in a situation of low-cost and low power hardware that lead to a frequently dropped reads (Derakhshan et al., 2007). Another cause of missed reads is simultaneous transmissions in RFID systems, which lead to collisions as the readers and tags typically operate on the same channel. Tag collisions in RFID systems happen when multiple tags simultaneously reflect their respective signals back to the reader at the same time, preventing the reader from identifying all tags. Filling in dropped reads is one way to alter missed reads but it is sufficient to prevent missing data from the beginning. RFID collision problem can be solved by using anti-collision techniques, to prevent two or more tags from responding to a reader at the same time, and to re-identify them again when collisions occurred.

The current deterministic anti-collision methods suffer from identification delay and high memories usage during the identification process, while the probabilistic anti-collision methods suffer from tag starvation problems due to inac-