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Testbed for Dense UHF RFID Systems

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I. Motivation

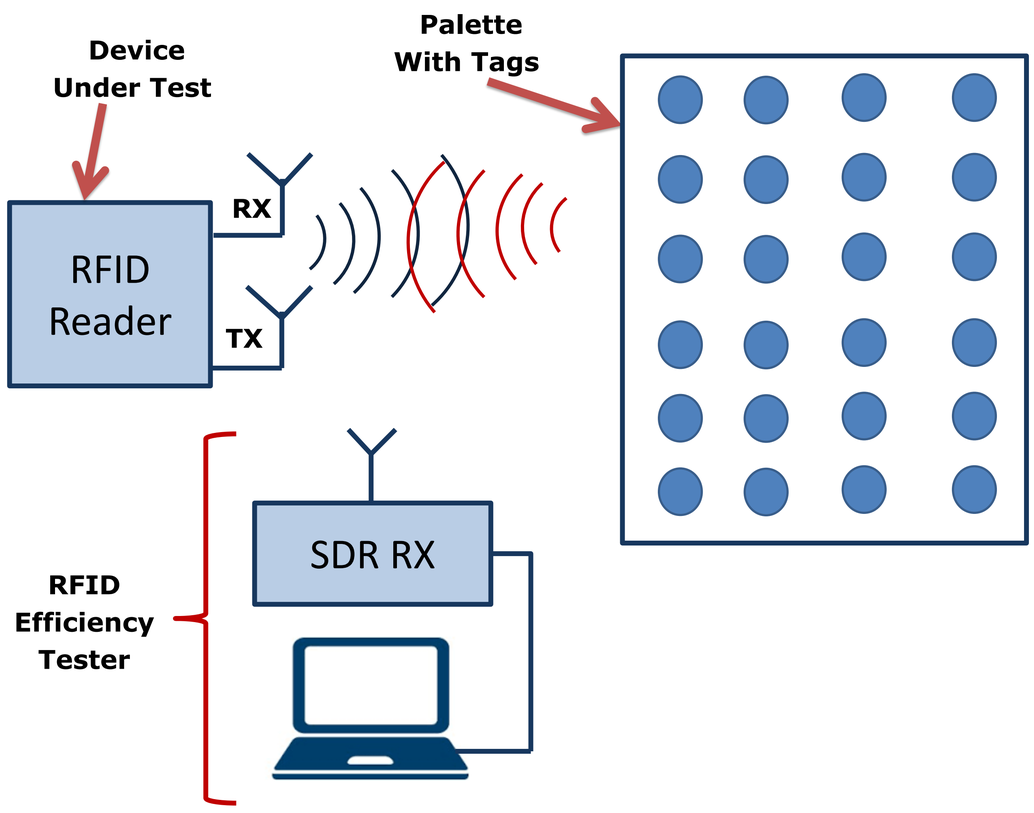
- Radio Frequency Identification (RFID) systems have been widely deployed for various applications such as supply chain management and logistics.
- There are various new RFID systems proposed in the market. However, the customers need to evaluate the performance of these systems.

http://bin95.com/BarCode_RFID.htm

Properties of the RFID network:

- Dense network >200 tags.
- Fast Identification process (few seconds).
- UHF band is used 868-872 MHz with frequency hopping.
- The identified items are muted until the end of the inventory round (reading process).

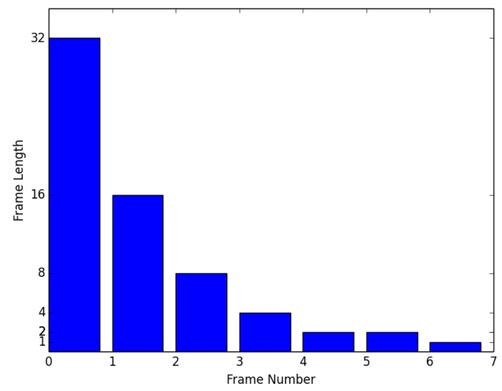
II. Testbed Description



Measurements setup of the proposed testbed

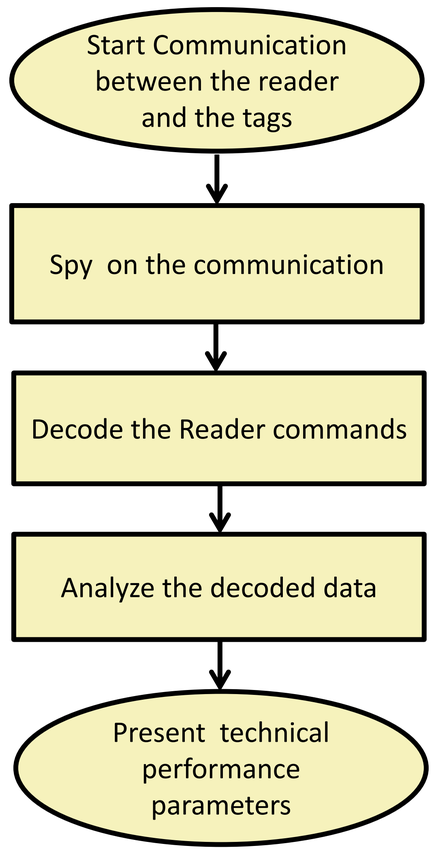
- The proposed testbed has the ability to spy on the UHF RFID communication channel.
- It contains SDR kit (USRP b210) used to decode the commands and transfer the data to be analyzed and presented live on a powerful PC.
- A graphical user interface is integrated to the system showing all the technical and performance parameters for each inventory round.
- The system evaluate the performance of each inventory round done by the device under test.

III. Performance Analysis



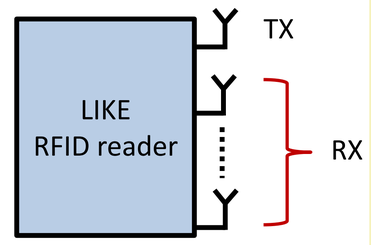
Behavior of the Frame length for one inventory round

- **Technical and performance parameters:**
  - Average identification efficiency
  - Packet error rate
  - Encoding scheme
  - Center frequency
  - Rate of the tag reply
  - Total time of the inventory round



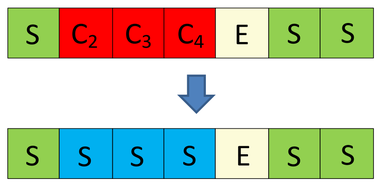
IV. Other RFID Research Activities

- **LIKE RFID reader:**
  - Follow EPCglobal C1 G2 standard
  - Different Anti-collision algorithms are under construction.



- **LIKE RFID Tags:**
  - Higher performance new tags are implemented.
  - The new tags are compatible with the EPC global C1 G2 standard

- **Advanced anti-collision algorithms (PHY-MAC):**
  - Collision Recovery Algorithms
  - Frame length Adaptation



V. Conclusions

- An online testbed is presented for UHF RFID system performance evaluation.
- The testbed can show the average performance and the detailed parameters.
- The proposed testbed can be used for the UHF RFID frequency ranges.

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