Efficient Access Protocols for High Storage RFID

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Introduction/motivations

• Passive RFID tags are starting to contain increasingly more storage space.
• RFID is not only useful for identification, but distributed storage.

• Need robust protocols to read from and write to these high storage tags, because of tag uncertainties (dynamics, failures).
• Do not keep track of individual tags.
• Want stateless protocols.
• Read newest information.
• Write to empty space or replace oldest information.

Algorithms

Regular aloha
Do aloha singulation. Read timestamps.

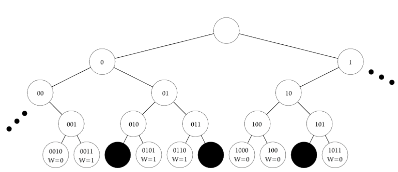
Aloha-max
Do aloha singulation. Segment out fraction of tags in each round. Requires knowing reader dynamics.

Aloha-half
Similar to aloha-max. Segment out approximately half of tags in each round. Does not require knowing reader dynamics.

Regular query tree
Do query tree singulation. Read timestamps.

Query tree-max
Do query tree singulation. Segment out fraction of tags in each round.

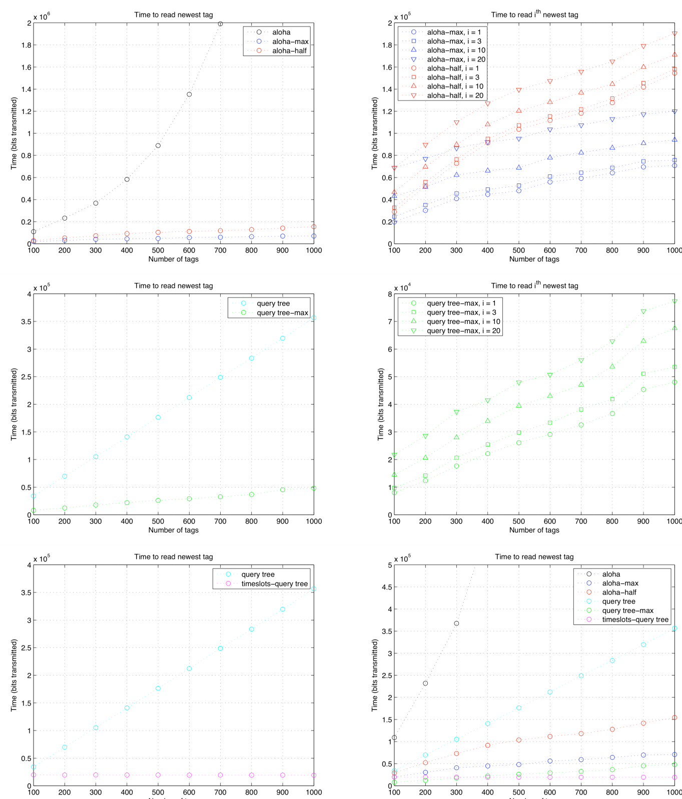
Timeslots-query tree
All possible tag IDs each mapped to a timeslot. Find the root of a subtree containing the target tag. Do query tree on the subtree.



Simulations

Bit times
• 96 bits for RFID unique ID (EPC).
• 17 bits for timestamp. Finer than second precision for 24 hours.
• 3 bits to store number of timeslots in aloha (16, 32, 64, 128, or 256).
• Variable bit lengths for prefix in query tree.

Results



References

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