**Reviewer (4):**

Thanks for your valuable comments. According to your review comments:

* This paper proposes a new closed form solution for the optimum FSA frame length taking into consideration the time differences between the slot durations. The proposed equation is function of the number of tags ‘n’ and the slot duration constant ‘C\_t’.

According to the below appendix, the variable C\_t is function of:

* The tag reply encoding scheme (M).
* The transmission data rate which presented in (T\_ari) and the Divided Ratio (DR).
* The pilot length in the tag reply preamble (X).

All these parameters are well known at the reader before transmission. So the value of C\_t can be calculated without need for storage or searching as mentioned before. However, the numerical methods should store a table for each combination of these parameters. These tables should specify the value of optimum frame length versus the estimated number of tags. Afterwards, they should search for this optimum value of the frame length at each time.

* The literature is reviewed and updated to 2014.
* According to figure 5, the main issue of these simulations is to show the practical effect on the reading time using the proposed frame length compared to the conventional frame length (L=n) for different estimation algorithms. The estimation algorithms are not the main focus in this paper. Based on figure 5, the mean reduction in reading time has the minimum value, when the number of tags at the reading area is known (perfect number of tags estimation). The mean reduction in reading time increases when we have not accurate tags estimations algorithms. Therefore, Vogt estimation algorithm is better than Schout, because its saving time curve approaches to the perfect estimation curve. This part is clarified again at the paper to be clearer.
* The text of figure 2 has been improved.
* The square brackets were a problem from the text editor and have been removed.
* For fair comparison, we used the fourth order Taylor expansion of the proposed equation and the LambertW function in the Dan Liu’s equation. The proposed equation converges to the exact solution in the complete region of Ct. However, Dan Liu’s equation diverges from the exact solution in the region of C\_t< 0.2.
* The proposed equation can be used for further analytical analysis, which is not possible using the LambertW function as it does not exist as elementary function.
* The name of the variable is changed from L\_opt\_TA to L\_TA.

APPENDIX:

Based on the ISO 18000-6C protocol, the slot duration constant C\_t is calculated as follow:

**C\_t=T\_e/T\_c**

Where, T\_e is the empty slot duration, and T\_c is the collided slot duration.

* T\_e=Tq+T1+T3.

Where, T\_q is the Query Repeat command duration.

* Tq=12.5us+7.5\*Tari.

Where, T\_ari =1/(reader data rate).

* T\_1=max {RTcal , 10T\_pri}.

Where, T\_pri=1/(tag data rate) =2.75\*M\*T\_ari/DR.

M =1,2,4,8 based on the encoding scheme (FM0, Miller 2, Miller 4, or Miller 8) and DR is the divided ratio and takes two values 8 or 64/3

* T1=max {2.5 T\_ari, 27.5\*M\*T\_ari/DR}

**Therefore:**

**T\_e=12.5us+7.5T\_ari+ max {2.5 T\_ari, 27.5\*M\*T\_ari/DR}**

* T\_c=T\_q+T\_1+T\_2 +TRN16
* T\_2=20T\_pri=55\*M\*T\_ari/DR
* TRN16=16\*Tpri+Tpreamble
* Tpreamble=6T\_pri+T\_pilot
* T\_poilot=X\*Tpri ,

where X=0,12,4,16 based on the standard (according to encoding scheme and the value of TRext equals 0 or 1)

* T\_RN16= (22+X)T\_pri=(22+X)\*2.75\*M\*T\_ari/DR

**Therefore:**

**T\_c=12.5us+7.5T\_ari+ max {2.5 T\_ari,27.5\*M\*T\_ari/DR}+55\*M\*T\_ari/DR+(22+X)\*2.75\*M\*T\_ari/DR**