



PR9200 AN035-02

2021-11-03

Configuration of Session for multi-tag

For RED4S_v2.2.0 or later

Contents

1	Revision History	3
2	Introduction	4
3	Inventoried Flag and Session	4
3.1	Inventoried Flag.....	4
3.2	Session.....	4
3.3	Use Case.....	5
4	Read Operation of Session Mode.....	6
4.1	Session 0.....	6
4.2	Session 1.....	6
4.3	Session 2, Session 3.....	7
5	References	8
6	Address Information	9

1 Revision History

Version	Date	Description
01	2014-12-12	First edition
02	2021-11-03	Update contents

2 Introduction

RFID systems need allow multiple readers to communicate with a single tag or multi Tags. For this variety of environments, the Gen-2 standard provides some limited support through the mechanism is termed session in Gen-2. This document describes session termed in Gen-2 standard and how to use session for multiple reader or multiple tags environment.

3 Inventoried Flag and Session

Tags provide four sessions (S0, S1, S2, and S3) and each session has its own inventoried flag. Tags participate only one session during an inventory round and shall neither use nor modify an inventoried flag for a different session. This section describes inventoried flag and tag operation according to four sessions. Refer to [1] for more detailed information about session and inventoried flags.

3.1 Inventoried Flag

A Tag maintains an independent inventoried flag for each of its four sessions and has two inventoried flag state A and B[1]. The initial value of the inventoried flag is determined according to the session used by the reader and the previous value of the inventoried flag. At the beginning of every inventory round interrogator selects to inventory either A or B Tags in one of the four sessions. After which it inventories the Tags an reader may issue a command that causes the Tag to invert its inventoried flag for that session (i.e. $A \rightarrow B$ or $B \rightarrow A$)[1].

3.2 Session

Four sessions allow four readers to independently communicate with a tag for reading its EPC. Sessions are can be used to set the inventoried flag of all tags to a known value. Then as the reader reads the EPC of each tag that inventoried flag will switch and that tag will no longer participate in the inventory round.

3.2.1 Persistence Time

Each session has an associated persistence time. This persistence time means the length of time that the inventoried flag for each session is maintained after the reader stops transmitting energy to the tag. Once the reader inventories the tag, the inventoried flag value is changed from A to B. This inventoried flag B is reverted back to A when persistence time is expired.

Each session has its own inventoried flag each having a different persistence time. Below table describes persistence time for each session.

Session	Tag energized	Tag not energized
S0	Indefinite	None
S1	500ms < persistence < 5s	500ms < persistence < 5s
S2, S3	Indefinite	2s < persistence

Table 1 Tag Persistence Time

The persistence time of session S0 is zero. In other words, the inventoried flag of session S0 is maintained only during tag energized. The persistence time for session S1 is between 500 milliseconds and 5 seconds. The S1 inventoried flag will revert to A after the persistence time expires, even if the tag is energized. The persistence time for the inventoried flag when the tag loses power in session S2 and S3 is minimum of 2 seconds.

3.2.2 Session 0

Tag powers up (energized by the reader) with its S0 inventoried flag is always set to A. the session S0 has a persistence time of zero, thus S0 inventoried flag is maintained only in this case the reader continually energize the tags. When the tag loses power, the S0 inventoried flag will revert to A regardless of its previous value.

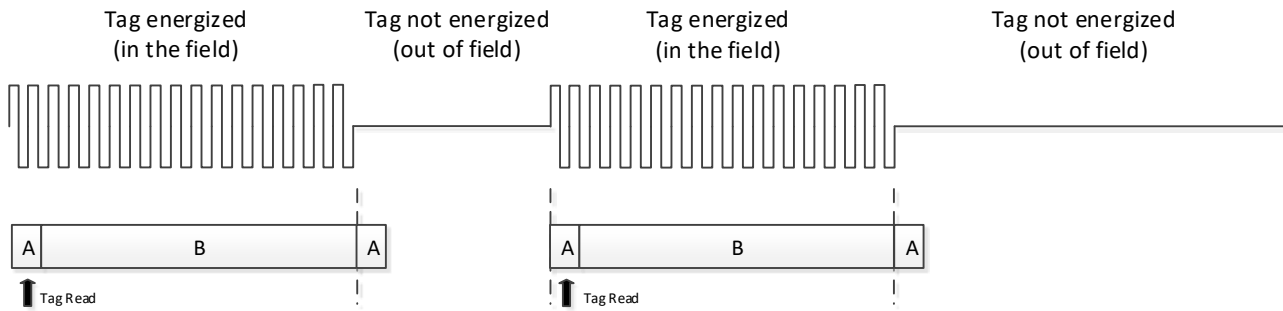


Figure 1 Session 0

In case of using Session S0, inventoried flag B is always maintained during tag energized. If reader reads by targeting the Inventoried flag A, it will read the EPC of the same tag only once during tag energized.

3.2.3 Session 1

The inventory flag of sessions S1 is set to previous value (either A or B) if the tag is energized before the persistence time expires. Otherwise the inventoried flag will default to A. Session S1 has persistence time between 500 milliseconds and 5 seconds. The S1 inventoried flag will revert to A after the persistence time expires, even if the tag is energized. Due to this, if the entire energized time lasts longer than the persistence time, reader may read the EPC of the same tag multiple times.

Also the inventoried flag is remained B during persistence time when tag is not energized. If tag is energized again before the inventoried flag revert A, Tag does not participate the new inventory round.

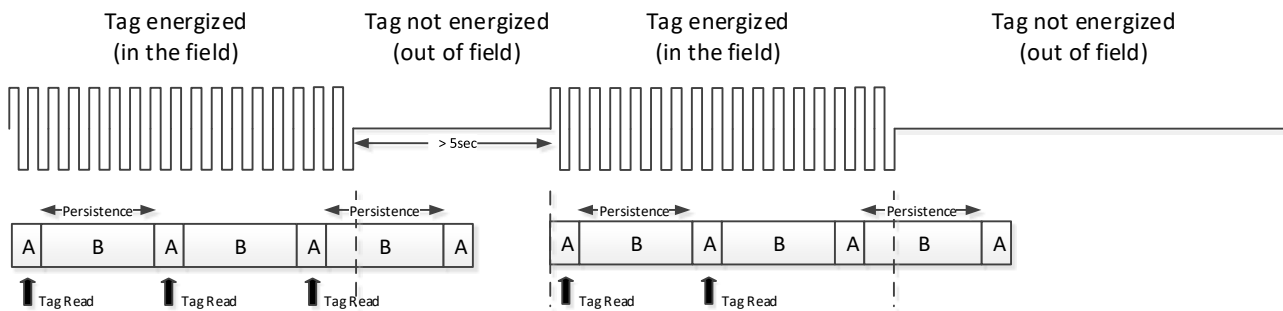


Figure 2 Session 1

3.2.4 Session 2, 3

The inventory flag of sessions S2, and S3 are set to previous value (either A or B) if the tag is energized before the persistence time expires. Otherwise the inventoried flag will default to A. Both sessions S2 and S3 have a persistence time as long as the reader can energize the tags and for at least 2 seconds after tag is not energized. Due to this mechanism, it is possible for tags to continually reenter the process. When using S2 and S3, the tag will be read only once. Then the tag switch the inventoried flag from A to B and remain entire time it is in the read field as below Figure 3. Although the reader inventories the tags again before persistence time is expired, the tag will not respond.

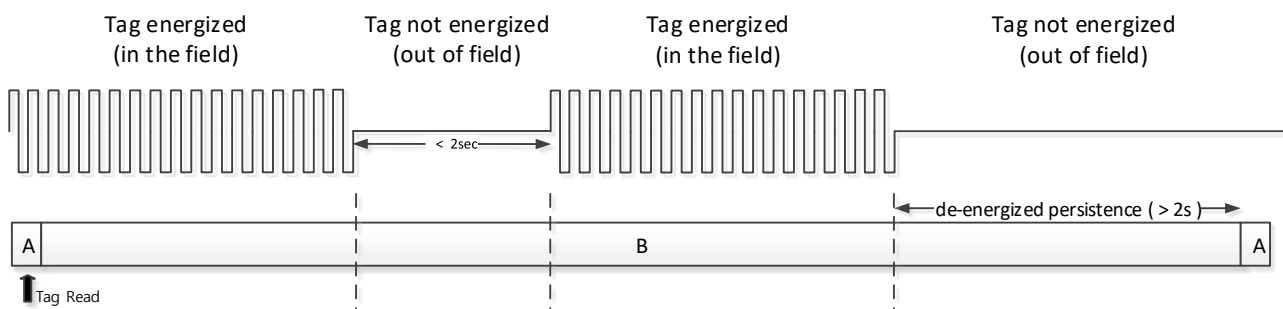


Figure 3 Session 2 or 3

3.3 Use Case

The RFID environment is very diverse. The reader must be configured depending on how many readers and tags are in field, the reader and tag is moving or fixed, how fast the reader reads tags. For this variety environment, the session has some benefits that is easier to read lots of tags that close to each other. In case of situation that needs to count tags multiple times in short time through fixed reader like conveyor, session will do better to set S0 or S1. Otherwise, if reader keep moving to read tags like handheld reader, Session will do better to set S2 or S3.

Several readers may want to simultaneously inventory a tag population. In case of this, each reader must use different session each other to avoid the collisions. For example, there are two reader of different types. If a reader is fixed reader and other one is handheld reader, fixed reader uses Session S1 and handheld reader uses Session S2. If both readers are handheld reader, the readers uses Session S2 and Session S3 respectively. Thus, four sessions can be assigned a different session to each of four readers.

4 Read Operation of Session Mode

PR9200 starts reading the tags by Start Auto Read2 command (or Start Auto Read). Reader repeatedly starts and stops read operation according to preset read time and idle time. (The read time and idle time can be changed by Set FH/LBT Parameters command). This process is stop when reader receives Stop Auto Read command from Host or meets completion condition. Below figure 6 shows tag read process of each session mode.

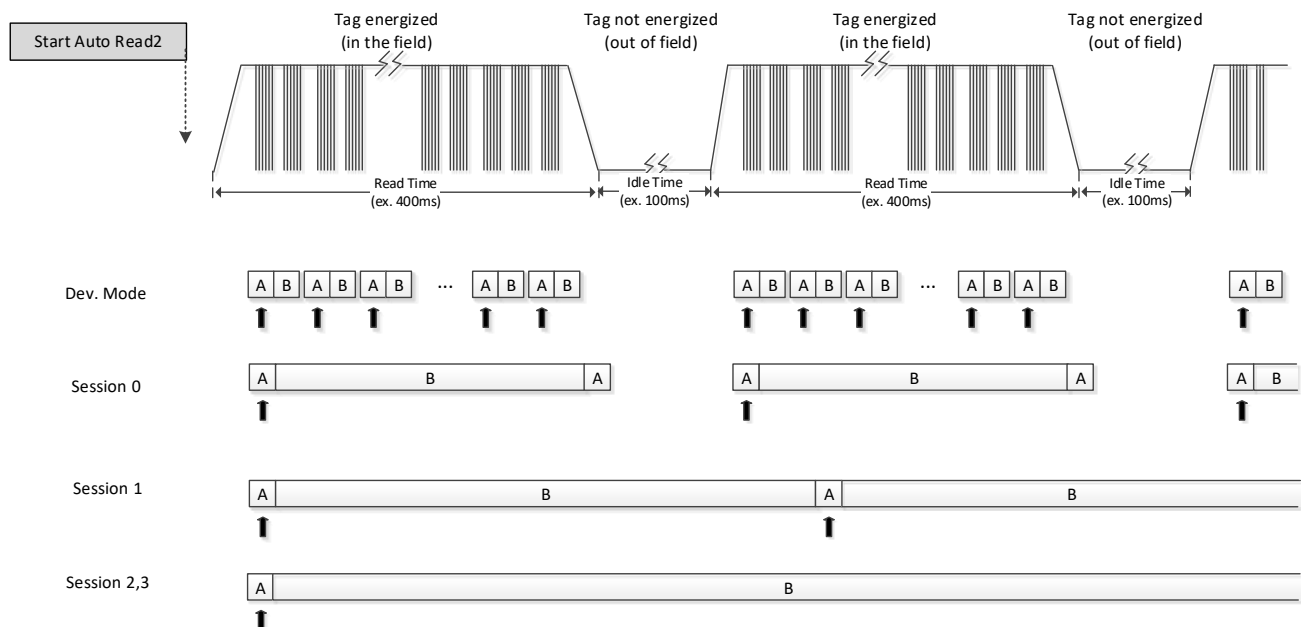


Figure 4 Tag Read Operation of Session Mode

4.1 Session 0

This mode starts inventory round by setting session filed of *Query* command to S0 without *Select* command. The reader inventories for only A tags, the inventoried flag of all tags which participates inventory round is changed to flag B. the inventoried flag B is maintained during read time and reverted to A when idle time. Due to this issue, the Session 0 mode can be read EPC of same tag only once during read time. However the reader can re-read same tag by targeting flag A at new read time because the Tag revert inventoried flag to A when idle time.

4.2 Session 1

This mode starts inventory round by setting session filed of *Query* command to S1 without *Select* command. The reader inventories for only A tags, the inventoried flag of all tags which participates inventory round is changed to flag B. the inventoried flag B is maintained during tag's persistence time regardless of read time and idle time. The inventoried flag B is reverted to A when persistence time expires. At this time reader can re-read EPC of same tag. If read time and idle time cycle is shorter than persistence time of Session S1, the EPC of same tag will be read at persistence time intervals. The Tags have different S1 persistence time between 500 milliseconds and 5 seconds.

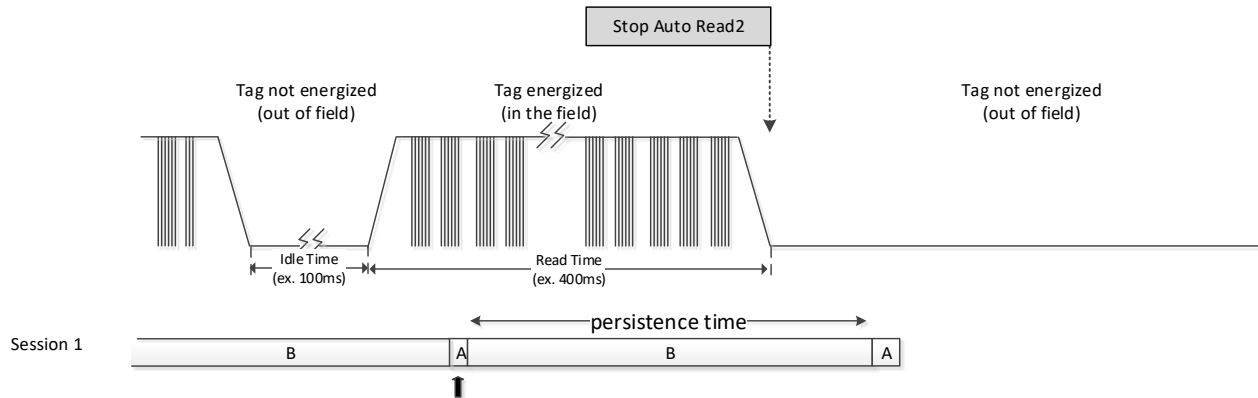


Figure 5 Session 1 Mode when Stop Auto Read

The tag read operation is stopped by Stop Auto Read2 (or Stop Auto Read) command or by meeting the completion condition. After stopping the read operation (tag read), the inventoried flag remained to *B* until persistence time expires.

4.3 Session 2, Session 3

This mode starts inventory round by setting session filed of *Query* command to S2 or S3 without *Select* command. The reader inventories for only *A* tags, the inventoried flag of all tags which participates inventory round is changed to flag *B*. the inventoried flag *B* is maintained during tag's persistence, even if tag is not energized. If idle time is shorter than 2 seconds, the inventoried flag *B* is always maintained during read operation. Then the reader will read only one EPC until stopping read process.

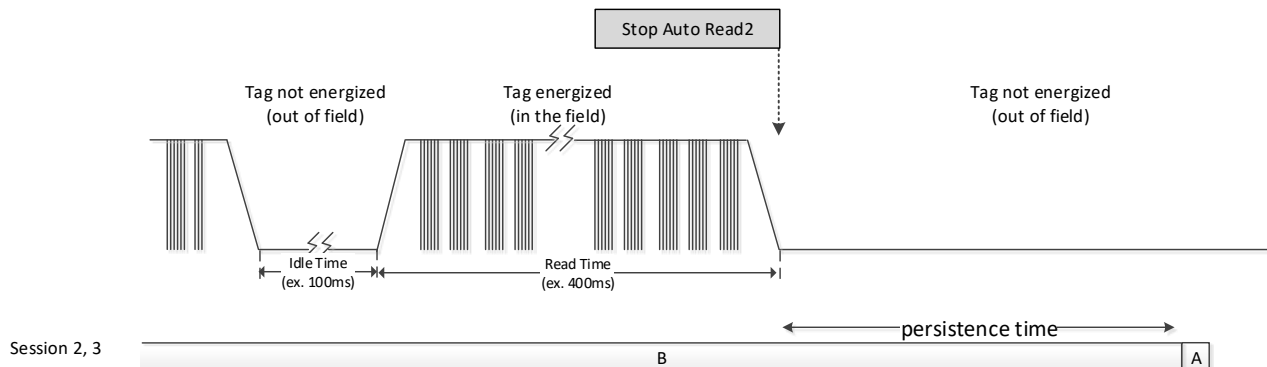


Figure 6 Session 2 and Session 3 Mode when Stop Auto Read

The tag read operation is stopped by Stop Auto Read2 (or Stop Auto Read) command or by meeting the completion condition. When using Session 2 or Session 3, the inventoried flag is remained more than 2 seconds. If the reader starts tag read again before persistence time expires, it will cannot read the tag.

5 References

[1] EPC Radio-Frequency Identity Protocol Generation-2 UHF RFID; Specification for RFID Air Interface – Protocol for communications at 860 MHz – 960 MHz; version V2.0.0 Ratified November 2013

6 Address Information

PHYCHIPS Inc.

#104, 187 Techno 2-ro, Yuseong-gu, Daejeon, Korea (Yongsan-dong, Migun Technoworld 2), 34025

Web site: <http://www.phychips.com>

E-mail: sales@phychips.com

TEL: +82-42-864-2402

FAX: +82-42-864-2403

Disclaimer: PHYCHIPS reserves the right to make changes to the information in this document without prior notice. The purchase of PHYCHIPS products does not convey any license under patent rights owned by PHYCHIPS or others. PHYCHIPS does not assume any responsibility for the use of this product. It is the customer's responsibility to make sure that the system complies with regulations.

© 2021 PHYCHIPS Inc. All rights reserved. The reproduction of this document is NOT allowed without approval of PHYCHIPS Inc.