SALTO PMS Protocol with Micros-Fidelio

Version 1.10

History

Date	Version	Description
1/8/2002	V 1.0	First draft
15/10/2002	V 1.1	Second revision
4/11/2002	V 1.2	Third revision
3/12/2002	V 1.3	Recovery techniques from TCP/IP connection failures explained. One shot key included.
16/4/2009	V 1.4	Spelling mistake with the RU error value: the error value in the 'KA' (Key Answer) command was incorrectly documented. Now the 'RU' error have been replaced by 'UR'.
18/2/2011	V 1.5	New fields have been added to the 'KR' command: $1 (track #1) and SI (Suite Information).
5/9/2012	V 1.6	Some minor wording mistakes fixed.
3/1/2013	V 1.7	The track '$2' is now supported for the 'KA' (Key Answer) command.
24/3/2014	V 1.8	The maximum number of key options (parameter **KO** in command **KR**) has been augmented to 62.
24/2/2016	V 1.9	The track fields (that is, $1 and $2) are included within the **LR** record for the **KR** command only when the corresponding settings within the SALTO DB are enabled.
15/06/2016	V 1.10	New command supported: **KM** (Key Data Change).

Table of content

Introduction

This document describes the communication interface between the Salto access control system and a Property Management System (PMS herein) based on the Micros-Fidelio protocol.

This document is mostly based on the 1.51 version of the *MICROS-Fidelio Interface Application Specification* (FIAS herein), though there are some few features extracted from more recent versions (for example, the "*$2*" parameter for the **KA** command as defined in FIAS version 2.20).

Note that the Salto implementation of the FIAS interface does not cover all the commands but only a subset of them, more specifically, those concerning the key service and management of hotel cards, such as "Key Request" and "Key Delete".

The reader is referred to the original documents provided by MICROS-Fidelio for further and more detailed information.

Set of Implemented Commands

The table below summarises the subset of FIAS commands (also referred to as records) supported by SALTO:

Record	***Description***	***Fields***	***Direction***
LS	Link start	**DA**, **TI**[1]	Both
LA	Link alive	**DA**, **TI**	Both
LE	Link end	**DA**, **TI**	Both
LD	Link description	**DA**, **TI**, **V#**, **IF**	To PMS
LR	Link record	**RI**, **FL**	To PMS
KR	Key request	**WS**, **KC**, **KT**, **RN**, K#, GD, DT, GA, KO, SI, $1, $2[2]	From PMS
KD	Key delete	**WS**, **KC**, **RN**	From PMS
KM	Key data change	G#, KC, **RN, RO**, WS, DT, GD	From PMS
KA	Key answer	**WS**, **KC**, **AS**, CT, $2	To PMS

In the following sections, a more detailed description for each command is given.

[1] Mandatory fields for a particular record are typed in **bold typeface**.
[2] The track fields $1 and $2 are included within the **LR** record for the **KR** command only when the corresponding settings within the SALTO DB are enabled.

LS, LA, LE, LD, LR- Link Commands

The link start (**LS**), link alive (**LA**) and link end (**LE**) records control the status of the connection between the PMS and SALTO. The SALTO application will send a link start record (**LS**) at start-up time and a link end record (**LE**) when shutting down. The link alive record (**LA**) is only used in the **LD**/**LR**/**LA** sequence explained below.

The fields involved in the **LS**, **LA** and **LE** commands are as follows:

Fields	***Description***	***Format***	***Values***
DA	Date	Date (YYMMDD)	**-**
TI	Time	Time (hhmmss)	**-**

The sequence **LD**/**LR**/**LA** is sent by the SALTO application immediately after receiving a link start (**LS**) or a link alive (**LA**) record from the PMS. This sequence (**LD**/**LR**/**LA**) gives information about the commands and fields of the FIAS protocol supported by the SALTO application.

Particularly, the link description (**LD**) record contains general link information (such as interface family and version), as shown in the following table:

Fields	***Description***	***Format***	***Values***
DA	Date	Date (YYMMDD)	**-**
TI	Time	Time (hhmmss)	**-**
IF	Interface family	Alphanumeric (2 chars)	**DL**
V#	Vendor version	Alphanumeric (max. 10 chars)	**-**

Note that the character '|' is considered as the field separator by SALTO interface.

The **LD** record is always followed by a set of link record (**LR**) commands. Basically, an **LR** command is comprised of a record identity and a list of fields for that particular record ID.

Fields	***Description***	***Format***	***Values***
RI	Record ID	Alphanumeric (2 chars)	**-**
FL	Field list	Alphanumeric (variable)	**-**

Finally, a link alive (**LA**) record is sent to the PMS to indicate that the link has been configured.

Link Initialization by SALTO

The following example shows all the records sent to or received from the PMS when the SALTO application is initialized. Note: this example is shown without low level protocol framing or response characters. The symbol '←' indicates that this record is sent by SALTO, '→' that the record is sent to SALTO.

When SALTO is initialized for the first time, a link start (**LS**) record is sent:

← **LS**|**DA**021015|**TI**154510|

If no previous link has been started before, the PMS should respond with a link start record, as follows:

→ **LS**|**DA**021015|**TI**154600|

SALTO interface will configure the link by sending the **LD**/**LR**/**LA** sequence. The link description **LD** command will contain the date, time, interface family (**DL**) and vendor sequence (**V#**).

← **LD**|**DA**021015|**TI**154510|**IF**DL|**V#**2.1|

Then it will send a first link record (**LR**) for the key request (**KR**) record specification. Valid fields are key count (**K#**), key coder (**KC**), key type (**KT**), room number (**RN**), workstation ID (**WS**), key options (**KO**), guest departure date (**GD**) and time (**DT**), guest arrival date (**GA**), suite information (**SI**), track 1 information (**$1**) and track 2 information (**$2**).

← **LR**|**RI**KR|**FL**K#KCKTRNWSKOGDDTGASI$1$2|

The next **LR** command will contain the specification for the key deletion (**KD**) record. Valid fields are key coder (**KC**), room number (**RN**) and workstation ID (**WS**).

← **LR**|**RI**KD|**FL**KCRNWS|

The next **LR** command will contain the specification for the key answer (**KA**) record. Valid fields are key coder (**KC**), answer status (**AS**), workstation ID (**WS**), error message (**CT**), date (**DA**), time (**TI**) and track 2 (**$2**).

← **LR**|**RI**KA|**FL**KCASWSCTDATI$2|

Note that this last field (i.e., **$2**) depends on the Salto settings: it only appears when the corresponding settings is enabled at the Salto DB.

After the last link record, a link alive record (**LA**) is sent to indicate that the link has been configured:

← **LA**|**DA**021015|**TI**154650|

The PMS should respond with a link alive as the link was inactive before:

→ **LA**|**DA**021015|**TI**154700|

After receiving the link alive (**LA**) from the PMS, the link is considered to be active.

In some cases, it may occur that the PMS has already got a valid link configuration when SALTO interface is initialized (for example, the SALTO application was previously shut down and started for a second time). In this case, the PMS might response with a link alive (**LA**) record rather than with a link start (**LS**), as shown in the following example:

← **LS**|**DA**021015|**TI**154510|

Since a previous link had been started before, the PMS will respond with a link alive record, as follows:

→ **LA**|**DA**021015|**TI**154600|

The SALTO application will configure the link by sending the same **LD**/**LR**/**LA** sequence:

← **LD**|**DA**021015|**TI**154510|**IF**DL|**V#**2.1|

← **LR**|**RI**KR|**FL**K#KCKTRNWSKOGDDTGASI$1$2|[3]

← **LR**|**RI**KD|**FL**KCRNWS|

← **LR**|**RI**KA|**FL**KCASWSCTDATI$2|

← **LR**|**RI**KM|**FL**G#KCRNROWSDTGD|

← **LA**|**DA**021015|**TI**154650|

→ **LA**|**DA**021015|**TI**154700|

The following paragraphs summarises the link initialization process as implemented by SALTO:

- SALTO will send a link start record (**LS**) at when starting its software. Actually, SALTO interface will retransmit the **LS** record every 10 seconds until an **LS** or **LA** record is received from the PMS.
- SALTO will send a link end record (**LE**) when terminating its software. SALTO will not wait for an **LE** record from the PMS.
- Each time a link start (**LS**) record is received from the PMS, SALTO interface will respond with a link description/link records/link alive (**LD**/**LR**/**LA**) sequence.
- If a link alive (**LA**) record is received from the PMS (and this record is not a response to a previous SALTO's **LS** or **LA** record), then SALTO interface will also respond with a **LD**/**LR**/**LA** sequence.

[3] As stated above, the inclusion of fields $1 and $2 (within the **LR** record of both **KR** and **KA** commands) depends on the corresponding settings in the SALTO DB.

KR- Key Request

This record is sent by the PMS to request a guest key. After processing the request, SALTO will send back a key answer (**KA**) record containing the result of the request.

The fields for this command are as follows:

Fields	***Description***	***Format***	***Values***
K#	Key count	Numeric (max. 2 digits)	Defaults to 1 is not specified
KC	Key coder	Alphanumeric (max. 8 chars)	**-**
KT	Key type	Alphanumeric (max. 2 char)	**N**: new **D**: duplicate **O**: one shot
RN[4]	Room number	Alphanumeric (max. 8 chars)	-
WS	Workstation ID	Alphanumeric (max. 16 chars)	-
KO	Key options	Alphanumeric (max. 62 chars)	0: authorization denied. 1: authorization granted. (Blank): default.
GD	Guest departure date	Date (YYMMDD)	-
DT	Departure time	hh:mm	-
GA	Guest arrival Date	Date	-
$1	Configurable track 1	Alphanumeric (max. 40 chars)	
$2	Fidelio standard track 2 format	Alphanumeric (max. 16 chars)	-
SI	Suite info	Alphanumeric (max. 30 chars)	Values are separated by ';' (semicolon).

Three kinds of keys can be issued by the SALTO interface (**KT**):

- New guest key: issuing a new guest key for a given room automatically cancels all its previous keys.

- Duplicate guest key: if more than one key is required for the same room, then this kind of keys must be used for it does not cancel previously issued ones.
  Note that it is not allowed to ask for duplicate keys when the target room is empty.

- One shot key: this kind of keys is intended to be used once only. After the first time, the key is not valid any longer. Additionally, the key is only valid for an interval of one hour, starting from the time of edition. (Note that for one shot key, the **KO**, **GD**, **DT**, **GA** and **$2** fields are not used).

[4] Note that SALTO interface is a room-oriented system. This means that, when issuing a key, the PMS should specify a room number or name rather than a guest name.

If no departure date is specified in the record, then default value will be current date plus one day.

The **KO** parameter contains the authorizations granted and/or denied to the cardholder. Note that authorizations are position-dependent, that is, the first character in the string represents de first authorization, the second character the second authorization and so on. In a given position, '0' means a denied authorization, '1' (or any other number different from '0') means denied and, finally, ' ' (white space) means default.

Example 1: in the following record, the PMS is requesting a new guest key for room 101 to be issued in encoder 1. The key will expire 27 October 2002 at 12 PM. The key has been granted authorizations #1, #2 and #4.

→ **KR**|**KC**1|**KT**N|**RN**101|**WS**1|**GD**021027|**DT**12:00|**KO**1101|

← **KA**|**AS**OK|**KC**1|**WS**1|**CT**|**DA**021025|**TI**131512|

It is assumed that return of card UID is disabled within the Salto settings. Hence the **KA** response does not include the **$2** field.

Note that the processing duration for this command depends on how long it takes for the receptionist to insert (and remove) a key in the corresponding key coder.

For a given key edition being currently executed, it is possible to abort the operation by sending a new key request for the same room, key coder and workstation. This could be useful when, for example, the receptionist requests a guest key only to realize that the expiration date was not correctly specified. In this case, a second key request can be sent with the correct parameters to abort the current key operation and start a new one, as shown in the following example:

→ **KR**|**KC**1|**KT**N|**RN**101|**WS**1|**GD**021027|**DT**12:00|

In this request, the PMS is asking for a new guest key for room 101 to be issued in encoder 1, being the expiration date 27 October 2002. While the encoder is waiting for a key to be placed, the receptionist might change his mind and want the new key to have a longer valid period (say, 29 October). In this case, the key edition operation being currently executed can be aborted from the PMS by sending another key request with the same field values except for the departure date (**GD**), as shown in the following record:

→ **KR**|**KC**1|**KT**N|**RN**101|**WS**1|**GD**021029|**DT**12:00|

When receiving this second request for the same room, key coder and workstation, SALTO interface will abort the previous edition and start a new want with the last received parameters (note that no key answer (**KA**) request is sent for the aborted operation). Eventually, a key answer request (**KA**) will be sent when finalizing the key edition.

← **KA**|**AS**OK|**KC**1|**WS**1|**CT** |**DA**021025|**TI**131512|

Example 2: in this example, it is assumed that the Salto DB has been configured to return cards UID within the **KA** response.

→ **KR**|**KC**1|**KT**N|**RN**101|**WS**1|**GD**021027|**DT**12:00|**KO**1101|

← **KA**|**AS**OK|**KC**1|**WS**1|**CT**|**DA**021025|**TI**131512|**$2**A5C3B701|

Note that, this time, the **KA** response does return the UID of the card presented at the card encoder. The actual format of the UID depends on the Salto settings.

KD- Key Delete

This record is used by the PMS to cancel a key of a specific room. When this record is executed by SALTO interface, previously edited keys of the specified room will be marked as invalid.

As a response to this record, SALTO interface will send back a key answer (**KA**) record with the result of the request.

The fields for this command are as follows:

Fields	***Description***	***Format***	***Values***
KC	Key coder	Alphanumeric (max. 8 chars)	**-**
RN	Room number	Alphanumeric (max. 8 chars)	-
WS	Workstation ID	Alphanumeric (max. 16 chars)	-

Example 3: in the following record, the PMS is requesting cancelation of all the issued keys for room 101.

→ **KD**|**KC**1|**RN**101|**WS**1|

← **KA**|**AS**OK|**KC**1|**WS**1|**CT**|**DA**021025|**TI**131512|

If the key to be canceled is currently being edited, then the edition operation is aborted, as shown in the following example:

→ **KR**|**KC**1|**KT**N|**RN**101|**WS**1|**GD**021027|**DT**12:00|

→ **KD**|**KC**1|**RN**101|**WS**1|

← **KA**|**AS**OK|**KC**1|**WS**1|**CT**|**DA**021025|**TI**131512|

Note that there is no key answer (**KA**) record for the aborted operation, that is, the first key request (**KR**) record.

KA- Key Answer

This record is sent by SALTO interface to notify about the result of a previous key request (**KR**) or key deletion (**KD**) record. The fields for this record are as follows:

Fields	***Description***	***Format***	***Values***
AS	Answer status	Alphanumeric (2 chars)	**OK:** no error **RY:** error, retry **UR**: unprocessable request, no retry. **BY:** busy, no retry
KC	Key coder	Alphanumeric (max. 8 chars)	**-**
WS	Workstation ID	Alphanumeric (max. 16 chars)	-
CT	Error message	Alphanumeric (max. 40 chars)	Error message (if any).
DA	Date	Date (YYMMDD)	-
TI	Time	Time (hhmmss)	-
$2	UID of the card	Hexadecimal characters.	This field depends on the Salto DB settings.

Note that, when enabled, the $2 contains the UID of the card presented at the specified encoder. The existence and actual content of the **$2** field depends on the Salto settings. See above "Example 2" for an illustrative example.

KM- Key Data Change

This record is used by the PMS to change some of the attributes within the guest key without having to re-encode it at the hotel reception. For this record to be effective, an online system is required, either in the form of online locks (e.g., RF or wired locks) or in the form of online hotspots (i.e., wired card update readers spread around the hotel and capable of updating the content of guest keys when presented).

The fields for this command are as follows:

Fields	***Description***	***Format***	***Values***
G#[5]	Reservation number	Integer	This field is omitted by Salto.
KC	Key coder	Alphanumeric (max. 64 chars)	This field is omitted.
RN	Room number	Alphanumeric (max. 24 chars)	-
RO	Old room number	Alphanumeric (max. 24 chars)	-
WS	Workstation ID	Alphanumeric (max. 100 chars)	This field is omitted.
GD	Guest departure date	Date (YYMMDD)	-
DT	Departure time	hh:mm	-

As a response to this record, SALTO interface will send back a key answer (**KA**) record with the result of the request.

Important note: in case the lock of the target room is an online RF, this record may take a lot of time to be processed (up to 2 minutes). This is due to the high latency of the RF channel. Therefore, the PMS system must take this latency into account and allow a long wait time when sending this record. More specifically, the wait time should be set to 2 minutes.

Example 4: let's imagine that a new guest arrives at the hotel and she is assigned room 101. On a close inspection of the room, she does not find it confortable enough and asks the receptionist for a different room. This time, the receptionist assigns her room 102. In this scenario, the following command from the PMS would make the guest have access to room 102 without the need of key re-encoding (access to room 101 would not be possible afterwards). Note that for this command to work an online system must exist.

→ **KM**|**KC**1|**RN**102|**RO**101|**WS**1|

← **KA**|**AS**OK|**KC**1|**WS**1|**CT**|**DA**151230|**TI**191200|

Example 5: in this example, the PMS system asks the Salto server to extend the validity of the card (until April 14th) for the guest of room 101.

[5] Note that SALTO interface is a room-oriented system. This means that, when moving from one room to antoher, the old and new room numbers must be provided rather than the reservation number.

→ **KM**|**KC**1|**RN**101|**RO**101|**GD**160414|**DT**12:00|**WS**1|

← **KA**|**AS**OK|**KC**1|**WS**1|**CT**|**DA**151230|**TI**191200|

Low Level Protocol Specifications[6]

All records are framed, that is, they started and ended with link control bytes as follows:

STX	Record	**ETX**	**LRC**

In order to ensure the integrity of a frame, an **LRC** (Longitudinal Redundancy Check) value can be specified just after the **ETX** control byte. **LRC** is calculated by performing the exclusive OR operation (XOR) on all characters after **STX** (**ETX** included).

In the following table, the low level control bytes are shown:

Control	***Value (hex.)***	***Description***
STX	02	Start of record
ETX	03	End of record
ENQ	05	It is used to reinquire when no response is received.
ACK	06	Positive acknowledgement.
NAK	15	Negative acknowledgement.

When transmitting a record, the sender must wait for an **ACK** control byte before sending a new record. If the sender receives a **NAK**, the original record is transmitted again, retrying 3 times (for a total of 4 transmission attempts).

It is possible that the sender does not receive an **ACK** or **NAK** within the 2 second response timeout. In this case, the sender should transmit an enquiry **ENQ** control byte within 2 seconds: this is a prompt to the receiving system to retransmit its last **ACK** or **NAK**.

Physical Layer

Communications between SALTO interface and PMS can be performed via serial link (RS-232) or TCP/IP.

Default communication parameters for serial link are as follows: 19200 baud rate, 8 data bits, no parity and 2 stop bits. These parameter is configurable in the SALTO software at any time.

If TCP/IP is selected, then SALTO interface is configured as a client. SALTO interface must be provided with the appropriate port number and IP address to establish communication with the PMS (server). If a connection error occurs, SALTO interface will attempt a new connection every 20 seconds.

Important: when tcp/ip connection is selected, then low level handshaking (positive acknowledgement **ACK**, negative acknowledgement **NAK** and enquiry **ENQ**) is not used since the tcp/ip protocol already provides with the necessary mechanism to guarantee data transmission and reception between sender and receiver. In addition, SALTO interface does not add any LRC value to each frame for the same reason.

[6] Only applicable to RS-232 serial connection. When using tcp/ip, low-level handshaking is not implemented.

TCP/IP connection failures

When TCP/IP connection failures occur (network cable accidentally broken, etc.), it is important to be capable of re-establishing the connection. In the SALTO interface, the following features have been implemented:

- Every time a socket connection error is detected by the SALTO interface, the tcp/ip connection will be closed from the client side and a new one will be attempted every 20 seconds until it is accepted by the PMS.

- Once a tcp/ip connection is established, the SALTO interface will send a link alive request from time to time (every 90 secs, approximately) in order to test that the connection with the PMS is still working. If error occurs in this test, then the socket will be closed and a new socket connection will be attempted (as described in the previous paragraph) every 20 seconds until it is accepted by the PMS.

- It is advisable that the PMS should accept any new incoming socket connection from the SALTO interface and discard the old ones. In other words, the valid tcp/ip connection from the SALTO interface should be the newest one.