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1   Introduction

This document specifies standard IQRF light device DPA commands and RFC Commands.

ID of this standard is 0x71.

The standard is implemented using one DPA peripheral and four DPA command. The device supporting this standard can contain up to 32 lights. The lights implemented by the device are addressed (indexed) consecutively using the index starting from index 0 up to 31. No "gaps" are allowed.

The following chapters describe the standard in more detail. Also, see provided Custom DPA Handler source code examples for the best practice implementation details.

2   DPA Commands

The standard uses peripheral PNUM = 0x**71** (stands for **LI**ght)

2.1 Set Power

PCMD = 0x00

Sets lights' power level and returns a previous power level. Up to 32 lights are supported.

Request

NADR	PNUM	PCMD	HWPID	0 … 3	4 … n
NADR	0x71	0x00	0xXXXX or 0xFFFF	Bitmap	Power

Bitmap   A 32-bit bitmap (4 bytes) specifying lights to set. If an unimplemented light is selected in the bitmap, then, of course, it is not set and also no error is reported. Thus the full bitmap 0xFF.FF.FF.FF indexing all theoretical 32 lights will cause setting all actually implemented lights without previous knowledge of their real count.

Power   Byte array with a power level bytes (plus optional ON time bytes) for each selected light. If the length of this field is not correct then ERROR_DATA is returned. Each power level byte has the following format:
[tppp.pppp]
bit:0…6   These bits specify the requested power level:

0-100	Requested power level value. The unit is 1 %. The device might set another actual (physical) value if for some reason it does not support the requested value (e.g. when only 0 % and 100 % i.e. on and off states are supported) nevertheless a non-zero value must always make the light shine (light is not off). Previously set ON timing is disabled.
101-126	Causes ERROR_DATA return code.
127	Keep current power level preserved.

bit:7   If this bit is set, then power level byte is followed by an ON time byte. ON time precision depends on the particular implementation. Especially in LP mode, it is influenced by the receiving timeout value (see LPtoutRF DPA variable). The meaning of the ON byte is the following:

0x01-0x7F   Sets the requested non-zero power level for next 1-127 minutes. After the specified time the light is set to 0 %. If requested power level is 0 %, then the time is ignored.

0x81-0xFF   Sets the requested non-zero power level 1-127 seconds (bit.7 is masked out). After the specified time the light is set to 0 %. If requested power level is 0 %, then the time is ignored.

0x00, 0x80   Causes ERROR_DATA return code.

Response

NADR	PNUM	PCMD	HWPID	ErrN	DpaValue	0 … n
NADR	0x71	0x80	0xXXXX	0	?	Previous power

Previous power   Each byte is the actual (physically used) previous power level of each selected light. If the unimplemented light was selected the returned value is 0.

2.2 Increment Power

PCMD = 0x01

Same as Set Power command but the specified power level is added to the previously set power level (does not have to equal to actually used power level). Resulting power level after adding is always trimmed to the range 0-100 % in case it would overflow.

If the light cannot actually (physically) set any power level value from the range 0 - 100 % then it must compute the next requested power level based on the last requested power level but not based on the actual set power level. The following example shows the behavior of the light that can physically use only power levels that are multiple of 10 % (i.e. 0, 10, …, 100 %):

step	command	requested power	actual power	reported previous power
0		0 %	0 %	
1	set 15 %	15 %	20 %	0 %
2	increment +6 %	21 %	30 %	20 %
3	decrement -10 %	11 %	20 %	30 %
4	decrement -9 %	2 %	10 %	20 %
5	decrement -100 %	0%	0 %	10 %
6	increment 0 %	0%	0%	0 %

2.3 Decrement Power

PCMD = 0x02

Same as Increment Power but the power value is decremented.

2.4 Enumerate Lights

PCMD = 0x3E

This command enumerates implemented outputs.

Request

NADR	PNUM	PCMD	HWPID
NADR	0x71	0x3E	0xXXXX or 0xFFFF

Response

NADR	PNUM	PCMD	HWPID	ErrN	DpaValue	0

NADR	0x71	0xBE	0xXXXX	0	?	Count

Count   Number of implemented binary outputs.

3 FRC Commands

Two implemented 2-bits FRC commands return the state of the light. FRC user-data has the following format:

UserData[0]   0x71 (equals to the PNUM)
UserData[1]   [xxxi.iiii]
        bit:0…4   Light index (from 0 to 31)
        bit:5…7   Reserved

3.1 Light On/Off - 0x10

Return values:
 0b10 Light is off.
 0b11 Light is on. It signalizes the light is on regardless of the requested power level. For instance, if the light power relay is malfunctioning (i.e. relay is always closed because of sintered contacts) the light reports the on state all the time.

3.2 Light Alarm - 0x11

Return values:
 0b10 No alarm.
 0b11 Alarm. Proprietary device commands and/or sensors can be used to find out details of the alarm state.

3.3 Predefined 2-bits FRC values

Return values:
 0b00 No FRC response (device is not responding).
 0b01 FRC not implemented.

4 Implementation notes

The power level of lights after the device is reset/restarted/waken-up or before it is reset/restarted/RFPGMed/putToSleep is not standardized. This behavior is device specific and proprietary.

5 Examples

Note: always PNUM=0x71, always the same device.

Enumerate lights:
- Request
PCMD=0x3E
- Response
PCMD=0xBE, PData=[0x03] => device implements 3 lights.

Set 1st light to 10% and 3rd light to 100% for 2 minutes:
- Request
PCMD=0x00, PData=[0x05,0x00,0x00,0x00] [0x0A] [0xE4,0x02]
- Response
PCMD=0x80, PData= [0x00,0x00] => 1st and 3rd lights were at 0%

Increase 1st light by +10% for 3 minutes and 2nd light by +50%:
- Request
PCMD=0x01, PData=[0x03,0x00,0x00,0x00] [0x8A,0x03] [0x32]
- Response
PCMD=0x81, PData= [0x0A,0x00] => 1st light was at 10%, 2nd lights was at 0%

Read FRC Light On/Off for the 2nd light.

- Request

PNUM=0x0D $^{FRC\ peripheral}$, PCMD=0x00 $^{FRC\ Send}$, PData=[0x10 $^{2\text{-bit Light On/Off}}$][0x71, 0x01 $^{2nd\ Light}$]

- Response

PNUM=0x0D, PCMD=0x80, PData=[0x?? $^{FRC\ status}$][…]

6   Revision History

0.05

- Enumeration response changed. Previously it returned a bitmap of implemented lights, now it returns a number of implemented lights.
- FRC example added.