

2N Telekomunikace a.s.

Lift M2M DTMF protocol

August 7, 2018

1 Introduction

The M2M DTMF protocol was designed to enable programming and command execution using automated systems. This article describes its usage.

2 Protocol description

To enter the M2M mode the master unit must wait a little bit after the call is connected (e.g. 500 ms) and send DTMF A to the slave (Lift). The switch to the M2M mode is acknowledged by the slave by sending DTMF B. If no response is received, the master unit can retry until the transition is confirmed.

In M2M mode the CPC Antenna protocol is used (standard CPC protocol, the checksum is calculated as the sum of all chars in the command and data part and the message length). The maximum supported length of the data part of the CPC message is 35 chars.

A few commands are supported, they use the CPC *Command* message (06). For parameter transfer, the *Data To Slave* (08) message is used and their hash retrieved using the *Data From Slave* (09) message. Every command is acknowledged using the *General Acknowledgement* (01) message (ACK or NACK).

3 Command messages

The following command messages and parameters (both in the CPC message data field) are supported:

ID	Command	Parameter(s)
90	Authorization	Service password ¹
91	Start sending parameter data packets	
92	Commit parameters (write to device)	
98	Use a configuration preset ²	Preset set number (0-9)
99	Reset all parameters to their factory defaults ²	Service password ¹

Before using any other commands the master unit must authorize itself using the command 90. After successful authorization it can send other commands.

4 Parameters transfer

The command 91 is sent to start the transfer of parameters. Then a number of *Data To Slave* messages are sent with the parameters themselves. Before committing the parameters to the device, the checksum of all parameters should be retrieved by sending the *Data From Slave* command and comparing it with the locally computed one.

The *Data To Slave* messages can contain multiple parameters. The parameter number³ is divided from its value by DTMF A, same goes for every parameter number - value pair. E.g. To send parameters 011 with value 12345 and 111 with value 1 in the same message, the message data

¹The service password is the parameter 991.

²Executed immediately.

³Only parameters up to 999 can be sent using this method.

part must be 011A12345A111A1. The number of parameters sent in every message is limited only by the maximum length of the message.

See example for further details (Figure 1).

4.1 Checksum calculation for Lift8, Lift IP

The Lift8 and Lift IP systems use a SHA-256 hash as checksum. All the data parts are run through the checksum algorithm as they are found in the data part of the message. The first (most significant) 96 bits of the 256 bit digest are taken and divided into 16 bit chunks (interpreted as little-endian words) which are encoded in decimal form (each 5 chars with leading zeroes if needed) and sent as one message.

Example

The following parameters are set: 011=123456789123456789, 111=3, 012=987654321, 112=1. The hash is calculated from the data part of all *Data To Slave* messages (before encoding repeating chars), i.e. SHA-256("11A123456789123456789A111A312A987654321A112A1") = ca0174f02aa58ff9ff5ffbf526a8124c17e8bb09fa367b5e82288297647c9cfc (hex). The first 96 bits are taken and divided into 16 bit chunks: ca01 74f0 2aa5 8ff9 ff5f bbf5. Those are encoded in decimal form (00458 61556 42282 63887 24575 62971) and sent as a string to the master.

4.2 Checksum calculation for Lift1

The Lift1 system uses the CRC-32 algorithm to calculate the checksum. All the data parts are run through the checksum algorithm as they are found in the data part of the message. The resulting CRC is transferred into decimal form and transferred digit after digit.

Example

The following parameters are set: 011=123456789, 111=3, 012=987654321, 112=1. The hash is calculated from the data part of all *Data To Slave* messages (before encoding repeating chars), i.e. CRC-32("11A123456789A111A3A12A987654321112A1") = 309891124 (dec). This value is sent as a string to the master.

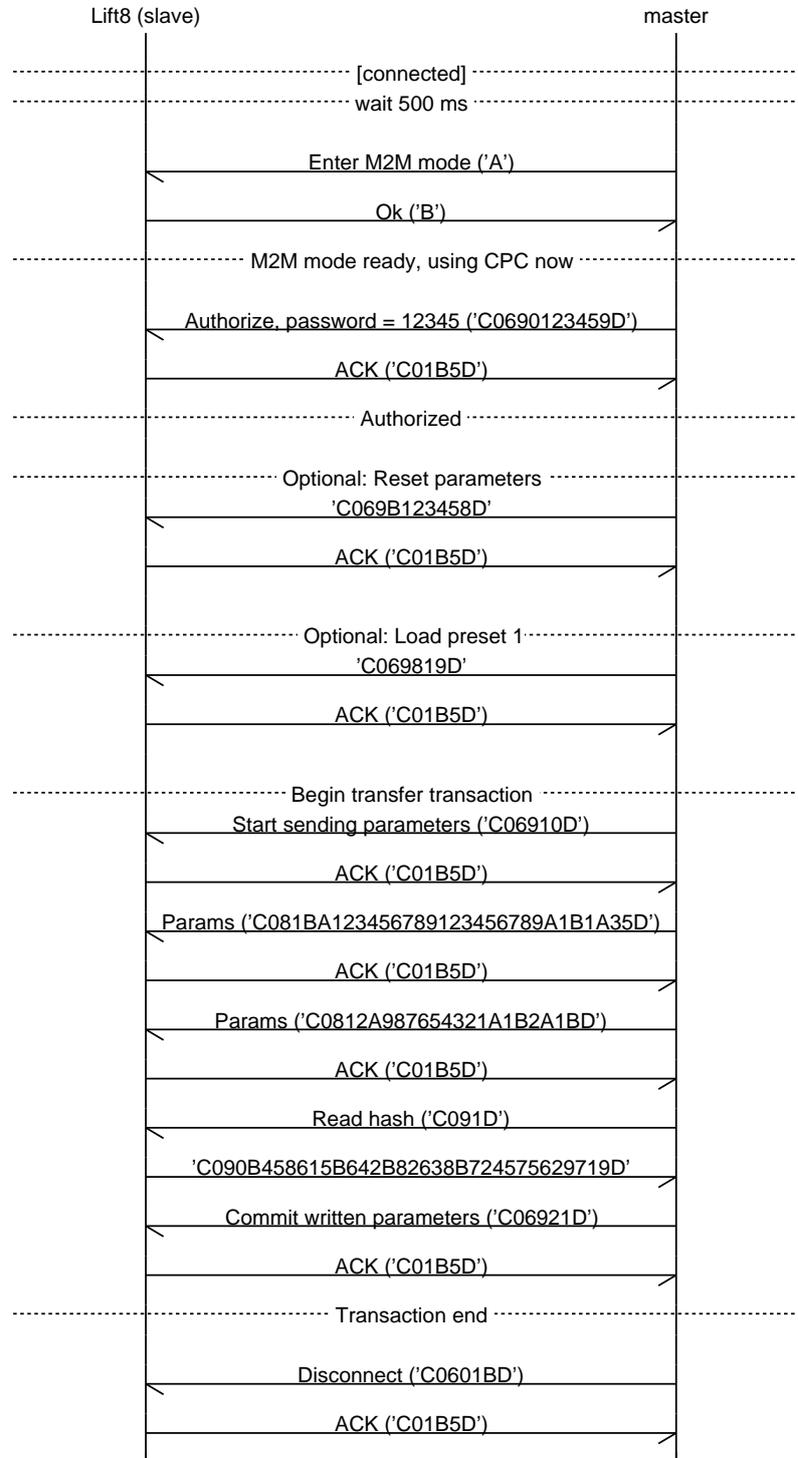


Figure 1: **Using the M2M protocol to set parameters.** All optional parts are described. The following parameters are set: 011=123456789123456789, 111=3, 012=987654321, 112=1.