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MLGW Protocol specification

MLGW02

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1 │ Introduction

....

This document specifies the general purpose protocol for communicating Beolink with a 3rd party controller.

The current version of the protocol is 2.4 and corresponds to MLGW software release 2.24a and BLGW v1.1.0.

This protocol is backwards compatible with MLGW01 RS232 protocol.

5 types of messages are conveyed by the protocol:
  ° Commands from the controller to Beolink products
  ° Commands from the controller to MLGW macro programming
  ° Status information from the products to the controller
  ° Light and Control commands received by the products are forwarded to the controller
  ° Authentication messages and configuration notifications for mobile applications

All messages are packetized in what is called a "telegram", which provides message synchronization and identification. Telegrams carry a payload with the actual information.

1.1 │ Supported communication media

MLGW Protocol can be carried over any transparent, character-oriented interface.

Examples are: TCP socket connection; asynchronous serial link.

1.2 │ Conventions
  ° All data in this protocol is binary-encoded.
  ° "Byte" or "character" are used interchangeably.
  ° All integer values are represented in hexadecimal notation, preceded by the standard "0x" prefix. E.g. 0x0A represents the decimal value 10.

° Large integers, which are represented with 2 bytes, are always transmitted and interpreted as most significant byte first, followed by the least significant byte. For example, the number 0x1234 is transmitted as 0x12 followed by 0x34.

2 | Telegram structure

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This section specifies all MLGW Protocol telegrams.

2.1 | Telegram general structure

All telegrams consist of a header followed by a payload.

The header provides frame synchronization, and indicates the type of information in the rest of the telegram (payload).

The payload includes the actual information transmitted to, or received from, the Beolink network.

The structure of a telegram is the following:

SOH	Type	Length	Spare	payload
0x01	1 byte	1 byte	1 byte	variable length

Description of header fields:

2.1.1 | Start of header
This is a fixed character used for frame synchronization.

2.1.2 | Type

This parameter identifies the payload type.

Payload types supported in this specifications and their coding are:

Payload type	Value	Direction	Notes

Payload type	Value	Direction	Notes
Beo4 Command	0x01	Controller to Beolink	
Source status	0x02	Beolink to Controller	
Picture and sound status	0x03	Beolink to Controller	Products with MLGW compatible SW
Light and Control command	0x04	Beolink to Controller	Products with MLGW compatible SW
All standby notification	0x05	MLGW to Controller	Since MLGW SW 1.5
BeoRemote One control command	0x06	Controller to Beolink	Since MLGW SW 2.4
BeoRemote One source selection	0x07	Controller to Beolink	Since MLGW SW 2.4
MLGW virtual button event	0x20	Bidirectional	Since MLGW SW 1.2, notification since SW 1.8
Login request	0x30	Controller to MLGW	Since MLGW SW 1.3
Login status	0x31	MLGW to Controller	Since MLGW SW 1.3
Change password request	0x32	Controller to MLGW	Since MLGW SW 1.3
Change password response	0x33	MLGW to Controller	Since MLGW SW 1.3
Secure login request	0x34	Controller to MLGW	Since MLGW SW 1.3
Ping	0x36	Controller to MLGW	Since MLGW SW 1.3
Pong	0x37	MLGW to Controller	Since MLGW SW 1.3
Configuration change notification	0x38	MLGW to Controller	Since MLGW SW 1.3
Request Serial Number	0x39	Controller to MLGW	Since MLGW SW 1.4
Serial Number	0x3A	MLGW to Controller	Since MLGW SW 1.4
Location based event	0x40	Controller to MGLW	BeoHome branch

Telegrams with type values other than the above shall be discarded and not interpreted. Optionally, a warning message can be raised or logged, if applicable, to indicate protocol version incompatibility.

2.1.3 | Length

Length specifies the number of data bytes in the payload. It is an unsigned integer in the range 0x00 to 0xEF.

Values beyond 0xEF are reserved for future protocol extensions. Telegrams with such values should be discarded and not interpreted.

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2.1.4 | Spare

For future use. Must be set to 0x00 for this version of the specification, and should be ignored by a device conforming to this version of the protocol.

2.1.5 | Payload

The payload represents the data traversing the gateway, and its structure is specified in the following sections.

3 | Telegram protocol

The following procedure is a recommendation on how to process the incoming characters in order to provide telegram synchronism. MLGW itself follows this recommendation, and the 3rd party controller should proceed similarly.

1. Discard all characters until reception of Start of Header (0x01, ASCII SOH).
2. Receive and decode the rest of the header (3 extra characters)
3. Receive the data corresponding to the payload: as many bytes as indicated by the length header parameter.
4. If not enough data has been received to complete the telegram, and the link is inactive for more than 1 second, then discard all characters received and start searching for a new telegram (step 1).
5. If the type value is unsupported, discard the whole telegram. Do the same if any of the other header parameters is out of range.
6. Process the payload.

This way, there will be no deadlocks if a character has been lost or inserted (e.g. due to interference), or if telegram synchronization has been lost (e.g. due to reconnection of the RS232 cable, or power-up of one of the devices).

In order to avoid buffer overflow, a 255 byte receiving buffer should be considered for storing and analyzing the received telegram. This is independent of any extra input queuing provided by the operating system.

4 | Beo4 Command telegram payload

There are 2 possible structures for this telegram; the extended version allows for selection of secondary sources.

MLN	Destination selector	Beo4 Command
1 byte	1 byte	1 byte

MLN	Destination selector	Beo4 Command	Secondary source	Link
1 byte	1 byte	1 byte	1 byte	1 byte

This telegram emulates Beo4 commands. It works on all MLGW compatible products.

4.1 | MLN

Masterlink Node number of the product to control.

4.2 | Destination selector

This parameter determines to which part of a system the command is targeted.
 ° In case of an audio product, always select "Audio Source".
 ° In case of a video product, normally you should select "Video Source".
 ° If you only want to switch / operate the audio source of a video product, without affecting the video source, then you should use "Audio Source" on the video product. This is analogous to using the AV option on Beo4.
 ° If the video product has a B&O VCR or a second DVD player attached to the SCART or other input connectors, then the command can be routed to the corresponding player by means of the two remaining options.

Destination selector coding:

Destination selector	Value
Video source	0x00

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Destination selector	Value
Audio source	0x01
V.TAPE/V.MEM	0x05
All products (for ALL STANDBY)	0x0F

4.3 | Secondary source

If the source to control is a secondary source (V.TAPE2 / DVD2 / V.MEM2), then **Destination selector** should be set to 0x05, and **Secondary source** to 0x01:

Secondary source	Source to control
0x00	V.MEM, V.TAPE
0x01	V.TAPE2 / DVD2 / V.MEM2

4.4 | Link

This field provides the functionality of Beo4 LINK prefix for selecting a remote source.

This is only necessary for sources that have a local source, to distinguish between the local and the remote source. It may also be required for controlling products in OPTION 4.

Link	Source to control
0x00	Local / default source
0x01	Remote source / OPTION 4 product

4.5 | Beo4 Command

The commands available are listed below, grouped into categories. Each command corresponds to functions available on Beo4.

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Commands are grouped by functionality, and both decimal and hexadecimal codes are given.

4.5.1 | Source selection:

Command	Hex	Dec
STANDBY	0x0C	012
SLEEP	0x47	071
TV	0x80	128
RADIO	0x81	129
AUX_V / DTV2	0x82	130
AUX_A	0x83	131
VTR / V.MEM / DVD2	0x85	133
CDV / DVD	0x86	134
CAMCORDER / CAMERA	0x87	135
TEXT	0x88	136
V_SAT / DTV	0x8A	138
PC	0x8B	139
DOORCAM / V.AUX2	0x8D	141
TP1 / A.MEM	0x91	145
CD	0x92	146
PH / N.RADIO	0x93	147
TP2 / N.MUSIC	0x94	148
CD2 / JOIN	0x97	151
VTR2	0xA8	168
MEDIA	0x84	132
WEB	0x8C	140
PHOTO	0x8E	142
USB2	0x90	144
SERVER	0x95	149
NET	0x96	150
PICTURE_IN_PICTURE / P-AND-P	0xFA	250

Note that VTR2 may be needed as a substitute for DVD2 on some link products.

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4.5.2 | Digits:

Command	Hex	Dec
CIFFER_0 / Digit 0	0x00	000
CIFFER_1 / Digit 1	0x01	001
CIFFER_2 / Digit 2	0x02	002
CIFFER_3 / Digit 3	0x03	003
CIFFER_4 / Digit 4	0x04	004
CIFFER_5 / Digit 5	0x05	005
CIFFER_6 / Digit 6	0x06	006
CIFFER_7 / Digit 7	0x07	007
CIFFER_8 / Digit 8	0x08	008
CIFFER_9 / Digit 9	0x09	009

4.5.3 | Source control:

Command	Hex	Dec
STEP_UP	0x1E	030
STEP_DW	0x1F	031
REWIND	0x32	050
REC_RETURN / RETURN	0x33	051
WIND	0x34	052
GO / PLAY	0x35	053
STOP	0x36	054
CNTL_WIND / Yellow	0xD4	212
CNTL_REWIND / Green	0xD5	213
CNTL_STEP_UP / Blue	0xD8	216
CNTL_STEP_DW / Red	0xD9	217

4.5.4 | Sound and picture control:

Command	Hex	Dec

Command	Hex	Dec
MUTE	0x0D	013
PICTURE_TOGGLE / P.MUTE	0x1C	028
PICTURE_FORMAT / FORMAT	0x2A	042
SOUND / SPEAKER	0x44	068
MENU	0x5C	092
ANALOG_UP_1 / Volume UP	0x60	096
ANALOG_DW_1 / Volume DOWN	0x64	100
CINEMA_ON	0xDA	218
CINEMA_OFF	0xDB	219

4.5.5 | Other controls:

Command	Hex	Dec
OPEN_STAND / STAND	0xF7	247
CLEAR	0x0A	010
STORE	0x0B	011
RESET / INDEX	0x0E	014
BACK	0x14	020
CMD_A / MOTS	0x15	021
GOTO / TRACK / LAMP	0x20	032
SHOW_CLOCK / CLOCK	0x28	040
EJECT	0x2D	045
RECORD	0x37	055
MEDIUM_SELECT / SELECT	0x3F	063
TURN / SOUND	0x46	070
EXIT	0x7F	127
CNTL_0 / SHIFT-0 / EDIT	0xC0	192
CNTL_1 / SHIFT-1 / RANDOM	0xC1	193
CNTL_2 / SHIFT-2	0xC2	194
CNTL_3 / SHIFT-3 / REPEAT	0xC3	195
CNTL_4 / SHIFT-4 / SELECT	0xC4	196
CNTL_5 / SHIFT-5	0xC5	197
CNTL_6 / SHIFT-6	0xC6	198
CNTL_7 / SHIFT-7	0xC7	199

Command	Hex	Dec
CNTL_8 / SHIFT-8	0xC8	200
CNTL_9 / SHIFT-9	0xC9	201

4.5.6 | Continue functionality:

Command	Hex	Dec
C_REWIND / Continue REWIND	0x70	112
C_WIND / Continue WIND	0x71	113
C_STEP_UP / Continue step UP	0x72	114
C_STEP_DW / Continue step DOWN	0x73	115
CONTINUE / Continue (other keys)	0x75	117
CNTL_C_REWIND / Continue Green	0x76	118
CNTL_C_WIND / Continue Yellow	0x77	119
CNTL_C_STEP_UP / Continue Blue	0x78	120
CNTL_C_STEP_DW / Continue Red	0x79	121
KEY_RELEASE	0x7E	126

4.5.7 | Functions:

Command	Hex	Dec
FUNCTION_1	0x0F	015
FUNCTION_2	0x10	016
FUNCTION_3	0x11	017
FUNCTION_4	0x12	018
FUNCTION_5	0x19	025
FUNCTION_6	0x1A	026
FUNCTION_7	0x21	033
FUNCTION_8	0x22	034
FUNCTION_9	0x23	035
FUNCTION_10	0x24	036
FUNCTION_11	0x25	037
FUNCTION_12	0x26	038
FUNCTION_13	0x27	039

Command	Hex	Dec
FUNCTION_14	0x39	057
FUNCTION_15	0x3A	058
FUNCTION_16	0x3B	059
FUNCTION_17	0x3C	060
FUNCTION_18	0x3D	061
FUNCTION_19	0x3E	062
FUNCTION_20	0x4B	075
FUNCTION_21	0x4C	076
FUNCTION_22	0x50	080
FUNCTION_23	0x51	081
FUNCTION_24	0x7D	125
FUNCTION_25	0xA5	165
FUNCTION_26	0xA6	166
FUNCTION_27	0xA9	169
FUNCTION_28	0xAA	170
FUNCTION_29	0xDD	221
FUNCTION_30	0xDE	222
FUNCTION_31	0xE0	224
FUNCTION_32	0xE1	225
FUNCTION_33	0xE2	226
FUNCTION_34	0xE6	230
FUNCTION_35	0xE7	231
FUNCTION_36	0xF2	242
FUNCTION_37	0xF3	243
FUNCTION_38	0xF4	244
FUNCTION_39	0xF5	245
FUNCTION_40	0xF6	246

4.5.8 | Cursor functions:

Command	Hex	Dec
SELECT / Cursor SELECT	0x13	019
CURSOR_UP	0xCA	202
CURSOR_DW	0xCB	203

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Command	Hex	Dec
CURSOR_LEFT	0xCC	204
CURSOR_RIGHT	0xCD	205

5 | BeoRemote One control command telegram payload (F17) [NEW]

....

The format for a BeoRemote One control command telegram is as follows:

MLN	Command	AV	Network
1 byte	1 byte	1 byte	1 byte

This telegram emulates an BeoRemote One control IR command.

MLN has the same meaning as for Beo4 Command.

AV corresponds to the AV-bit, and can have values 0 or 1. This parameter can be safely set to 0, but a specific value may be required in the future.

Network corresponds to the Network-bit and can have values 0 or 1. Network-bit is used to tell the product whether the telegram is meant to this product's local source or to a source in a network. If it is not defined local source is assumed.

Command specifies a source control command in general, and the values can be obtained from the list of "Beo4 command" listed above.

6 | BeoRemote One source selection telegram payload (F20) [NEW]

....

The format for a BeoRemote One source selection telegram is as follows:

MLN	Command	Unit	AV	Network
1 byte	1 byte	1 byte	1 byte	1 byte

This telegram emulates an BeoRemote One source selection IR command.

MLN has the same meaning as for Beo4 Command.

AV and Network have the same meaning as for *BeoRemote One control command* commands.

Command together with Unit, selects between the different sources as listed in next list:

Source	Command	Unit
TV	80	0
RADIO	81	0
TUNEIN	81	1
DVB RADIO	81	2
AV IN	82	0
LINE IN	83	0
A.AUX	83	1
BLUETOOTH	83	2
HOMEMEDIA	84	0
DLNA-DMR	84	1
RECORDINGS	85	0
CAMERA	87	0
Future use	89	0
USB	90	0
USB 2	90	1

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Source	Command	Unit
A.MEM	91	0
CD	92	0
NET RADIO	93	0
MUSIC	94	0
DLNA-DMR	94	1
AirPlay	94	2
SPOTIFY	96	0
DEEZER	96	1
QPLAY	96	2
JOIN (toggle)	97	0
WEBMEDIA	8C	0
YOUTUBE	8C	1
HOME APP	8C	2
HDMI 1	CE	0
HDMI 2	CE	1
HDMI 3	CE	2
HDMI 4	CE	3
HDMI 5	CE	4
HDMI 6	CE	5
HDMI 7	CE	6
HDMI 8	CE	7
MATRIX 1	CF	0
MATRIX 2	CF	1
MATRIX 3	CF	2
MATRIX 4	CF	3
MATRIX 5	CF	4
MATRIX 6	CF	5
MATRIX 7	CF	6
MATRIX 8	CF	7
MATRIX 9	D0	0
MATRIX 10	D0	1
MATRIX 11	D0	2
MATRIX 12	D0	3
MATRIX 13	D0	4
MATRIX 14	D0	5
MATRIX 15	D0	6

Source	Command	Unit
MATRIX 16	D0	7
PERSONAL 1	D1	0
PERSONAL 2	D1	1
PERSONAL 3	D1	2
PERSONAL 4	D1	3
PERSONAL 5	D1	4
PERSONAL 6	D1	5
PERSONAL 7	D1	6
PERSONAL 8	D1	7
TV ON	D2	0
MUSIC ON	D3	0
PATTERNPLAY	D3	1

7 | Source status telegram payload

These telegrams carry information about the current source.

This status information is transmitted by the products whenever any of the involved parameters change.

The structure of the source status telegram is the following:

MLN	Source	Source medium position	Source position	Source activity	Picture format identifier
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

7.1 | MLN

Masterlink Node number of the product reporting a status change.

7.2 | Source

The currently selected source, according to the following table:

Source	Value
TV	0x0B
V_MEM / V_TAPE	0x15
DVD_2 / V_TAPE2	0x16
SAT / DTV	0x1F
DVD	0x29
DTV_2 / V_AUX	0x33
V_AUX2 / DOORCAM	0x3E
PC	0x47
RADIO	0x6F
A_MEM	0x79
A_MEM2	0x7A
CD	0x8D

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Source	Value
A_AUX	0x97
N_RADIO	0xA1
MEDIA	
WEB	
PHOTO	
USB2	
SERVER	
NET	

7.3 | Source medium position

Indicates a higher-level media navigation position. Availability and exact meaning are product and media dependent. The value is a 16 bit unsigned integer.

For example, it indicates the current CD position playing on BS9000 (1 to 6).

7.4 | Source position

Media index. E.g. CD track number, RADIO or TV program number. The value is a 16 bit unsigned integer.

7.5 | Source activity

Source activity indicates the current state for audio and video sources with searchable media (such as CD, V.TAPE, V.MEM).

Source activity	Value
Unknown	0x00
Stop	0x01
Playing	0x02
Wind	0x03
Rewind	0x04
Record lock	0x05
Standby	0x06

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Source activity	Value
No medium	0x07
Still picture	0x08
Scan-play forward	0x14
Scan-play reverse	0x15
Blank status	0xFF

7.6 | Picture format identifier

Aspect ratio of the picture being displayed.

Picture format	Value
Not known	0x00
Known by decoder	0x01
4:3	0x02
16:9	0x03
4:3 Letterbox middle	0x04
4:3 Letterbox top	0x05
4:3 Letterbox bottom	0x06
Blank picture	0xFF

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8 | Picture and sound status telegram payload
....

Information on sound settings and picture activity is carried by these telegrams.

Such status information is transmitted by the products whenever any of the involved parameters change.

Check for products that support reporting of picture and sound status, and ensure that it has been enabled in the product setup menu.

MLN	Sound status	Speaker mode	Volume level	Screen1 mute	Screen1 active	Screen2 mute	Screen2 active	Cinema mode	Stereo
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte

8.1 | MLN
Masterlink node.

8.2 | Sound status
Indicates whether sound output has been muted.

Sound status	Value
Sound output not muted	0x00
Sound output muted	0x01

8.3 | Speaker mode
Indicates the speaker mode setting of the product. The currently available options are the following.

Speaker mode	Value
Speaker mode 1 (center channel)	0x01

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Speaker mode	Value
Speaker mode 2 (2ch stereo)	0x02
Speaker mode 3 (front surround)	0x03
Speaker mode 4 (4ch stereo)	0x04
Speaker mode 5 (full surround)	0x05

8.4 | Volume level

The current volume setting of the product. The range is 0 to 90 (0x00 to 0x5A).

8.5 | Screen mute

Indicates if signal to the screen has been muted.

Screen mute	Value
Screen signal not muted	0x00
Screen signal muted	0x01

Screen 1 refers to the main screen; Screen 2 refers to the secondary screen or projector.

8.6 | Screen active

Indicates if the screen is the active screen.

Screen active	Value
Not active screen	0x00
Active screen	0x01

Screen 1 refers to the main screen; Screen 2 refers to the secondary screen or projector.

8.7 | Cinema mode

This field indicates whether a video system is in daily viewing mode (internal screen and

speakers), or if it has been switched to event viewing (home theater mode, on external screen / projector).

Cinema mode	Value
Cinema mode off	0x00
Cinema mode on	0x01

8.8 | Stereo indicator
Indicates the audio option selected on a TV program.

Stereo indicator	Value
Mono	0x00
Stereo	0x01

9 | Light and Control telegram payload

Light and Control (L&C) command telegrams have the following structure:

Room Number	LC Type	LC Command
1 byte	1 byte	1 byte

9.1 | Room Number

The Room Number parameter identifies in which room the command was issued.

Light and Control commands are associated to a room and not to particular products. More than 1 product in a room may be configured to forward L&C commands to MLGW02.

Room numbers and the products that belong to each room are defined during MLGW02 configuration.

9.2 | LC Type

This field indicates if the command is a LIGHT or CONTROL command as folloes:

LC Type	Meaning
0x01	LIGTH command
0x02	CONTROL command

9.3 | LC Command

This field is the actual command. The list of available commands is identical for LIGHT

and for CONTROL, except for the "LIGHT" and "CONTROL" commands themselves.

9.3.1 | Keys:

Key / command	Hex	Dec
LIGHT	0x9B	155
CONTROL	0x9C	156
CIFFER_0 / Digit 0	0x00	000
CIFFER_1 / Digit 1	0x01	001
CIFFER_2 / Digit 2	0x02	002
CIFFER_3 / Digit 3	0x03	003
CIFFER_4 / Digit 4	0x04	004
CIFFER_5 / Digit 5	0x05	005
CIFFER_6 / Digit 6	0x06	006
CIFFER_7 / Digit 7	0x07	007
CIFFER_8 / Digit 8	0x08	008
CIFFER_9 / Digit 9	0x09	009
STEP_UP	0x1E	030
STEP_DW	0x1F	031
REWIND	0x32	050
REC_RETURN / RETURN	0x33	051
WIND	0x34	052
GO / PLAY	0x35	053
STOP	0x36	054
STANDBY	0x0C	012
CNTL_WIND / Yellow	0xD4	212
CNTL_REWIND / Green	0xD5	213
CNTL_STEP_UP / Blue	0xD8	216
CNTL_STEP_DW / Red	0xD9	217
MENU	0x5C	092
BACK	0x14	020
RECORD	0x37	055
ALL STANDBY	0xAB	171
C_REWIND / Continue REWIND	0x70	112
C_WIND / Continue WIND	0x71	113

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Key / command	Hex	Dec
C_STEP_UP / Continue step UP	0x72	114
C_STEP_DW / Continue step DOWN	0x73	115
CONTINUE / Continue (other keys)	0x75	117
CNTL_C_REWIND / Continue Green	0x76	118
CNTL_C_WIND / Continue Yellow	0x77	119
CNTL_C_STEP_UP / Continue Blue	0x78	120
CNTL_C_STEP_DW / Continue Red	0x79	121
KEY RELEASE	0x7E	126
CNTL_PLAY	0xD6	214
CNTL_STOP	0xD7	215
SELECT / Cursor SELECT	0x13	019
CURSOR_UP	0xCA	202
CURSOR_DW	0xCB	203
CURSOR_LEFT	0xCC	204
CURSOR_RIGHT	0xCD	205

9.3.2 | General purpose functions:

Key / command	Hex	Dec
FUNCTION_1	0x0F	015
FUNCTION_2	0x10	016
FUNCTION_3	0x11	017
FUNCTION_4	0x12	018
FUNCTION_5	0x19	025
FUNCTION_6	0x1A	026
FUNCTION_7	0x21	033
FUNCTION_8	0x22	034
FUNCTION_9	0x23	035
FUNCTION_10	0x24	036
FUNCTION_11	0x25	037
FUNCTION_12	0x26	038
FUNCTION_13	0x27	039
FUNCTION_14	0x39	057
FUNCTION_15	0x3A	058

Key / command	Hex	Dec
FUNCTION_16	0x3B	059
FUNCTION_17	0x3C	060
FUNCTION_18	0x3D	061
FUNCTION_19	0x3E	062
FUNCTION_20	0x4B	075
FUNCTION_21	0x4C	076
FUNCTION_22	0x50	080
FUNCTION_23	0x51	081
FUNCTION_24	0x7D	125
FUNCTION_25	0xA5	165
FUNCTION_26	0xA6	166
FUNCTION_27	0xA9	169
FUNCTION_28	0xAA	170
FUNCTION_29	0xDD	221
FUNCTION_30	0xDE	222
FUNCTION_31	0xE0	224
FUNCTION_32	0xE1	225
FUNCTION_33	0xE2	226
FUNCTION_34	0xE6	230
FUNCTION_35	0xE7	231
FUNCTION_36	0xF2	242
FUNCTION_37	0xF3	243
FUNCTION_38	0xF4	244
FUNCTION_39	0xF5	245
FUNCTION_40	0xF6	246

10 | All standby notification

This telegram is transmitted when an all-product standby has been detected in Masterlink.

Telegram structure: This telegram has no payload.

11 | MLGW virtual button event

....

This telegram is used to generate a virtual button event on MLGW. This event can be used to trigger macros on MLGW programming.

A similar telegram will be broadcast by MLGW on all MLGW protocol connections whenever a virtual button event is generated. This feedback is available since MLGW SW 1.8.

The first parameter indicates the button number, in the range 1 to 255.

The second parameter (available since MLGW SW 2.2) determines the button action. This parameter is optional and defaults to PRESS (1):

Action	Value
PRESS	1
HOLD	2
RELEASE	3

A short button press should be signaled as a single PRESS telegram.

A long button press should be signaled by a single PRESS telegram, followed by a sequence of HOLD telegrams at a rate not lower than 2 per second, follwed by a single RELEASE telegram.

MLGW will filter out all HOLD telegrams except for the first one. The rest of the HOLD telegrams serve as a keep alive indication for the long press.

If for some reason the flow of HOLD telegrams is interrupted, then MLGW will time out and generate its own RELEASE event.

Telegram structures:

Button number	Action

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Button number	Action
1 byte	1 byte

Button number
1 byte

12 | Authentication

....

MLGW Protocol authentication can be enabled on MLGW. In this case, a MLGW Protocol connection over TCP/IP will not process any command until authentication succeeds (the only exception being the Serial Number request telegram).

Authentication is requested by sending a Login Request telegram to MLGW, to which MLGW will respond with a Login Status telegram. As long as authentication is pending, each message (of any type) received by MLGW will generate a negative Login Status telegram to be sent back to the controler.

12.1 | Login Request

Telegram structure:

Username+Password
variable length

The username + password combination is encoded as follows:
  ° All encoding is UTF-8
  ° The string consists of the concatenation of the user name, followed by the byte 0x00, followed by the password.

Security note: the password will travel in clear-text. Consider using Secure Login Request as an alternative.

12.2 | Login Status

Telegram structure:

Status

Status
1 byte

Status can take values 0x00 (STATUS_OK) to indicate successful authentication, or 0x01 (STATUS_FAIL) to indicate authentication failure or pending authentication.

12.3 | Change password request

Telegram structure:

New password
variable length

The supplied password is the new password for the authenticated user. The new password will be effective immediately, but the currently open sessions will not be terminated.

Changing the password can only occur after a successful authentication, no matter if authentication requiremente is disabled for the connection.

Security note: the password will travel in clear-text.

12.4 | Change password response

Telegram structure:

Status
1 byte

Status can take values:
  ° 0x00 (STATUS_OK) to indicate successful update
  ° 0x02 (BAD_PASSWORD) if password supplied was empty or too long
  ° 0x03 (CHANGE_PASSWORD_NOT_ALLOWED) if no user is logged in

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12.5 | Secure login Request

Telegram structure:

Username+hash_string
variable length

The username + hash combination is encoded as follows:
  ° All encoding is UTF-8
  ° The string consists of the concatenation of the user name, followed by the byte 0x00, followed by the hash string.
  ° The hash string is the binary representation of the hash value (e.g. as returned by OpenSSL MD5 function).
  ° The hash value is the MD5 algorithm applied to the concatenation of the user name and the password (all previously encoded in UTF-8).

Example for user 'peter' password 'oneTWOthree'
  ° concatenated user + password: 'peteroneTWOthree'
  ° MD5 ("peteroneTWOthree") = 8213fa3500eef8d543fcaa4c5f742b23
  ° payload is concatenation of 'peter', \0, \82, \13, ..., \2b, \23

Security note: this login telegram avoids sending the user password in clear text over the network. However, this is not a challenge-response mechanism; the returned hash is always the same and could be reused by an attacker.

13 | Ping-pong test messages

These messages are intended for testing MLGW Protocol connectivity.

Upon receiving a Ping telegram from the controller, MLGW will respond with a Pong telegram (unless authentication is pending, in which case a negative login status will be sent back).

Telegram structure: Ping and Pong telegrams contain no payload.

14 | Configuration change notification

This telegram is generated by MLGW whenever the active configuration changes (i.e. whenever the controller starts, or TEST / SAVE / CANCEL / DISCARD / PREVIOUS buttons are selected on the configuration GUI).

The controller / mobile application may choose to reload the configuration information to reflect the new setup.

15 | Serial number query

These messages provide a query/response of the MLGW serial number. The controller sends a query telegram, to which MLGW replies with the SN telegram.

This mechanism works independent of authentication having been established.

The query telegram contains no payload.

The response telegram contains the ASCII character string with the serial number (truncated to maximum payload size).