

NLC protocol ver 1.30 "N"

This paper describes the Lopolight "N" protocol, for lopolight NLC unit P/N: 400-018

Physical layer:

RS-485 bus, two wires. 38400 baud, N81

Hardware setup:

Example on this page: 3 nodes and host.

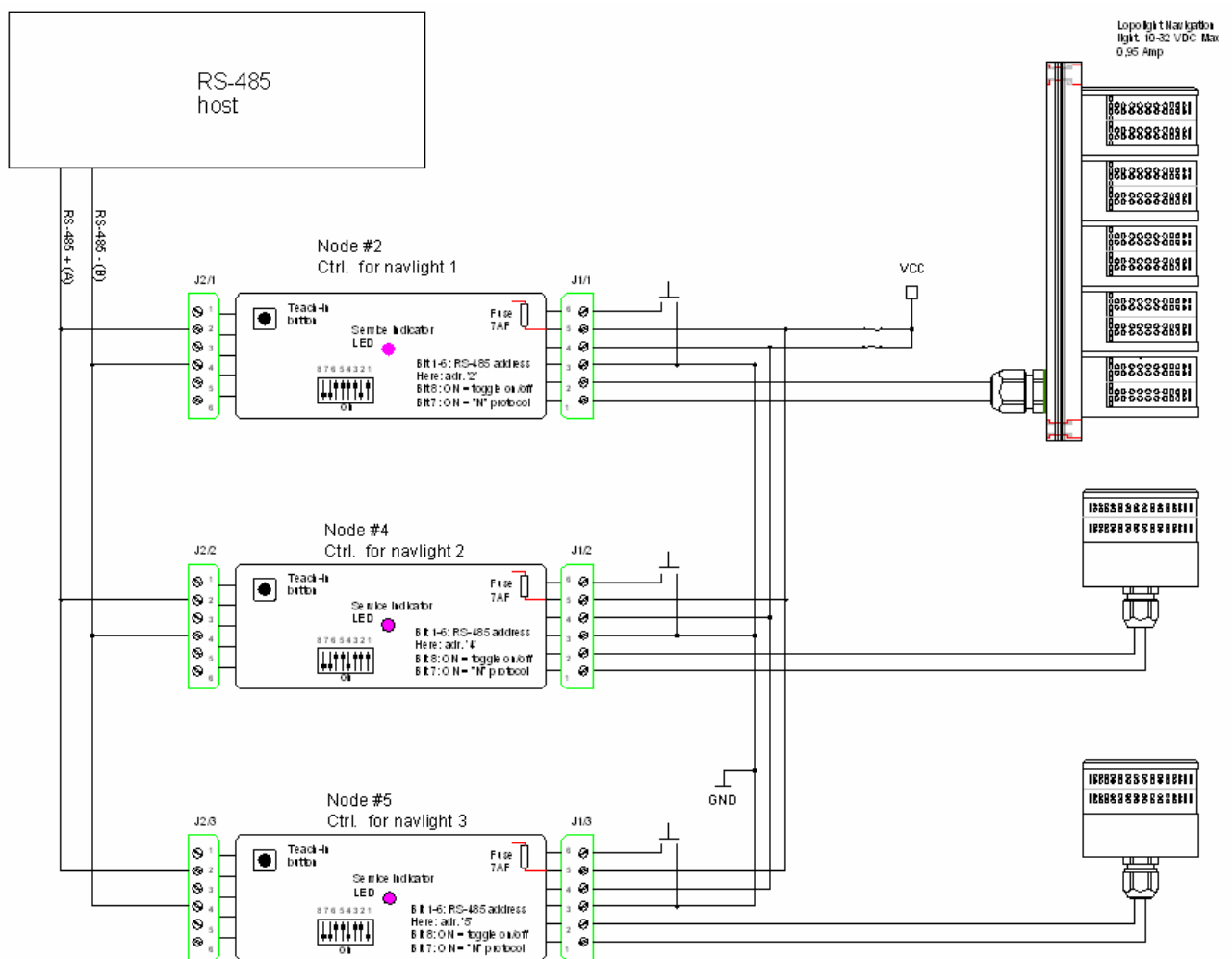
Other related protocols:

"M" protocol: communication with Lopolight NPC units.

"L" protocol: describes communication with [Tranberg Commander control panel].

"N" and "M" protocols can co-exist in same network.

"L" protocol units can NOT co-exist with "N" and "M" protocol units.



Node/host:

The node is passive in the network, and a suitable host must initiate communication with regular intervals, and update indicators/alarms, representing each lamp

Valid characters:

Extended ASCII table is used. (see appendix)

Addresses below DEC(49) and above DEC(250) are reserved for hosts and other internal purposes.

Truncated logic:

The sequence number is represented by the corresponding ASCII char in pos:
5,6,7,8,9,12,13,14

Node address:

A unique address between DEC(49) & DEC(112) [incl], must be assigned to every node in the system. The working address is set on dipswitch bit 1-6. Address must be set between 1 and 64 (included). Truncated SEQUENCE number is used, and must be interpreted to ASCII value between 49 and 112 [char "1" to "p"]

Host address:

The host must always use address DEC(33) [ASCII = "!"]

Telegram length:

21 char + CR + LF

Node answer: A node that receives a query, will act in the following way:

- wait 2ms
- enable transmit mode
- wait 1ms
- send the relevant status telegram (~6ms)
- wait 2ms
- disable transmit mode

Timing:

The host may initiate bus activity max every 19 ms (~59 telegrams per second)

Manual override:

Node/lamp will always turn on if manual override is pulled down. It cannot be turned off via RS-485 commands when the manual override is active.

Checksum calculation:

XOR pos 1 to 18 (incl) byte by byte. Result in hex. MSB(H) is placed in pos 19 in telegram, LSB(H) is placed in pos 20 in telegram

Ex: Result of XOR= 5A(H) => pos19: 5 pos 20: A

(Accepted default checksum char: ASCII Char "32" (space) in pos 19 & 20.)

Datafields, command telegram from host: (example of telegram where host turn-on output on node 4)

Pos	Meaning	Ex.		This example	Possible val.	Comment:
1	Start character	{		Start of telegram	"{"	Always "{"
2	Receiver	4		Query to node 4	"49" to "412"	
3	Sender	!		Host sends telegram	"!"	[!] = host,
4	Command	4		Command telegram	"1" to "9"	"1"=answer to query "3"=query "4"=command "5"=perform teach in "9"=Command – turn on without surveillance
5	Internal code	X			"1" or "~"	Host must ignore value in this field (Only used for debug purposes).
6	Internal code	X			"1" or "~"	Host must ignore value in this field (Only used for debug purposes).
7	Not used	0			"0" to "~"	Any value in this field is ignored
8	Not used	0			"0" to "~"	Any value in this field is ignored
9	Not used	0			"0" to "~"	Any value in this field is ignored
10	Output state	:			"0" or ":"	"0"=off ":"= on
11	Not used	0			"0" to "~"	Any value in this field is ignored
12	Not used	0			"0" to "~"	Any value in this field is ignored
13	Not used	0			"0" to "~"	Any value in this field is ignored
14	Not used	0			"0" to "~"	Any value in this field is ignored
15	Not used	0			"0" to "~"	Any value in this field is ignored
16	Not used	0			"0" to "~"	Any value in this field is ignored
17	Internal code	X			"1" or "~"	Host must ignore value in this field (Only used for debug purposes).
18	Not used	0			"0" to "~"	Any value in this field is ignored
19	Checksum MSB	X		ASCII (MSB) checksum	"1" to "~"	Byte XOR (MSB)
20	Checksum LSB	X		ASCII (LSB) checksum	"1" to "~"	Byte XOR (LSB)
21	End character	}		End of telegram	"}"	Must always be "}"

Datafields, query telegram from host: (example of telegram where host queries node 4 for status)

Pos	Meaning	Ex.		This example	Possible val.	Comment:
1	Start character	{		Start of telegram	"{"	Always "{"
2	Receiver	4		Query to node 4	"49" to "112"	
3	Sender	!		Host sends telegram	"!"	[!] = host,
4	Command	3		Query telegram	"1" to "9"	"1"=answer to query "3"=query "4"=command "5"= perform teach in "9"=Command – turn on without surveillance
5	Internal code	X			"1" to "~"	Host must ignore value in this field (Only used for debug purposes).
6	Internal code	X			"1" to "~"	Host must ignore value in this field (Only used for debug purposes).
7	Not used	0			"0" to "~"	Any value in this field is ignored
8	Not used	0			"0" to "~"	Any value in this field is ignored
9	Not used	0			"0" to "~"	Any value in this field is ignored
10	Not used	0			"0" to "~"	Any value in this field is ignored
11	Not used	0			"0" to "~"	Any value in this field is ignored
12	Not used	0			"0" to "~"	Any value in this field is ignored
13	Not used	0			"0" to "~"	Any value in this field is ignored
14	Not used	0			"0" to "~"	Any value in this field is ignored
15	Not used	0			"0" to "~"	Any value in this field is ignored
16	Not used	0			"0" to "~"	Any value in this field is ignored
17	Internal code	0			"1" or "~"	Host must ignore value in this field (Only used for debug purposes).
18	Not used	0			"0" to "~"	Any value in this field is ignored
19	Checksum MSB	X		ASCII (MSB) checksum	"1" to "~"	Byte XOR (MSB)
20	Checksum LSB	X		ASCII (LSB) checksum	"1" to "~"	Byte XOR (LSB)
21	End character	}		End of telegram	"}"	Must always be "}"

Datafields, answer from node: (example on telegram where node 4 returns query answer to host.
Status summary in this example: Lamp turned on, partial failure

Pos	Meaning	Ex.		This ex.	Possible val. (chr)	Comment:
1	Start character	{		Start of telegram	"{"	Always "{"
2	Receiver	!		Node is sending to host	"!"	[!] = host,
3	Sender	4		Query to node 4	"49" to "112"	
4	Command	1		Answer to query	"1" to "9"	"1"=answer to query "3"=query "4"=command "5"= perform teach in "9"=Command – turn on without surveillance
5	Software version	2		Version 1.30	"1" to "250"	"2": 130 = version 1.30
6	Current (10)	3		"3*10 mA"	"0" to "250"	Number of "10" mA
7	Current (0,1)	b		"50*0,1" mA	"0" to "250"	Number of "0.1" mA (here total: 35 mA)
8	Voltage (10)	2		"20" Volt	"1" to "250"	Number of "10 volts"
9	Voltage (0,1)	X		40*0,1" Volt	"1" to "250"	Number of "0,1 volts" (here total: 24 Volt over LED string)
10	Dimming level	:			"0" or ":"	"0" =off ":"=on
11	Internal code	X			"1" or "~"	Host must ignore value in this field (Only used for debug purposes).
12	Service hours (1000)	F		22.000 (F=22)	"49" to "250"	Number of "1000 hours"
13	Service hours (100)	5		500 hour	"0" to "9"	Number of "100 hours"
14	Not used	0			"0" to "~"	Any value in this field is ignored
15	Internal code	X			"1" or "~"	Host must ignore value in this field (Only used for debug purposes).
16	Status	6		Partial lamp failure	"1" to "9"	"1"= light on "2"= light expires "3"= light off "4"= light expired "5"= total failure "6"= partial failure "7"= HW on "8"= overload "9"= Teach-in active
17	Internal code	X			"1" or "~"	Host must ignore value in this field (Only used for debug purposes).
18	Protocol code	N		"N"	"76"	"N" = this NLC protocol ("M" = if NPC protocol)
19	Checksum MSB	X		ASCII (MSB) checksum	"1" to "~"	Byte XOR (MSB)
20	Checksum LSB	X		ASCII (LSB) checksum	"1" to "~"	Byte XOR (LSB)
21	End character	}		End of telegram	"}"	Must always be "}"

Explanations:

Pos 4: command: the following commands can be sent to the node:

"1" = node is answering query

"3" = query

"4" = command

"5" = perform teach in*

"9"=Command – turn on without surveillance. (Simple relay function). Unit is ready to receive turn on/off command in pos10. No alarms will be given.

*Command [5] causes the unit to register the I*U product (power), and store this value as "value for unit in good working order". If the unit exceeds the defined thresholds, then field 16 will return error code 5 or 6 in answer to next query.
The teach-in command should only be used when one is absolutely certain that unit is ok (all LED's working).

Pos 6-7, current: Current supplied to navlight . Resolution: 0,1 mA

Pos 8-9, voltage: Voltage over output terminals. Resolution: 0,1 Volt.

Pos 12-13, service hours: time in which the lamp has been energized.
Resolution: 100 hours.

Pos 16, status:

The node can return the following status codes:

"1"= light on:

The lamp is turned on, and uses the expected power,
(expected power referring to values registered during teach-in).

Everything is ok.

"2"= light expires:

The lamp is turned on, but has less than 2.000 burning hours left of it's total lifetime.

Everything is ok.

"3"= light off:

The lamp is turned off, but is expected to be ok.

Everything is ok.

"4"= light expired:

The lamp has exceeded its theoretical lifetime of 50kh and should be replaced

Failure

"5"= total failure:

The node/controller is attempted to turn on the light, but it consumes no power

Failure

"6"= partial failure:

The node/controller has detected that the LED rows uses some,
but not as much power as expected. More than 10% of the LED's is probably failing.

Failure

"7"= Manual override active:

The node/lamp is forced on, and cannot be turned off via RS-485 telegram.

information

"8"= Overload: (current limiter active)

The power output uses more than 1 A, and the node has shut down the output.

It retries to energize the lamp every 30 sec. and returns to normal mode if success full.

Failure

"9"= Teach-in active:

information

ASCII values used (truncate to sequence number in field:).

DEC	HEX	ASCII	SEQ	DEC	HEX	ASCII	SEQ
33	21	!		81	51	Q	33
34	22	"		82	52	R	34
35	23	#		83	53	S	35
36	24	\$		84	54	T	36
37	25	%		85	55	U	37
38	26	&		86	56	V	38
39	27	'		87	57	W	39
40	28	(		88	58	X	40
41	29	)		89	59	Y	41
42	2A	*		90	5A	Z	42
43	2B	+		91	5B	[	43
44	2C	,		92	5C	\	44
45	2D	-		93	5D	]	45
46	2E	.		94	5E	^	46
47	2F	/		95	5F	_	47
48	30	0	0	96	60	`	48
49	31	1	1	97	61	a	49
50	32	2	2	98	62	b	50
51	33	3	3	99	63	c	51
52	34	4	4	100	64	d	52
53	35	5	5	101	65	e	53
54	36	6	6	102	66	f	54
55	37	7	7	103	67	g	55
56	38	8	8	104	68	h	56
57	39	9	9	105	69	i	57
58	3A	:	10	106	6A	j	58
59	3B	;	11	107	6B	k	59
60	3C	<	12	108	6C	l	60
61	3D	=	13	109	6D	m	61
62	3E	>	14	110	6E	n	62
63	3F	?	15	111	6F	o	63
64	40	@	16	112	70	p	64
65	41	A	17	113	71	q	65
66	42	B	18	114	72	r	66
67	43	C	19	115	73	s	67
68	44	D	20	116	74	t	68
69	45	E	21	117	75	u	69
70	46	F	22	118	76	v	70
71	47	G	23	119	77	w	71
72	48	H	24	120	78	x	72
73	49	I	25	121	79	y	73
74	4A	J	26	122	7A	z	74
75	4B	K	27	123	7B	{	75
76	4C	L	28	124	7C	|	76
77	4D	M	29	125	7D	}	77
78	4E	N	30	126	7E	~	78
79	4F	O	31	127	7F		79
80	50	P	32				

DEC	HEX	ASCII	SEQ		DEC	HEX	ASCII	SEQ
128	80	€	80		172	AC	¬	124
129	81		81		173	AD		125
130	82	,	82		174	AE	®	126
131	83	f	83		175	AF	-	127
132	84	„	84		176	B0	°	128
133	85	...	85		177	B1	±	129
134	86	†	86		178	B2	²	130
135	87	‡	87		179	B3	³	131
136	88	^	88		180	B4	'	132
137	89	‰	89		181	B5	μ	133
138	8A	Š	90		182	B6	¶	134
139	8B	‹	91		183	B7	·	135
140	8C	Œ	92		184	B8	,	136
141	8D		93		185	B9	₁	137
142	8E	Ž	94		186	BA	°	138
143	8F		95		187	BB	»	139
144	90		96		188	BC	¼	140
145	91	‘	97		189	BD	½	141
146	92	’	98		190	BE	¾	142
147	93	“	99		191	BF	¿	143
148	94	”	100		192	C0	À	144
149	95	•	101		193	C1	Á	145
150	96	–	102		194	C2	Â	146
151	97	—	103		195	C3	Ã	147
152	98	~	104		196	C4	Ä	148
153	99	™	105		197	C5	Å	149
154	9A	š	106		198	C6	Æ	150
155	9B	›	107		199	C7	Ç	151
156	9C	œ	108		200	C8	È	152
157	9D		109		201	C9	É	153
158	9E	ž	110		202	CA	Ê	154
159	9F	ÿ	111		203	CB	Ë	155
160	A0		112		204	CC	Ì	156
161	A1	ı	113		205	CD	Í	157
162	A2	ç	114		206	CE	Î	158
163	A3	£	115		207	CF	Ï	159
164	A4	¤	116		208	D0	Ð	160
165	A5	¥	117		209	D1	Ñ	161
166	A6	¦	118		210	D2	Ò	162
167	A7	§	119		211	D3	Ó	163
168	A8	¨	120		212	D4	Ô	164
169	A9	©	121		213	D5	Õ	165
170	AA	ª	122		214	D6	Ö	166
171	AB	«	123		215	D7	×	167

DEC	HEX	ASCII	SEQ
216	D8	Ø	168
217	D9	Ù	169
218	DA	Ú	170
219	DB	Û	171
220	DC	Ü	172
221	DD	Ý	173
222	DE	Þ	174
223	DF	Ë	175
224	E0	à	176
225	E1	á	177
226	E2	â	178
227	E3	ã	179
228	E4	ä	180
229	E5	å	181
230	E6	æ	182
231	E7	ç	183
232	E8	è	184
233	E9	é	185
234	EA	ê	186
235	EB	ë	187
236	EC	ì	188
237	ED	í	189
238	EE	î	190
239	EF	ï	191
240	F0	ð	192
241	F1	ñ	193
242	F2	ò	194
243	F3	ó	195
244	F4	ô	196
245	F5	õ	197
246	F6	ö	198
247	F7	÷	199
248	F8	ø	200
249	F9	ù	201
250	FA	ú	202
251	FB	û	203
252	FC	ü	204
253	FD	ý	205
254	FE	þ	206
255	FF	ÿ	207