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OpenDCC

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Transmission of S88 data over network cable

Current Situation:

The S88 bus is established as inexpensive feedback bus for model layouts. It follows a simple principle: the S88 bus is just a serial shift register with parallel load entries.

In order to minimize [disturbance during the transmission](#), a switch over to cheap network cables for wiring is recommended.

The advantages of CAT-5 cabling and RJ-45 plug connectors are also recognized by other designers. Unfortunately there are different pin assignments. Standardization took place mid of 2007. Future developments should use this standard **s88-N**. There are already some products and announcements, like from [Tams](#) and [moba-digital.net](#). OpenDCC supports S88-N from HW revision 1.4.

Pin Allocation

s88-N: Standardization of s88 on network cable (CAT-5, RJ45)				
Pin S88	Name	Description	Pin RJ45	Color
1	DATA	data to read	2	gn

2	GND	Return (Ground) for signals and power supply	3	wt/or
2	GND		5	wt/bl
3	CLOCK	clock signal for shifting data	4	bl
4	PS (LOAD)	load request for slave devices	6	or
5	RESET	clear the slave devices	7	wt/br
6	+5V/+12V	power supply to feedback modules	1	wt/gn
-	RAILDATA	track signal (e.g. DCC or MM)	8	br

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Adapter

S88-N Schematic

S88-N Layout

schematic adapter S88-N pcb layout adapter S88-N

Components:

The following components can be used (order number according to reichelt.de):

- MEBP 8-8 (double socket to extend a CAT-5 cable)
- MEBP 8-8S (socket for pcb)
- BL 1X20W8 2,54 (socket for S88 header; this one comes with 20 pins and can be divided in pieces with 6 pins each)
- CAT5 cables: also available at Reichelt, seek for 'RJ45'

Overview and comparison of past assignments s88 to RJ45

Overview of past assignments s88 to RJ45					
	Vendor / Standard				
Pin RJ45	digital-bahn.de	opendcc.de	railway-lauf.de	iek.de	s88-N
1	+12V	GND	DATA	DATA	+12V/+5V
2	DATA	CLK	GND	DATA	DATA
3	GND	GND	GND	GND	GND
4	CLK	PS	CLK	CLK	CLK
5	GND	GND	PS	PS	GND
6	PS	RESET	RESET	RESET	PS
7	+12V	+5V	+5V	+5V	RESET
8	RAILDATA	DATA	+5V	+5V	RAILDATA

Following my comments on these pinnings:

- The assignments of railway lauf.de and iek.de are electrically unfavorable, because the sensitive lines are not paired with static lines. Both assignment were obviously driven by the wish of having a simple pcb layout. To make things worse, the assignment of IEK does not strengthen the GND.

- A possible higher supply voltage of 12V and an appropriate shift of the threshold for the signals offers more margin, so that disturbances cannot affect the signal lines. Therefore also the 12V supply was allowed as an alternative to the 5V supply. The user must pay attention that only if all attached modules are tolerant to the higher supply than 12V may be turned on by the command station or by a s88 booster. Therefore this 12V supply may cause damage in the field, so in my opinion only 5V should be used.
- In the assignment of digital bahn.de the RESET line was omitted, which may cause compatibility problems. The RESET line is contained in s88-N.
- The optimal GND assignment of opendcc was weakened in favor of RAILDATA (i.e. the track signal).

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