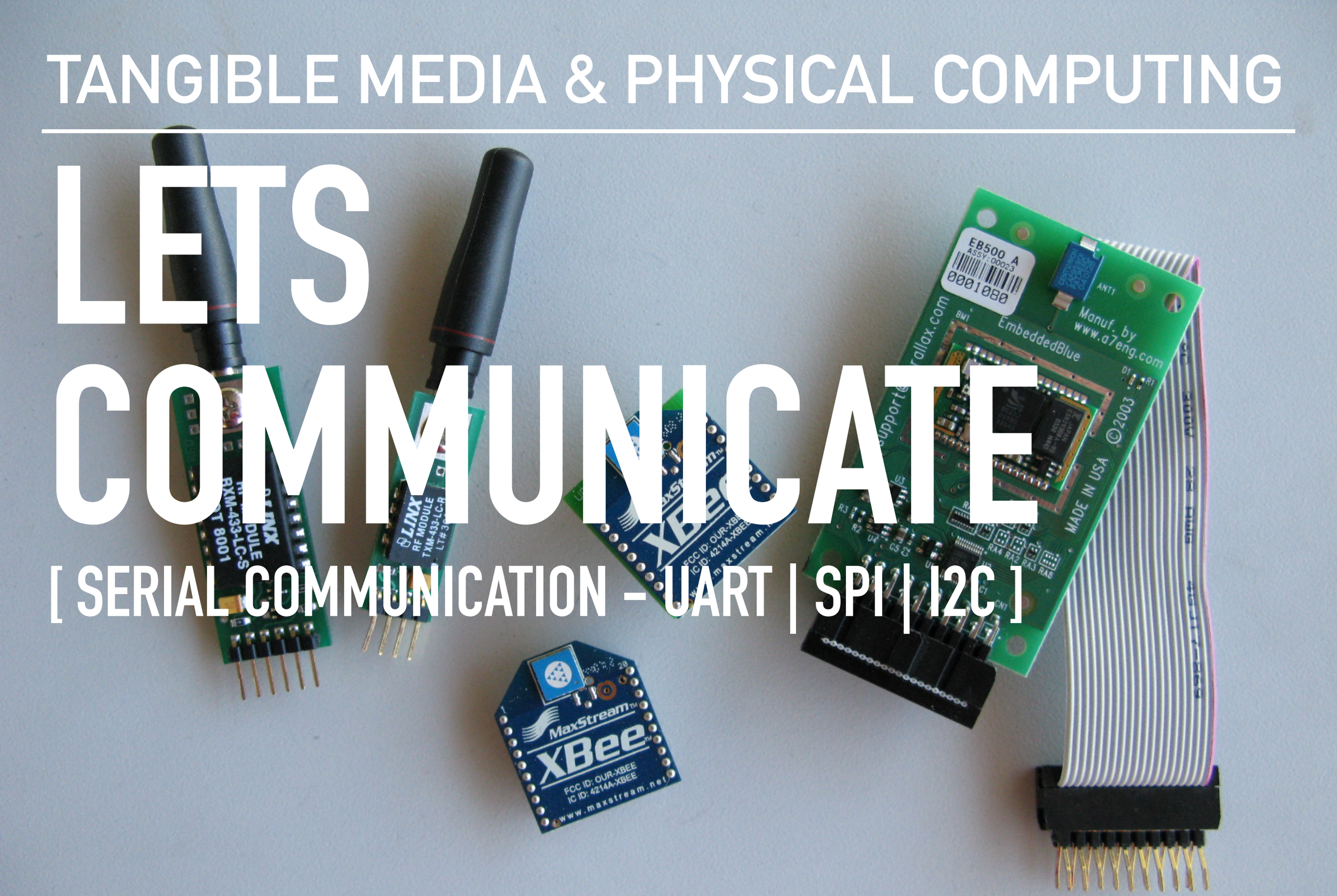
TANGIBLE MEDIA & PHYSICAL COMPUTING

LETS COMMUNICATE

[SERIAL COMMUNICATION – UART | SPI | I2C]



AGENDA

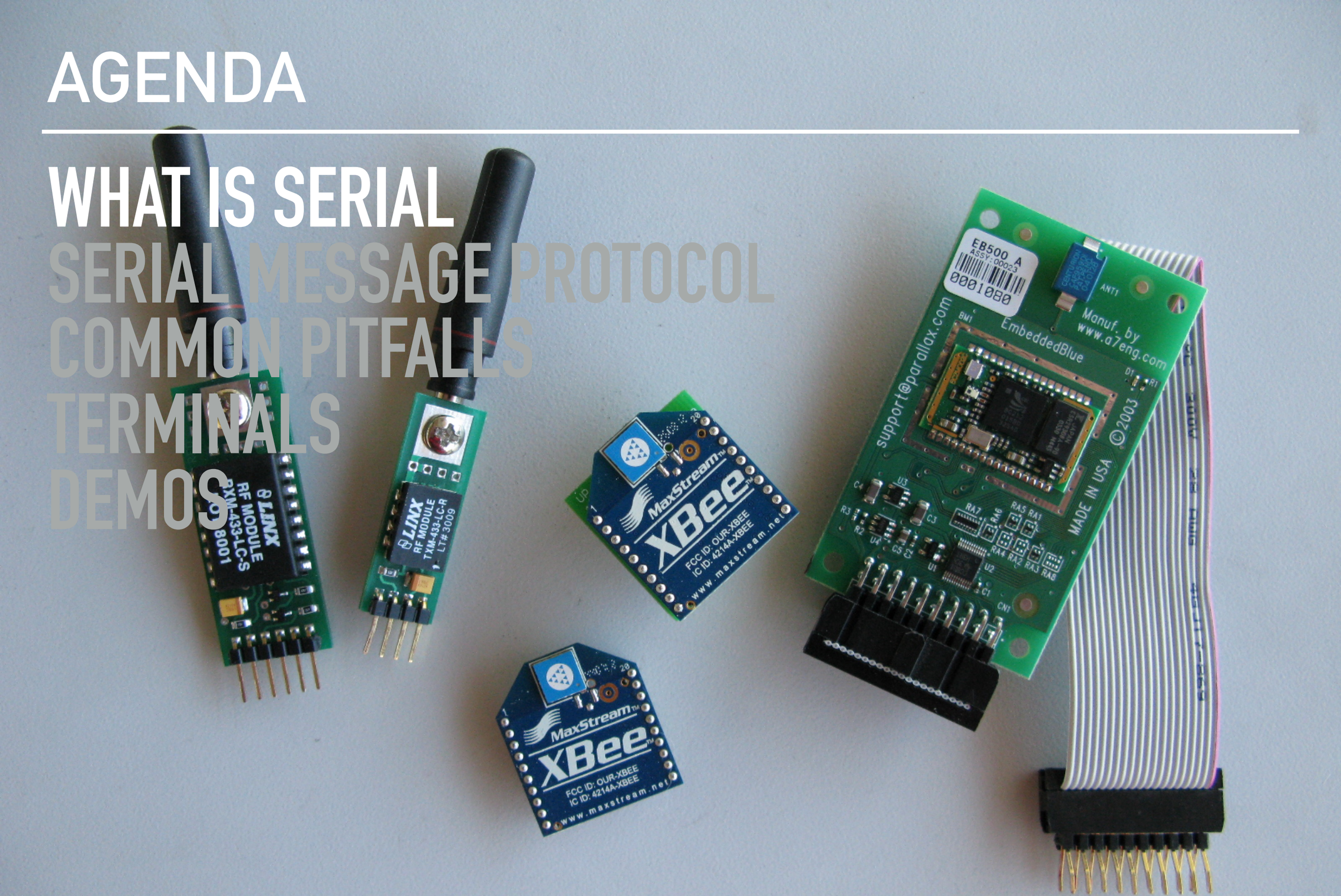
WHAT IS SERIAL

SERIAL MESSAGE PROTOCOL

COMMON PITFALLS

TERMINALS

DEMOS



WHAT IS SERIAL

SERIAL COMMUNICATION [UART | SPI | I2C] ALLOWS A DEVICE TO TRANSMIT AND RECEIVE ANY "FORM" OF DATA FROM ANOTHER DEVICE'S SERIAL INTERFACE.

MOST MICRO-CONTROLLERS HAVE UART, SPI OR I2C INTERFACE(S), AND WE CAN OBSERVE THE DATA "ON THE WIRE" BY USING A SERIAL MONITOR [TERMINAL].

WHAT IS SERIAL

SYNCHRONOUS SERIAL

I2C – SPI – CLOCK SIGNAL PROTOCOL

ASYNCHRONOUS SERIAL

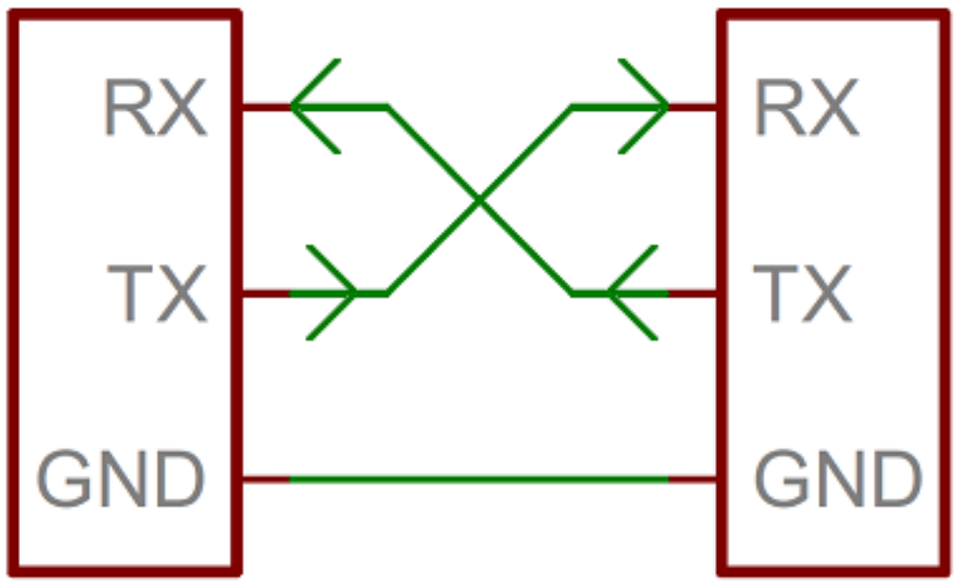
UART (SERIAL) – CLOCKLESS PROTOCOL

WHAT IS SERIAL

9600 8N1

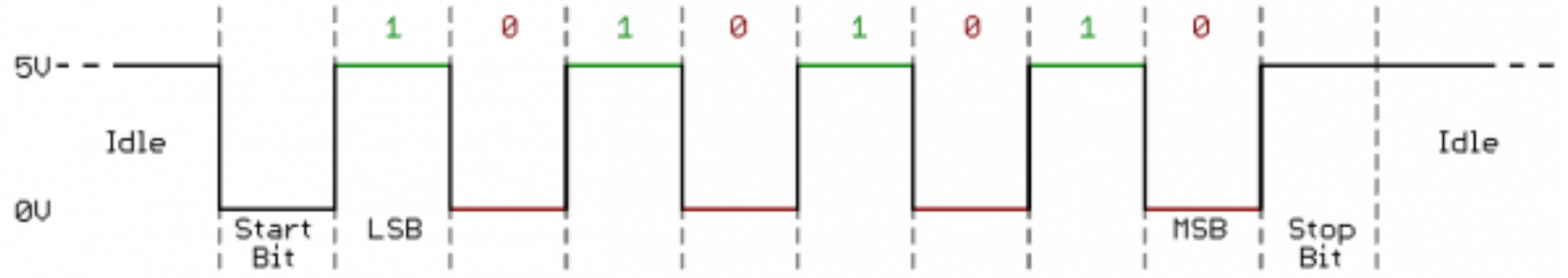
BAUD(PPS) – 8 DATA BITS – NO PARITY – 1 STOP BIT

WHAT IS SERIAL



WHAT IS SERIAL

TTL



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HANDSHAKING

HANDSHAKING IS AN AUTOMATED PROCESS OF NEGOTIATION THAT DYNAMICALLY SETS PARAMETERS OF A COMMUNICATIONS CHANNEL ESTABLISHED BETWEEN TWO ENTITIES BEFORE NORMAL COMMUNICATION OVER THE CHANNEL BEGINS.

A HANDSHAKE FOLLOWS THE PHYSICAL ESTABLISHMENT OF THE COMMUNICATION CHANNEL AND PRECEDES NORMAL INFORMATION TRANSFER.

HANDSHAKING

MAKE IT MEANINGFUL

HEADER [PREAMBLE] [PAYLOAD] FOOTER

SERIAL MESSAGE PROTOCOL

MAKE IT DESCRIPTIVE

~ SID RID MID DIG {2BYTES} ANA {12BYTES} CHKSUM !

SERIAL MESSAGE PROTOCOL

MAKE IT NIMBLE

~ SID RID MID DIG {2BYTES} ANA {12BYTES} CHKSUM !

~ SID RID MID ANA {12BYTES} CHKSUM !

~ SID RID MID DIG {2BYTES} CHKSUM !

MAKE IT ROBUST

CONSIDER MESSAGE FORMAT: RAW BYTE OR ASCII

Dec	Bin	Hex	Char	Dec	Bin	Hex	Char	Dec	Bin	Hex	Char	Dec	Bin	Hex	Char
0	0000 0000	00	[NUL]	32	0010 0000	20	space	64	0100 0000	40	@	96	0110 0000	60	`
1	0000 0001	01	[SOH]	33	0010 0001	21	!	65	0100 0001	41	A	97	0110 0001	61	a
2	0000 0010	02	[STX]	34	0010 0010	22	"	66	0100 0010	42	B	98	0110 0010	62	b
3	0000 0011	03	[ETX]	35	0010 0011	23	#	67	0100 0011	43	C	99	0110 0011	63	c
4	0000 0100	04	[EOT]	36	0010 0100	24	$	68	0100 0100	44	D	100	0110 0100	64	d
5	0000 0101	05	[ENQ]	37	0010 0101	25	%	69	0100 0101	45	E	101	0110 0101	65	e
6	0000 0110	06	[ACK]	38	0010 0110	26	&	70	0100 0110	46	F	102	0110 0110	66	f
7	0000 0111	07	[BEL]	39	0010 0111	27	'	71	0100 0111	47	G	103	0110 0111	67	g
8	0000 1000	08	[BS]	40	0010 1000	28	(	72	0100 1000	48	H	104	0110 1000	68	h
9	0000 1001	09	[TAB]	41	0010 1001	29	)	73	0100 1001	49	I	105	0110 1001	69	i
10	0000 1010	0A	[LF]	42	0010 1010	2A	*	74	0100 1010	4A	J	106	0110 1010	6A	j

SERIAL MESSAGE PROTOCOL

SLIP

SERIAL LINE INTERNET PROTOCOL

COBS

CONSISTENT OVERHEAD BYTES STUFFING

USE FLOW CONTROL

AGENDA

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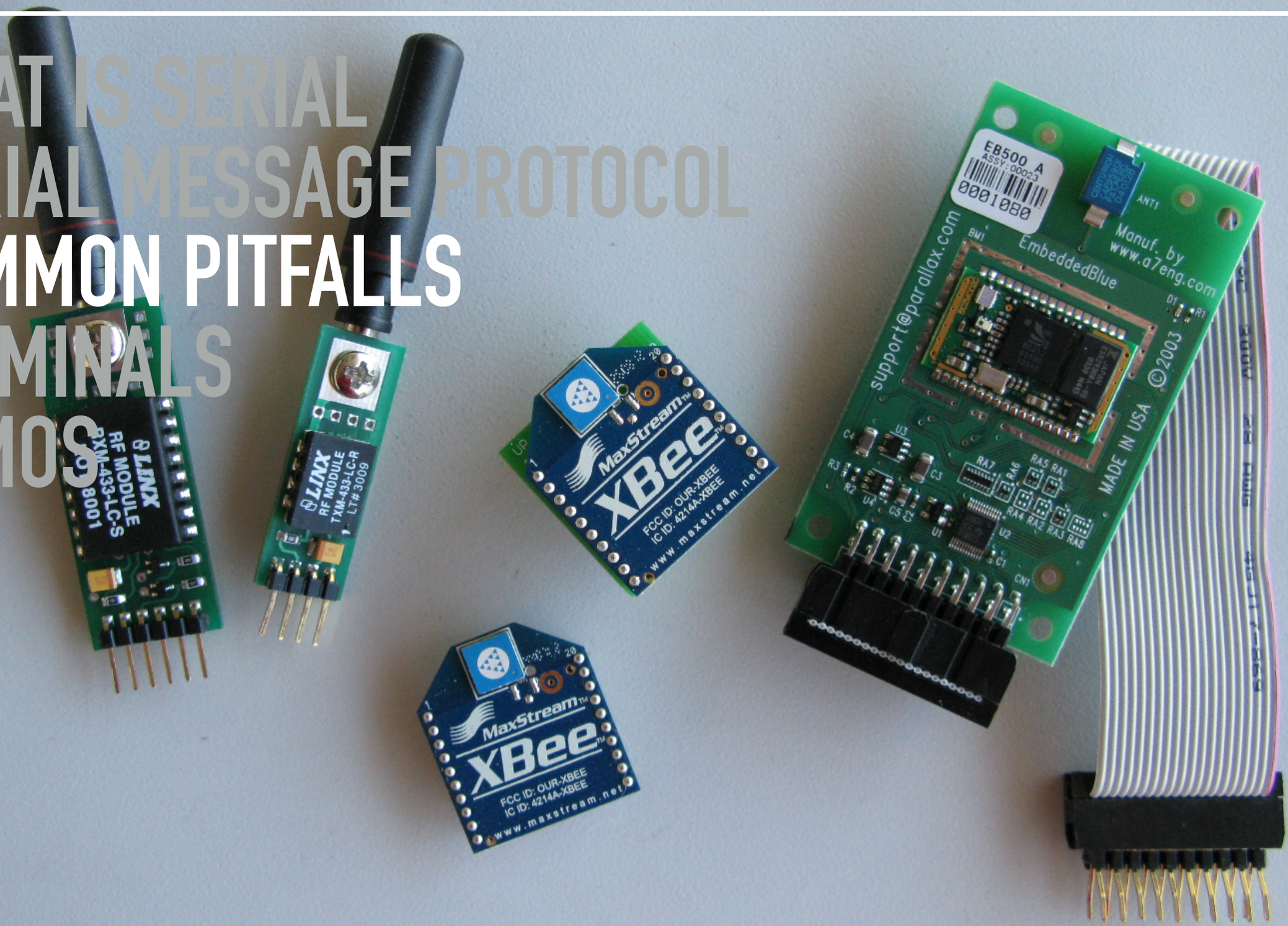


COMMON PITFALLS

TX -> RX

RX <- TX

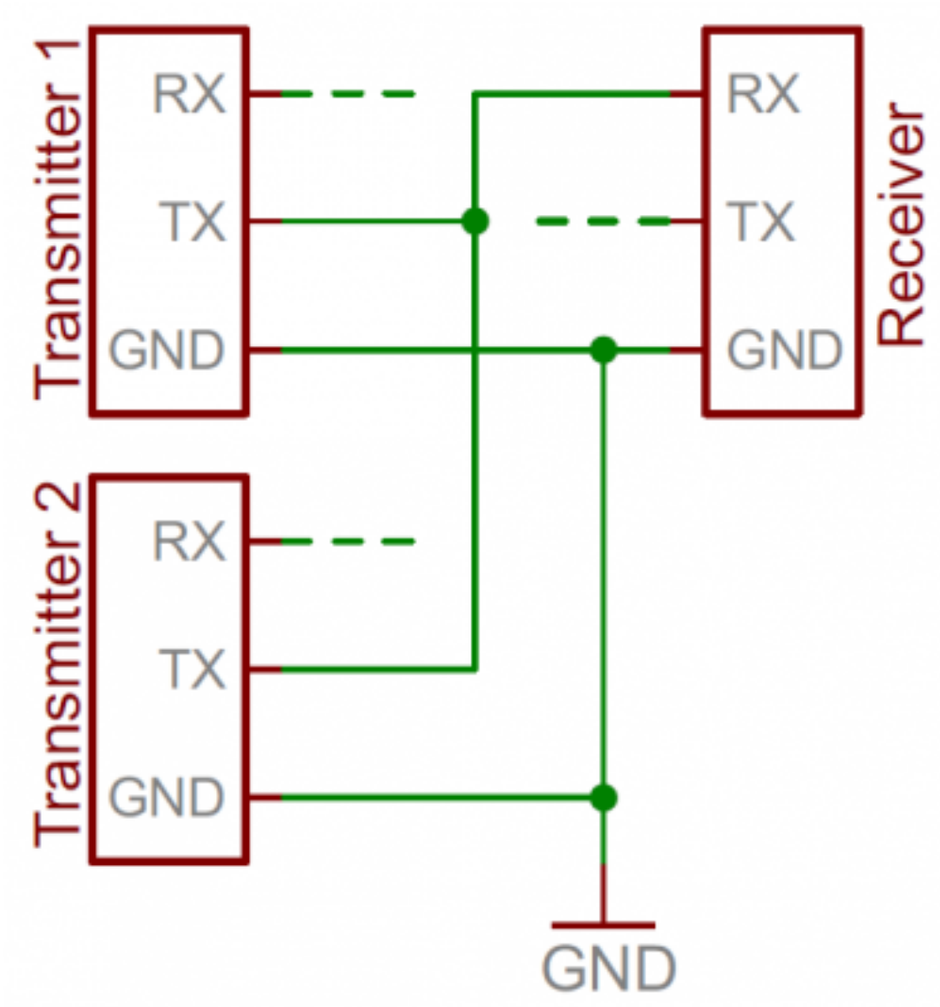
BAUD RATE MISMATCH

FRAME ERRORS

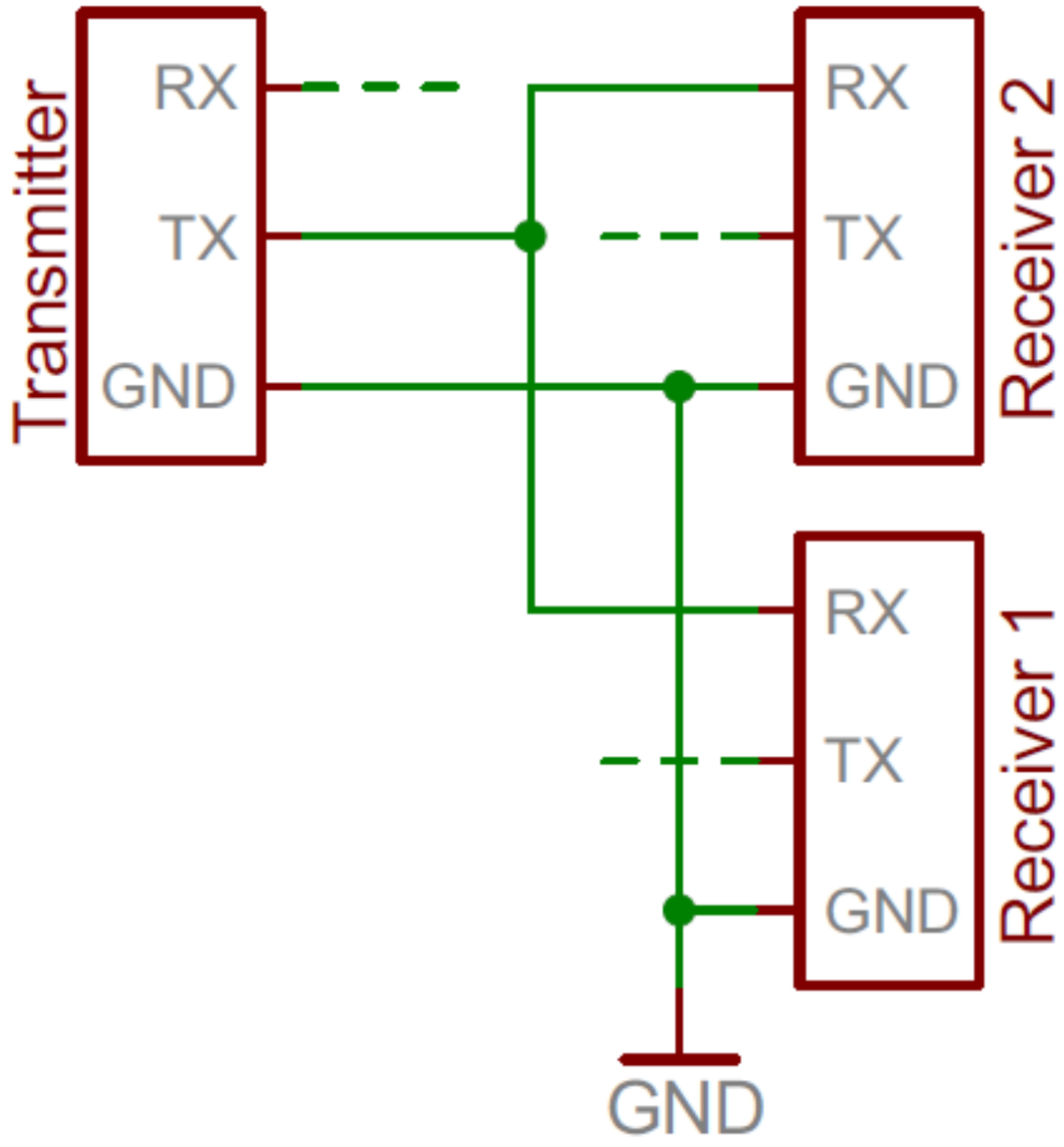
BAUD – PARITY BITS – DATA BITS – STOP BITS

BUS CONTENTION

COMMON PITFALLS



COMMON PITFALLS



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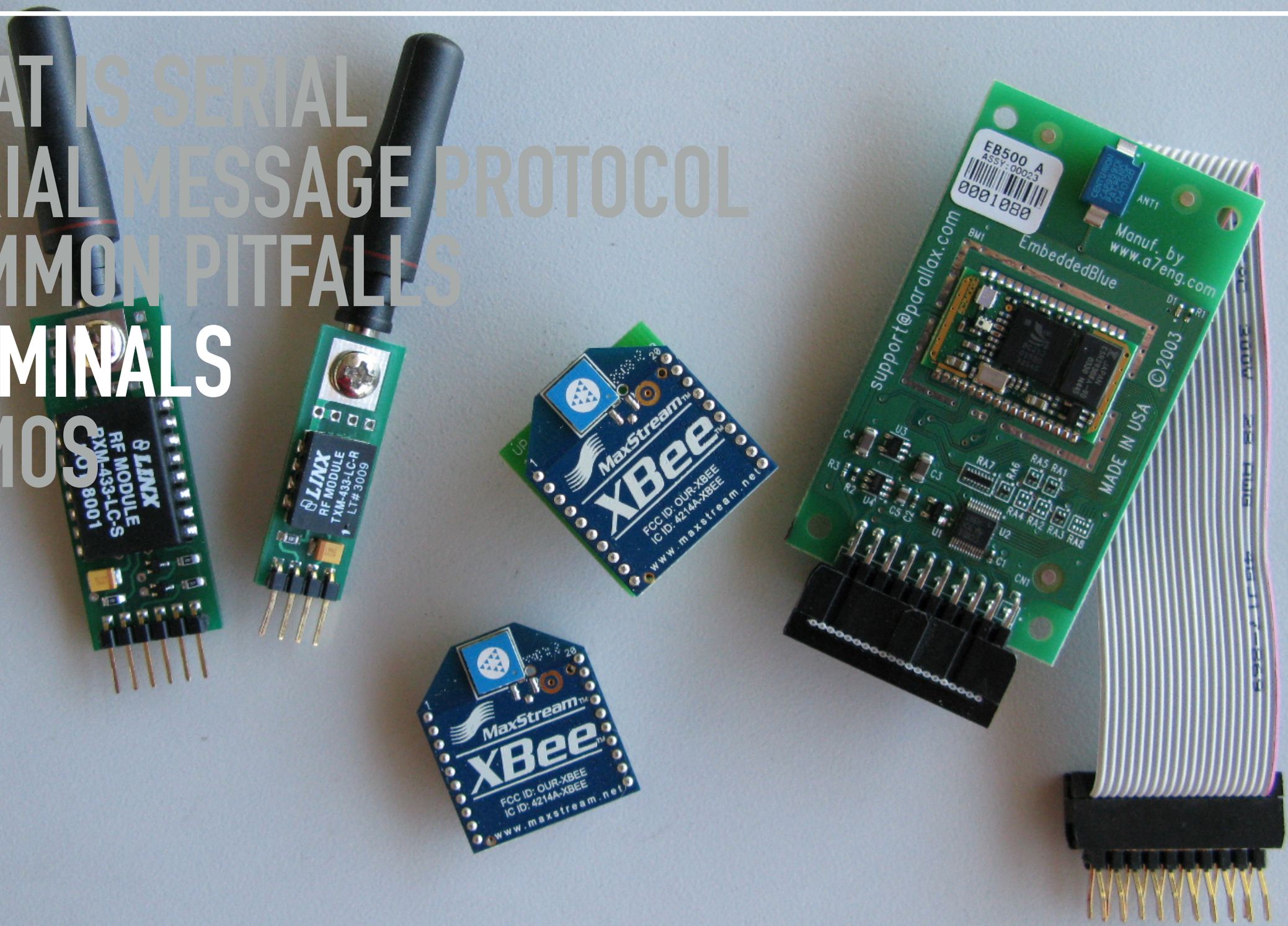

TERMINALS

COOLTERM [MAC WINDOWS LINUX]

CUTECOM [LINUX]

GNU SCREEN [MAC LINUX]

PUTTY [WINDOWS LINUX]

REALTERM [WINDOWS]

XCTU [MAC WINDOWS LINUX]

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