

UART Communication Specification

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1 UART communication protocol

All packets shall be sent as an 8-bit, no-parity, 1 stop bit message at 115200 baud. In other words, a 115200 8N1 UART packet.

Furthermore, each packet's first bit will be a 1 if there will be another byte after. The last packet of each set will have a 0 in the first bit.

2 Transmission structure

Each transmission shall consist of the following 7-byte structure:

byte 0	byte 1	byte 2	byte 3	byte 4	byte 5	byte 6
time[27-21]	time[20-14]	time[13-7]	time[6-0]	command	payload[13:7]	payload[6:0]

This is invariant of whether the transmission is from the FPGA or radio.

3 Command specifications

3.1 7-bit command codes and payloads

The 7-bit command and accompanying payload bytes are defined as follows

sender	receiver	command							payload											
		6	5	4	3	2	1	0	13	12	11	10	9	8	7	6	5	4	3	2
cFPGA	robot	000	robot ID					left motor vel							right motor vel					
robot	FPGAs	001	robot ID					touch duration												
checkpoint	FPGAs	010	checkpoint ID					touch duration												
rFPGA	cFPGA	100	game state					auxilliary info												
cFPGA	rFPGA	101	powerup state					auxilliary info												

3.2 4-bit game state command codes

The 4-bit game state commands sent from the rFPGA to the cFPGA are as follows

Description	game state command	auxilliary info
Start game	0000	–
End game	0001	–
Reset game	0010	–
Set time	0011	–
Disable player	0100	robotID (bits 13-10)
Enable player	0101	robotID (bits 13-10)
Disable powerups	0110	–
Enable powerups	0111	–
Clear all powerups	1000	–
Acknowledge receipt	1111	powerup command acknowledged (13-10) robotID (9-6)

3.3 4-bit powerup state command codes

The 4-bit powerup state commands sent from the cFPGA to the rFPGA are as follows

Description	powerup state command	auxilliary info
Powerup deactivated	0000	robotID (bits 13-10) - powerupID (bits 9-2)
Powerup activated	0001	robotID (bits 13-10) - powerupID (bits 9-2)
Acknowledge receipt	1111	game command acknowledged (13-10)