Data Receiver Formats Update

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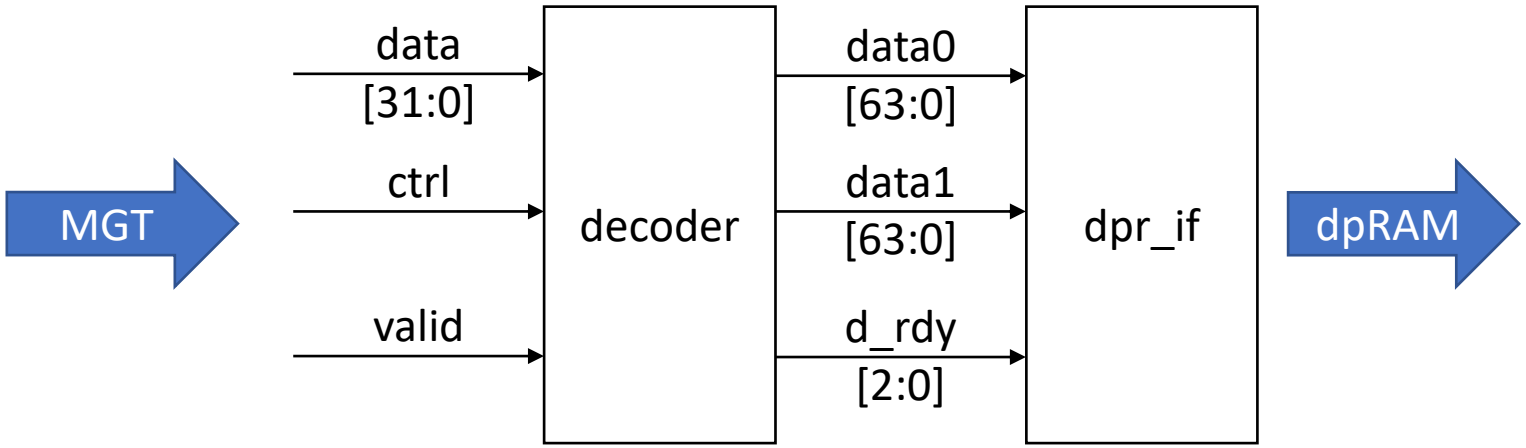
Data Receiver Architecture

First Step: Maintain Filiberto's interface and update the decoder only

- 2x 64-bit data ports
- 3x data-ready flags

Second step (possible): It could be improved due to format update

- 1x 64-bit data (or 1x96 bit)
- dpr_if update necessary



Old Format – data decoder → dpr_if

Input – 32 bit

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
ADC2 CH3[7:0]								ADC1 CH3[7:0]								ADC2 CH2[11:4]								ADC1 CH2[11:4]							
ADC2 CH4[11:4]								ADC1 CH4[11:4]								CH4[3:0]				CH3[11:8]				CH4[3:0]				CH3[11:8]			
CH6[3:0]				CH5[11:8]				CH6[3:0]				CH5[11:8]				ADC2 CH5[7:0]								ADC1 CH5[7:0]							
ADC2 CH7[7:0]								ADC1 CH7[7:0]								ADC2 CH6[11:4]								ADC1 CH6[11:4]							
ADC2 CH8[11:4]								ADC1 CH8[11:4]								CH8[3:0]				CH7[11:8]				CH8[3:0]				CH7[11:8]			

Output – 64 bit

63	60	59	58	49	48	47	44	43	42	33	32	31	28	27	26	17	16	15	12	11	10	1	0	
0		ADC1 CH4				0		ADC1 CH3				0		ADC1 CH2				0		ADC1 CH1				data0
0		ADC2 CH4				0		ADC2 CH3				0		ADC2 CH2				0		ADC2 CH1				data1
0		ADC1 CH8				0		ADC1 CH7				0		ADC1 CH6				0		ADC1 CH5				data0
0		ADC2 CH8				0		ADC2 CH7				0		ADC2 CH6				0		ADC2 CH5				data1

New Format

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
0x00								0x00								0x00								SOF (K28.1)								
14-bit WIB Code														FEMB Valid		F#		WIB Slot#				DF Version#				WIEC Crate#					WIB HEADER
32-bit WIB/COLDATA Code																																
Timestamp [31:0]																																
Timestamp [63:32]																																
U0…U39 ADC[13:0]																																FEMB0
V0…V39 ADC[13:0]																																
X0…X47 ADC[13:0]																																
U0…U39 ADC[13:0]																																FEMB1
V0…V39 ADC[13:0]																																
X0…X47 ADC[13:0]																																

New Format – header decoder → dpr_if

- Rearrange the WIB Header
- No COLDATA headers in input
  - Output has COLDATA header words for compatibility, but they are tied at 0

Input – 32 bit

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0x00								0x00								0x00								SOF (K28.1)							
14-bit WIB Code														FEMB Valid	F#	WIB Slot#				DF Version#				WIEC Crate#							
32-bit WIB/COLDATA Code																															
Timestamp [31:0]																															
Timestamp [63:32]																															

Output – 64 bit

63	56	55	54	53	52	51	50	49	48	47	46	45	44	43	34	33	32	31	30	29	28	3	2	1	0	
0		EMB Val		F#	WIB Slot#			DF Version#				14-bit WIB Code						32-bit WIB/COLDATA Code								WIB HEADER
Timestamp [63:32]																		Timestamp [31:0]								
0																										4x COLDATA HEADERS
0																										

New Format – data decoder → dpr_if

	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	U2										U1														U0							
1	U4												U3												U2							
2	U6														U5										U4							
3	U9		U8														U7														U6	
4	U11						U10																U9									
5	U13								U12																U11							
6	U15														U14														U13			
19	U34										U33														U32							
20	U36												U35												U34							
21	U38														U37										U36							
22	V1		V0														U39														U38	
23	V3						V2																V1									
24	V5								V4																V3							
25	V7														V6														V5			

Input – 32 bit

Output – 64 bit

FORMAT "as BEFORE"																									
63	62	61	60	49	48	47	46	45	44	33	32	31	30	29	28	17	16	15	14	13	12	1	0	
0		U6				0		U4				0		U2				0		U0				data0
0		U7				0		U5				0		U3				0		U1				data1
0		U14				0		U12				0		U10				0		U8				data0
0		U15				0		U13				0		U11				0		U9				data1
0		U38				0		U36				0		U34				0		U32				data0
0		U39				0		U37				0		U35				0		U33				data1
0		V6				0		V4				0		V2				0		V0				data0
0		V7				0		V5				0		V3				0		V1				data1

New Format – data decoder → dpr_if

Input – 32 bit

	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	U2								U1																U0							
1	U4												U3														U2					
2	U6														U5														U4			
3	U9				U8												U7														U6	
4	U11							U10															U9									
5	U13										U12														U11							
6	U15															U14													U13			
19	U34								U33																U32							
20	U36												U35														U34					
21	U38														U37														U36			
22	V1				V0												U39														U38	
23	V3							V2															V1									
24	V5										V4														V3							
25	V7															V6													V5			

Output – 64 bit

POSSIBLE UPDATE																									
63	62	61	60	49	48	47	46	45	44	33	32	31	30	29	28	17	16	15	14	13	12	1	0	
0		U3				0		U2				0		U1				0		U0				data0
0		U7				0		U6				0		U5				0		U4				data1
0		U11				0		U10				0		U9				0		U8				data0
0		U15				0		U14				0		U13				0		U12				data1
0		U35				0		U34				0		U33				0		U32				data0
0		U39				0		U38				0		U37				0		U36				data1
0		V3				0		V2				0		V1				0		V0				data0
0		V7				0		V6				0		V5				0		V4				data1