Hardware	Inputs	Outputs	Synthesis	Trend
			LUTs	*LUTs*
Gate Level 2LD (NGEN)	2	4	2	0.5n
	3	8	4	0.5n
	4	16	8	0.5n
	5	32	16	0.5n
	6	64	64	n
	7	128	68	0.5n
	8	256	136	0.5n
	9	512	528	n
	10	1024	1056	n
	11	2048	2112	n
	12	4096	2176	0.5n
	13	8192	8264	n
	14	16384	8320	0.5n
	15	32768	16512	0.5n
	16	65536	65664	n
	17	131072	65924	0.5n
	18	262144	161704	0.5n
Generalized Function Based Decoders	2	4	2	0.5n
	3	8	4	0.5n
	4	16	8	0.5n
	5	32	16	0.5n
	6	64	64	n
	7	128	68	0.5n
	8	256	136	0.5n
	9	512	528	n
	10	1024	1056	n
	11	2048	2112	n
	12	4096	2176	0.5n
	13	8192	8264	n
	14	16384	16524	n
	15	32768	32916	n
	16	65536	65864	n
	17	131072	131728	n
	18	262144	132128	0.5n
Generalized Loop Based Decoders	2	4	2	0.5n
	3	8	4	0.5n
	4	16	8	0.5n
	5	32	16	0.5n
	6	64	64	n
	7	128	68	0.5n
	8	256	136	0.5n
	9	512	528	n
	10	1024	682	0.5n
	11	2048	2188	n
	12	4096	2974	0.75n
	13	8192	8361	n
	14	16384	19092	1.165
	15	32768	20612	0.629
	16	65536	47746 [1]	0.729
	17	131072	failed	
	18	262144		
Generalized Tree Based Decoders (2, 4)	3	8	4	0.5n
	4	16	8	0.5n
	5	32	32	n
	6	64	66	n
	7	128	68	0.5n
	8	256	136	0.5n
	9	512	528	n
	10	1024	1044	n
	11	2048	2072	n
	12	4096	4128	n
	13	8192	8224	n
	14	16384	8256	0.5n
	15	32768	32906	n
	16	65536	66312	n

Hardware	Inputs	Outputs	Synthesis	Trend
			LUTs	*LUTs*
	17	131072	132616	n
	18	262144	265256	n
Generalized Tree Based Decoders (2, 8)	4	16	8	0.5n
	5	32	32	n
	6	64	34	0.5n
	7	128	132	n
	8	256	136	0.5n
	9	512	528	n
	10	1024	1044	n
	11	2048	2072	n
	12	4096	4128	n
	13	8192	8224	n
	14	16384	8256	0.5n
	15	32768	32906	n
	16	65536	66312	n
	17	131072	132616	n
	18	262144	265256	n
Generalized Tree Based Decoders (2, 16)	5	32	32	n
	6	64	34	0.5n
	7	128	68	0.5n
	8	256	136	0.5n
	9	512	**288**	0.5n
	10	1024	1044	n
	11	2048	**1056**	0.5n
	12	4096	4128	n
	13	8192	8240	n
	14	16384	8240	0.5n
	15	32768	32914	n
	16	65536	65864	n
	17	131072	131720	n
	18	262144	264232	n
Generalized Tree Based Decoders (2, 32)	6	64	66	n
	7	128	132	n
	8	256	264	n
	9	512	528	n
	10	1024	1044	n
	11	2048	1072	0.5n
	12	4096	**2096**	0.5n
	13	8192	8736	n
	14	16384	8256	0.5n
	15	32768	32906	n
	16	65536	66308	n
	17	131072	132616	
	18	262144	265248	
Generalized Tree Based Decoders (4, 4)	3	8	4	0.5n
	4	16	8	0.5n
	5	32	32	n
	6	64	66	n
	7	128	68	0.5n
	8	256	136	0.5n
	9	512	528	n
	10	1024	1044	n
	11	2048	2072	n
	12	4096	4116	n
	13	8192	**4144**	0.5n
	14	16384	16472	n
	15	32768	32964	n
	16	65536	66000	n
	17	131072	131872	n
	18	262144	266320	n
	4	16	8	0.5n
	5	32	32	n
	6	64	66	n
	7	128	132	n
	8	256	136	0.5n

Hardware	Inputs	Outputs	Synthesis	Trend
			LUTs	*LUTs*
Generalized Tree Based Decoders (4, 8)	9	512	528	n
	10	1024	1044	n
	11	2048	2072	n
	12	4096	4116	n
	13	8192	8216	n
	14	16384	16472	n
	15	32768	32932	n
	16	65536	66000	n
	17	131072	131736	n
	18	262144	266320	n
Generalized Tree Based Decoders (4, 16)	5	32	32	n
	6	64	34	0.5n
	7	128	132	n
	8	256	136	0.5n
	9	512	528	n
	10	1024	1044	n
	11	2048	2072	n
	12	4096	4112	n
	13	8192	8216	n
	14	16384	8256	n
	15	32768	32932	n
	16	65536	66832	n
	17	131072	131736	n
	18	262144	267344	n
Generalized Tree Based Decoders (4, 32)	6	64	34	0.5n
	7	128	132	n
	8	256	136	0.5n
	9	512	528	n
	10	1024	1044	n
	11	2048	1072	0.5n
	12	4096	4112	n
	13	8192	8216	n
	14	16384	8256	0.5n
	15	32768	32868	n
	16	65536	66832	n
	17	131072	133392	n
	18	262144	267344	n
Generalized Tree Based Decoders (8, 4)	7	128	136	n
	8	256	264	n
	9	512	**288**	0.5n
	10	1024	1044	n
	11	2048	2072	n
	12	4096	2312	0.5n
	13	8192	8224	n
	14	16384	16912	n
	15	32768	**18468**	0.5n
	16	65536	65924	n
	17	131072	132398	n
	18	262144	**147752**	0.5n
Generalized Tree Based Decoders (8, 8)	7	128	136	n
	8	256	136	0.5n
	9	512	288	0.5n
	10	1024	1040	n
	11	2048	2068	n
	12	4096	2312	0.5n
	13	8192	8220	n
	14	16384	16416	n
	15	32768	18500	0.5n
	16	65536	65860	n
	17	131072	131877	n
	18	262144	148004	0.5n
	7	128	68	0.5n
	8	256	136	0.5n
	9	512	288	0.5n
	10	1024	1044	n

Hardware	Inputs	Outputs	Synthesis	Trend
			LUTs	*LUTs*
Generalized Tree Based Decoders (8, 16)	11	2048	2068	n
	12	4096	4124	n
	13	8192	8240	n
	14	16384	16416	n
	15	32768	32883	n
	16	65536	66820	n
	17	131072	131877	n
	18	262144	263979	n
Generalized Tree Based Decoders (8, 32)	7	128	68	0.5n
	8	256	264	n
	9	512	288	0.5n
	10	1024	1044	n
	11	2048	1064	0.5n
	12	4096	4124	n
	13	8192	8240	n
	14	16384	16432	n
	15	32768	32883	n
	16	65536	66820	n
	17	131072	84524	0.65n
	18	262144	263979	n
Generalized Tree Based Decoders (8, 64)	7	128	68	0.5n
	8	256	264	n
	9	512	288	0.5n
	10	1024	1044	n
	11	2048	1064	0.5n
	12	4096	2312	0.5n
	13	8192	8240	n
	14	16384	16432	n
	15	32768	18500	0.5n
	16	65536	66820	n
	17	131072	84524	0.65n
	18	262144	148004	0.5n
Generalized Tree Based Decoders (16, 4)	7	128	68	0.5n
	8	256	136	0.5n
	9	512	528	n
	10	1024	1044	n
	11	2048	2084	n
	12	4096	4136	n
	13	8192	4624	0.5n
	14	16384	15427	< n
	15	32768	33321	n
	16	65536	68105	n
	17	131072	73872	0.5n
	18	262144	266920	n
Generalized Tree Based Decoders (16, 8)	7	128	132	n
	8	256	136	0.5n
	9	512	528	n
	10	1024	1044	n
	11	2048	2072	n
	12	4096	2096	0.5n
	13	8192	4624	0.5n
	14	16384	15427	< n
	15	32768	33094	n
	16	65536	35337	0.5n
	17	131072	73872	0.5n
	18	262144	266920	n
Generalized Tree Based Decoders (16, 16)	8	256	136	0.5n
	9	512	528	n
	10	1024	1044	n
	11	2048	1056	0.5n
	12	4096	2096	0.5n
	13	8192	8228	n
	14	16384	8256	0.5n
	15	32768	16664	0.5n
	16	65536	35336	0.5n

Hardware	Inputs	Outputs	Synthesis	Trend
			LUTs	*LUTs*
	17	131072	136456	n
	18	262144	235496	< n
Generalized Tree Based Decoders (16, 32)	9	512	528	n
	10	1024	1044	n
	11	2048	1056	0.5n
	12	4096	2096	0.5n
	13	8192	8228	n
	14	16384	8256	0.5n
	15	32768	16664	0.5n
	16	65536	37128	0.5n
	17	131072	136456	n
	18	262144	235496	< n
Generalized Tree Based Decoders (16, 64)	10	1024	1044	n
	11	2048	1056	0.5n
	12	4096	2096	0.5n
	13	8192	4624	0.5n
	14	16384	8256	0.5n
	15	32768	16664	0.5n
	16	65536	37128	0.5n
	17	131072	73992	> 0.5n
	18	262144	235496	< n
Generalized Tree Based Decoders (32, 4)	7	128	132	n
	8	256	136	0.5n
	9	512	288	0.5n
	10	1024	1044	n
	11	2048	1088	0.5n
	12	4096	4136	n
	13	8192	8236	n
	14	16384	10384	< n
	15	32768	33224	n
	16	65536	66656	n
	17	131072	136224	n
	18	262144	275488	n
Generalized Tree Based Decoders (32, 8)	8	256	136	0.5n
	9	512	288	0.5n
	10	1024	1044	n
	11	2048	1088	0.5n
	12	4096	4136	n
	13	8192	8224	n
	14	16384	10384	< n
	15	32768	33224	n
	16	65536	66206	n
	17	131072	70688	> 0.5n
	18	262144	271392	n
Generalized Tree Based Decoders (32, 16)	9	512	288	0.5n
	10	1024	1044	n
	11	2048	1088	0.5n
	12	4096	4136	n
	13	8192	8224	n
	14	16384	16448	n
	15	32768	29961	< n
	16	65536	33376	0.5n
	17	131072	70688	> 0.5n
	18	262144	271392	n
Generalized Tree Based Decoders (32, 32)	10	1024	1044	n
	11	2048	1088	0.5n
	12	4096	4136	n
	13	8192	4160	0.5n
	14	16384	16448	n
	15	32768	26372	< n
	16	65536	33376	0.5n
	17	131072	74272	> 0.5n
	18	262144	148512	0.5n
	11	2048	2076	n
	12	4096	4136	n

Hardware	Inputs	Outputs	Synthesis	Trend
			LUTs	*LUTs*
Generalized Tree Based Decoders (32, 64)	13	8192	4160	0.5n
	14	16384	9088	> 0.5n
	15	32768	29572	< n
	16	65536	33376	0.5n
	17	131072	74272	> 0.5n
	18	262144	148512	0.5n
Generalized Tree Based Decoders (64, 4)	8	256	264	n
	9	512	528	n
	10	1024	1044	n
	11	2048	2084	n
	12	4096	2084	0.5n
	13	8192	8272	n
	14	16384	16432	n
	15	32768	32906	n
	16	65536	66630	n
	17	131072	133318 [2]	n
	18	262144	272450	n
Generalized Tree Based Decoders (64, 8)	9	512	528	n
	10	1024	1044	n
	11	2048	2084	n
	12	4096	2084	0.5n
	13	8192	8272	n
	14	16384	16432	n
	15	32768	32906	n
	16	65536	66630	n
	17	131072	132434	n
	18	262144	141378	> 0.5n
Generalized Tree Based Decoders (64, 16)	10	1024	1044	n
	11	2048	2084	n
	12	4096	2084	0.5n
	13	8192	8272	n
	14	16384	16432	n
	15	32768	32906	n
	16	65536	62923	< n
	17	131072	67618	0.5n
	18	262144	141346	> 0.5n
Generalized Tree Based Decoders (64, 32)	11	2048	2084	n
	12	4096	2084	0.5n
	13	8192	8272	n
	14	16384	16432	n
	15	32768	32906	n
	16	65536	62923	< n
	17	131072	67618	0.5n
	18	262144	148514	> 0.5n
Generalized Tree Based Decoders (64, 64)	12	4096	2084	0.5n
	13	8192	8272	n
	14	16384	16432	n
	15	32768	32906	n
	16	65536	66095	n
	17	131072	67618	0.5n
	18	262144	148514	> 0.5n
Generalized Tree Based Decoders (128, 16)	12	4096	2084	0.5n
	13	8192	4136	0.5n
	14	16384	16412	n
	15	32768	22238	< n
	16	65536	41539	< n
	17	131072	133764	n
	18	262144	264587	n
Generalized Tree Based Decoders (128, 32)	13	8192	4136	0.5n
	14	16384	16412	n
	15	32768	22238	< n
	16	65536	38161	< n
	17	131072	132495	n
	18	262144	281220	> n
	13	8192	4136	0.5n

Hardware	Inputs	Outputs	Synthesis	Trend
			LUTs	*LUTs*
Generalized Tree Based Decoders (128, 64)	14	16384	16412	n
	15	32768	22238	< n
	16	65536	38161	> 0.5n
	17	131072	132495	n
	18	262144	281220	n
Generalized Tree Based Decoders (128, 128)	14	16384	17028	n
	15	32768	22256	< n
	16	65536	38388	> 0.5n
	17	131072	129845	< n
	18	262144	281220	n
Multi-Level Decoders (3GO) [3]	9	512	528	n
	10	1024	1056	n
	11	2048	2112	n
	12	4096	2176	0.5n
	13	8192	8264	n
	14	16384	16524	n
	15	32768	33064	n
	16	65536	65864	n
	17	131072 [4	131728	n
	18	262144 [5	132138	0.5n
Multi-Level Decoders (3FO) [6]	9	512	528	n
	10	1024	1056	n
	11	2048	2112	n
	12	4096	2176	0.5n
	13	8192	8264	n
	14	16384	16524	n
	15	32768	33064	n
	16	65536	65864	n
	17	131072 [7	131728	n
	18	262144	132138 [8]	0.5n
Multi-Level Decoders (3GA) [9]	9	512	528	n
	10	1024	1040	n
	11	2048	2072	n
	12	4096	4128	n
	13	8192	8240	n
	14	16384	16448	n
	15	32768	16480	0.5n
	16	65536	67648	n
	17	131072	65792	0.5n
	18	262144	132140	0.5n
Multi-Level Decoders (3FA) [10]	9	512	528	n
	10	1024	1040	n
	11	2048	2072	n
	12	4096	4128	n
	13	8192	8240	n
	14	16384	16448	n
	15	32768	16480	0.5n
	16	65536	67648	n
	17	131072	65776	0.5n
	18	262144	132140	0.5n
Multi-Level Decoders (4GO) [11]	9	512	528	n
	10	1024	1056	n
	11	2048	2112	n
	12	4096	2176	0.5n
	13	8192	8264	n
	14	16384	16524	n
	15	32768	33064	n
	16	65536	65864	n
	17	131072	131728	n
	18	262144	144853	> 0.5n
Multi-Level Decoders	9	512	528	n
	10	1024	1056	n
	11	2048	2112	n
	12	4096	2176	0.5n
	13	8192	8264	n

Hardware	Inputs	Outputs	Synthesis	Trend
			LUTs	*LUTs*
Decoders (4FO) [12]	14	16384	16524	n
	15	32768	33064	n
	16	65536	65864	n
	17	131072	131728	n
	18	262144	132128	0.5n
Multi-Level Decoders (4GA) [13]	9	512	524	n
	10	1024	1040	n
	11	2048	2112	n
	12	4096	2120	0.5n
	13	8192	8224	n
	14	16384	16424	n
	15	32768	32816	n
	16	65536	36896	> 0.5n
	17	131072	72761	> 0.5n
	18	262144	147520	> 0.5n
Multi-Level Decoders (4FA) [14]	9	512	524	n
	10	1024	1040	n
	11	2048	2112	n
	12	4096	2120	0.5n
	13	8192	8224	n
	14	16384	16424	n
	15	32768	32816	n
	16	65536	36896	> 0.5n
	17	131072	72757	> 0.5n
	18	262144	147520	> 0.5n
Multi-Level Decoders (5FO) [15]	9	512	528	n
	10	1024	1056	n
	11	2048	2112	n
	12	4096		
	13	8192		
	14	16384		
	15	32768		
	16	65536		
	17	131072		
	18	262144	144739	> 0.5n
Multi-Level Decoders (5FA) [16]	9	512		
	10	1024		
	11	2048		
	12	4096		
	13	8192		
	14	16384		
	15	32768		
	16	65536		
	17	131072		
	18	262144		

Hardware	Inputs	Outputs	Synthesis	Trend
			LUTs	*LUTs*

Hardware	Inputs	Outputs	Synthesis	Trend
			LUTs	*LUTs*

Hardware	Inputs	Outputs	Synthesis	Trend
			LUTs	*LUTs*

Hardware	Inputs	Outputs	Synthesis	Trend
			LUTs	*LUTs*

[1] ~52 min synth time

[2] took like 22 minutes, why?

[3] Codes:

First number: [G_max_lvls]

Second letter: G (gate-level enabled) / F (function-based, gate-level disabled)

Third letter: A (cascaded) / O (composed)

[4] ~40 min synth time

[5] ~40 min synth time

[6] Codes:

First number: [G_max_lvls]

Second letter: G (gate-level enabled) / F (function-based, gate-level disabled)

Third letter: A (cascaded) / O (composed)

[7] ~35 min synth time

[8] may want to verify this was 138 and not 128

[9] Codes:

First number: [G_max_lvls]

Second letter: G (gate-level enabled) / F (function-based, gate-level disabled)

Third letter: A (cascaded) / O (composed)

[10] Codes:

First number: [G_max_lvls]

Second letter: G (gate-level enabled) / F (function-based, gate-level disabled)

Third letter: A (cascaded) / O (composed)

[11] Codes:

First number: [G_max_lvls]

Second letter: G (gate-level enabled) / F (function-based, gate-level disabled)

Third letter: A (cascaded) / O (composed)

[12] Codes:

First number: [G_max_lvls]

Second letter: G (gate-level enabled) / F (function-based, gate-level disabled)

Third letter: A (cascaded) / O (composed)

[13] Codes:

First number: [G_max_lvls]

Second letter: G (gate-level enabled) / F (function-based, gate-level disabled)

Third letter: A (cascaded) / O (composed)

[14] Codes:

First number: [G_max_lvls]

Second letter: G (gate-level enabled) / F (function-based, gate-level disabled)

Third letter: A (cascaded) / O (composed)

[15] Codes:

First number: [G_max_lvls]

Second letter: G (gate-level enabled) / F (function-based, gate-level disabled)

Third letter: A (cascaded) / O (composed)

[16] Codes:

First number: [G_max_lvls]

Second letter: G (gate-level enabled) / F (function-based, gate-level disabled)

Third letter: A (cascaded) / O (composed)