

## 題號: 6 Clock Tree Synthesis

# A3 Result

Skew Constraint	Example1		Exampe2		Example3		Example4		Example5	
	Delay	Skew	Delay	Skew	Delay	Skew	Delay	Skew	Delay	Skew
0.1	2.125644	1.483015	2.262933	0.118931	3.544994	0.2021	3.841497	0.146272	3.283654	0.369976
0.2	2.129537	1.488335	2.262933	0.118931	3.386095	0.199945	3.781131	0.146272	3.37293	0.365697
0.3	2.124093	1.483039	2.262933	0.118931	3.260619	0.216846	3.836912	0.146272	3.288983	0.367891
0.4	2.122377	1.48256	2.262933	0.118931	3.52726	0.233101	3.838483	0.146272	2.841923	0.367155
0.5	2.117947	1.479367	2.262933	0.118931	3.400725	0.236377	3.50819	0.146683	2.84342	0.368653
0.6	2.129537	1.506605	2.262933	0.118931	3.328945	0.234241	3.50819	0.146683	3.713339	0.362346
0.7	2.122378	1.482562	2.262933	0.118931	3.249449	0.200645	3.629156	0.146563	2.837779	0.363011
0.8	2.117947	1.479367	2.262933	0.118931	3.168388	0.290419	3.50819	0.146683	2.833604	0.358836
0.9	2.119941	1.479337	2.262933	0.118931	3.416645	0.225387	3.50819	0.146683	2.867817	0.393049
1	2.119941	1.479337	2.262933	0.118931	3.367756	0.252048	3.50819	0.146683	3.284708	0.371031
1.1	2.126766	1.484925	2.262933	0.118931	3.212068	0.24523	3.50819	0.146683	2.835587	0.368235
1.2	2.120759	1.480155	2.262933	0.118931	3.575427	0.288556	3.50819	0.146683	2.842764	0.367997
1.3	2.129537	1.488335	2.262933	0.118931	3.444666	0.252981	3.50819	0.146683	2.854743	0.387637
1.4	2.119941	1.479337	2.262933	0.118931	3.133443	0.249825	3.50819	0.146683	2.838212	0.363444
1.5	2.127542	1.497304	2.262933	0.118931	3.320624	0.249547	3.50819	0.146683	2.839711	0.364943
1.6	2.119165	1.479349	2.262933	0.118931	3.192339	0.283654	3.634411	0.146563	2.854049	0.379281
1.7	2.126766	1.484925	2.262933	0.118931	3.348838	0.266206	3.605978	0.146563	2.840488	0.365721
1.8	2.124772	1.484955	2.262933	0.118931	3.081575	0.198044	3.50819	0.146683	2.837268	0.362501
1.9	2.310086	1.481821	2.262933	0.118931	3.479199	0.259465	3.50819	0.146683	2.874225	0.407119
2	2.152264	1.512728	2.262933	0.118931	3.406709	0.28093	3.50819	0.146683	2.845818	0.37779

# A37 Result

Skew Constraint	Example1		Exampe2		Example3		Example4		Example5	
	Delay	Skew	Delay	Skew	Delay	Skew	Delay	Skew	Delay	Skew
0.1	2.1389	1.5034	2.3374	0.1189	3.0645	0.1935	4.1914	0.1467	3.7055	0.3471
0.2	2.1389	1.5034	2.1779	0.1189	2.9707	0.1984	3.3728	0.1467	3.7055	0.3471
0.3	2.1389	1.5034	2.1779	0.1189	2.8963	0.2587	3.3728	0.1467	3.7055	0.3471
0.4	2.1389	1.5034	2.1779	0.1189	2.8963	0.2587	3.3728	0.1467	2.9885	0.4
0.5	2.1389	1.5034	2.1779	0.1189	2.8963	0.3985	3.3728	0.1467	2.8251	0.4342
0.6	2.1389	1.5034	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
0.7	2.1389	1.5034	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
0.8	2.1389	1.5034	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
0.9	2.1389	1.5034	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1	2.1389	1.5034	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.1	2.1389	1.5034	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.2	2.1389	1.5034	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.3	2.6108	1.4686	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.4	2.6108	1.4686	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.5	2.1179	1.4974	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.6	2.1628	1.5714	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.7	2.1628	1.5714	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.8	2.1628	1.5714	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.9	2.1628	1.5714	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
2	2.1628	1.5714	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665

# A44 Result

Skew Constraint	Example1		Exampe2		Example3		Example4		Example5	
	Delay	Skew	Delay	Skew	Delay	Skew	Delay	Skew	Delay	Skew
0.1					Core Dump		RunTime >8hr			
0.2			2.1779	0.1189	2.8963	0.3667	3.3728	0.1467		
0.3			2.1779	0.1189	2.8976	0.2697	3.3728	0.1467		
0.4			2.1779	0.1189	2.8963	0.3312	3.3728	0.1467	2.8251	0.3556
0.5			2.1779	0.1189	2.8963	0.3367	3.3728	0.1467	2.8251	0.3556
0.6			2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.3556
0.7			2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.3741
0.8			2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.4342
0.9			2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1			2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.1			2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.2			2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.3			2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.4			2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.5	2.1265	1.4796	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.6	2.1307	1.5641	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.7	2.1307	1.5641	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.8	2.1307	1.5641	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
1.9	2.1307	1.5641	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665
2	2.1307	1.5641	2.1779	0.1189	2.8963	0.5541	3.3728	0.1467	2.8251	0.5665

Note: 1. When the program report "No Solution" the cell is left empty.

2. In example3, the other two group can meet constraint at 0.2 ns but this program can't.

**The execution result under the constraint of skew = 0.1 ns**

組別	A3					A37					A44				
Circuits	P1	P2	P3	P4	P5	P1	P2	P3	P4	P5	P1	P2	P3	P4	P5
Clock Skew	1.479	0.118	0.185	0.147	0.375	1.503	0.119	0.193	0.147	0.347	No Solution	No Solution	Core Dump	Runtime Grater 8Hr	No Solution
Clock Delay	2.119	2.262	3.143	3.508	2.850	2.138	2.337	3.065	4.191	3.71					
Buffer changed	17	14	24	1	10	39	18	25	11	16					
Runtime (sec)	2.49	0.22	16.38	0.6	3.83	1	0.16	1.83	0.78	0.59					

**Note:**

1. Only the rising edge skew and delay had been taken into consideration in the above execution result.
2. The correctness of skew and delay values for the generated clock tree had been verified for all submissions.
3. Regarding to A3,
  - a. **The execution result is different for every execution for the same case and the same constraint.**
  - b. An additional clock tree viewer had been implemented.
4. Regarding to A37,
  - a. No Source Code.
5. Regarding to A44,
  - a. If the solution cannot meet the skew constraint, then it will report “No solution.”
  - b. Examples 1,2,5 report no feasible solution for the skew constraint = 0.1 ns
  - c. Example 3 Core Dump when the skew constraint = 0.1 ns (other cases are fine)
  - d. Example 4 Runtime > 8hr when the skew constraint = 0.1 ns (other cases are fine)