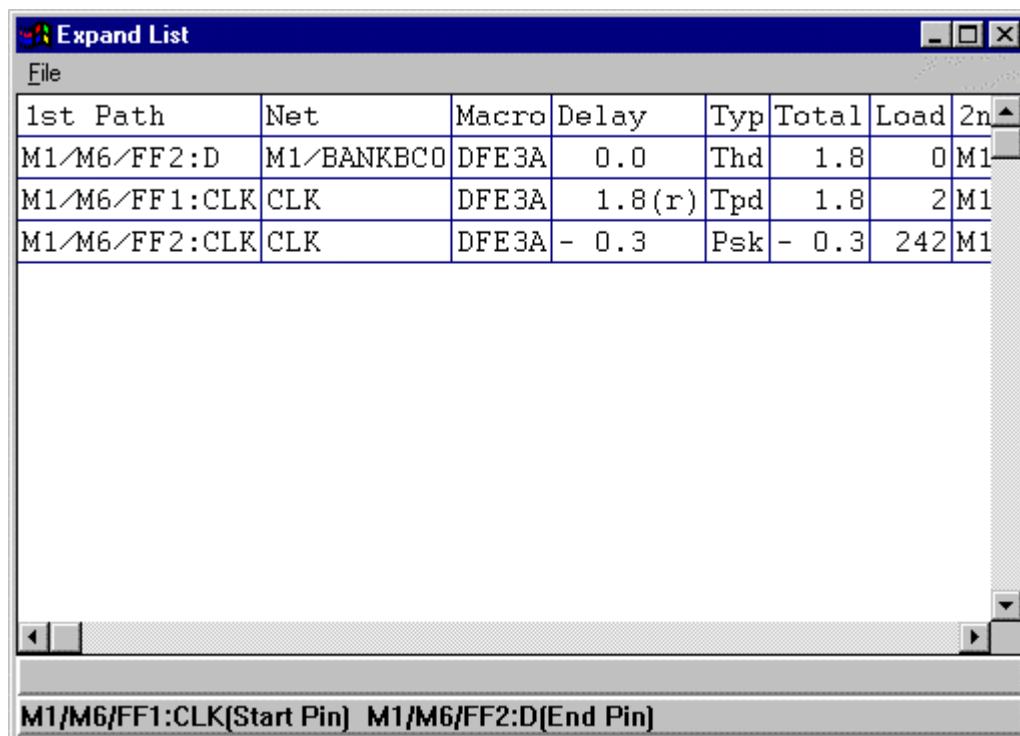


Hold Time Analysis with Designer

When calculating hold times, the inputs to the equation are propagation delay, routing delay, the hold time of the receiving flip-flop, and the clock skew. The clock skew can either help or hurt, depending upon its sign. Here's the definition from the Actel help system:

This command calculates the delay from a clock signal arriving at an ending memory element relative to the clock signal arriving at a beginning memory element. For example, if the clock signal arrives at the first flip-flop in the path 2 ns before it arrives at the next flip-flop in the path, the skew would be reported as 2.0 ns

There is a bug in the calculation performed in Designer 3.0 and later, where clock skew is not included in the calculations for minimum delay, as seen in the example below:



The screenshot shows a window titled "Expand List" with a menu bar containing "File". Below the menu bar is a table with the following data:

1st Path	Net	Macro	Delay	Typ	Total	Load	2n
M1/M6/FF2:D	M1/BANKBC0	DFE3A	0.0	Thd	1.8	0	M1
M1/M6/FF1:CLK	CLK	DFE3A	1.8(r)	Tpd	1.8	2	M1
M1/M6/FF2:CLK	CLK	DFE3A	- 0.3	PsK	- 0.3	242	M1

At the bottom of the window, there is a status bar with the text: "M1/M6/FF1:CLK[Start Pin] M1/M6/FF2:D[End Pin]"

For the maximum delay case, used to determine maximum operating frequency, the setup time and clock skew is correctly included in the calculations. An example of this, from the same design data base as that used above, is shown below.

The screenshot shows a window titled "Expand List" with a menu bar containing "File". Below the menu bar is a table with the following columns: "1st Path", "Net", "Macro", "Delay", "Typ", "Total", "Load", and "2r". The table contains the following data rows:

1st Path	Net	Macro	Delay	Typ	Total	Load	2r
M1/M11/F1/FF2:S	M1/M11/F1/SB	DFMB	7.6	Tsu	102.9	0 M	
M1/M11/F1/G5:A	M1/M11/EBA	BUF	9.6(f)	Tpd	95.3	3 M	
M1/M11/G8:A	M1/LDHC	BUF	11.3(f)	Tpd	85.7	10 M	
M1/G12:A	M1/MSBEQLSB	AND3	12.1(f)	Tpd	74.4	2 M	
M1/M9/G8:B	M1/M9/\$1N26	NOR4A	14.2(f)	Tpd	62.3	1 M	
M1/M9/G5:B	M1/BANKAC2	XO1	8.2(r)	Tpd	48.1	1 M	
M1/M2/FF3:CLK	CLK	DFE3A	42.2(f)	Tpd	39.9	6 M	
M1/M11/F1/FF2:CLK	CLK	DFMB	- 2.3	Psk	- 2.3	242 M	

At the bottom of the window, there is a status bar with the text: "M1/M2/FF3:CLK[Start Pin] M1/M11/F1/FF2:S[End Pin]".