When n = 10000,average number of connections: 48355.74 Theoretical Value(1/2nlogn): 46051.78 Error: 5.00%
When n = 20000,average number of connections: 103041.93 Theoretical Value(1/2nlogn): 99034.88 Error: 4.05%
When n = 30000,average number of connections: 160486.42 Theoretical Value(1/2nlogn): 154634.29 Error: 3.78%
When n = 40000,average number of connections: 218983.43 Theoretical Value(1/2nlogn): 211932.69 Error: 3.33%
When n = 50000,average number of connections: 291782.83 Theoretical Value(1/2nlogn): 270494.46 Error: 7.87%
When n = 60000,average number of connections: 345642.84 Theoretical Value(1/2nlogn): 330063.00 Error: 4.72%

N	ln(N)	N*ln(N)	Connections	Errors
10000	9.21034037197618	92103.4037197618	48355.74	5.00%
20000	9.90348755253613	198069.751050723	103041.93	4.05%
30000	10.3089526606443	309268.579819329	160486.42	3.78%
40000	10.5966347330961	423865.389323843	218983.43	3.33%
50000	10.8197782844103	540988.914220514	291782.83	7.87%
60000	11.0020998412042	660125.990472254	345642.84	4.72%

Chart
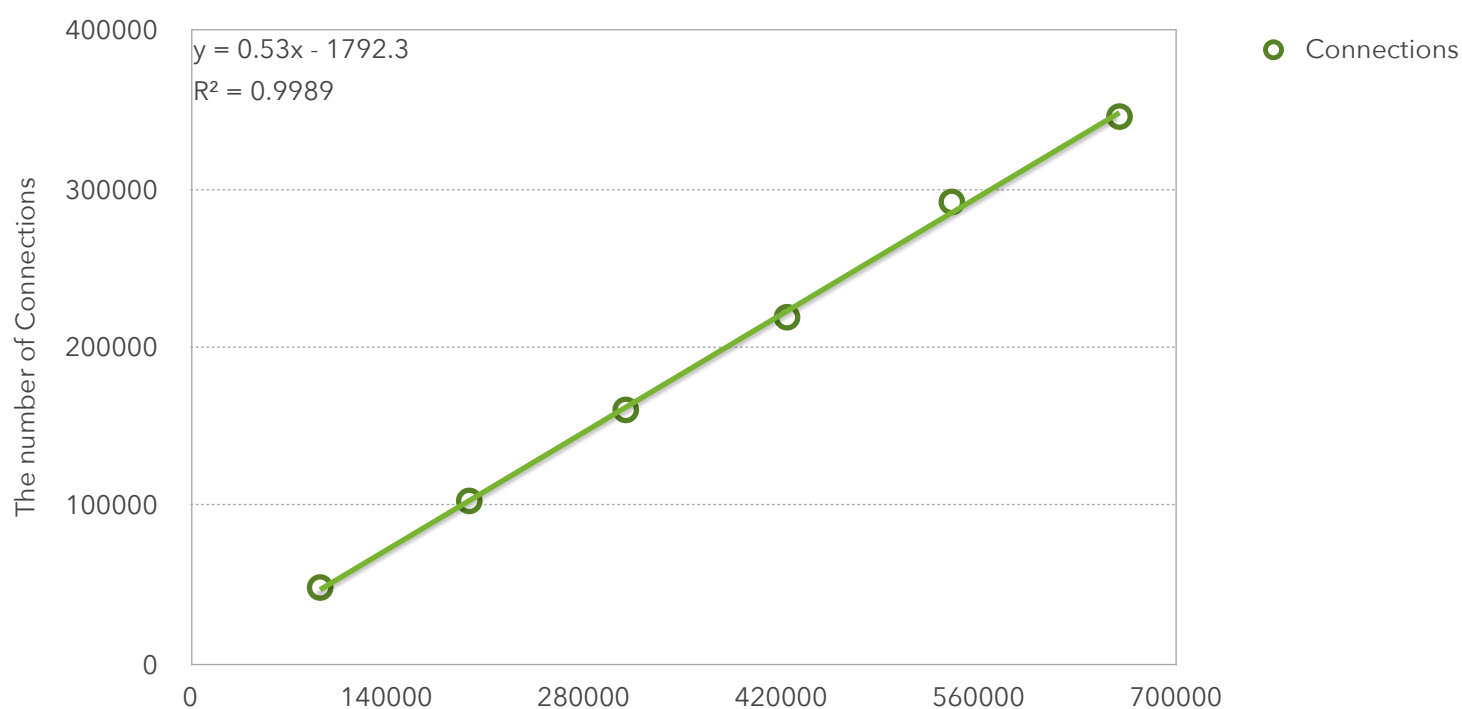
It can be verified from the result that when reduce the number of components from n to 1, the average value of connections tends to be ~1/2nlogn where log n is the natural logarithm of n.