CHAPTER 5

Simulation Results

In this chapter, we validate our model. The transmission behavior simulation base on the Figure 3.7and Figure 3.8 was implemented by the C code. The mathematic evaluation base on our proposed schemes throughout the CHAPTER 4 was computed by the MATLAB 7.0. There are two major items that we will evaluate, which are the delay time and the success probability of MSH-DSCH transmission.

5.1. Delay Time

The formula (17) is our proposed scheme to evaluate the delay time of one certain node transmitting its scheduling information MSH-DSCH. The MATLAB 7.0 is applied to calculate this complex operation in our numeric validations. Following parameters are applied:

Exponent = 2

Node ID: random number between 1~4095

Probability: Pc= 0.5

And the result is shown as Figure 5.1. The “sim” denotes a curve by simulation; “math” denotes a curve by mathematics. With this figure, it shows our mathematical model approaches the simulation result. By the way, the error rate is analyzed by the statistic method, as Figure 5.2, presents the difference in distance between the method by behavior simulation and by our proposed mathematic formula. The error is under 10% while the nodes of number between 2 to 20. Except for the exponent x=2, we are also interested in x=3 and x=4. These simulation results are shown from Figure 5.3 to Figure 5.6. The errors are under 10% throughout the above simulations. The stable accuracy is performed all over these simulation results; even the different exponents are applied.

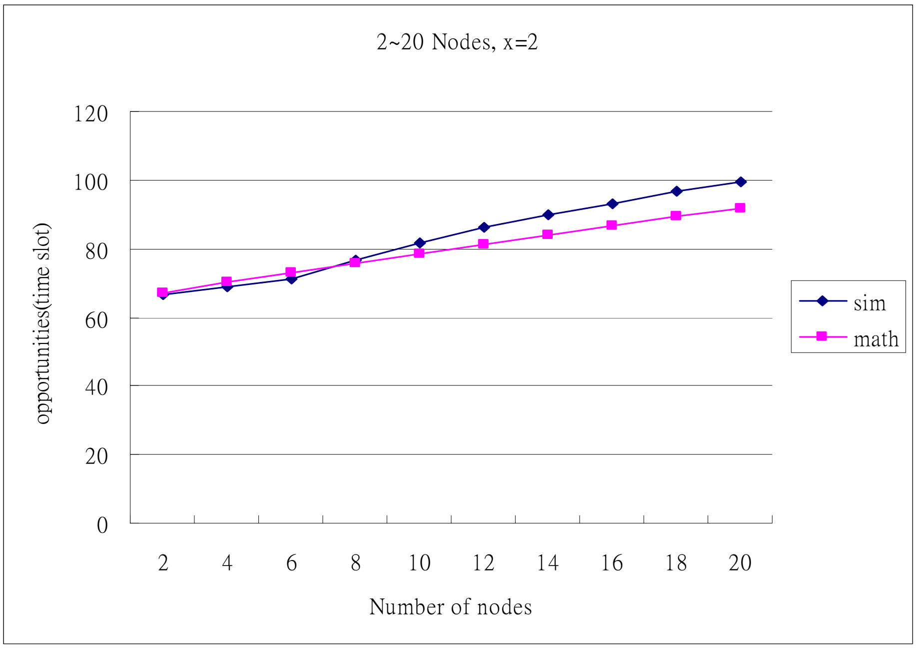

Figure 5.1: The delay time of opportunities between simulation and mathematic model-1

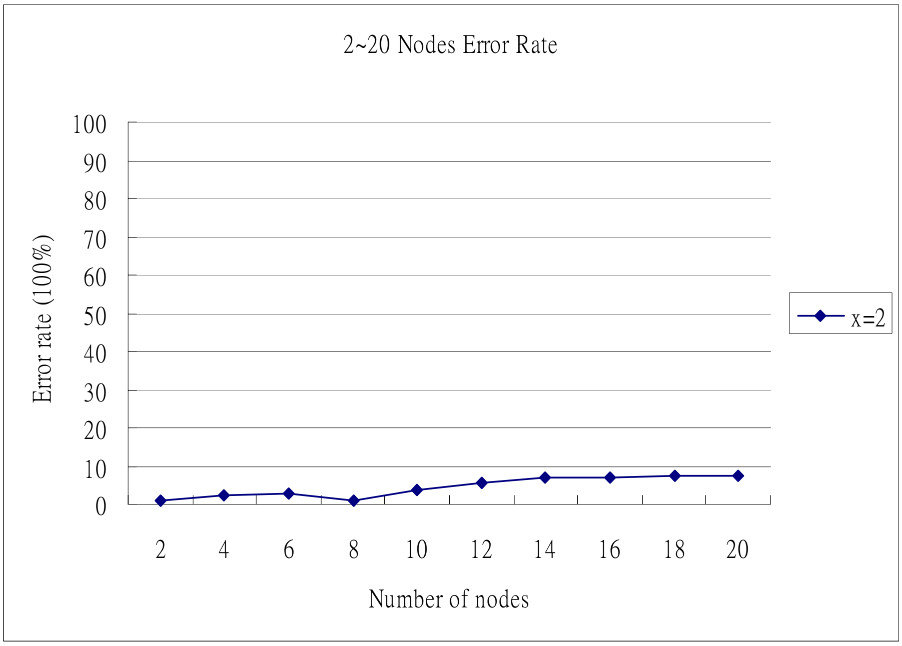

Figure 5.2: The error rate between simulation and mathematic model-1

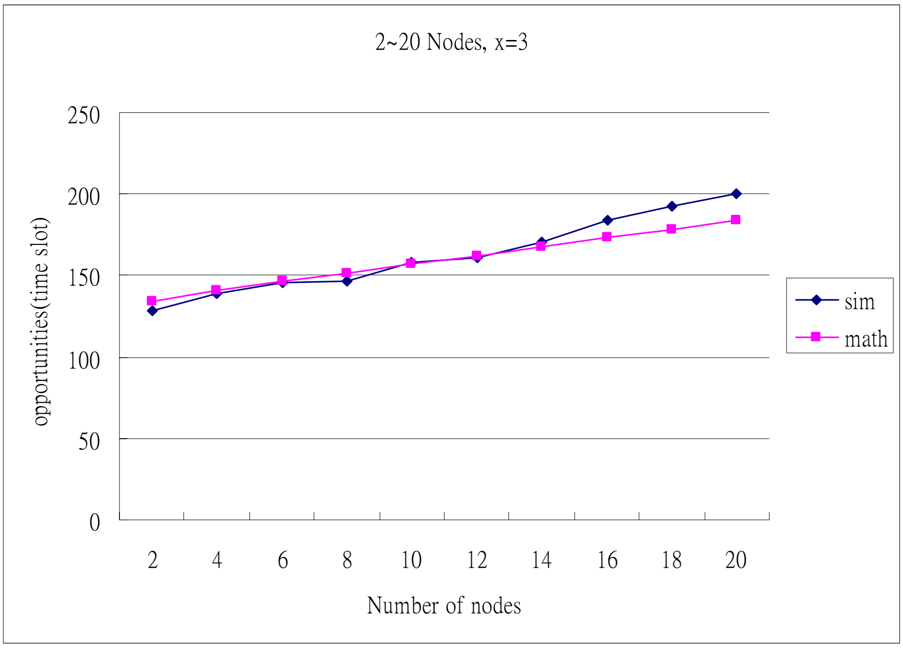

Figure 5.3: The delay time of opportunities between simulation and mathematic model-2

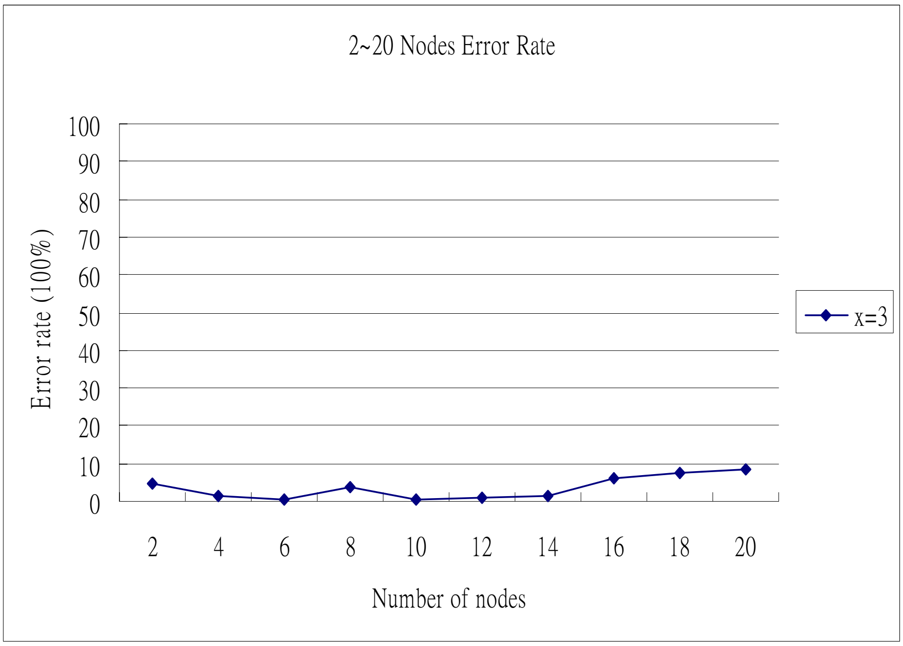

Figure 5.4: The delay time of opportunities between simulation and mathematic model-2

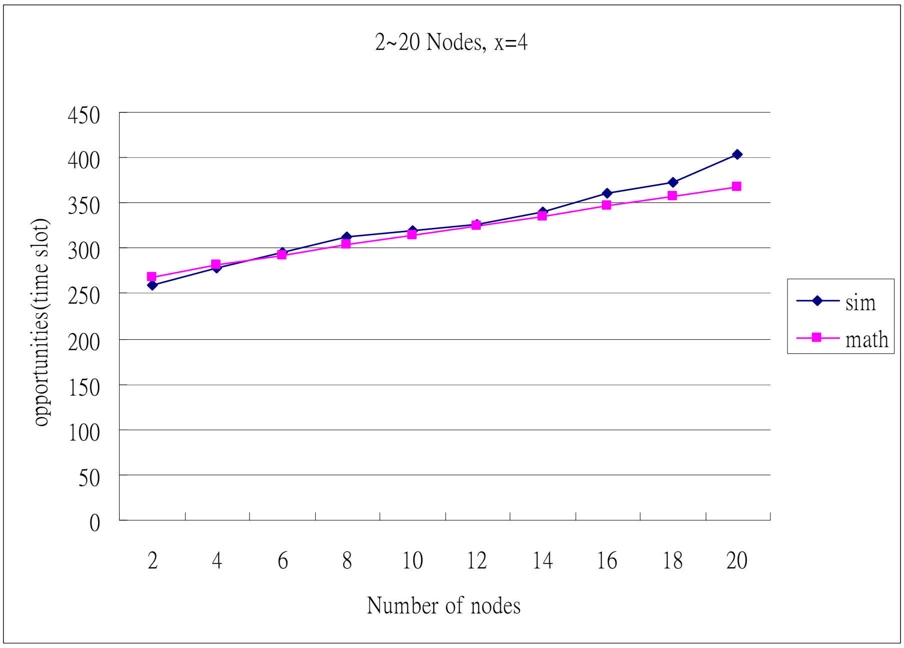

Figure 5.5: The delay time of opportunities between simulation and mathematic model-3

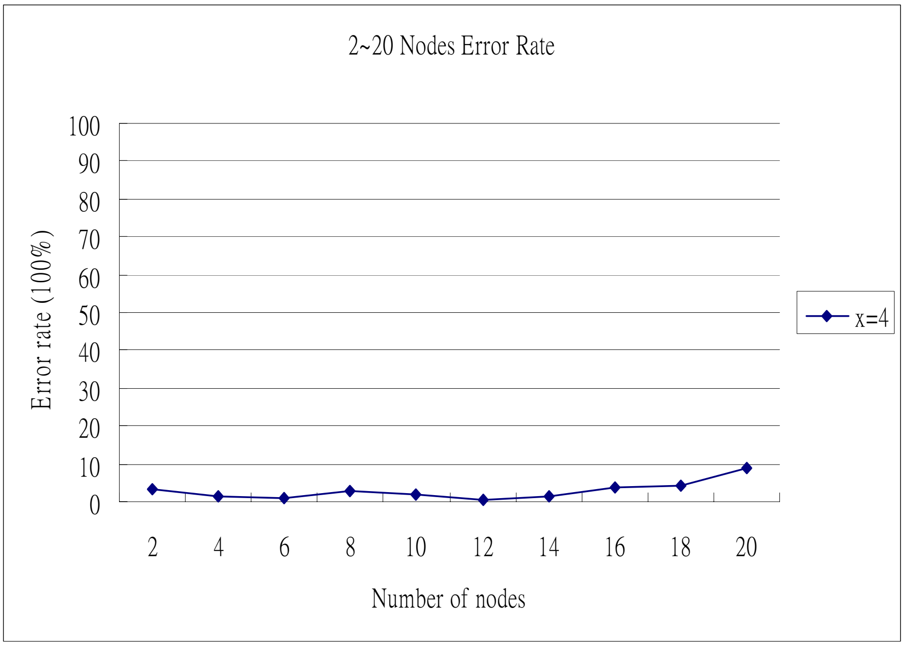

Figure 5.6: The delay time of opportunities between simulation and mathematic model-3

Besides, as shown in the Table 5.1 and Figure 5.7, there is an error rate comparison between the [9] and proposed evaluation. In order to compare with original analysis, Table 5.1 follows the original table format in the [9], that's why the exponent x is list here without regular order.

Table 5.1: Comparison between original and proposed evaluation

Numbers of Nodes	X	Original (100%)	Proposed (100%)
2	2	2.47	0.75
3	3	3.12	1.97
4	3	2.81	1.39
5	1	0.85	0.36
6	0	0.36	0.38
7	2	2.28	2.2
8	2	3.85	0.9
9	1	0.86	0.65
10	0	0.42	0.1

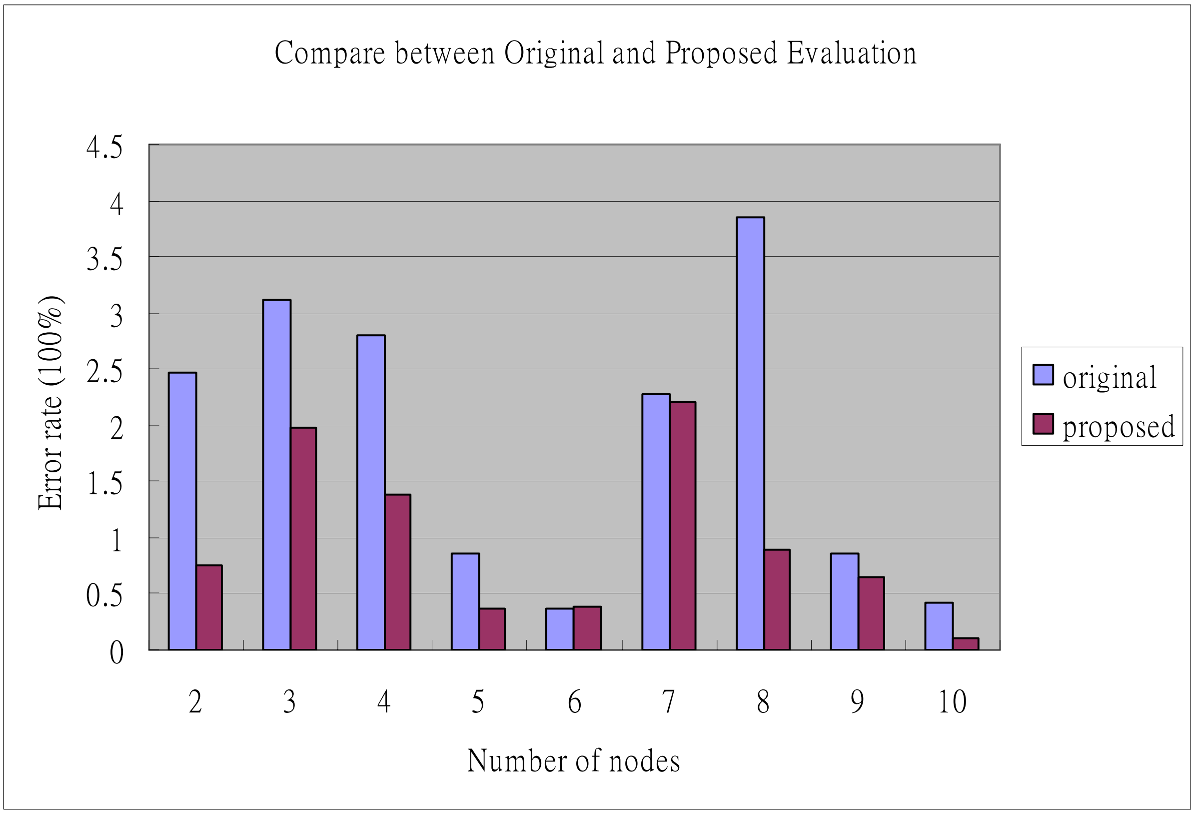

Figure 5.7: Comparison between original and proposed evaluation

The Figure 5.7 shows that the values predicted by our model have a smaller degree of error than the values generated by [9]'s model do.

5.2. The Success Probability of MSH-DSCH Transmission

The formula (18) is a recursive function, so the initial value should be assumed for the recursive calculation. The initial value of $\underline{\pi}$ is assumed as follows,

$$\underline{\pi}^{(0)} = (1, 0, 0, 0, \ldots)$$

If we are interested in the exponent x=2, the probability of success is evaluated as Figure

5.8. The inverse ratio depicted in this figure shows that as the number of nodes increases, the probability of success decreases.

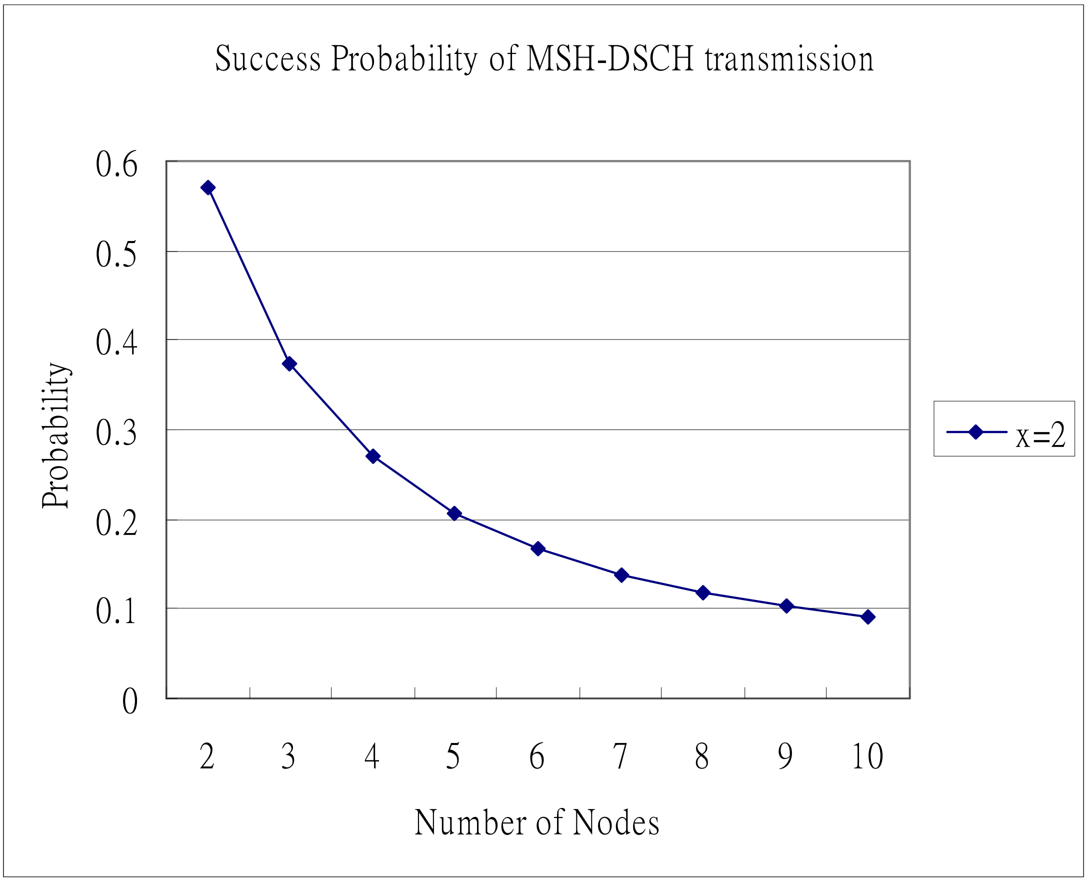

Figure 5.8: The mean of success probability that a node transmit MSH-DSCH

The Figure 5.9 shows the probabilities of success which three different exponents are compared. This figure shows that as the number of exponent increases, the probability decreases. So there is a concept that the small exponent can speed-up the MSH-DSCH transmission. This is useful in the future as a mechanism of QoS or call admission control. For example, a node which has the small exponent may have the more probabilities to transmit its scheduling information MSH-DSCH. The time for transmitting the MSH-DSCH may image as a call setup time at beginning of a link connection. Thus the higher probability for transmitting scheduling information MSH-DSCH implies the higher chance or priority it will be to initialize a connection.

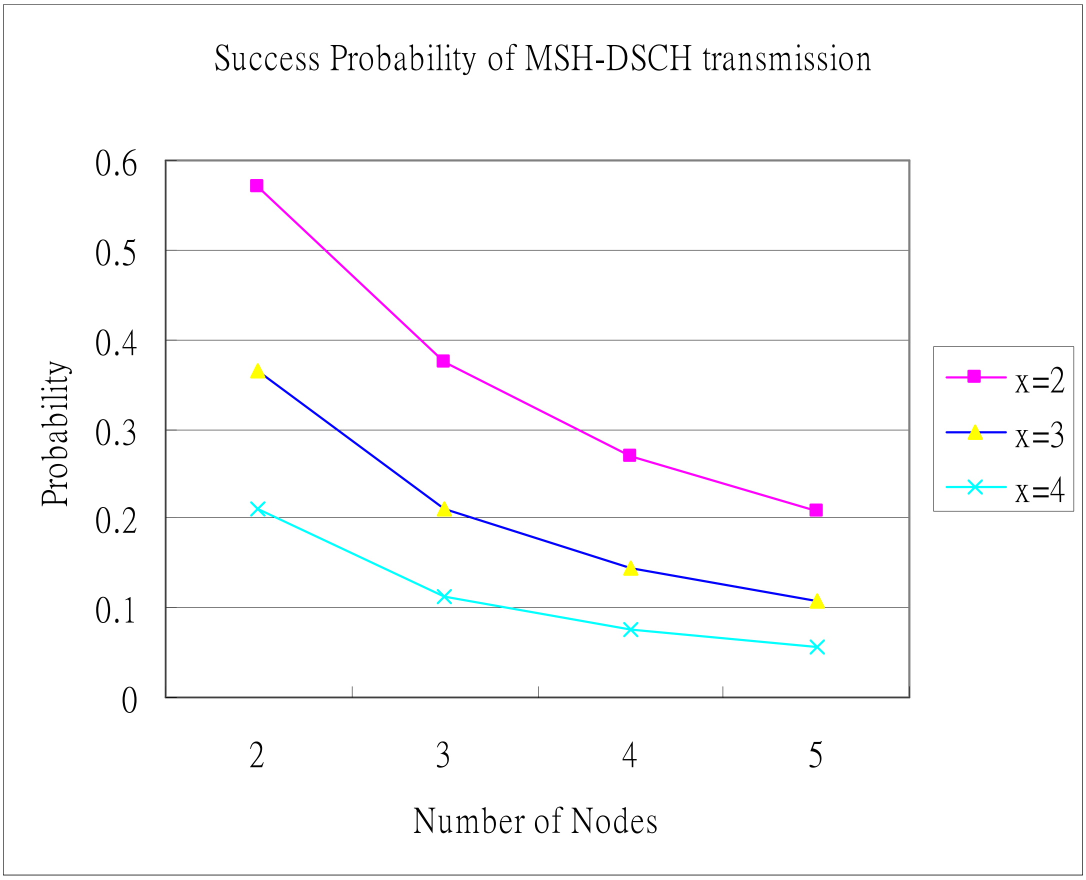

Figure 5.9: The mean of success probability when x is non-identical