Chapter 6

Simulation Results

To observe the departure behavior of ABR and VBR with respect to g_1, we assume the following parameter set by $r(0) = 0.4$ and $r(1) = 0.8$, $p(0) = p(1) = 0.6, L = 1000, C = 1000, M = 10, B = 40, g_2 = 700, 50 \leq g_1 \leq 500$. The results are shown in Figures 6.1 and 6.2. Figure 6.1 illustrates $E[D]$ and $E[Y]$ do not make significantly changes while g_1 changes. This is because u_A is not sensitive to the change of g_1. Figure 6.2 illustrates by numerical experiments how the loss probability and utilization of ABR are affected by g_1. It shows the loss probability and utilization of ABR are not affected by g_1 explicitly.

Figure 6.1: $E[D], E[Y]$ vs. g_1.

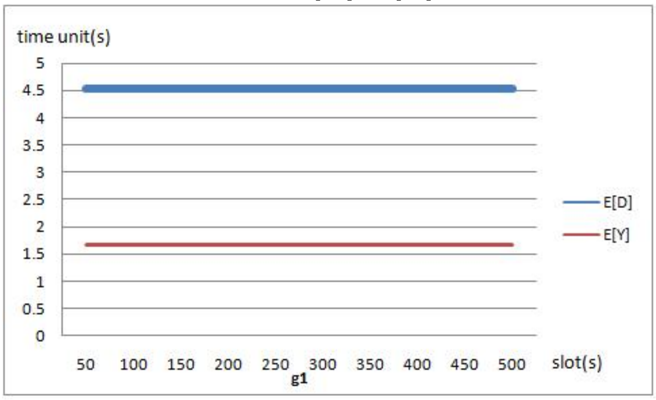
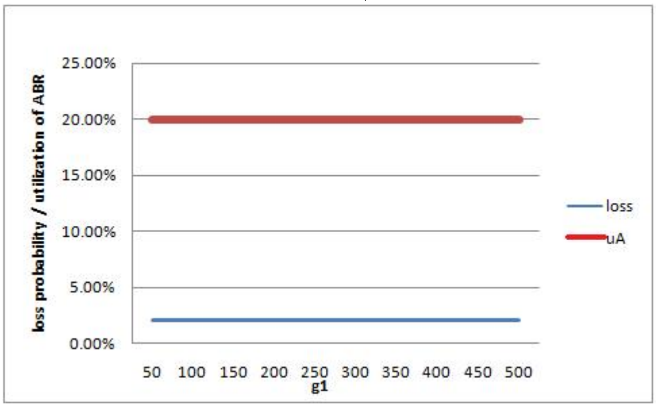


Figure 6.2: The loss probability / utilization of ABR vs. g_1.



For the second experiments, we fix $r(0) = 0.4$ and $r(1) = 0.8$, $p(0) = p(1) = 0.6, L = 1000, C = 1000, M = 10, B = 40, g_1 = 50, 100 \leq g_2 \leq 500$. We will observe the departure behavior of ABR and VBR with respect to g_2. The results are shown in Figures 6.3 and 6.4. Figure 6.3 illustrates $E[D]$ and $E[Y]$ have changes while g_2 changes. Figure 6.4 illustrates by numerical experiments how the loss probability and utilization of ABR are affected by g_2. It shows the loss probability and utilization of ABR are affected by g_2. It concludes that g_2 has made more impact of the departure of ABR cells than g_1.

Figure 6.3: $E[D], E[Y]$ vs. g_2.

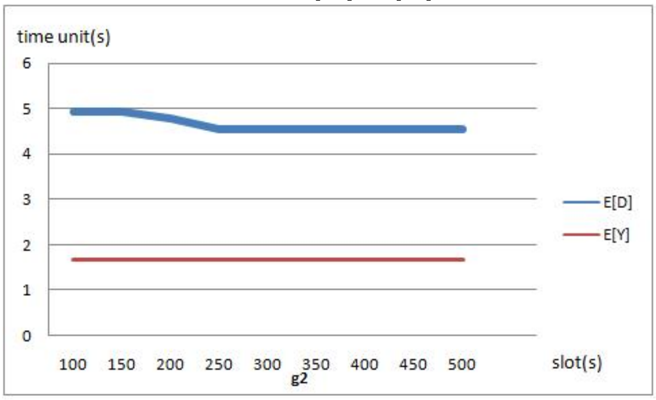
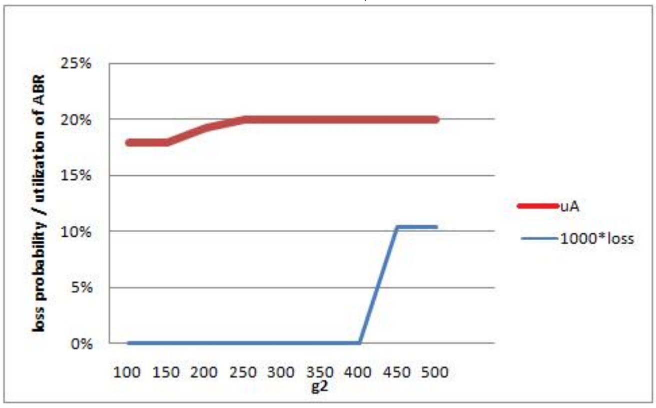


Figure 6.4: The loss probability / utilization of ABR vs. g_2.

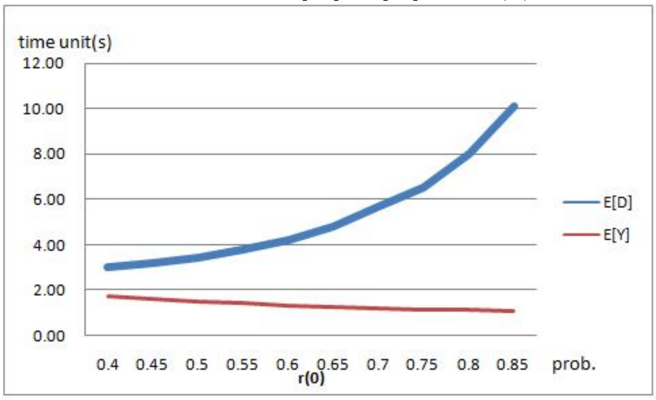


We have seen that g_1 and g_2 have both no significant impact to the departure of VBR cells. Figure 6.4 shows g_2 has a little impact on the loss probability of ABR cells. However, it is visualized that the loss probability of ABR cells increases when B increases.

We change $r(0)$ and $r(1)$ to investigate $E[D]$ and $E[Y]$. First, we assume that the buffer of ABR is $C = 1000$ units, $p(0) = p(1) = 0.5$ and $g_1 = 400$ and $g_2 = 700$. Suppose $L = 50$, $B = 2$ and $z = 1, 2, \ldots, 30$. Then, let $r(1) = 0.99999$ and change the value of $r(0)$ to observe behavior of expected value of VBR and ABR, respectively. We present the numerical results in Figure 6.5. Clearly, the mean of inter-departure time of ABR increases while $r(0)$ increases. However, the mean of inter-departure time of VBR decreases while $r(0)$ increases. Because the probability of VBR served is increasing, and the mean of inter-departure time of VBR decreases, the result shows that VBR is not affected by ABR. Hence, as the probability of ABR served is decreasing, the mean of inter-departure time of ABR increases.

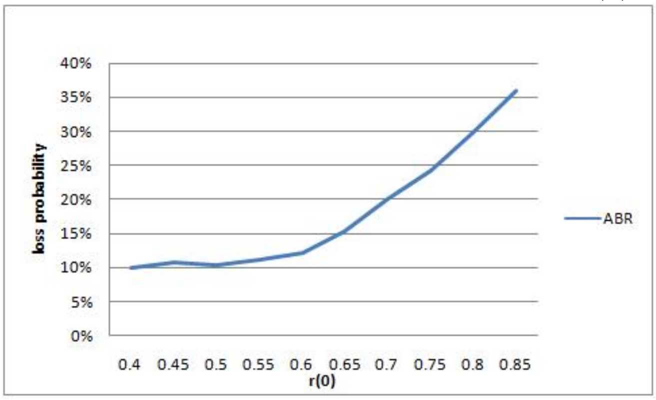
Meanwhile, as above assumption conditions hold and let $B = 10$, we show the

Figure 6.5: $E[D], E[Y]$ vs. $r(0)$.



loss probability of ABR cells in Figure 6.6 increases as $r(0)$ increases.

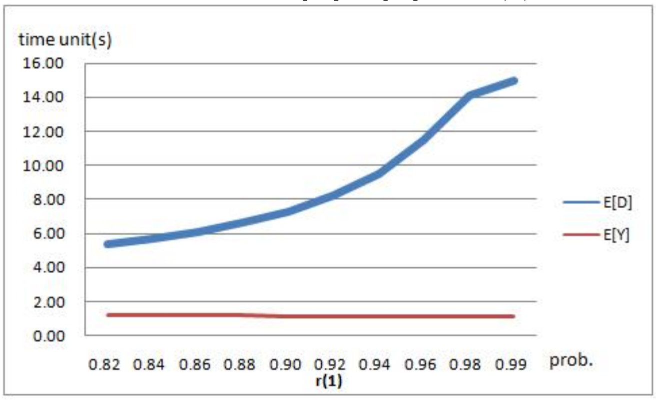
Figure 6.6: The loss probability ABR vs. $r(0)$.



Continuously, we change the value of $r(1)$ with other conditions fixed and $r(0) = 0.8$. These numerical results are shown in Figure 6.7. Obviously, if the probability of VBR cells at heavy traffic is increasing, then the probability of VBR served is increasing, and the mean of inter-departure time of VBR decreases. Therefore, if the probability of ABR served is decreasing, the mean of inter-departure time of ABR increases.

Finally, as above assumption conditions hold and let $B = 10$, we show the loss

Figure 6.7: $E[D], E[Y]$ vs. $r(1)$.



probability of ABR cells in Figure 6.8 increases as $r(0)$ increases.

Figure 6.8: The loss probability ABR vs. $r(1)$.