

Errata to the paper “A New Queueing Model for QoS Analysis of IEEE 802.11 DCF with Finite Buffer and Load”

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The authors of [1] have become aware that several of the equations in [1] were presented with errors. In this brief note, we provide correct equations. The implementation of the model in [1] was in accordance with the correct equations, so the implementation results presented in Section V. Performance Analysis of [1] are still valid.

The third term in the equation for \mathbf{F}_{sub} in [1] has the wrong value for i . The following equation replaces the equation for \mathbf{F}_{sub} .

$$\mathbf{F}_{\text{sub}}[i, j] = \begin{cases} p(1 - q_T), & i = j, j < L; \\ p, & i = j = L; \\ pq_T, & i = j + 1, j < L; \\ 0, & \text{otherwise,} \end{cases}$$

The second and third equations for \mathbf{C} in [1] are only specified for $i = 0, \dots, m$. The equations need to be specified for $i = 0, \dots, s$ and need altering to be valid for backoff stage- s . The following equations replace the equations for \mathbf{C} .

$$\begin{aligned} \mathbf{C}[1, 1] &= (1 - p)q; \\ \mathbf{C}[2, 1] &= p(1 - q); \\ \mathbf{C}[h, 1 + h + iL] &= (1 - p + p\delta_{si})(1 - q_T), \\ &\quad \text{for } h = 1, \dots, L \text{ and } i = 0, \dots, s; \\ \mathbf{C}[1 + h, 1 + h + iL] &= (1 - p + p\delta_{si})q_T, \\ &\quad \text{for } h = 1, \dots, L \text{ and } i = 0, \dots, s; \\ \mathbf{C}[i, j] &= 0, \text{ otherwise.} \end{aligned}$$

The first equation for \mathbf{D} in [1] has incorrect ranges for h and f , and the condition in the second equation should be for

i , not j . The following equations replace the equations for \mathbf{D} .

$$\begin{aligned} \mathbf{D}[1 + h, 1 + h - f] &= \frac{q^f}{W_0} \sum_{j=0}^{W_0-1-f} \binom{j+f}{f} (1-q)^j, \\ &\quad \text{for } \begin{cases} h = 0, \dots, L-1, \\ f = 0, \dots, \min(h, W_0 - 1); \end{cases} \\ \mathbf{D}[i, j] &= 0, \text{ otherwise, for } i \neq L+1; \text{ and} \\ \mathbf{D}[L+1, j] &= 1 - \sum_{h=1}^L \mathbf{D}[h, j], j = 1, \dots, L+1. \end{aligned}$$

The first equation for \mathbf{H}_i in [1] has the wrong summation range for r and the wrong range for h . Also, the equation for the last row of \mathbf{H}_i was omitted from [1]. The following equations replace the equations for \mathbf{H}_i , noting that the indexing of k and r have been changed for neatness and that $\binom{0}{0} = 1$.

$$\begin{aligned} \mathbf{H}_i[1 + h + f, h + \delta_{0i}] &= \frac{1}{W_i} \sum_{k=f}^{W_i-1-k-f} \sum_{r=0}^{r+f} \binom{r+f}{f} (1-q)^r q^f, \\ &\quad \text{for } \begin{cases} i = 0, \dots, m, \\ h = 1 - \delta_{0i}, \dots, L-1, \\ f = 0, \dots, \min(L-1-h, W_i - 1); \end{cases} \\ \mathbf{H}_i[j, k] &= 0, \text{ otherwise, for } i = 0, \dots, m, j \neq L+1; \\ \mathbf{H}_i[L+1, k] &= \frac{W_i+1}{2} - \sum_{j=1}^L \mathbf{H}_i[j, k], \\ &\quad \text{for } \begin{cases} i = 0, \dots, m, \\ k = 1, \dots, L + \delta_{0i}; \text{ and} \end{cases} \\ \mathbf{H}_i &= \mathbf{H}_m, \text{ for } i = m+1, \dots, s, \end{aligned}$$

The equation for P_B in [1] has a missing bracket. The following equation replaces (10), the equation for P_B .

$$\begin{aligned} P_B &= P[Q = L] - ((1-p)T_s(\mathbf{v}[L+1, 1]) \\ &\quad + \sum_{i=1}^s (\mathbf{B}_i \mathbf{v})[L, 1]) + pT_c(\mathbf{B}_s \mathbf{v})[L, 1])/E_s. \quad (10) \end{aligned}$$

REFERENCES

- [1] R. P. Liu, G. J. Sutton, and I. B. Collings, “A new queueing model for QoS analysis of IEEE 802.11 DCF with finite buffer and load,” *IEEE Trans. Wireless Commun.*, vol. 9, no. 8, pp. 2664–2675, Aug. 2010.

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