

Correction to “Structured Network Coding and Cooperative Wireless Ad-hoc Peer-to-Peer Repair for WWAN Video Broadcast”

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We identified simulation errors in [1]. This errata outlines a corrected derivation and presents updated simulation results. In Eq. (13) of [1] we rewrite $Q(n, x)$ as:

$$Q(n, x) \approx \sum_{k=\lceil l \sum_{F_i \in \Theta_x} B_i \rceil}^R \binom{R}{k} \left(\sum_{i=1}^x \beta_n(i) \right)^k \left(\sum_{i=x+1}^X \beta_n(i) \right)^{R-k} \times A(x, k) \quad (1)$$

where $R = \frac{R_n P_{in}^{L_x, S}}{S}$ is the total number of innovative CPR packets. $A(x, k)$ is the *SNC group allocation ratio*, i.e., given there are k received CPR packets in SNC group Θ_x , the fraction of possible allocations of k packets to SNC groups $\leq x$ such that they are innovative and hence are useful for the recovery of SNC group Θ_x . As an example, suppose there are two SNC groups with two frames F_1 and F_2 of sizes $B_1 = 2$ and $B_2 = 2$, respectively. Assume in addition that there are 3 packet losses. Then Θ_1 can lose at most 2 packets via WWAN and thus can consume at most 2 SNC packets; the third packet loss must be in Θ_2 and one SNC packet must be in Θ_2 . $A(x, k)$ can be written as follows:

$$A(x, k) = \min \{A_1(x, k), \dots, A_{x-1}(x, k)\}, \quad (2)$$

where each term $A_i(x, k)$ is the probability of assigning extra CPR packets that SNC group Θ_i cannot consume to SNC groups greater than i . $A_i(x, k)$, in turn, can be written as:

$$A_i(x, k) = \sum_{\lambda=\lceil g_i \rceil}^{k - \lceil \sum_{F_j \in \Theta_i} B_j \rceil} \left(\frac{\sum_{j=i+1}^x \beta_n(j)}{\sum_{j=1}^x \beta_n(j)} \right)^\lambda \left(\frac{\sum_{j=1}^i \beta_n(j)}{\sum_{j=1}^x \beta_n(j)} \right)^{k - \lceil \sum_{F_j \in \Theta_i} B_j \rceil - \lambda} \quad (3)$$

where g_i is the minimum number of CPR packets that must be in SNC group Θ_x , but not SNC group Θ_i . g_i is written as

$$g_i = l \sum_{F_j \in \Theta_x} B_j - l \sum_{F_j \in \Theta_i} B_j. \quad (4)$$

We replace Fig. 5-9 of [1] with Fig. 1-5.

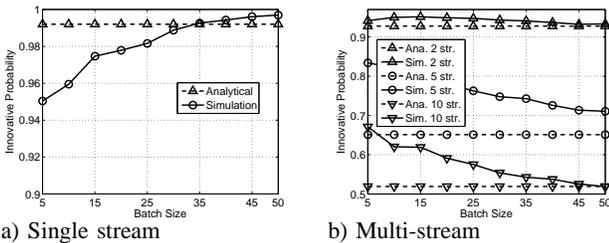


Fig. 1. Receiving CPR packet Innovative probability.

REFERENCES

[1] X. Liu, G. Cheung, and C.-N. Chuah, “Structured network coding and cooperative wireless ad-hoc peer-to-peer repair for WWAN video broadcast,” in *IEEE Transactions on Multimedia*, vol. 11, no.4, June 2009.

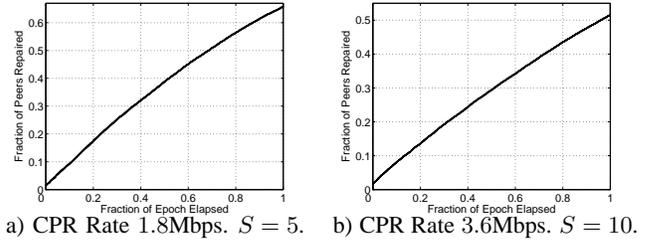


Fig. 2. CDF of number of peers repaired during one epoch time.

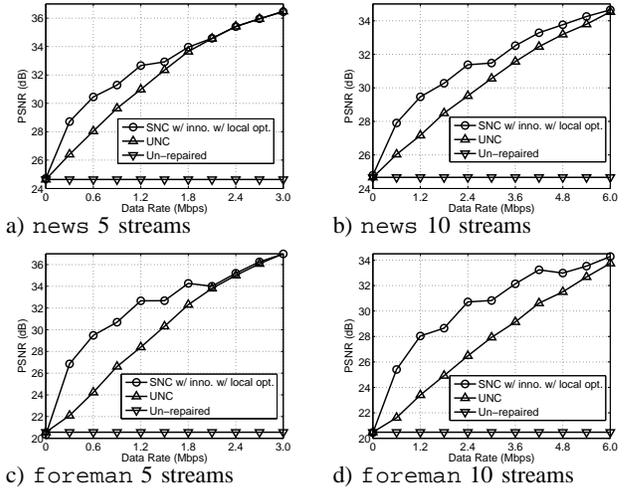


Fig. 3. PSNR for the news and foreman sequences under various CPR transmission rates and number of streams.

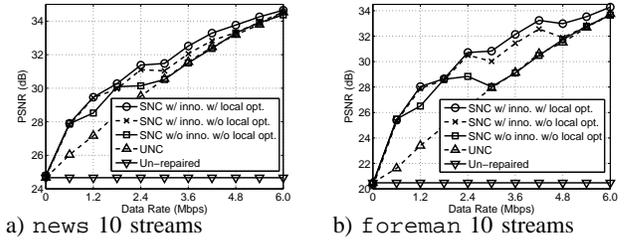


Fig. 4. PSNR for the news and foreman sequences under various CPR transmission rates and SNC scheme settings.

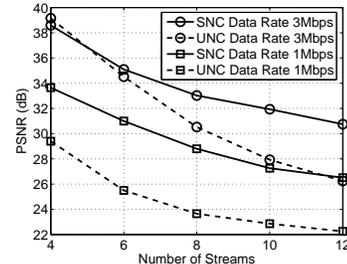


Fig. 5. PSNR for the foreman sequence under various multi-stream scenarios