Dr. Christian Scheideler
Johns Hopkins University

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Communication in Parallel Systems

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Assignment 4

Problem 8 (8 points)**:**
Prove that for any collection of paths with congestion C and dilation D there is an offline schedule that needs at most $O(C + D)$ time steps to send a packet along each of these paths.

Hints: For the first refinement, show with the help of the Chernoff bounds and the Lovász Local Lemma that there are delays so that the congestion within any I_1^3-interval is at most $(1 + o(1))I_1^3$. For the second refinement, cut S_1 into frames of length I_1^4 and show that for every frame there are delays in a range of size $O(I_1^3)$ so that the congestion within any I_2^3-interval is at most $(1 + o(1))I_2^3$. Show that continuing these refinements results in a valid schedule of length $O(C + D)$.