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In this paper, we study the problem of gossiping with interference constraint in radio chain networks. Gossiping (or total exchange information) is a protocol where each node in the network has a message and wants to distribute its own message to every other node in the network. The gossiping problem consists in finding the minimum running time (makespan) of a gossiping protocol and efficient algorithms that attain this makespan.

Transmission model The radio chain network is modeled as a symmetric dipath P_n, where the vertices represent the nodes and the arcs represent the possible communications. A call (s, r) is defined as the transmission from the node s to the node r, in which s is the *sender* and r is the *receiver* and (s, r) is an arc of the dipath. The network is assumed to be synchronous and the time is slotted into *steps*. We suppose that each device is equipped with a half duplex interface, and therefore, a node cannot both receive and transmit during a step.

Interference model Furthermore, communication is subject to interference constraints. We use a binary asymmetric model of interference based on the distance in the communication digraph like the ones used in [1, 2, 5]. Let $d(s, r)$ denote the distance, that is the length of a shortest directed path, from s to r in P_n and d_I be a non-negative integer. We assume that when a node s transmits, all nodes v such that $d(s, v) \leq d_I$ are subject to the interference from the transmission at s. So two calls (s, r) and (s', r') do not interfere if $d(s, r') > d_I$ and $d(s', r) > d_I$. During a given step only non-interfering (or compatible) calls can be done and we will define a round as a set of such compatible calls. We focus here on the case where $d_I = 1$.

Main result Within this model, the problem has been studied in general in [4] where approximation results are given in particular for ring and chain networks (see also the survey [3]). We solved completely the gossiping problem in radio ring networks (work presented at JCDCG[3] 2017), and presented partial results for radio chain networks (work presented at JCDCG[3] 2018).

In this talk, we present new gossiping algorithms for chain networks which meet the lower bounds enabling us to prove the following theorem:

Theorem 1 *The minimum number R of rounds needed to achieve a gossiping in a chain network P_n $(n \geq 3)$, with the interference distance $d_I = 1$ is*

$$R = \begin{cases} 3n - 5 & \textit{if } n \geq 4 \\ 5 & \textit{if } n = 3 \end{cases}$$

References

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