

WiOpt 2016 – Invited Talk

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Title:

Age of Information: packet queue management and deadlines

Abstract:

With the recent emphasis on content in networking, the traditional metrics of throughput and delay do not tell the whole story when analyzing network performance. We consider a newer metric called the age of information or status update age, which describes the "freshness" of information updates pertaining to some continuously updating piece of data. We study an update monitoring system over a network, which exemplifies this emphasis on content freshness, and consider various models of the network for which to compute the status update age. We apply queueing theory to model and analyze the average status age over the network as a function of the rate of update generation. The computation of the average status update age opens up a whole new set of interesting questions, most importantly, how does one maintain information freshness at the receiver, and what are the levers of control we can use to affect it? While intuition suggests that age can be lowered by allowing the source to generate updates more rapidly, this could actually have an adverse effect as it could lead to increased congestion in the network. Coincidentally, reducing the update generation rate has a similar effect on the age as well, which leads us to believe that the optimum lies somewhere in between. Therefore, as part of this study, we have analyzed the impact of the update generation rate on the status update age, and we have demonstrated that there is a tradeoff between the status age and the wastage of network resources. Other network control mechanisms that we have studied include packet queue management and packet deadlines. This talk will also discuss the impact of these mechanisms on the age metric.