Abstract: I will talk about infrastructure-based wireless networks, that comprises two types of nodes, namely, relays and sinks; the relay nodes are used to extend the network coverage by providing multi-hop paths to the sink nodes that are connected to a wireline infrastructure. Restricting to the one-dimensional case, we will proceed to characterize the fraction of covered region for given densities of sink and relay nodes. We will first compare and contrast our infrastructure-based model with the traditional setting, where a point is covered if it simply lies within the range of any node. Then, drawing an analogy between the connected components of the network and the busy periods of an $M/D/\infty$ queue, and using renewal theoretic arguments we will obtain an explicit expression for the average vacancy (which is the complement of coverage). We also compute an upper bound for vacancy by introducing the notion of left-coverage (i.e., covered by a node from the left). We prove a lower bound by coupling out model with an independent-disk model, where the sinks' coverage regions are independent and identically distributed. Through numerical work, we study the problem of minimizing network deployment cost subject to a constraint on the average vacancy. If time permits, I will briefly discuss about an hop-count constrained notion of coverage. (This is joint work with Prof. Anurag Kumar from IISc, Bangalore.)

Bio: Dr. K.P. Naveen received the B.E. degree in ECE from the Visveswaraya Technological University (VTU), Belgaum (2005), and Ph.D degree from the Department of Electrical Communication Engineering, Indian Institute of Science, Bangalore (2013). From Jan 2006 to July 2007 he worked at the ISRO Satellite Centre, Bangalore. From Jan 2014 to Dec 2015 he was a post-doctoral fellow with the INFINE team at INRIA Saclay, France. Since Jan 2016 he is with the Department of Electrical Engineering, Indian Institute of Technology Madras, as a DST-INSPIRE faculty. His research interests include modeling and performance analysis of wireless networks, content delivery networks, stochastic games and optimal control.