1000x Wireless Data Capacity Increase by Small Cell Densification

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As mobile data demand continues to increase exponentially, mobile networks need to prepare for 1000X traffic growth over the next decade. Since radio spectrum is a finite resource, one powerful technique to address this increase in data demand is through network densification. Provisioning of many nodes to serve a geographical area achieves cell splitting gains, i.e. increased spatial reuse of the spectrum. Traditional operator-planned macro and small cell deployments face some cost challenges to achieve network densification due to relatively high site acquisition/rental, backhaul and RF planning/engineering costs. In this talk, we present a network deployment model termed "Neighborhood Small Cells" (NSC) consisting of very dense deployment of small cells providing both indoor and outdoor coverage. This unplanned deployment model has significant advantages over traditional planned deployments. First, it leverages consumer site and backhaul as much as possible. Second, the NSC model inherently enjoys an organic growth in capacity by providing capacity where the users are. Third, when accompanied by SON (self-organizing network) algorithms, NSC network can be deployed with no RF planning in a plug-n-play manner while still providing high QoS services enjoyed by cellular users today.

This talk provides analysis of potential capacity gains under network densification via NSC and points to a path to the '1000X' vision. Further, it discusses some crucial enablers needed to achieve robust and seamless mobility under hyper-dense networks. These enablers consist of SON solutions for small cells that address self-configuration, mobility management and capacity optimization. SON methods including transmit power management and radio resource management benefit both mobility and capacity aspects. We will focus on 4G LTE NSC networks and present results with specific SON solutions.