

PERFORMANCE OF BLUETOOTH SCATTERNETS UNDER E-LIMITED POLLING AND WALK-IN BRIDGE SCHEDULING

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Abstract. In this paper we analyze the performance of Bluetooth scatternets with piconets interconnected with SS bridges. Masters do not maintain any specific schedules of meeting points with bridges; they simply poll the bridge in every cycle and exchange the data when bridge is present. Both ordinary slaves and bridges are polled using the E-limited scheme. We consider bursty traffic and model service times, access delay and bridge delay as the QoS parameters of the scatternet. Analytical and simulation results show that this scatternet/piconet scheduling approach offers good performance and excellent scalability.

Keywords. Bluetooth scatternet, queues with vacations, E-limited service scheduling, scalability.

AMS (MOS) subject classification: This is optional. But please supply them whenever possible.

1 Introduction

Bluetooth is an emerging wireless technology for forming short range ad hoc networks [4, 6]. Bluetooth devices form small networks known as piconets, wherein one device assumes the role of master, and others act as slaves, up to seven of which may be active at any given time.

Piconets may share devices to form more complex networks known as scatternets. In this work we consider scatternets formed by piconets interconnected with the so-called Slave/Slave bridges. In each piconet, both bridges and ordinary slaves are polled using the E-limited discipline, in which the master stays with a slave for at most M frames or until there are no more packets to send in both downlink and uplink direction, and then moves on to the next slave. Our previous work [15] shows that in a single piconet, E-limited service outperforms both limited and exhaustive service scheduling, and that the value of M can be adjusted to give optimum performance for the given mean size of the packet burst.

Since all communications in Bluetooth networks are performed under control of the piconet masters, the choice of scheduling policies, both within a