

Low-Cost Wireless RFID Networks

Ember Corp. has teamed with a maker of RF integrated circuits to develop chips for wireless "mesh networks" that could dramatically reduce the cost of deploying RFID readers.

May 12, 2003 - One of the big challenges in creating large-scale RFID tracking systems across store shelves or warehouse racks is installing networks of readers. Wireless 802.11b access points offer one solution, but Ember Corp., a networking software company based in Boston, is working on another option. Ember recently signed a partnership deal with Norway's Chipcon AS, which specializes in making radio frequency integrated circuits (RFICs) and systems on a chip (SoCs). The two companies are working on new chips that take advantage of Ember's technology to create low-cost wireless networks for RFID readers, as well as systems for industrial monitoring and building automation.

According to Ember, adding its controllers to the radio chips can turn the chips into wireless routers capable of routing application-specific data across a wireless mesh network. The active chips, which are currently capable of transmitting 35 kilobits of data per second, are expected to cost less than \$5 and have enough battery power to last for more than five years.

Mesh networks are a hot topic among technologists these days. They are ad hoc peer-to-peer networks in which devices organize themselves and assist each other in transmitting data. If one node goes down, data is just re-routed through another low-cost device.

Embers' embedded networking software uses a mesh network routing algorithm to create these resilient networks. The new Chipcon RFICs could be used in a range of applications, such monitoring and reporting equipment status and environmental changes, or acting as a simple on/off control switch.

Robert Poor, co-founder and CTO of Ember, says that a low power mesh network could be used to connect RFID readers to back-office systems more cheaply than using CAT5 cable. Not only is the cost of deployment lower, he says, but the mesh network is far more flexible because readers could be moved without the need for ripping up floors, walls or ceilings to reroute cables.

"Wired networks are just not appropriate for networking unattended devices, such as RFID readers on retail shelves," says Poor. The technology can also be used to extend the reach of RFID by monitoring the tag and relaying the information over the mesh network when the tag is out of range of fixed RFID readers, he says.

Under the new partnership, Ember is adding its controller technology to existing Chipcon RFICs. Those products are available immediately. The two companies plan to jointly design and manufacture new RFICs and SoCs that will integrate Ember's controllers right onto the chip. The chips will operate in three frequency ranges -- 300-400 MHz, 800-900 MHz, and 2.4 GHz.

Further down the line, Poor says chips from the partnership will comply with the emerging IEEE 802.15.4 RF standard for low-data-rate networks. He adds that Ember also supports the work of the ZigBee Alliance, which brings together semiconductor manufacturers, technology providers, OEMs and end-users to ensure low-power wireless networking equipment from different vendors will work together.

Ember adds that more integrated chip designs will follow as part of its partnership with Chipcon and that it will announce other chip partnerships to deliver a range of wireless nodes that will be integrated into its sensing and control products. -- Jonathan Collins.

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