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Spectrum

Israeli Consortium Unveils Cognitive Technology to Address Spectrum Crunch

A broad consortium of Israeli hi-tech companies and academic research centers unveiled a breakthrough technology for frequency-sharing on Oct. 28 that its members say could solve the communications spectrum crunch.

“Cognitive radio networks are the next significant milestone addressing the spectrum shortage . . . by automatically [and] continuously detecting and intelligently allocating segments of unutilized spectrum space,” Bat-Sheva Ovadia, chairwoman of Cornet Cognitive Radio Networks and executive strategic manager of Telematics Wireless, said in a statement.

In the future, she predicted, “networks will exploit cognitive routing to meet end-to-end goals, taking into account such parameters as capacity, delay, spectrum availability or interference. For non-licensed wireless communication network providers, cognitive technology may, in effect, mean the ability to communicate or to not communicate at all,” she added.

Concern for a spectrum shortage has grown as governments have exhausted available frequencies on the wireless spectrum, selling and allocating licenses for specific frequencies to public and private users such as radio and TV broadcasters and mobile phone companies.

A smaller, unlicensed portion of the spectrum was left open for use by all other wireless devices, including Wi-Fi. However, as the number of private wireless devices and the weight of data communicated on the open frequencies has increased, so has traffic on the bandwidth, which already causes slowdowns, network interference and even service disruptions.

“I believe that the biggest threat to the future of mobile in America is the looming spectrum crisis. Mobile data usage is not just growing, it’s exploding,” US Federal Communications Commission (FCC) Chairman Julius Genachowski repeatedly warned.

The FCC was a “pioneer in understanding the frequency problem and the potential for spectrum sharing,” Ovadia told Bloomberg BNA on Nov. 3. She said it was also the first regulatory authority to issue a National Broadcast Plan, in 2010, calling for the development of new technologies to enable “dynamic” use of the spectrum.

Cornet’s cognitive technology does just that, Ovadia said, detecting which parts of the frequency Wi-Fi users are occupying at any point in time, and equipping wireless devices to “jump almost instantaneously” to empty parts of the bandwidth as other devices connect, disconnect or move.

“Just imagine that all the appliances in your home — your microwave oven, cordless phone, mobile phone, Bluetooth, computer router and more — are all trying to talk to the network, on the same frequency, at the same time,” Ovadia said. “It’s like a conversation. If ev-

everyone talks at once, no one will understand anything. But if everyone gets a window of time to speak, they can all be heard.”

Cornet is one of more than a dozen projects launched by MAGNET (a Hebrew acronym for “Technology Generating R&D”), an initiative of the Chief Scientist’s Office in Israel’s Economy Ministry, bringing market competitors together to “solve shared problems through breakthrough technologies”. Cornet’s members include Israeli hi-tech developers like Elbit Systems, Elisra (Tadiran Spectralink) and Telematics Wireless, as well as 13 academic research groups from leading Israeli universities and institutes.

According to Ilan Peled, director of MAGNET, Cornet is working in “one of the hottest research and development areas currently being pursued in the wireless communications world” and “several European companies participating in the Eureka and EU7 projects have expressed great interest” in its technology.

Singapore Technologies Electronics (ST Electronics) agreed in a Nov. 4 email response, calling the introduc-

tion of cognitive radio technologies “the answer to the next revolution in wireless technologies to overcome the spectrum crunch”.

“Cornet’s achievements make an important contribution to our businesses, and may create new opportunities in building wireless sensor-fabric networks in the Internet of Things,” said Andrew Chow, president of ST Electronics (Info-Comm Systems).

The Israeli project partners are already incorporating the technology into their global product lines, Ovadia noted, a step, which she said does not require government regulation. However, standards for dynamic frequency selection and regulations on spectrum sharing would help move the system forward, she said.

“Technology history demonstrates that breakthroughs are quickly adapted by major players,” she continued. “I am confident that in a few years we will see cognitive technology in almost all wireless communications.”

By Jenny David