

# FCC move opening E-Band could be telecom gold mine

When Secretary of State William H. Seward bought Alaska from the government of Russia for \$7 million in 1867, the huge and empty territory seemed so worthless the deal was mocked as "Seward's Folly." Only with the discovery of gold 30 years later and oil a century later did the brilliance of Seward's move become clear.

On Oct. 16, the Federal Communications Commission quietly announced what could be the telecom equivalent of Seward's Folly: opening up a huge and empty swath of spectrum that looks marginally useful now but could ultimately become essential to ultra-high-speed data communication.

This untraversed domain lies in the frequency bands from 71 to 76 gigahertz (GHz), 81 to 86 GHz and 92 to 95 GHz — collectively known as "E-Band," the highest frequencies ever licensed by the FCC.

Broadcast television and radio, mobile phones, WiFi computer networks and other familiar wireless applications operate from under 1 GHz to 5 GHz.

These frequencies use radio waves that are several feet high, while E-Band signals are three to five millimeters high — about an eighth of an inch.

Such Lilliputian dimensions make

E-Band a challenging place to work. Transmission range is severely limited, and the signals can sometimes be blocked by rain, fog or even high humidity.

Yet E-Band's small waves can transmit huge volumes of data — about 1.25 gigabits per second today and possibly 10 gigabits per second in a few years. That's 1,000 to 10,000 times faster than today's high-speed home cable modem and DSL service.



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An uncompressed two-hour DVD-quality movie, for example, would take about nine hours to download through a cable modem running at 1 megabit per second, but only 30 seconds through a 1-gigabit network and just four seconds through a 10-gigabit connection.

It's also much easier to focus E-Band radio waves into a very narrow "pencil beam" that can be aimed from one point to another, without causing interference at nearby E-Band receivers.

All of which explains the first application for E-Band: extending 1-gigabit fiber-optic networks from one building to another.

Fiber-optic cable is cheap. Stringing the cable on poles or burying it in trenches isn't, running from \$100,000 to \$500,000 a mile.

Two E-Band dishes, no more than four feet in diameter, aimed at each other from a distance of up to a mile, can establish a 1-gigabit link for a fraction of the cost for poles or trenches. In a year or two, when production is cranked up to full volume, such an E-Band link should cost only \$20,000.

Because the pencil beams stay tightly focused over such short distances, the FCC is allowing a very unusual form of licensing. Instead of applying for rights to cover an entire region, such as an AM radio sta-

tion with a license to broadcast over a large metropolitan area, E-Band licenses will be granted from one geographic point to another. The broadcasting paths will be allowed to cross each other, because it won't cause interference, so almost no one will ever be denied an E-Band request.

E-Band licensing will be managed through an FCC Web site, with approvals granted in a few hours instead of the weeks and months required for conventional broadcast licenses.

Two small companies did most of the work on selling E-Band to the FCC: Loea ([www.loeacom.com](http://www.loeacom.com)) on the island of Maui in Hawaii, and End-

wave ([www.endwave.com](http://www.endwave.com)) of Sunnyvale.

Loea, a Hawaiian word of respect for a wise older woman, has staged several demonstrations of 1-gigabit E-Band transmissions in the past two years, between two office buildings in lower Manhattan, from a tower to a resort hotel on Maui and from a high-definition television camera on a hill overlooking San Diego's Qualcomm stadium to a broadcast truck during the Super Bowl on Jan. 26.

Endwave, meanwhile, is working on the chips that generate E-band radio waves.

Cisco Systems of San Jose, the world's largest manufacturer of computer networking equipment, also played a crucial role by endorsing the efforts of Loea and Endwave.

How fast will E-Band become a realistic alternative to fiber-optic wiring? Will prices ever come down enough to deliver 1-gigabit Internet access to homes? Could other technologies emerge to solve the same problems at lower prices?

There are no sure answers. "The one thing we know is that all the forecasts will be wrong, but we also know bandwidth consumption will keep

going up," said Jeff Campbell, a Cisco executive in Washington who worked on the FCC's E-Band approval, in a phone interview last week.

To which I'd add: We also know entrepreneurs, like nature, abhor a vacuum and will move quickly to capitalize on the E-Band. Already, Endwave founder Douglas G. Lockie has left the company he created in 1991 to work on a start-up that will design and build E-Band equipment.