

MAKING WAVES IN WASHINGTON

How some scrappy little ultra-wideband companies fought to gain FCC approval and learned some hard lessons along the way

WHEN RALPH PETROFF SAW what ultra-wideband (UWB) technology could do for wireless communications, his life took an unexpected turn. Petroff and his two brothers had just sold their successful pollution-control business in Huntsville, Ala. He was going to relax, perhaps do some angel investing. But once he saw the technology UWB pioneer Larry Fullerton was developing, Petroff caught the entrepreneurial bug all over again.

UWB is nothing short of the reinvention of radio, says Petroff. Whereas traditional radio uses a carrier signal tuned to a specific frequency, UWB uses short digital pulses spread across a frequency spectrum. Originally designed for the military, the technology can be used as radar to detect people through walls or rubble, as a position location device to pinpoint items with more accuracy than global positioning satellite (GPS) technology or as a highly secure communications method capable of carrying more data at lower power levels than existing wireless technologies. (For more on the technology, see "Unleashing UWB," September 2003, page 62.)

Fullerton was an independent inventor who had been tinkering with UWB since the early 1970s. By 1996 he had built prototypes that demonstrated many of the technology's capabilities. "The toys he had built in his garage just blew

our minds," says Petroff. But then Fullerton started ticking off the risks he faced in commercializing the technology. At the top of the list: convincing the U.S. Federal Communications Commission to change its regulations to allow ultra-wideband to operate in the unlicensed spectrum. Petroff's face fell with a sad realization: *This is going to take someone five years and \$100 million to pull off.*

Petroff was not far off in his estimation, and **Time Domain**, the Huntsville-based company his family formed with Fullerton, became a chief force in lobbying the FCC to approve UWB. But Time Domain was not alone. Several other UWB startups worked for more than five years against formidable obstacles to gain FCC approval for this obscure technology that some observers say may revolutionize the wireless industry. "Long-term, this technology will compete with Wi-Fi and perhaps ultimately with cellular," says David Hoover, an analyst with Precursor, an independent investment firm.

The story of ultra-wideband shows how difficult it can be to get a new technology through the regulatory hoops, especially if its only backers are small startups, and how much the technology and business strategies can change in the process. It provides a useful case study of the costs, the benefits and the dangers of lobbying for approval of a new technology. In an age of exploding wireless technology innovations, more and more

By Tam Harbert

A close-up portrait of Julius Knapp, a man with dark hair and a slight smile, wearing a blue suit jacket, a blue shirt, and a patterned tie. He is looking directly at the camera. In the background, there is a circular object with a blue center and a red outer ring, possibly a light fixture or a decorative element.

Regulatory issues surrounding ultra-wideband were among the toughest encountered by 29-year-veteran of the FCC Julius Knapp because its footprint spread across every radio service in the spectrum

companies are spending more and more time convincing not only the FCC but also Congress and other parts of the federal government of the potential of their technology.

The UWB companies started out thinking their biggest job was convincing the FCC, but they quickly found themselves waging war with the Department of Defense as well as large, established companies, such as Sprint and Cingular, that feared potential competition from the technology. The start-ups were united in their desire to get UWB approved, but ultimately each company pursued a slightly different strategy, one that often promoted its own competitive edge. Against formidable odds, they succeeded in getting UWB approved for commercial use, but in the wake of the battle, some companies were left dead on the battlefield and others had to dramatically alter their business strategies.

The surviving companies learned some hard lessons. Not surprisingly, spending lots of money and hiring power brokers helps. Disappointingly, superior tech-



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—Martin Rofheart, CEO, XtremeSpectrum

nical arguments don't necessarily win, even at a presumably technically savvy agency such as the FCC. And perhaps most important, federal agencies move much more slowly than the fast-paced technology industry. Companies and their innovations can literally die waiting for the government to make up its mind. It helps to have patient investors. It also helps to have a Plan B, because a slight nuance of the final regulations can derail your business strategy.

Good technology, good timing

The UWB companies get credit for presenting a good case to the government. “This is a case where that industry really took the time to develop the story in technical terms, in business terms and in policy terms,” says Kevin Werbach, who was the FCC's counsel for new technology policy in the mid-1990s. He now runs his own consulting firm, The Supernova Group. But the startups also had a very good story to tell, at a time when the FCC was all ears to hear it. The commission was already looking for better ways to use the existing spectrum, and ultra-wideband offered many advantages. “It was the advantages of the technology that got the attention of the FCC,” says analyst Hoover. “It was an easy sell.”

Up until the military, aviation, GPS and cellular industries got wind of it, that is. The military, which had used UWB for years in top-secret spy gadgets, had no desire to see it commercialized. The Department of Transportation and the Federal Aviation Administration were afraid it would interfere with aircraft

radar. And the major commercial entities—global positioning satellite (GPS), cellular and personal communications service (PCS) companies—already using the spectrum feared not only possible signal interference but also the competitive threat of UWB.

Specifically, the UWB companies wanted the FCC to change its Part 15 regulations to allow UWB to operate in the unlicensed spectrum. Part 15 already allowed many devices, such as laptops and microwaves, that emit low

levels of electromagnetic energy to operate in the unlicensed spectrum. UWB emitted the same low levels, except that the emissions were intentional. On the surface, it seemed to be a fairly simple regulatory change, says Petroff.

Since about 1996, the UWB startups had been quietly showing the technology to the FCC, which immediately saw its potential. But it wasn't until the FCC issued a notice of inquiry in 1998, asking for public comment on allowing UWB in the unlicensed spectrum, that the startups realized how powerful the opposition was going to be. The commission was deluged with close to 1,000 filings, many from companies that were already entrenched in that part of the spectrum.

“This one was particularly tough,” says Julius Knapp, deputy chief at the FCC's Office of Engineering and Technology. The 29-year FCC veteran was intimately involved in the UWB case. Whereas most regulatory changes pertain to only a portion of the spectrum and thus affect only a handful of interested parties, he says, “UWB's footprint spread across every radio service in the spectrum.”

So UWB startups learned their first lesson: how their opponents could use tactics to slow down an already slow regulatory process.

The FCC was set up in 1934, when most technical innovation came from the labs of government or large corporations, notes Martin Rofheart, CEO of XtremeSpectrum, one of the UWB startups. But today's innovations often come from startups that depend on getting their technology to market quickly to survive. The slow regulatory approval process, which in the case of UWB took years, introduces uncertainty into the market. There's also a problem with the complexity of new technologies such as UWB. Although the FCC has technical expertise, it is “deep but not broad,” says Rofheart. Others put it more bluntly: The FCC doesn't pay well enough to attract top-notch technical talent, says Bob Fontana, CEO of UWB company Multispectral Solutions Inc. (MSSI).

That puts small companies at a disadvantage. Large companies have lob-

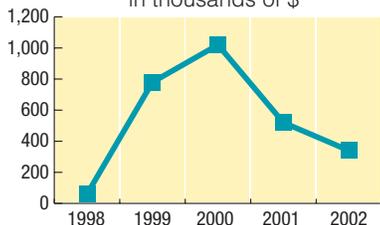
bying staffs that understand the needs of the FCC and can spend a lot of time preparing background papers to help educate its staff. “The single biggest mistake companies make is that they don’t appreciate how little information actually gets into the building at the FCC,” says Werbach. The agency can’t even afford to subscribe to technical newspapers or send staff to trade shows, he says.

Knapp doesn’t dispute this. Although the FCC staff does travel to some events and subscribe to some publications, “the criticism is that there has not been enough of that, and we are taking steps to remedy it.” Specifically, FCC Chairman Michael Powell has asked Congress for more funding. Powell also is working to upgrade the technical skills of FCC engineers by establishing an “FCC University.”

Big corporate lobbying staffs also have what Rofheart calls “institutional knowledge.” They’ve worked with the FCC for years. They know how the process works and how to get to the right people. They also know how to jam up the system.

“When a big company wants to slow you down, it simply floods the docket,” says Rofheart. “The FCC process is so open to the public that the ability of people to throw sand into the process is almost inexhaustible,” Petroff agrees. By law, the FCC must review every filing, and the UWB filings were filled with reams of highly complex equations. “For someone who doesn’t have a real work-

TIME DOMAIN LOBBYING COSTS
in thousands of \$



SOURCE: CENTER FOR RESPONSIVE POLITICS

ing knowledge of this stuff, it’s very difficult to judge who is right,” says Fontana.

Hired guns

How do new companies get access to “institutional knowledge”? They hire it,

of course. Time Domain spent lavishly on lobbying, perhaps because the Petroffs had been so successful with their former company, ADS Environmental Services, and already wielded some political influence. (On the day of his *EB* interview, Ralph Petroff had just attended a \$500-a-plate Republican fund-raising event for an Alabama freshman Republican congressman hosted by Vice President Dick Cheney.) Competitors say Time Domain spent as much as \$50 million, but Petroff says that it was closer to \$20



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—Ralph Petroff, CEO, Time Domain

million. Public records show that from 1998 to 2002, Time Domain spent about \$3 million directly on lobbying. (See table, “Time Domain Lobbying Costs,” this page.) That’s small change compared to what UWB’s opponents spent but significant for a small company with a new technology. In addition to direct lobbying fees, the company spent about \$15 million to conduct internal technical tests and send staff to technical conferences and to Washington, Petroff estimates. Third-party tests and FCC filings cost another \$4 million to \$5 million, he adds.

“Time Domain deserves 99 percent of the credit for the FCC approval,” says Bruce Watkins, CEO of *Pulse-Link*, a UWB company that is targeting the wireless LAN market. “Of all the money spent on lobbying, 90 percent or more was from Time Domain.” Not only did Time Domain hire high-powered lobbyists but Petroff also used his leverage with Alabama’s congressional representatives, says Watkins. What’s more, the company helped conduct a grassroots

campaign to publicize the benefits and potential of UWB to certain groups that could benefit from it. This prompted a wave of filings from groups such as police and firefighters, says Watkins, which bolstered UWB’s case.

Probably the most powerful lobbyist hired by Time Domain was Dick Wiley, a former FCC chairman who now runs one of the top communications law firms in the nation, Wiley Rein & Fielding. But Time Domain also followed a common practice of spreading its business among several lobbying firms, to ensure

getting access to Democrats as well as Republicans. It retained Thomas Hale Boggs Jr., chairman of the law firm of Patton Boggs and the son of Hale Boggs, onetime Democratic majority leader of the House of Representatives. It also hired Gregory Simon, who had been Vice President Al Gore’s chief domestic policy adviser.

“The real strategic value of the lobbyists is in opening doors to policy makers,” says Petroff. “Former FCC chairmen and people like that are very helpful in arranging access to the policy makers.” Indeed, between 1996 and 2002, Petroff says, he made 153 trips to Washington, D.C. “I made so many trips to Capitol Hill that I actually had to register as a lobbyist myself,” he says.

This access frustrated MSSI’s Fontana. His company had been doing UWB work for the military since the mid-1980s, most of it classified. Fontana questioned the validity of some of the technical claims Time Domain made but had a hard time getting a

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meeting with the chairman of the FCC. He finally went through his representatives in Congress to request a meeting. “At one point, I asked an FCC staffer, ‘How much money do I really need to get into the FCC?’” he says. “If you can get the right lobbyist to get you into the high levels of the FCC, it’s amazing what a few million bucks can get you.”

Knapp counters that the FCC is accessible to everyone. “We look at the arguments solely on their merits,” he says. “It doesn’t matter to us whether a company makes the argument on its own or hires someone to do it.”

XtremeSpectrum also lobbied, but not on as grand a scale. Records show that it paid a few thousand dollars to The Cohen Group, the lobbying firm of former Secretary of Defense William Cohen. It also hired a couple of attorneys, including Michelle Farguar, a former FCC staffer. And it brought on board a full-time government-relations person, Veronica Haggart, who had worked on the government-relations staff of Motorola, an investor in Xtreme.

Xtreme spent a lot of time and energy looking for the right people to



represent the company, says Rofheart. “If you get that right, you can assemble a proxy for the institutional knowledge startups lack,” he says. But Xtreme tried to make its case primarily with technology, not politics, he stresses.

Peace talks

Where Time Domain tended to bluster at its opponents—Petroff accuses the FAA and the military of “chicken-littleism,” because they warned that UWB might interfere with aircraft radar—Xtreme played the diplomat. It did not

dismiss the objections against UWB but listened to them.

“We saw the handwriting on the wall that, absent some compromise, we would never get the rules out,” says Rofheart. The fact is that one of the FCC’s prime mandates is to protect the spectrum. Powerful parts of the government and industry were claiming that UWB was going to cause interference. “We were asking for permission to operate in the unlicensed spectrum,” says Rofheart. “It was incumbent upon us to ensure that we would not interfere with anybody.”

So Xtreme talked with the UWB opponents about their concerns, trying to understand as much about them as possible. Through those discussions, Xtreme realized that a prime concern was that UWB’s power level would cause interference. Xtreme then went back to the drawing board and investigated whether it could tweak its chip so that it still performed with lower power levels. It could. “We were willing to go the extra mile to assure the incumbent spectrum holders,” says Haggart, Xtreme’s vice president of strategic relations. Indeed, one of the most effective tactics of UWB proponents was to recognize and respond to their opponents’ objections with good, scientific analyses, says Knapp.

Other UWB companies disagreed with Xtreme’s approach. “When it really got down to the wire, we had differing views on what the power levels should be,” says Haggart. This was because some UWB companies were aiming at markets that would require higher power levels than Xtreme’s.

One UWB company was so conservative in its recommendations that it alienated the other UWB companies. MSSI’s Fontana, who had worked on military projects for almost 20 years and most of whose business was still in the military, concurred that UWB

Lessons in lobbying

- Be prepared for the process to take much longer than you expect. There is no such thing as a 12-month product life cycle in the government.
- Hire someone—an attorney, lobbyist, former FCC staffer—who knows how the FCC works and can get you access.
- Prepare a solid argument that explains how your technology works, how it will benefit society and why it will not interfere with existing services in the spectrum.
- Identify the incumbent spectrum users, and be ready with good technical analyses to counter their objections.
- Garner political influence, and be prepared to use it. Hire high-powered lobbyists. Talk with members of Congress and government officials to win their support.
- Keep your business strategy flexible enough to accommodate final regulations that aren’t perfect.—T.H.

would cause interference under certain conditions. Although he wanted to see the technology commercialized, he says, he wanted to keep UWB completely out of the lower frequency ranges, for fear of possible interference problems.

"I felt that the statements being made by the UWB proponents were false," he says, and he sided with some of the technical data presented by UWB's opponents, particularly the

that is because Time Domain's particular type of UWB technology is geared to operate in those frequencies.

Meanwhile, at least one company could not hold out any longer. In 2001 Fantasma Networks failed to raise a second round of funding. "With FCC approval, there is a decent chance that Fantasma would have been funded," says Petroff.

By the time the FCC finally issued

band OFDM, which is gaining support as an IEEE standard for the UWB PAN market. But XtremeSpectrum's chip, which is already on the market, uses dual-band modulation. If multiband OFDM becomes the standard, "my feeling is that Xtreme will go out of business," says Fontana.

Such are the arrows that stick in the pioneers' backs. In fact, Roberto Aiello, former CEO of the now defunct Fantasma, launched a new UWB company right after the FCC regulations were approved. Although his first company died as a result of regulatory uncertainty, his new company—**Staccato Communications**—has had the advantage of knowing the regulations from its inception. In fact, he says, his company decided to support the multiband modulation technique after reading the FCC regulations carefully. "We looked at how the rules were done, and then we decided on multiband," he says. "I would never have thought about it if the FCC hadn't ruled that way."

In fact, the very definition of UWB changed dramatically between the FCC's initial notice of inquiry, which referred to UWB as "pulse-width systems," and its final report and order, in which "there were no constraints on what modulation was to be used," notes Fontana.

"When we write the rules, we try to make them flexible," says Knapp. "The UWB rules we adopted did not satisfy everybody, but they will allow this industry to grow and to provide new products and services." Maybe just not exactly the products and services the UWB companies originally envisioned.

Xtreme's Rofheart doesn't agree with Aiello's assessment of the FCC regulations. And the company maintains that it has a Plan B if the standard goes against dual-band modulation but won't say what it is. What company officials do say is that they plan to maintain the same flexible stance they believe helped them make the FCC regulations a reality.

"The market is huge. There is plenty of room for competition," says Xtreme's Haggart. "We never thought we'd have the market to ourselves."

"Some of us just wanted to get something approved, so we could get more venture capital."

—Bruce Watkins, CEO, Pulse-Link

National Telecommunications and Information Administration (NTIA)—a government body charged with safeguarding the spectrum used by the U.S. government—and the GPS Industry Council. His views prompted one UWB proponent to dub him "the ultra-wide-band anti-Christ," says Fontana.



regulatory approval for UWB, in February 2002, "we were gasping for life, as were some other UWB companies," says Pulse-Link's Watkins. Although the regulations were less than perfect for every UWB vendor, they all claimed to be happy with the ruling. "Some of us just wanted to get *some-*

thing approved, so we could get more venture capital," he adds.

Ironically, the existence and wording of the regulations may be causing some of the biggest UWB promoters to adjust their business strategies. Time Domain has split into two companies: a spin-off called **Alereon** will develop and market chips for the personal-area networking (PAN) market while the rest of Time Domain concentrates on the military market. Competitors say that that split was the result of the final FCC regulations. Petroff denies this. Now that the FCC regulations are in place, the real competition is beginning, he notes, and "everyone likes to take potshots at the market leader."

Some UWB companies also have suggested that the substance of the FCC regulations seems to support one particular modulation standard, called multi-

Indeed, some of MSSI's competitors say that Fontana's position was prompted by competitive concerns. "I don't think MSSI wanted other VC-funded companies in this space," harps one.

Competitive lobbying

But Fontana says that UWB's opponents had some valid points. GPS operates in the 1.5-GHz range, and GPS vendors rightfully feared interference from UWB. There was a simple solution, he believes. "Back then, had the UWB industry as a whole said, 'We will stay out of the GPS band,' then we'd have had it done in two years and we'd all be making products today," says Fontana. But some UWB companies, particularly Time Domain, were lobbying for rules that allowed operation at lower frequencies. Fontana believes that

Now you tell me

So what lessons have these companies learned from their adventures in lobbying? First, be prepared for a long siege. "It's extraordinarily difficult to effect change," says Petroff. "I learned the hard way that it is much easier to stop something in D.C. than it is to start something."

Second, "institutional knowledge" is critical. Xtreme's Rofheart credits his FCC-savvy attorneys with providing him with that knowledge and also preparing him for how long the regulatory process was likely to take. "We got the timing right," he says. Others that did not get the timing right, such as Fantasma, fell by the wayside.

Third, innovative technology and a solid explanation of why it will not interfere with other signals are essential. However, good science gets you only so far. Any clever company can bend technical data to suit its needs. "Every one of these technical analyses rests on the assumptions that the individual company wants to make," notes the FCC's

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Knapp. You've got to play politics, as well. "In the end, technical arguments aren't useful, because it's all about protecting your own backyard," notes Aiello. In fact, the FCC rules ended up keeping UWB out of the GPS spectrum, but it wasn't because technical arguments won the day. Rather, it was because of political pressure from the NTIA and the GPS industry, says Fontana.

Finally, be flexible enough to adjust your business strategy to suit the realities of the final regulations. If a good compromise is when no party gets everything it wanted, then the UWB regulations are an excellent compro-

mise. Companies are now rejiggering to bring products to market that meet both the FCC regulations and their own need for revenues.

Despite all the money, time, effort and frustration, most of the UWB companies say they would do it all again. "This is a technology that really did justify all the efforts to make it happen," says Petroff. "It's going to pay off in so many fields."

What's your favorite method of dealing with regulatory agencies? Send your thoughts to feedback@eb.mag.com.

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