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*Honoring the Past, Committed to the Future*



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AUCTION OF 700 MHz BAND LICENSES SCHEDULED FOR

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AUCTION

Comment

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Angus Tait, installing a T4 radio in 1948

**Sir Angus Tait touched the lives of so many in the radio industry.**

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# A Message From Phil

*Time* magazine had a recent article titled “The Case for National Service.” It stated that, in 2006, more than 61 million Americans dedicated 8.1 billion hours to volunteerism. That’s a lot of hours! It’s encouraging that so many of us are willing to donate so much of our time for what we believe is worthwhile.

These past eight months as your president have been very enlightening for me. To see the countless hours members have invested in the success of the Radio Club of America, our service to the wireless industry, to preserving its history and to promoting its future is inspiring. Two of our very-long-time officers who epitomize this kind of selfless service are **Gil Houck** and **Eric Stoll**. They both are retiring this year from their respective RCA positions of secretary (13 years) and treasurer (20 years). It has been a pleasure as well as an education to work with them.

There have been so many examples this year of outstanding service to our organization that I’d like to recognize several more members, like **Carolyn Servidio**, who conceptualized and implemented our very popular West Coast Event, and **Carroll Hollingsworth**, who appreciated what a good idea a regional event could be for RCA and who organized a very successful Texas Event in conjunction with a regional APCO show. These events bring together those RCA members who otherwise would have not gotten together, they attract new members and, most important, they are of service to our industry. Both Carolyn and Carroll invest a great deal of time and effort to make these RCA-sponsored days into professionally run industry events.

Every November, many of us meet to honor fellow members at our Awards Banquet. We arrive with the expectation of good food, worthy award presentations and an informative as well as an engaging speaker. And we are never disappointed, thanks to all the hours **Mal Gurian** and **Connie Conte** put into making the banquet a success. If you haven’t attended one of these RCA events, you are missing a wonderful opportunity to witness how the RCA is servicing our industry in a very positive way.

In conjunction with our Awards Banquet, we have a Technical Symposium. **Rich Reichler** works diligently to invite informative and interesting presenters to discuss technologies that are making wireless the exciting industry it is. He is always reaching out to our membership for

presenters and attendees. We are working on extending the hours for the Symposium and to possibly providing educational credits for attending. He needs all of our help to make this project grow into an all-day educational symposium that will be capped by the Banquet.

Our 100<sup>th</sup> Anniversary is another major club initiative that requires many hours of work. **Debra Wayne**, who is chairing this committee, has presented many options to the board, including one to move the celebration to Orlando for 2009 for an entire weekend of various events celebrating our 100 years of service to wireless. Her committee analyzed several cities for accessibility, cost and weather. We would use one hotel for all our meetings, our banquet and rooms. It’s a very large undertaking for volunteers, so I applaud Debra and her committee for their efforts.

Last, but by far not least, is our volunteer of all volunteers: **Mercy Contreras**. Mercy’s ability to attract sponsors makes all our RCA events possible. She is tireless in her efforts to raise money, to sign up new members and to support any committee where she can be of help.

We have so many other members who are diligently working on behalf of the RCA. There is not enough space here to mention you all but you know who you are and we thank you. A special thanks to all of you who are our faithful sponsors. Time and money are the main ingredients for a successful event.

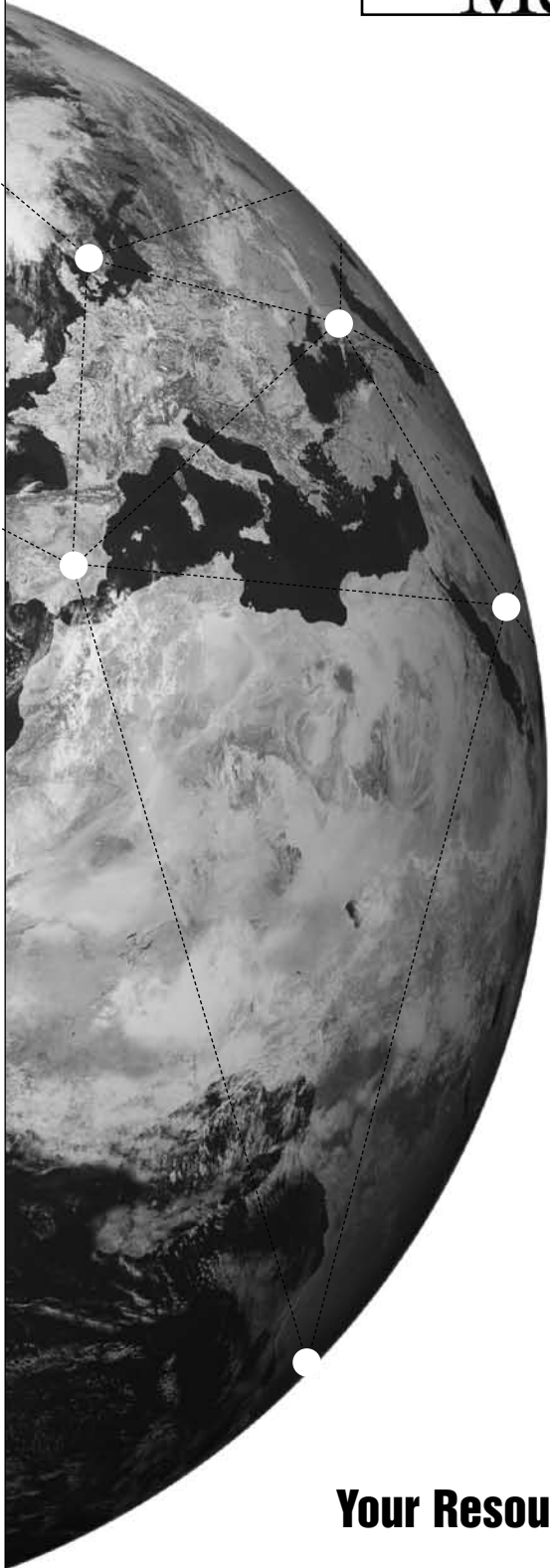
I’m encouraged by the members who have stepped up this year to join committees. A continuous infusion of “new blood” is a healthy thing for an organization. We have a full slate of candidates for our seven board seats up for election this year, and we have two candidates for secretary and one for the treasurer’s position.

I am pleased to report that your Club is alive and vibrant in 2007. Membership is growing, as is participation of our members. Everyone is welcomed to join a committee. Please contact **Karen Clark** at the RCA office or visit the RCA Web site to find out more about upcoming Club-sponsored events and how you can become an active participant

A handwritten signature in black ink, appearing to read "Phil", written in a cursive style.



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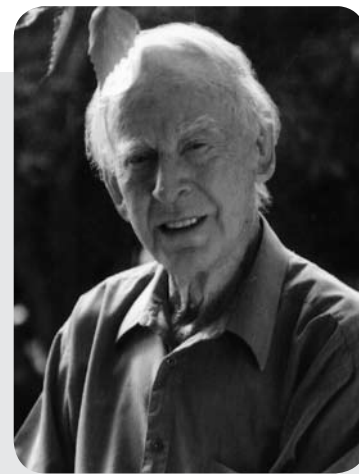
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Angus Tait

## **Sir Angus Tait: “We aren’t doing anything extraordinary. We’re only demonstrating what can be done”**

*Throughout his long and distinguished career in wireless, Sir Angus Tait maintained, “What is the advantage of a bag of gold over a structure that provides careers for lots of people and puts products into the world that are well-respected? What is the point in walking away from a life’s work or half a life’s work with a bag of gold?”*

**S**ir Angus Tait, founder and chairman of New Zealand’s Tait Electronics Ltd. and the 2006 Radio Club of America Fred M. Link Award winner, died Aug. 7, 2007, leaving behind a 60-year legacy of innovation in RF communications and an unwavering loyalty to his homeland.

At the Radio Club’s annual awards banquet in November 2006, Sir Angus, ZL3NL, was cited “for his substantial contributions to the advancement and development of land mobile radio and communications.” Having spent a lifetime doing what he enjoyed, Sir Angus does not need the recognition. “I’m not a fan for awards. I prefer to just get on quietly with the business.” While he could not be in New York City to accept his award in person, Tait said in an interview with Don Bishop (F), W0WO, he was “amazed and delighted” at the honor.

“I was quite overwhelmed that this prestigious organization in the States had even known about me,” he added. Sir Angus said he got into the land-mobile business because of his early interest in short-wave listening. In 1999, Queen Elizabeth II designated Tait a Knight Companion of the New Zealand Order of Merit “for services to technology, manufacturing and export.” He also was an Officer of the British Empire and remained active in ham radio on voice over Internet Protocol (VoIP) modes.

A month before he died, Sir Angus sent this message to his staff: “What makes me optimistic about the future? I know this company has a talented, committed and experienced team of people and we continue to attract new employees who are eager to make a difference. With this remarkable group of individuals, the Tait organization can face the future with confidence and we can go on changing our world for the better.”

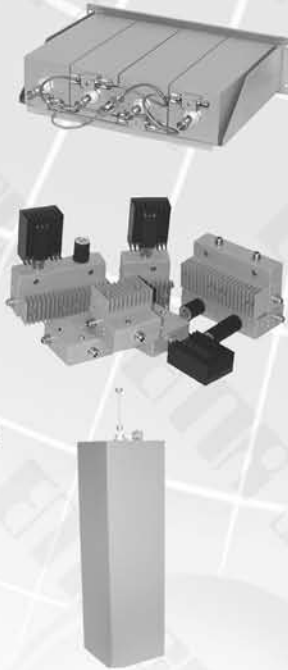
Michael Chick, Tait’s managing director, said the country, company and worldwide radio industry was poorer for his passing. “He was an immensely determined yet compassionate man, a great innovator and mentor for so many. He was humble and curious; never seeking the limelight but never shy of making his voice heard if it would help business and education in New Zealand,” he said. “Tait Electronics is a close-knit team, and we’re all devastated by the news. But our sadness can also be tinged with pride: Pride in Angus himself, what Angus originally created and what we have all helped build together.”

He continued, “He was a selfless soul: refusing to sell-up this New Zealand-based business despite overseas buyers making offers in the 1980s. As a result, many jobs were saved, and the company has gone on to earn over \$2 billion (in exports) for New Zealand.” In addition, the Tait Foundation has donated millions of dollars to a variety of causes, most recently to the

*(Continued on p. 8)*

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**Sir Angus installed one of the first T4 radios in the trunk of his Hillman car around 1948.**

Canterbury University's Wireless Research Centre.

Finally, Chick eulogized, "Tait Electronics Limited is a leader in the global radio communications industry, and that is a great testament to a great man. He was the chairman and, at 88, he had been coming into work most days. However, Angus was always quick to emphasize the team aspect: the fact that together we achieve more. He surrounded himself with talented and motivated radio engineers, designers, salespeople and technicians. It is they who will endure and continue working towards his vision. Thanks to Angus's team ethos, the company, Tait Electronics Limited is in good shape with great products, innovations in the pipeline and strong orders worldwide. His quiet and unassuming way, his ability to challenge you to do better, his knowledge of the people and issues within the community and industry and his generosity of spirit are gone to us, and we're all feeling that loss. Yet Angus's professional legacy is a company driving for growth for New Zealand and the team at Tait Electronics Limited will keep striving to create jobs and wealth for this country, because that is what Angus wanted."

Upon learning of Tait's death, New Zealand Progressive Party leader Jim Anderton said, "As a Christchurch electorate MP, I had a lot to do with Sir Angus. Like many others, I was deeply impressed with his abilities, integrity, and energy. He was a constant advocate in all areas that mattered for his industry, and of course his own company, but he had a tireless energy for assisting others, particularly young people, into his company and into the industry. He was a fierce nationalist in the best sense of the word, in terms of New Zealand ownership, New Zealand-based international corporations in maintaining their presence in this country and the development of their company in New Zealand hands."

He continued, "His legacy will be the most well-known and well-developed electronic engineering company in New Zealand, being left in the hands of a trust for the future of electronic engineering manufacturing in Christchurch in particular and New Zealand in the wider sense. On a personal note, he was an extraordinarily committed New Zealander, an extraordinary advocate, and an extraordinary human being in how he approached his life and work. He will be irreplaceable."

### **In The Beginning**

Sir Angus was fascinated by crystal sets while at school in Oamaru. This led to work as a radio serviceman prior to World War II. In 1940 he joined the Royal New Zealand Air Force, which sent him to Great Britain, where he studied at the Royal Air Force radar school in Scotland. He stayed on as an instructor working initially on radar for coastal command crews hunting U-boats. On his return to Christchurch after the war, Tait eked out a living selling electronic control devices to industry. It barely provided a living so, to make ends meet, he worked part-time in a radio shop.

The need for mobile communication was recognized long before it became a reality. Broadcast radio developed before World War II; however, the limitation

*(Continued on p. 10)*

**Sir Angus on new product development: "If you're going to start down the road on a new piece of activity, don't be too wise. Don't know too much about it, because if you know how hard it is, you won't do it."**



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**Everyone, including Sir Angus (center), was on best behavior when Queen Elizabeth II toured Tait Electronics' Wairakei Road factory.**

of one-way communication restricted its commercial application. It is difficult today to imagine just how bulky early mobile radio systems were. The wartime urgency to put radar into aeroplanes spurred the development of smaller radio-technology units, operating at much higher frequencies than had earlier been possible, between 100 MHz and 500 MHz. Even so the early systems installed by Sir Angus effectively filled up the entire trunk of a car - and were thought to be marvels of compact communication.

His mobile radios were the first to be made in New Zealand. The pent-up demand for mobile radio meant that business was good. Companies whose business was on the road were delighted that at long last they had the ability to talk to the man in the field and organize him. The first customers were Blue Star Taxis, and Rink Taxis. Other early applications included fire engines and carriers.

Early successes led to the formation in 1950 of A M Tait Ltd, funded in part by a small loan. The company grew

to employ about 100 people. There was little competition. The business enjoyed good margins and sold a lot of radios, but it was opportunistic and unorganized.

“There was no planning. I did most things, I worked ridiculous hours. I had people on the production side. The technology was my prime concern, but I was also the salesman. I spent the day rushing around and I went all over the country selling things and generally dissipating my energy with varying degrees of success,” Sir Angus said in an interview recounting his early years.

Sir Angus had some good advisers, but he lacked a mentor capable of telling him where he was going wrong and what he needed to do about it. The business ran on blind optimism. It was headed for the rocks.

“I was convinced that technology was the shining gold that would solve all problems. I’m not a numerate person, I hate numbers. I was over optimistic. I pretended there were no other goals in life other than technology,” he said. “I very rapidly found out that this thing called payday came round once a week, it was a ghastly experience”.

**The Next Company**

Sir Angus had preferred to hire engineers, and he had not put in place someone to do the financial management. A small economic downturn in 1967 tipped the scales. On Christmas Eve, he received a phone call telling him the business was being put into receivership. According to Sir Angus, the business failed “because it deserved to fail.” Sir Angus was 48 years old.

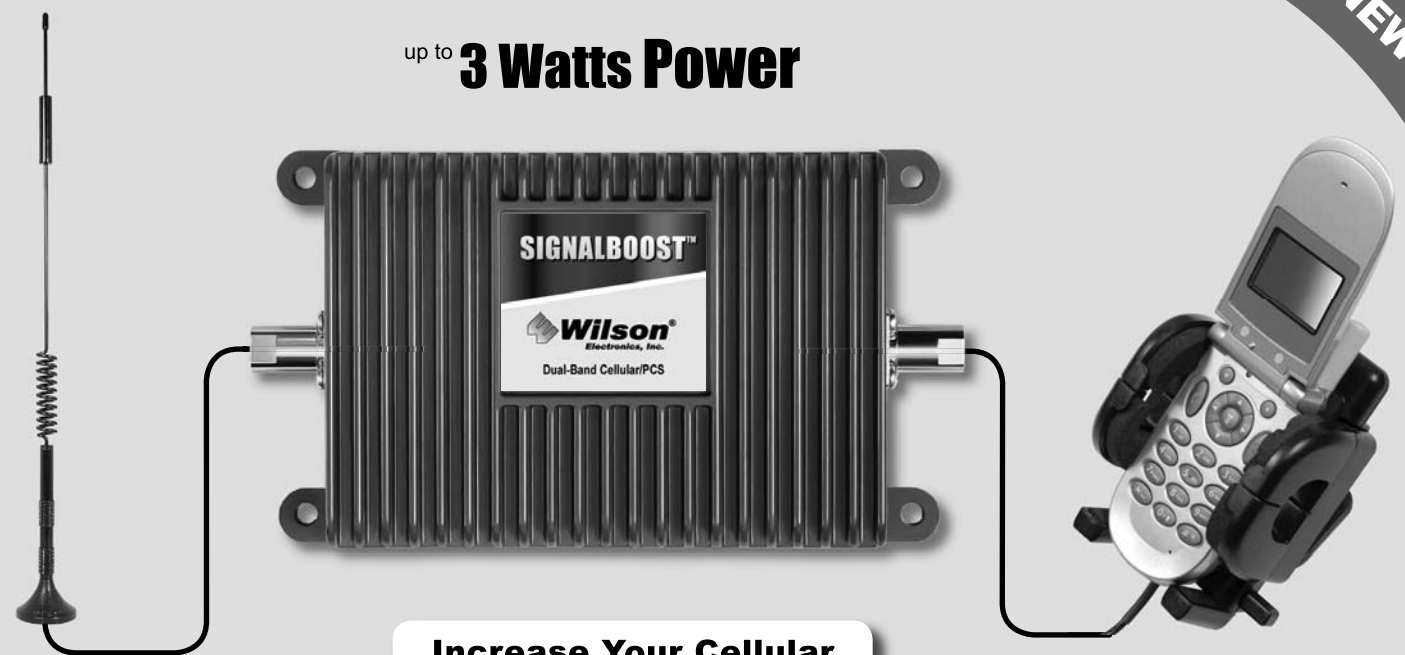
He was convinced his ideas were basically sound and that worldwide development of mobile two-way radio services still was in its infancy. With vehicle, fuel and labor costs all increasing, he envisioned an ever-growing market for communications links that would improve business efficiency by saving time and

*(Continued on p. 12)*

**Sir Angus on considering engineering as a career:  
“Recognize it as a sphere of activity that has no bounds. Don’t be concerned that you’ll be bored and be doing the same thing every day. It’s moving so quickly with new technologies that are emerging, I hesitate to predict where it will go.”**

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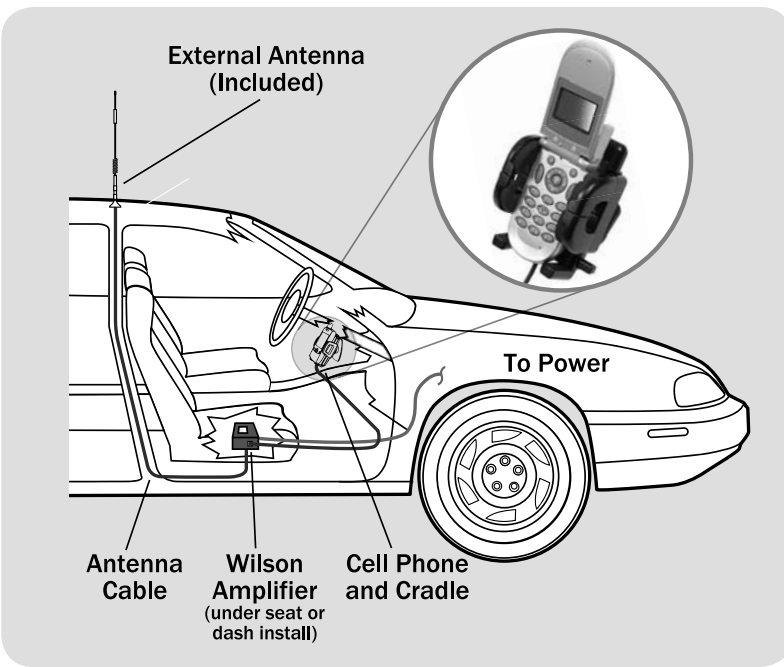


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**Sir Angus and the first Flying Kiwi Award, commemorating his “significant and pioneering contribution to the electronics industry.”**

unnecessary travel. Sir Angus decided to start over.

Sir Angus’ new company, Tait Electronics Ltd., started in 1969. Initially, Tait Electronics sold hybrid radios, bought from his old company at a modest price. These radios incorporated both valve and the emerging transistor technology.

Just as the wartime development of airborne radar had spurred the valve-based mobile radios of the 1950s, the American space program of the 1960s spurred the new transistor technology. Tait engineers had been working with transistor technology in the old company, trying to tame the transistor’s tendency to slip into feedback loops, an instability which made transmitting unreliable.

At that time there was no all-transistor mobile equipment in New Zealand. Tait seized the opportunity and began work on what became the first all transistorized mobile radio in New Zealand. The transistor revolutionized mobile communications as it permitted much smaller units and required far less power. The new units could be installed under the dash, and could be left on all day without running the battery flat.

The space race led by the United States to put the first man on the moon would open new doors for Sir Angus’s next venture. A lot of effort was put into developing RF transistors to provide astronauts with suitable radio communications, which in turn led Tait to become the first company in Australasia to build the all-transistor mobile radio.

### **New Markets**

With limited potential for domestic growth, the company looked overseas. The first target was England, as Sir Angus had spent six or seven years there during the war and understood the culture. He visited the U.K. and researched local prices. He was pleasantly surprised to find that the company could profitably sell into the new market. Tait’s production costs were much lower than those in the U.K., and possibly the New Zealand company accepted lower margins, too.

In 1976, Tait appointed Dymar Ltd. as its U.K. agent. When Dymar went into receivership about 1978, Tait formed its own subsidiary, Tait Mobile Radios.

PYE, GEC and Kosser were the three most important competitors in the U.K. market, and there were a number of smaller firms as well. Tait’s clear focus on mobile radio was an advantage.

Tait was surprised at its success in the U.K. market and quickly achieved a 20-percent market share that it still retains. Today, Tait is one of the major U.K. suppliers. The U.K. subsidiary employs around 50 staff, including its own engineering people and, like Australia, it contributes about 25 percent of total sales. Europe, Australia and China are the company’s most important export markets.

Success in the U.K. market built Tait’s confidence and, in 1982, it set its cap for the huge American market. Texas was the fastest growing state and Houston the fastest-growing center within Texas, so Tait set up there. Tait was to learn the hard way that the United States is the largest and most demanding market for

*(Continued on p. 14)*

**Sir Angus on creativity: “When designing new products, yes, there were sparks of creativity, but often it was applied knowledge and accumulated experience that improved every little detail and generated a great product.”**





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mobile radio in the world. To launch the business, the company sent over a New Zealand staffer who had not been to the United States before, and who failed to set up the agencies Tait were seeking. Tait discovered American expectations were completely different from those in the U.K. and in New Zealand. Tait sold 25-watt systems in the rest of the world, but the Americans with their “V8” culture were demanding 100-watt systems. After all, “that’s what the competition had.”

And the Australian market sprang to life in 1984. A number of dealers formed a buying consortium that gave Tait complete coverage of the country. This arrangement worked well and stayed in place until the second half of the 1980s. The Australian market now produces a quarter of Tait’s sales. Today, Tait has its own sales offices in Australia, the U.K., Thailand, Singapore, Hong Kong, Beijing, Taiwan, Houston, Toronto, France, Germany and Miami (serving Latin America).

Here’s how Sir Angus characterized his business strategy: “There is only one challenge - to be up at the front. Do things that the world requires and will pay for. Not to claim that we do things better than anyone else but we must be as good as anyone else. Our secret weapons are cost-effectiveness and our continuous investment in technology.”

The company’s competitive advantages reinforce each other and are reinforced by the strategies discussed above. Two of the most important are the passion for technology and the fact that Tait Electronics remains a private company. Being a private company is important to Tait, because it enables the retention of almost all profits within the business to fund further R&D. It also provides an assurance to staff that the company and their jobs will not be sold out from under them.

“I have enjoyed the opportunity of putting virtually all that money back into the business primarily to drive this technology. In truth, out of \$X millions, \$18,000

is the total [annual] amount that’s ever been paid out in dividends,” Sir Angus said. “If you made \$5 million profit, it means that we’ve given the shareholders \$18,000 and the rest has gone back into the business. Now, if I turned the place into a public company, I would have a bunch of whining shareholders saying, ‘you made \$5 million, we know that you have got to build the company but, hell, we want at least a million, or whatever.’ My answer to that is ‘no, I want to control this thing and I want to decide how and where the money will go.’”

He continued, “What is the advantage of a bag of gold over a structure that provides careers for lots of people and puts products into the world that are well-respected? What is the point in walking away from a life’s work or half a life’s work with a bag of gold?”

One reason Sir Angus never took the company public is the short-term focus of public companies. “There’s a bloody great magnifying glass examining what you are doing, forcing you to keep one eye on the stock exchange and the other on the quarterly reports,” he said. “What a dreadful way to live. I don’t think that you can build any company that’s worthwhile within 10 years, probably 20.”

Sir Angus also believed “at the end of the day we are selling technology - technology is our sword.” He also continued to seek out the risk-takers whenever he needed to bolster staff.

“I’ve encountered many people throughout my life who are (a) intellectually much more able than I, and (b) much better performers, much better educated. Ignorance is, I think, bliss,” he said. “If you are well-educated, and you are cautious of nature, and part of your education has been to study the ups and downs, and the difficulties, you will prefer the security of a well-paid job and you will not take the risks.”

He added, “Also I would debunk another myth. Many people will say a successful business starts from a business plan [so] you know where you are going and you know what you are going to do. That’s rubbish. Take Sony’s Morita. He didn’t know what he was going to do. He did all sorts of silly things until he found something that worked.” ■

*Editor’s note: Much of this feature was excerpted from a July 2000 case history written by Ken McCarthy as part of the CANZ Research Programme at Victoria University School of Business and Public Management in Wellington, NZ. Other information was supplied by Tait Electronics.*

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# A Nationwide Public-Safety Wireless Broadband Network

— Harlin R. McEwen (F), chief of police (retired), Ithaca, N.Y.;  
and chairman of the IACP Communications and Technology Committee

*The ability of public-safety agencies to have seamless nationwide roaming capability on a wireless broadband network that is hardened to public-safety requirements is not only achievable but essential for them to meet their increasing responsibilities.*

**P**ublic-safety professionals in the United States must have access to the most modern and reliable communications technology that the nation offers so they can communicate with each other and with federal officials across agencies and geographies during emergencies. The ability of public-safety agencies to have seamless nationwide roaming capability on a wireless broadband network that is hardened to public safety requirements is not only achievable but essential for public-safety agencies to meet their increasing responsibilities.

In 1995, the Federal Communications Commission (FCC), in concert with the National Telecommunications and Information Administration (NTIA), established the Public Safety Wireless Advisory Committee (PSWAC) to provide an assessment of the communications needs of public-safety agencies through the year 2010. On Sept. 11, 1996 (exactly five years before the terrorist attacks of Sept. 11, 2001), PSWAC released a report setting forth the current and future spectrum needs of public safety.

Among the findings of the PSWAC report was that 97.5 megahertz of new public-safety radio spectrum was needed by 2010, including 25 megahertz within five years (*i.e.*, by 2001).

As a result of the PSWAC report, Congress directed the FCC (in the Balanced Budget Act of 1997) to allocate, no later than Jan. 1, 1998, 24 megahertz of radio spectrum between 746 MHz and 806 MHz (to be recovered from television channels 60–69 as a result of the implementation of digital television). The

FCC then reallocated for public-safety use television channels 63, 64, 68 and 69. On Aug. 6, 1998, the FCC created the Public Safety National Coordinating Committee (NCC) under the authority of the Federal Advisory Committee Act (FACA). The purpose of the NCC was to recommend rules for the use of the 24 megahertz of public-safety spectrum in the 700 MHz band.

In various proceedings, the FCC allocated half of the new spectrum (12 megahertz) for urgently needed public-safety narrowband voice channels and the remaining half for wideband data channels. Since then, significant advances in technology have made it desirable to consider broadband data channels. To accommodate new broadband technologies, the FCC currently has proposed some modifications to the 700 MHz spectrum.

## Insufficient Channels

Unfortunately, the current 24 megahertz of spectrum already allocated for public safety is not sufficient for a nationwide broadband network for the following two reasons:

- Half of the spectrum (12 megahertz) is allocated for urgently needed narrowband voice and is already licensed and being used by public-safety agencies in areas where there are no competing television broadcasters. Many other agencies have planned to use the frequencies available in this spectrum once television broadcasters have vacated the spectrum in February 2009.

*(Continued on p. 18)*



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- The 12 megahertz of spectrum designated for data channels is not sufficient in capacity to support both public safety and commercial services. There must be sufficient spectrum for commercial investors to be able to offer reliable commercial services that would not regularly be disrupted by public-safety pre-emption. Without commercial investors, public safety has no funding mechanism to build a nationwide broadband network.

The concept currently under consideration by the FCC is to have priority access for public safety to a nationwide, interoperable wireless broadband network that incorporates the latest technologies in use by the private sector. The public-safety community currently is supporting a proposal to create such a network, based upon a public/private partnership model. The original model was developed by Morgan O'Brien (M), a co-founder of Nextel and currently chairman of Cyren Call Communications, with input from the public-safety community. That model required congressional action to allocate 30 megahertz of spectrum, scheduled for auction, to the public-safety community in what would be known as a "public-safety broadband trust." Because such legislation has been blocked by the strong lobbying of the current commercial carriers, that proposal has been put on hold by the public-safety community.

Many public-safety organizations have issued resolutions and supporting statements asking Congress and the FCC to give serious consideration to the concept of a public/private partnership that would build a nationwide public-safety broadband network. Statements have been issued by the IACP; the Association of Public-Safety Communications Officials—International (APCO); the International Association of Fire Chiefs (IAFC); the National Sheriffs' Association; the Major Cities Chiefs Association; the Major County Sheriffs' Association; police chiefs associations of the states of

Michigan and Illinois; the Western Fire Chiefs Association; fire chiefs associations of the states of Connecticut, Virginia, Maryland, Michigan and New York; and the National Public Safety Telecommunications Council (NPSTC).

The public-safety benefits envisioned include the following:

- Broadband data services (such as text messaging, photos diagrams, and streaming video) currently unavailable in existing public-safety land-mobile systems
- A hardened public-safety network with infrastructure built to withstand local natural hazards (tornadoes, hurricanes, earthquakes, floods, etc.) that would include strengthened towers and backup power with fuel supplies to withstand long-term outages of public power sources
- Nationwide roaming and interoperability for local, state and federal public-safety agencies (police, fire and emergency medical services) and other such emergency services as transportation, health care and utilities
- Access to the Public Switched Telephone Network (PTSN) similar to current commercial cellular services
- Push-to-talk, one-to-one and one-to-many radio capabilities that would provide a backup to (but would not replace) traditional public-safety land-mobile mission-critical voice systems
- Access to satellite services to provide reliable nationwide communications where terrestrial services either do not exist or are temporarily out of service

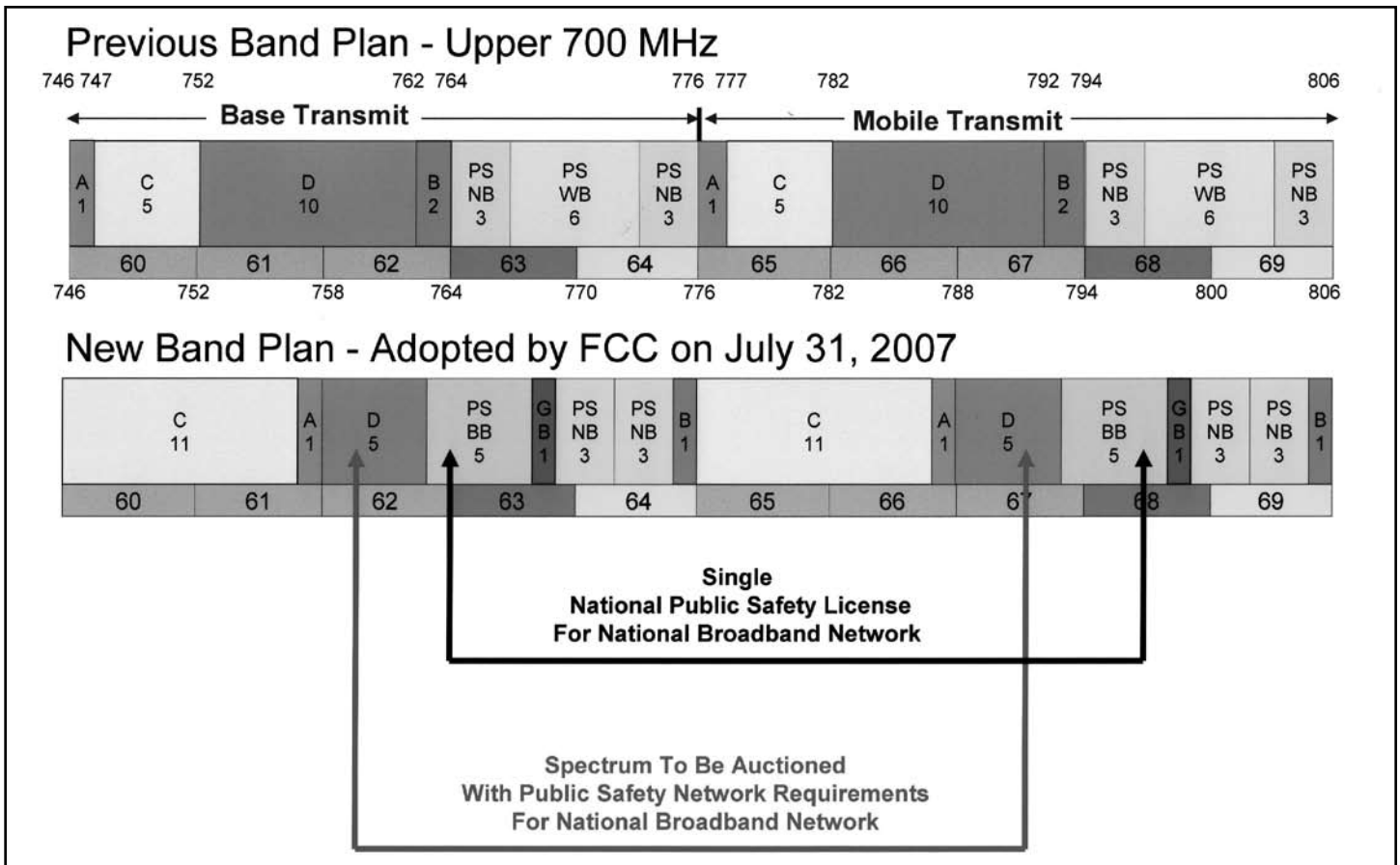
The public-safety community, represented primarily by the NPSTC, has rallied behind a modified concept for a public/private partnership that would build a nationwide public safety broadband network. Frontline Wireless originally developed the current proposal. Although the national public-safety community, represented by the NPSTC, has not endorsed the Frontline Wireless proposal in its entirety, there are many parts of the proposal that would be beneficial to public safety.



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**Enter The PSST**

In anticipation of possible FCC approval of this concept, some of the national Public-safety organizations created a new nonprofit corporation called the Public Safety Spectrum Trust (PSST) that will apply to the FCC to become the new National Public Safety Licensee. In June 2007, the PSST met and elected officers to begin this process. The author has been elected president. The vice president is Robert M. Gurs (M), who also serves as the director of legal and government affairs for APCO. The secretary-treasurer is Alan Caldwell (M), who also serves as a senior adviser to the IAFC.

On July 31, 2007, the FCC voted to adopt rules for implementation of a nationwide interoperable broadband public-safety network in the 700 MHz band (see chart at top of page).

On Aug. 10, 2007, the FCC issued a Report and Order (R&O) on the matter, which will take effect 60 days after publication in the *Federal Register* (see related story in this publication). The R&O designates 10 megahertz of the currently allocated 700 MHz public-safety spectrum to be combined with 10 megahertz of the auctioned spectrum to provide a total of 20 MHz of spectrum for the new network. The R&O also

provides for a single Public Safety Broadband License (PSBL) that will negotiate a network sharing agreement (NSA) with the auction winner of the adjacent spectrum to form the new nationwide public/private broadband network. The auction winner would build the new network pursuant to the NSA.

As part of this negotiation, the PSBL will insist on appropriate rules and technical standards to help ensure maximum interoperability, reliability, redundancy, innovation, and choice for public safety customers using this spectrum. Finally, as part of its decision, the FCC also included a mechanism for

*(Continued on p. 20)*



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the PSBL to allow for limited local construction of broadband or wideband systems.

The FCC R&O requires a slightly different makeup than originally included in the PSST. It requires 11 board members, six of which were included in the original board (APCO, IACP, NSA, IAFC, NASEMSO and NPSTC). In addition, the PSBL is required to include the National Governors Association (NGA), National Emergency Number Association (NENA) and International City/County Managers Association (ICMA) among the organizations represented on the board.

The PSBL is expected to retain an adviser/agent who will help ensure that the nationwide, Internet Protocol (IP)-based, next-generation network is built to the technology and hardening standards established by the PSBL through business relationships with commercial entities that will build and maintain the network.

One final observation is that the 700 MHz spectrum remains encumbered by television broadcasters in many areas of the country. The Budget Deficit Act of

2005, enacted by Congress and signed into law by the president in January 2006, finally sets a firm vacate date for broadcasters of Feb. 17, 2009. Until then, much of the spectrum under consideration will not be available.

Given the many ramifications of the July 2007 FCC decision, the construction of a new nationwide public-safety broadband network should have an enduring positive impact on public safety for many years to come. ■

*Harlin McEwen has been in the field of law enforcement for more than 49 years. He served as chief of police for the City of Ithaca, N.Y., and as a deputy assistant director of the U.S. Federal Bureau of Investigation. He has served as chairman of the IACP Communications and Technology Committee for more than 29 years. He serves as communications adviser to the National Sheriffs' Association, Major County Sheriffs' Association, and the Major Cities Chiefs Association; and he advises various local, state and federal agencies. He is a member of the U.S. Department of Homeland Security SAFECOM Program Executive Committee, and he has served as vice chair of the NPSTC.*



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# 20 Things You May Not Know About Jack Poppele

**A**ccording to a long-ago article in the *Newark* (N.J.) *Star-Ledger* honoring J.R. (Jack) Poppele (F) (1898-1986), reporter Gordon Bishop wrote, “This unique individual, who lived a long, productive and rewarding life, was the last of the inventive pioneers who ushered in the age of radio and television which we know today as the ‘broadcast industry’ – the most powerful form of communication the world has ever experienced. Jack Poppele was there in the beginning, before radio, before the advent of television, when legendary giants like Marconi, Edison, Sarnoff and Morse were the original wireless operators – or ‘lightning slingers’ – as they called the Wizard of Menlo Park. Jack knew and worked with all these geniuses.”

Another article, this time in a 1939 issue of *Broadcasting* magazine, gave this description of Poppele: “tall, dark, lean and intense in his work, Jack Poppele rules his staff of crack technicians with the precision of a militarist, gearing them to the split-second necessities of modern network operation. In addition to his engineering prowess, he also possesses the mind of a business man with a far-sighted flair for the practical. An army of friends includes radio men all over this nation and in Europe as well, many of them turning to him for aid in the solution of broadcast problems.”

A short biography of Poppele, written in 1951, gives all the requisite information regarding schooling, first jobs, technical successes, professional-organization membership and his founding of Tele-Measurements Inc. in 1963. What is presented here are some of his career highlights you may not know (in no particular order):

- 1 His first job after World War II was selling crystal sets in Bamberger’s Department Store in Newark, N.J.
- 2 In 1926, he rigged what possibly could have been the first portable radio. After buying tickets to the famous Dempsey-Tunney fight, his seats ended up being in the last row, nearly a quarter-mile from the ring. He created a small radio-receiving set, brought it with him to the stadium and set it up (the batteries were in his pocket), with the aerial hanging behind him on the seat.
- 3 In a series of broadcast “firsts” while at radio station WOR, he oversaw the first transatlantic communication test to London and later the first play by play description of a remote football game. He also broadcast the first golf tournament. According to a speech given later by daughter June, the play-by-play broadcasts were his version of what was going on “because he was that knowledgeable about the sports.”
- 4 He served as a radio consultant to the New Jersey State Police, helping that agency to plan its early state-wide system. He also helped the Newark police in that state to install their first in-vehicle radios.
- 5 He founded the Television Broadcasters Association, the original FM Broadcasters Association and the Radio Pioneers Club.
- 6 During World War II, he helped develop station synchronization to create enemy deception for radio ranging.
- 7 In 1954, President Dwight D. Eisenhower named him Assistant Director of the U.S. Information Agency for Radio and the Soviet Orbit. He also was responsible for “Voice of America.”
- 8 In an early stab at pay TV, while at WOR-TV in 1952, he experimented at broadcasting programming that contained secret coding that could be translated by a receiver to product a clear picture.
- 9 In 1922, he gave up his Christmas Day to play holiday music at WOR (which was supposed to

(Continued on p. 22)

be off the air that day) so that people who had received radios as gifts would have something to listen to.

- 10 In early 1924, a dirigible named Shenandoah broke away from its moorings in Lakehurst, N.J. (well-known for the location of the Hindenburg disaster) and began drifting north. He informed WOR listeners that they may hear it passing over their homes, and he asked their assistance in tracking it. Via Morse code, he kept the Shenandoah's crew updated as to where they were during the dark and foggy night, helping them to return to home base.
- 11 In 1940, he designed a special "radio desk" for New York City Mayor Fiorello LaGuardia that immediately switched on when a certain drawer was opened.
- 12 Everyone knows the old saw of it being so hot you can fry an egg on the sidewalk, but he proved it, sending a station engineer outside one oppressive day with an egg and a microphone to transmit the frying of that egg right on the street.
- 13 He met his future wife Pauline at department store Bamberger's (which owned WOR at the time), where she worked as the china buyer. He promoted a line of dishes that weren't selling well on the air, and the crockery soon sold out. They were married a year later.
- 14 In 1927, he set up a transmitting signal to Mars, hoping for a response. It never came.
- 15 He set up the transmission scheme for newly elected President Franklin Roosevelt's first inaugural address.
- 16 After World War II ended, he set up WOR-TV to promote the new concept of television. He received the second TV set manufactured by Allen B. DuMont (DuMont kept the first set), and they were numbered 100 and 101 to make it look like production was in full swing. The



**President Gerald R. Ford accepts the Golden Telegraph Key from Jack Poppele, president of the Veteran Wireless Operators Association, in 1975 on the occasion of the group's 50th anniversary. (Photo courtesy of the VWOA Scrapbook)**

sets had no sound, and the screens were so small Poppele said he used magnifying glass "to better see the action."

- 17 The broadcasting of school closings due to snow was a Poppele idea.
- 18 In 1956, after leaving Voice of America, he designed and built "Santa's Land," an amusement park in Putney, Vt.
- 19 The Jack Poppele Broadcast Award was initiated on 1989 by the Radio Club of America Board of Directors and is given to a person who has made important and long-term contributions to the improvement of radio broadcasting. The award has been made 11 times since its inception.
- 20 In 1992, the Voice of America named its Delano, Calif.-based transmitting station for Poppele, with the plaque saying:

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*(Editor's note: Thanks to June Poppele (F) for the materials that contributed to this feature.) ■*

**Just a reminder that the "Radio Club Proceedings" accepts manuscripts and story ideas from members of the Radio Club of America. If you have given a speech, presented a paper, written a feature for an industry publication or have plans to do so, we'd love to include it in a future issue. Contact Debra Wayne, editor, at [dwayne@accessintel.com](mailto:dwayne@accessintel.com).**



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# The Fight For 700 MHz Spectrum: FCC Says Bring It On

— Debra Wayne (F), editor,  
*Radio Club of America Proceedings*

*The Federal Communications Commission officially announced that the long-awaited 700 MHz airwaves, cleared by the move from analog to digital TV, will be auctioned off starting Jan. 16, 2008.*

In a much-anticipated Second Report & Order, the Federal Communications Commission (FCC) revised the 700 MHz band plan and service rules “to promote the creation of a nationwide interoperable broadband network for public-safety and to facilitate the availability of new and innovative wireless broadband services for consumers.” In the process, it also created some concern as to whether Tier One players will continue to run the show at the expense of smaller, more innovative players.

As in past auctions, the spectrum has been divided into a number of blocks and licenses. There is a nationwide 10-megahertz paired block in which the winner will have to provide a public-safety network in addition to any private use. There is a 22-megahertz paired block divided into 12 regional licenses that has open device and software mandates. There are two economic area blocks of 176 licenses each; one is 12-megahertz paired and the other is 6-megahertz unpaired. Finally there is a 12-megahertz paired block of 734 metro area licenses.

The FCC voted to keep the “open access” provision of its 700 MHz auction rules but decided to cut a part of the proposed rules that would have required a licensee to sell access to its network on a wholesale basis, which may cause search-engine giant Google to change its mind about participating in the spectrum sale.

In simple terms, open access - a bipartisan plan backed by Chairman Kevin Martin, and Commissioners Michael Copps and Jonathan Adelstein - will allow wireless subscribers to use whatever handset and software they choose on about one-third of the spectrum to be auctioned.

The Congressional Budget Office estimates this auction

will bring in between \$10 billion and \$15 billion, while others project as much as \$20 billion. While the sale will consist of 60 megahertz of spectrum taken back from the broadcast community, 22 megahertz are expected to be subject to “open access” rules. Another 10 megahertz has been earmarked for a nationwide public-safety broadband network that will be shared between a commercial operator and public safety agencies.

Upon learning of the FCC’s affirmative vote, Sen. Daniel K. Inouye (D-Hawaii), chairman of the Senate Committee on Commerce, Science, and Transportation, commented, “The Federal Communications Commission took important steps to meet the broadband communications needs of first responders and to promote openness and competition in commercial markets. Without question, the decision is not perfect and, admittedly, represents a number of hard-fought compromises by the members of the FCC. However, on balance, I am hopeful that the agreement reached will benefit consumers and serve the public interest.”

## **The National Public-Safety Broadband Network**

As its Number One priority, the Order establishes a framework for a 700 MHz public safety/private partnership between the licensee for one of the commercial spectrum blocks and the licensee for the public-safety broadband spectrum (*see related story in this publication*). As part of the partnership, the commercial licensee will build out a nationwide, interoperable broadband network for the use of public safety. This network will facilitate effective communications among first responders not just in emergencies, but as part of cooperative communications plans that will enable first responders from different disciplines, such as police and fire



departments, and jurisdictions to work together in emergency preparedness and response.

Under the partnership, the public-safety broadband licensee will have priority access to the commercial spectrum in times of emergency, and the commercial licensee will have pre-emptible, secondary access to the public safety broadband spectrum. Many national and local public-safety organizations have expressed support for a public safety/private partnership approach. Providing for shared infrastructure will help achieve significant cost efficiencies while maximizing public safety's access to interoperable broadband spectrum.

Commented Chairman Martin, "The adoption of a National Public Safety Broadband Licensee to be a part of this partnership is also the best way to establish a truly interoperable network. The local licensing regime that has been used to date has resulted in a patchwork of networks that do not talk to each other. We cannot keep licensing public safety spectrum in the same manner as before and expect a different result. A National Public Safety Broadband Licensee will facilitate a unified national approach to the use of this spectrum, finally enabling all public safety users to talk to each other during a crisis."

Immediately following the FCC's vote, Wanda McCarley, president of the Association of Public-Safety Communications Officials (APCO) International that originally had backed Cyren Call's nationwide broadband plan, said, "We applaud the FCC for taking this bold step to address the future communications needs of our nation's first responders. We have worked long and hard in recent months to help the FCC forge this order in a manner that will benefit public safety to the maximum degree possible. While we need to review the text of the FCC's order, it appears that the commission has addressed most of our concerns."

At least one commissioner wanted more on the public-safety front. According to Commissioner Michael Copps, who both approved in part and concurred in part with the 700 MHz order, "My first preference—by a long country mile—would have been a fully funded, federally funded, public-safety-grade network reserved solely for first responders and built to the specifications they deem essential for their job of protecting you and me. At this late date, that is apparently not to be. In light of the options before us today, then, I believe that pursuing a shared public-private model—and trying to make it work—is the next best choice. There are no guaranteed outcomes here, but we have to find a way—finally—to get this done."

He continued, "Today we put the commission in the middle of the public safety action—right where it should have been all along. When the parties reach a network sharing agreement, the license will be granted only if the full commission concludes that the terms reached are in the public interest. If agreement has not been reached, the full FCC has the authority either to decide outstanding disputes or to select another commercial entity to negotiate a different network sharing agreement. After the license has been granted, there will inevitably be questions about what a particular provision means or whether it is necessary to adjust certain terms in the agreement. Again, the commission will be at the table, and it will be there during the ensuing operation of the license, too."

### **What The Order Says**

The order also makes several changes to the rules governing the commercial services portion of the 700 MHz band. Most notably, the FCC determined that licensees for one of the spectrum blocks to be auctioned – the large, 22-megahertz Upper 700 MHz C Block – will be required to provide a platform that is more open to devices and applications. Those who purchase this spectrum must allow customers, device manufacturers, third-party application developers and others to use any device or application of their choice on their networks in this band, subject to certain conditions. The following bullet points detail, in the FCC's words, how the order lays out:

#### **>>The 700 MHz Band Plan**

- Under the new band plan, 62 megahertz of spectrum, divided into five spectrum blocks, will be auctioned for commercial uses.
- The commercial spectrum will be made available at auction in a mix of geographic area sizes, including Cellular Market Areas (CMAs), Economic Areas (EAs), and Regional Economic Area Groupings (REAGs). (Editor's note: the National Telecommunications Cooperative Association actively opposed this plan, advocating instead that this spectrum be broken into smaller blocks, with smaller license territories. NTCA continued its efforts into the final hour, seeking congressional support for a compromise in which the 22 MHz would be split into two blocks of spectrum, one 12-megahertz block to be auctioned according to REAGs and the remaining 10 megahertz to be auctioned according to CMAs, both with an open access requirement.)

- The 10-megahertz Upper D Block will be licensed on a nationwide basis and will become part of a 700 MHz Public Safety/Private Partnership.
- Within the 24 megahertz of public-safety spectrum, the public-safety wideband spectrum is being redesignated for broadband use to allow for nationwide interoperable broadband communications by public-safety users.
- The public-safety broadband spectrum is placed in a 10-megahertz block at the bottom of this band and the existing public safety narrowband spectrum is consolidated in a 12-megahertz block at the top of the band. Internal guard bands are placed in between the broadband and narrowband segments.
- There will be a single, nationwide license for the public-safety broadband spectrum, assigned to a Public Safety Broadband Licensee, which will work with the adjacent commercial D Block licensee as part of the 700 MHz Public Safety/Private Partnership.
- The Public Safety Band is shifted by downward by one megahertz from 764 MHz-776 MHz/794 MHz-806 MHz to 763 MHz-775 MHz/793 MHz-805 MHz in order to protect public-safety narrowband operations in the Canadian border areas.
- To accommodate the shift in the Public Safety Band, the Guard Band A Block is being relocated to a new location between the Upper C and D Blocks, and, to further protect the public-safety narrowband operations from potential interference, the Guard Band B Block is being placed above the narrowband block at the top of the 700 MHz band.

#### >>The Public-Safety/Private Partnership

- The Upper D Block commercial licensee and the Public Safety Broadband Licensee will form a Public Safety/Private Partnership to develop a shared, nationwide interoperable network for both commercial and public-safety users.
- The terms of the Partnership will be governed both by FCC rules and by the details of the Network Sharing Agreement (NSA) to be negotiated by the Upper D Block commercial licensee and the Public Safety Broadband Licensee. The NSA is subject to FCC approval

and must contain certain provisions, such as service fees and a detailed build-out schedule for the network.

#### >>Performance Requirements for Commercial Spectrum

- New, more stringent performance requirements were adopted for commercial licenses that have not yet been auctioned in order to promote better access to spectrum and the provision of service, especially in rural areas.
- For licenses based on CMAs and EAs, licensees are required to provide service sufficient to cover at least 35 percent of the geographic area of their license within four years, and 70 percent of this area by the end of the license term.
- For licenses based on REAGs, licensees must provide service sufficient to cover at least 40 percent of the population of their license area within four years, and 75 percent of the population of the license area by the end of the license term.
- If licensees fail to meet the four-year, interim geographic or population benchmark, the license term will be reduced from 10 to eight years, thus requiring these licensees to meet the end-of-term benchmark at an accelerated schedule. Interim reporting requirements have also been adopted to ensure that build out is timely.
- If licensees fail to meet the end-of-term buildout requirements, the FCC will automatically reclaim the unserved portions of the license area and make them available to other potential users.

#### >>Open Access

The licensees of the Upper 700 MHz Band C Block of spectrum will be required to provide a platform that is more open to devices and applications. This would allow consumers to use the handset of their choice and download and use the applications of their choice in this spectrum block, subject to certain reasonable network management conditions that allow the licensee to protect the network from harm.

#### >>Auction Procedures

- In the upcoming 700 MHz auction, the FCC will use “anonymous” bidding procedures, in which any information that may indicate specific applicants’ interests in the auction, including their license selections and bidding

activity, is withheld until after the close of the auction. These procedures will be used irrespective of any pre-auction measurement of likely competition in the auction.

- The FCC will use “package bidding” procedures when auctioning the 12 licenses in the Upper 700 MHz Band C Block in order to assist bidders that are seeking to create a nationwide footprint.
- The Order directs the Wireless Telecommunications Bureau to establish reserve prices for the upcoming 700 MHz Band auction.

### But Back To Google

The giant search-engine provider had made loud rumblings about entering the auction arena but only if the FCC set aside part of the spectrum for a wholesale operation, thus bringing in another competitor (like itself). However, no such set-aside was included in the proceedings, and Google hasn't decided yet as to whether it will sit this sale out, and its first comments are pretty noncommittal.

Google wanted four things - wholesale and open access

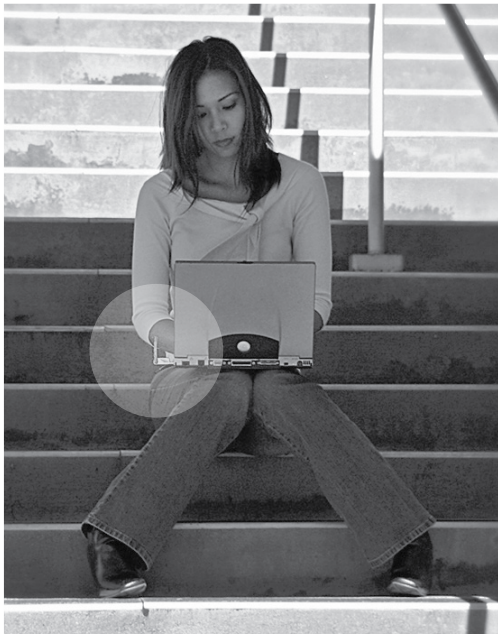
were the other two - and it hit .500, which would be All Star material for any baseball player. For a telecommunications rookie, batting for the first time against big league opponents like Verizon, it was an auspicious - some would say ominous - start.

“Google is rapidly becoming what I call a Google-opoly,” said Scott Cleland, chairman of NetCompetition.org, founder and president of Precursor, and an unabashed Google critic. “Google dominates the wireline space. They have 65-percent share in the United States; in Germany and Spain, they have 90 percent; in the U.K., they have 75.”

Now Google, which already is working with Sprint Nextel's mobile WiMAX play (running in the 2.5 GHz band), wants to control the 700 MHz wireless space, Cleland insisted.

“Google (which offered to bid \$4.6 billion for the spectrum if its four conditions were met) is basically telling the government ‘you should set the market up to favor us,’” he added.

It's a hot issue, and it will only get hotter as the January 2008 auction deadline approaches. ■



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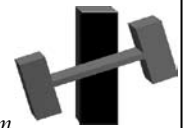


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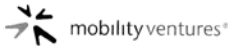
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**WIRELESS COMMUNICATION SYSTEMS**

# The Radio Club of America, Inc.



Founded 1909, New York, U.S.A.  
WORLD'S FIRST RADIO COMMUNICATIONS SOCIETY

*The mission of The Radio Club of America is to provide a forum for the exchange of knowledge, recognize outstanding achievement, provide financial assistance to deserving students and preserve the history of wireless communications.*

## APPLICATION FOR MEMBERSHIP

TO: **THE EXECUTIVE COMMITTEE**

I hereby apply for  Regular  Retired  Student (*please check one*) membership in THE RADIO CLUB OF AMERICA and certify that I meet the requirement for the grade selected. I further agree that, if elected, I will be governed by the Club's Constitution and By-Laws as long as I continue to be a Member.

Date: \_\_\_\_\_ Signature: \_\_\_\_\_

Full Name: \_\_\_\_\_  
(FIRST) (MIDDLE INITIAL) (LAST) (CURRENT AMATEUR CALL)

Home: \_\_\_\_\_  
(STREET) (The above information is used for mailings and your membership directory listing)

\_\_\_\_\_  
(CITY) (STATE) (ZIP CODE)

\_\_\_\_\_  
(PHONE) (FAX) (EMAIL)

***Please complete REVERSE SIDE as well.***

### ENTRANCE FEE AND DUES

**REGULAR.....\$185** ..... includes \$135 for 3 years of dues (required at initiation) + a \$50 initiation fee  
[After your initial 3 years, you will have the option to pay the annual dues rate (currently \$50) or a discounted 3-year dues rate (currently \$135).

**RETIRED.....\$100** ..... includes \$75 for 3 years of dues (required at initiation) + a \$25 initiation fee  
**QUALIFICATION:** *At least 65 years of age and fully retired.*  
[After your initial 3 years, you will have the option to pay the annual dues rate (currently \$32) or a discounted 3-year dues rate (currently \$75).

**STUDENT .....\$30** ..... includes \$20 for 1 year of dues + a \$10 initiation fee  
**QUALIFICATION:** *A full-time student at an accredited academic institution.*

#### **\*For Non-U.S. Mailing Address**

**REGULAR & RETIRED:** Please add \$45 surcharge (\$15 per year of dues)

**STUDENT:** Please add \$15.

Check enclosed  International Money Order enclosed  Traveler's Check enclosed  Credit Card

Visa M/C Amex Card number \_\_\_\_\_ Exp. date \_\_\_\_\_ Amt. \$ \_\_\_\_\_

Cardholder Name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Billing address for credit card \_\_\_\_\_

**PLEASE NOTE:** *The charge could appear on your statement as "Marketing Connection"*

All monies to be issued in U.S. funds, drawn on an U.S. bank. International money orders and traveler's checks are accepted in U.S. funds, payable in the U.S. Checks should be made payable to **The Radio Club of America, Inc.**

Mail this application with the applicable ENTRANCE FEE (as indicated above) to:  
**The Radio Club of America, Inc., PO Box 621074, Littleton, CO 80162-1074**  
303-948-4921 ▪ Fax 303-972-1653 ▪ karen@radioclubofamerica.org ▪ www.radioclubofamerica.org

The Radio Club of America was founded in 1909 by a group of the industry's pioneers, and is the first active electronics organization in the world. Its roster of members is a worldwide Who's Who that includes many who founded and built the radio industry.

The Club's objectives include promoting cooperation among individuals interested in electronic communications and in preserving its history. The Club administers its own Scholarship Fund to provide educational scholarships from tax-deductible contributions of the Club's members and business organizations.

The Club publishes and distributes its *PROCEEDINGS* twice a year.

---

Business: \_\_\_\_\_  
(ORGANIZATION) (DIVISION)

\_\_\_\_\_  
(STREET) (CITY) (STATE) (ZIP CODE)

\_\_\_\_\_  
(PHONE) (EXT.) (FAX) (EMAIL)

IF APPLYING FOR STUDENT MEMBERSHIP: School \_\_\_\_\_ Graduation Year \_\_\_\_\_

Birthplace: \_\_\_\_\_ Date of Birth: \_\_\_\_\_

Education and memberships in other clubs and societies: \_\_\_\_\_

Present occupation \_\_\_\_\_

Previous experience, indicate approximate dates (a current resume may be attached to the application):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

In what particular branch of the communications art are you most interested? \_\_\_\_\_

In what year did you become interested in electronic communications? \_\_\_\_\_

---

SPONSOR (optional) Please list the name of a member to whom you are personally known: \_\_\_\_\_

Recommendation of sponsor: (optional)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Sponsor Signature: \_\_\_\_\_

Date: \_\_\_\_\_



# The Radio Club of America, Inc.



Founded 1909

WORLD'S FIRST RADIO COMMUNICATIONS SOCIETY

## APPLICATION FOR SENIOR GRADE MEMBERSHIP

Date: \_\_\_\_\_

### TO: THE EXECUTIVE COMMITTEE

I hereby apply for the Grade of Senior Member of THE RADIO CLUB OF AMERICA, INC. and agree, if advanced to this level, that I will be governed by the Club's Constitution and By-Laws.

\_\_\_\_\_  
Full Signature

Full Name: \_\_\_\_\_  
(LAST) (FIRST) (INITIAL)

Home Address: \_\_\_\_\_  
(STREET)

\_\_\_\_\_  
(CITY) (STATE) (ZIP CODE)

\_\_\_\_\_  
(PHONE) (FAX) (EMAIL)

### PRESENT OCCUPATION

\_\_\_\_\_  
(COMPANY OR ORGANIZATION NAME)

\_\_\_\_\_  
(TITLE OR POSITION)

\_\_\_\_\_  
(STREET) (CITY) (STATE) (ZIP CODE)

\_\_\_\_\_  
(PHONE) (EXT.) (FAX) (EMAIL)

### SPONSORS

Letters of recommendation are required from two or more members (any grade) for sponsorship of Grade of Senior Member. Letters must be sent by each sponsor directly to The Radio Club of America, Inc., 10 Drs James Parker Blvd – Ste 103, Red Bank, NJ 07701-1500. List Sponsors below:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

Mail this application with the \$40 initiation fee to cover the cost of the Senior Grade Certificate and Pin (which will be mailed to the address indicated above).

Check enclosed       International Money Order enclosed       Traveler's Check enclosed       Credit Card

Visa M/C Amex Card number \_\_\_\_\_ Exp. date \_\_\_\_\_ Amt. \$ \_\_\_\_\_

Signature \_\_\_\_\_ Billing address for credit card \_\_\_\_\_

*(The charge could appear on your statement as Marketing Connection)*

All monies to be issued in U.S. funds, drawn on a U.S. bank. International money orders and traveler's checks are accepted in U.S. funds, payable in the U.S. Checks should be made payable to **The Radio Club of America, Inc.**

(more) →

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**EDUCATION**

Institution

Level Achieved

Date

Field

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**MANAGERIAL, PROFESSIONAL AND TECHNICAL EXPERIENCE  
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**PUBLICATIONS OF SCIENTIFIC OR PROFESSIONAL PAPERS, BOOKS OR ARTICLES  
RELATING TO ELECTRONIC COMMUNICATIONS**

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**OTHER BACKGROUND  
RELATING TO ELECTRONIC COMMUNICATIONS**

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Professional Awards \_\_\_\_\_

Professional Engineer's License(s) \_\_\_\_\_

Other Professional Society Affiliations & Grade of Membership \_\_\_\_\_

Current Amateur Radio Call Sign \_\_\_\_\_

Other FCC Licenses Now or Previously Held \_\_\_\_\_

---

**FOR OFFICIAL USE**

**REV-042007**

Date Application received: \_\_\_\_\_

Amount of Fee Received: \_\_\_\_\_

Date Approved by Board: \_\_\_\_\_

Certificate & Pin issued on: \_\_\_\_\_

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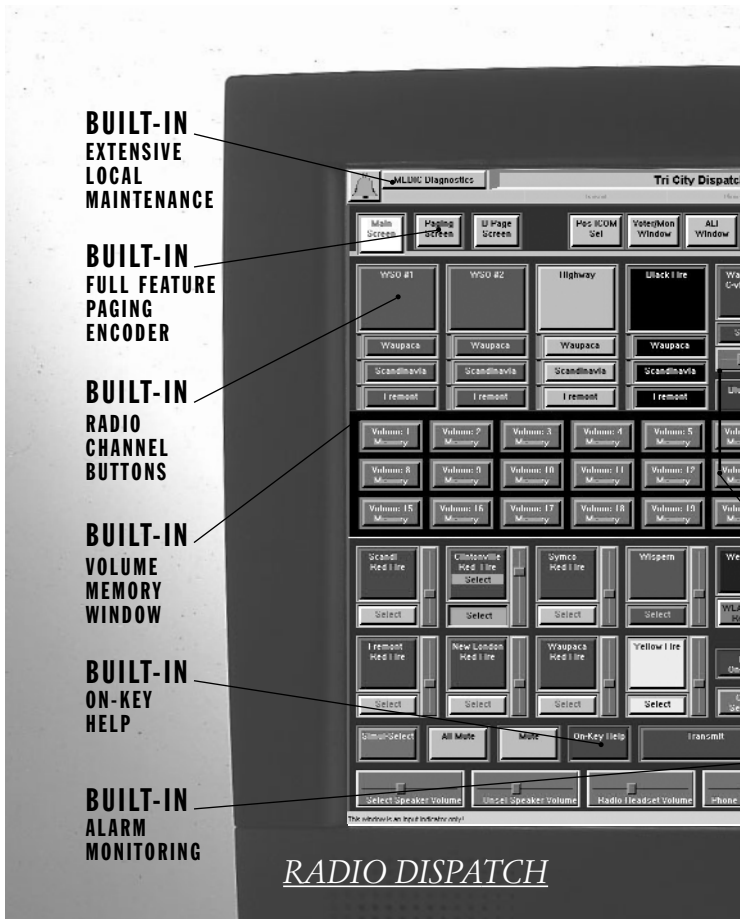
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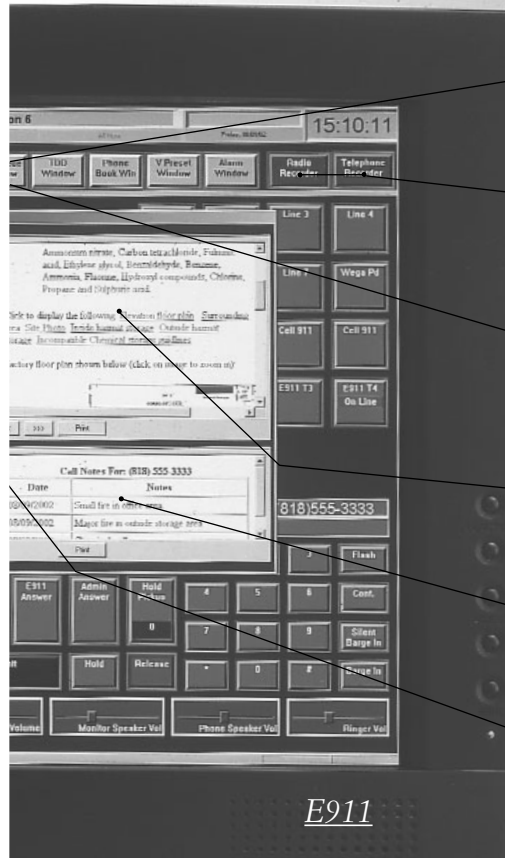
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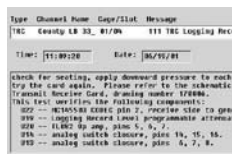
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