

## RCA's Wireless Pioneers

**Note:** This List is not meant to be all-inclusive, because there are scores and scores of RCA individuals who have made significant contributions to wireless. Instead, this list is meant to be indicative of just some of the wireless industry pioneers who are or have been associated with RCA. The list will be updated from time to time. Most of those mentioned are/were RCA members; a few were honorary members.

### Contemporary

**Dr. Jim Breakall:** Dr. Breakall is a professor of electrical engineering at Penn State. His area of specialty is antenna modelling and design. As a student he worked with the Arecibo Radio Observatory in Puerto Rico. During his career he has worked with the U.S. Army and Navy, and with the Lawrence Livermore Laboratories measuring electro-magnetic pulse (EMP). Dr. Breakall's team designed and built the HAARP ionosphere modification facility in Alaska. He used the Uniform Theory of Diffraction (UTD) to model HF antennas in irregular terrain. Dr. Breakall developed and patented the 3D frequency independent phased array antenna (3D-FIPA). For more information go to <https://www.eeweb.com/featured-engineers/interview-with-dr-jim-breakall>



**Marty Cooper:** Marty Cooper received bachelors and masters degrees in electrical engineering from the Illinois Institute of Technology. He spent most of career at Motorola, and he is best known as the inventor of the hand-held cellular telephone, the DynaTAC 8000X, first introduced in 1973. Later Cooper went on to found a number of wireless related companies including Dyna LLC, GrandCall Inc. (the 'Jitterbug' cell phone), and Arraycomm which holds over 400 patents on smart antenna technology. Cooper received the RCA Fred Link Award in 1996, and the RCA Lifetime Achievement Award in 2010. More information may be found at

[https://en.wikipedia.org/wiki/Martin\\_Cooper\\_\(inventor\)](https://en.wikipedia.org/wiki/Martin_Cooper_(inventor)), and <https://www.britannica.com/biography/Martin-Cooper>



**Dr. Nathan Cohen:** Dr. Cohen received his Ph.D. from Cornell. He is widely recognized as the ‘father of fractal antenna technology’, and produced his first fractal antenna in 1988. He has over 37 patents, has published over 100 technical papers, and 3 books. He is currently CEO, Chairman, and CTO of Fractal Antenna Systems. Dr. Cohen is also a Director and Fellow of the RCA. More information may be found at <http://www.fractenna.com/about/management.html>.



**Bob Heil:** Bob Heil is best known for his innovations in musical and audio sound systems and microphones. Heil microphones are used throughout the world. His big start came in 1970 when he assisted the band The Grateful Dead at a concert they were about to give, except that their equipment wouldn’t work. More information may be found at [https://en.wikipedia.org/wiki/Bob\\_Heil](https://en.wikipedia.org/wiki/Bob_Heil).



**Harlin McEwen:** Police Chief Harlin McEwen has been a tireless advocate for public safety communications. He was the first chair of FirstNet's Public Safety Advisory Council (PSAC) for 5 years. Prior to the formation of FirstNet, he vigorously advocated for the assignment of the D Block of 700 MHz spectrum to make broadband available to public safety, and was the chair of the Public Safety Spectrum Trust Corp. (PSST) in that role. Chief McEwen was for 35 years the Chairman of the International Association of Chiefs of Police (IACP) Communications Committee, and previously served as Communications Advisor to the Major Cities Police Chiefs Association, the National Sheriffs' Association and the Major County Sheriffs' Association. He was police chief in Ithaca NY, later served the state of NY, and then served as Deputy Assistant Director of the Federal Bureau of Investigation from 1996 – 2000. During that time he had executive oversight for many major programs including the National Crime Information Center (NCIC) 2000 Project, the Integrated Automated Fingerprint Identification System (IAFIS), and the Law Enforcement Online (LEO) system. McEwen has won numerous awards in the industry, and NPSTC has an award in his name. More information can be found at [https://broadbandsummit.apointnl.org/wp-content/uploads/Bio\\_HarlinMcEwen.pdf](https://broadbandsummit.apointnl.org/wp-content/uploads/Bio_HarlinMcEwen.pdf)



**Morgan O'Brien:** Morgan O'Brien is a serial wireless entrepreneur. In 1987 he and several co-founders bought up 800 MHz radio spectrum all across the U.S. and built a company called FleetCall, which later became Nextel, of which he was co-founder and chairman. It was a nation-wide digital wireless network aimed at helping business and industrial companies get push-to-talk communications, long before the cellular companies could provide it. In 2005 Nextel merged with Sprint Corp. In 2006 O'Brien co-founded a company called Cyren Call which proposed to build a nation-wide broadband network at 700 MHz just for public safety. Although Cyren Call did not prevail, the idea did, and eventually became what we call today FirstNet. Since then, O'Brien helped form pdvWireless, and is their Vice Chairman. pdvWireless is a venture that aims to use 900 MHz spectrum to provide PTT and broadband services to business customers. For more information go to <http://urgentcomm.com/blog/listen-morgan-o-brien-tosses-out-his-latest-fantastical-notion-0?page=1>



**Carole Perry:** Carole Perry is a former Staten Island NY middle school teacher who has dedicated 31 years to passionately developing an interest in wireless and STEM (science, technology, engineering, and math) subjects in middle school and high school students across the U.S., and recently internationally (in Europe and India). Using the medium of amateur radio, she has been exciting the interest of these young students, long before anyone knew what STEM was. Each year at the Dayton Hamvention conference of radio amateurs, she holds a Youth Forum that is one of the most heavily attended events. Young amateur radio operators present technical projects they have been working on, and each year Carole picks one presenter to present at RCA's Technical Symposium. The projects have included fractal antennas, home sensor networks, balloons, and a pole climbing robot. Scores of students have gone on to careers in engineering and science as a result of her efforts. Carole is a recipient of RCA's Vivian Carr Award.



**Dr. Ted Rappaport:** Theodore (Ted) S. Rappaport is the David Lee/Ernst Weber Professor of Electrical and Computer Engineering at the NYU Tandon School of Engineering and is a professor of computer science at New York University's Courant Institute of Mathematical Sciences. Rappaport is a pioneer in the fields of radio wave propagation for cellular and personal communications, wireless communication system simulation, analysis and design, and broadband wireless communications circuits and systems at millimeter wave frequencies. His research has influenced many international wireless standard bodies over three decades. He also invented the technology of site-specific radio frequency (RF) channel modeling and design

for wireless network deployment—a technology now used routinely throughout the wireless industry. More recently, his work has explored the millimeter wave (mmWave) bands for future broadband access such as with 5G technology.

Rappaport has over 100 U.S. or international patents issued or pending and has authored, co-authored, and co-edited over 200 papers and 20 books in the wireless field, including *Wireless Communications: Principles & Practice* (translated into seven languages), *Principles of Communication Systems Simulation with Wireless Applications*, and *Smart Antennas for Wireless Communications: IS-95 and Third Generation CDMA Applications*.



**Andrew Seybold:** Andrew M. Seybold, CEO and Principal Analyst of Andrew Seybold, Inc., is one of the most respected and influential analysts in the wireless industry today. For more than twenty-five years, he has served the industry and shaped initiatives for world leaders of the wireless industry, including Verizon, Nokia, AT&T, Motorola, and Qualcomm. His firm has provided wireless consulting and education services for startups to Fortune 1000 companies such as Dow Chemical, Ford Motor Company, and Microsoft.

Andrew Seybold has consulted to some of the industry’s most talented and successful entrepreneurs. He was a key consultant to a number of companies that introduced products and services that have had a significant impact on wireless including Research In Motion’s popular BlackBerry, Hewlett-Packard’s first handheld device, the first two-way pager, Good Technologies’ first products, and AT&T’s push-to-talk offering. He also introduced RadioMail to Dell for the first-ever notebook wireless email offering. He has served on the Motorola Research Visionary Board, IBM’s Mobile Computing Advisory Board, and a number of other prestigious advisory boards. Andrew was heavily involved as public safety’s technical consultant assisting in the securing of the “D Block” 700 MHz frequency allocation which helped to FirstNet. He writes regularly in a publication entitled “All things FirstNet”, and also publishes the “Public Safety Advocate”. More information may be found at <http://andrewseybold.com/>



## Historical

**Major Howard Armstrong:** 1890-1954. Armstrong received his EE degree from Columbia. He is widely recognized as the most prolific inventor of wireless systems, including regenerative receivers, super-regenerative receivers, superhetrodyne receivers (which are the basis for most wireless receivers today), and FM or frequency modulation. He had 42 patents issued. More information may be found at [https://en.wikipedia.org/wiki/Edwin\\_Howard\\_Armstrong](https://en.wikipedia.org/wiki/Edwin_Howard_Armstrong).



**Charles Stuart Ballantine:** 1897 – 1944. Mr. Ballantine made many improvements in wireless technology, including negative feedback, condenser microphones, and his invention of the throat microphone which became widely used in aviation. He was president of the Institute of Radio Engineers (IRE) in 1935. For more information go to [http://ethw.org/Charles\\_Stuart\\_Ballantine](http://ethw.org/Charles_Stuart_Ballantine) (image below from that site)



**Salvatore Barone:** 1898 – 1976. Sal Barone was a wireless engineer and entrepreneur. He attended Cooper Union in NYC and studied electrical engineering from 1916 to 1920. In 1923

he joined Wired Radio as their engineer, and developed what is called today carrier transmission (using low frequency RF to be carried on AC power lines). The company morphed into what became Muzak, and Barone worked on pilots in Cleveland OH, Washington DC, and Staten Island NY. Later he joined the REL company and built FM transmitters, a new technology at the time. Barone installed a 10 kW REL FM transmitter on Mt. Washington NH in the late 1930s. He then joined Press Wireless as their Chief Engineer, building radio equipment during WW2. In 1946 he formed his own company, Northern Radio, which sold frequency shift keying equipment for radio teletype transmission over HF circuits to both the military and commercial interests. In 1968 the company was sold to RF Communications (which became Harris Corp.).



**Dr. Harold Beveridge:** 1893-1993. After receiving his BSEE degree he worked for General Electric. Later he became chief research engineer for the Radio Corporation of America. Dr. Beveridge had 42 patents to his name. He is best known for his development of the wave antenna, or Beveridge antenna. He received the RCA Armstrong Medal in 1938. For more information go to [https://en.wikipedia.org/wiki/Harold\\_Beverage](https://en.wikipedia.org/wiki/Harold_Beverage) and [http://ethw.org/Harold H. Beverage](http://ethw.org/Harold_H._Beverage) (image below from that site)



**Vivian Carr:** 1926-2018. Vivian A. Carr was a senior executive at Bell Labs and later at AT&T. In 1972 Vivian was elected to the Engineers Club of New York where she was the first woman member, and later became the first female member of its Board of Directors. Vivian was also very active in the IEEE, became a Senior Lifetime member, and rose to become the first female chairperson of an IEEE section, the prestigious (and largest) New York Section. She was also the



first female member of the Radio Club of America, became a Fellow in 1975, and was its president from 2011-2012. RCA established the Vivian A. Carr Award in 2014 to recognize outstanding women for their achievements in the wireless industry.



**Walter Cronkite:** 1916 – 2009. Walter Cronkite is best known as the CBS Evening News anchorman from 1962 to 1981, during a period when his show was watched and trusted by millions. During his many years as a broadcast journalist he covered some of the major events of the twentieth century including World War 2, the Nuremberg trials, the Vietnam war, Watergate, NASA's space program, the Iran Hostage Crisis, and the assassinations of JFK and the Rev. Martin Luther King.



**John DiBlasi:** 1898-1981. John DiBlasi attended Cooper Union in New York City, studying electrical engineering between 1918 and 1920. As radio amateur 2FD he was one of several US stations heard by Paul Godley in Scotland during the RCA Transatlantic Wireless Tests in 1921. He formed a partnership with Charles Cooper (Cooper-DiBlasi) which was a manufacturers' representative company supplying parts and engineering assistance to radio manufacturing companies in the NY/NJ area. In 1947 he helped form the Quarter Century Wireless Association (QCWA) of radio enthusiasts licensed 25 or more years, and was its first president for many years. QCWA has grown into a prestigious organization with chapters all over the world. More information can be found at <http://www.qcwa.org/w2fx-00001-sk.htm>. (image below from that site)



**Paul Godley:** 1889 – 1973. Paul Godley was an early radio pioneer who worked with Armstrong, DeForest, Marconi and Pupin. He did research on regenerative vacuum tube circuits and the superheterodyne receiver invented by Armstrong. In 1921 the American Radio Relay League (ARRL) and the Radio Club of America (RCA) sent him to Scotland for trans-Atlantic shortwave signal tests by radio amateurs, using modest equipment, as opposed to the large companies attempting the same thing with much more expensive and complex equipment. He was successful in receiving amateurs in the U.S. multiple times, proving that short waves could go across the ocean beyond line-of-sight. Mr. Godley later operated a radio engineering consulting company in New Jersey from 1926 until his retirement in 1963. For more information see <https://www.nytimes.com/1973/10/22/archives/paul-godley-dies-pioneer-in-radio-made-transatlantic-tests-of.html> (Image below from <http://www.amateurradio.eu/gm/silent-keys/2ze-paul-godley.html>)



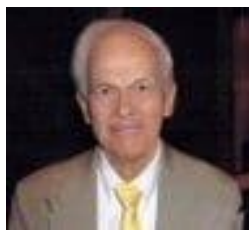
**Prof. Alan Hazeltine:** 1887-1964. Hazeltine received a his bachelor's degree in mechanical engineering and worked for General Electric. Later he became a professor at Steven's Institute of Technology. He invented the neutrodyne receiver, and the Hazeltine-Fremodyne superregenerative circuit. Later he formed the Hazeltine Electronics Corporation to manufacture radio equipment. He served as a consultant to the U.S. Navy, and later to the military during WW2. He received RCA's Armstrong Medal in 1937. More information may be found at [http://ethw.org/Alan\\_Hazeltine](http://ethw.org/Alan_Hazeltine). (image below from that site)



**Raymond A. Heising:** 1888-1965. He received the BSEE and MSEE degrees, and worked for Western Electric and later Bell Labs. Recipient of over 100 patents, Heising is best known in the wireless field for the Class C amplifier, grid modulation of AM radio transmitters, and constant current Heising modulation of AM radio transmitters. Heising received the RCA Armstrong Medal in 1954. For more information see [http://ethw.org/Raymond A. Heising](http://ethw.org/Raymond_A_Heising). (image below from that site)



**Leonard Kahn:** 1926-2012. Kahn's work was primarily with AM broadcasting and he is best known for his Kahn-Hazeltine AM stereo system that used independent sidebands. Chicago radio station WLS used his system for many years. He also invented the CAM-D Compatible AM Digital system. He had over 80 patents to his name and worked for many years for the Radio Corporation of America. He received the RCA Armstrong Medal in 1980 and the first RCA Poppele Broadcast Award in 1989. For more information see <https://www.rbr.com/am-stereo-cam-d-inventor-leonard-kahn-passes/>. (image below from that site)



**Jay Kitchen:** 1945-2015. After receiving his electrical engineering degree, Kitchen worked for the FCC. Later he became president and CEO of the National Association of Business and Educational Radio (NABER), and president and CEO of the Personal Communications Industry Association (PCIA). For more information go to

<http://wirelessestimator.com/articles/2015/former-pcia-chief-and-wireless-pioneer-jay-kitchen-passes-at-age-70/> (image below from the Washington Post and Legacy.com site)



**Fred Link:** 1905-1998. Fred Link had a long history in wireless, starting from the early 1920's as an amateur radio operator. He worked for DeForest Radio, and in 1931 formed the Link Radio Corporation, which specialized in FM radio equipment, which at the time was very new technology. In 1939 the Connecticut State Police wanted a new communications system, and approached a local professor of electrical engineering, Dan Noble, to design the system. Noble decided to use FM in a 2 way system, and hired Link to build the equipment. During WW2 Link provided communications equipment for all branches of the armed services and won 5 Army-Navy E Awards. In 1950 Fred sold the company, but then got back in the mobile radio business in 1954 with a 5 year contract with Dumont Laboratories. Over the years he consulted with many land mobile companies, and he was the president of the Radio Club of America for 23 years. For more information go to [http://urgentcomm.com/mag/radio\\_fred\\_link\\_goodwill](http://urgentcomm.com/mag/radio_fred_link_goodwill), and <https://www.rcwireless.com/19980622/archived-articles/industry-pioneer-fred-link-dies> and <http://hamgallery.com/Tribute/3BVA/> (image below courtesy Mercy Contreras)



**Jack R. Poppele:** 1898 – 1986. Jack Poppele launched radio station WOR in 1922 in the New York City area, and was its chief engineer. WOR over the years experimented with many technical broadcasting innovations. Later he was a vice president in charge of engineering for the Mutual Broadcasting System. From 1954 to 1956 Poppele was the director of the Voice of America, during a time of heightened Cold War tensions, when the VOA's overseas broadcasts in many languages provided an important information source to people living behind the "Iron Curtain". He developed the first portable radio and made stereo available on AM radio. In recognition of his long and varied career, RCA created an award in his name, first given in 1989, which recognizes individuals who have made important and long-term contributions to the field of radio broadcasting. For more information go to <http://mt-shortwave.blogspot.com/2010/08/mediumwave-wor-in-new-york-on-shortwave.html>

(image below courtesy Mercy Contreras)

