Who Really Invented Television?

Revisionist history says RCA, but in truth it was a Mormon farm boy named Farnsworth. His struggles presaged the battle between Bill Gates and Netscape.

by Evan I. Schwartz  September 1, 2000

Presiding over the landmark Microsoft antitrust case, Judge Thomas Penfield Jackson made international headlines when he compared Microsoft’s market power to the hegemony enjoyed by John D. Rockefeller’s Standard Oil a century ago. But perhaps another, less chronicled story actually serves as a better model for what is happening today and what may yet take place in the years to come. Way back during the birth of broadcasting, a largely forgotten but portentous battle raged between a lone inventor and the indomitable mogul at the helm of the first electronic media-age monopoly. The conflict differed sharply from the Rockefeller case, which involved the supply of a physical product—oil—as well as the system for piping and transporting this commodity. By contrast, the primary product in broadcasting was information, broadly defined. And the primary issue at hand wasn’t pricing but innovation itself.

Innovation in the early days of radio was controlled so tightly by David Sarnoff, the stocky, domineering, Russian-born visionary who led the Radio Corporation of America (RCA), that the federal government was compelled to investigate. What government trustbusters found was something that had been obvious to industry insiders for years: Sarnoff’s company had an iron grip on every aspect of radio, from the patents on the device itself to the creation and distribution of programming. “Sarnoff was the Bill Gates of his age,” says Thomas Lento, director of communications for the Sarnoff Corp., a Princeton, N.J., research lab spun off from RCA in the late 1980s. “RCA had a stranglehold over an entire sector of the economy.” But it was Sarnoff’s move to capture the next big thing, television, and his plot to destroy the ambitious
young inventor behind the new technology, that sent sparks flying.

Just as Microsoft didn’t invent the PC operating system, RCA didn’t invent radio. The firm was formed in 1919 when General Electric purchased the U.S. subsidiary of the Italian inventor Guglielmo Marconi’s original company. Sarnoff, who had worked at the American Marconi Company since his teens, was among the first to envision the news and entertainment applications of broadcasting.

Appointed RCA’s commercial manager at 28, Sarnoff greatly expanded the original Marconi patent portfolio and made sure no one could legally manufacture or sell a radio set without paying RCA a stiff royalty, just as no one could later make or sell a so-called IBM-compatible PC without paying a fee for the use of Microsoft’s MS-DOS and Windows. “The patents were all bundled together,” Lento says. “If you wanted to make a radio, you had to license all of them.”

And just as Microsoft used the infrastructure of Windows to propel its Office software to dominance, Sarnoff leveraged his advantage as radio’s standards-setter to organize hundreds of local stations into a national network, founding his National Broadcasting Company (NBC) division in 1926 and making it the primary provider of free electronic news, music and sports.

The rewards of dominance were great. Over a span of 15 years, radio exploded, from the domain of a few thousand hobbyists to a fixture in most Americans’ homes. Along the way, the RCA shares that GE issued skyrocketed. Multiplying more than 10,000 percent, RCA became the single hottest security in the great bull market of the Roaring Twenties-going from startup to component of the Dow even faster than Microsoft would accomplish the same feat decades later.
Then, on the evening of May 30, 1930, the Department of Justice served Sarnoff with a summons, interrupting a black-tie dinner at which the newly promoted RCA president was an honored guest. The charges: RCA was using its patent portfolio to restrain competition. Government antitrust action against RCA would drag on for almost three decades, sparking patent disputes, endless hearings and standards battles. There were also critical compromises, including a 1932 consent decree in which GE and Westinghouse agreed to sever all ties to RCA—a remedy Sarnoff privately favored. And the case led to new laws, foremost the 1934 act launching the Federal Communications Commission (FCC). But technology catapulted at such a terrific pace that the real battle was never fought in the federal arena, but in the marketplace.

In the marketplace, Sarnoff was already becoming less focused on his radio monopoly than on his attempt to extend it to the new frontier of transmitting moving pictures through the air. He only saw one major obstacle in his way: a Mormon farm boy named Philo T. Farnsworth. Born in 1906 in a Utah log cabin without electricity or a telephone, Farnsworth at age 6 declared his intention to become an inventor like his heroes Bell and Edison. The kid taught himself physics, studying Einstein’s theories and reading borrowed science books and magazines late into the night. As a teenager, he worked part time repairing radios and thought constantly about the properties of something known as the electron.

From his reading, Farnsworth knew that several inventors had achieved limited success with a mechanical television system, transmitting images along a wire between two spinning disks with spiral rows of holes to pick up patterns of light at one end and project them at the other. But he figured, correctly, that such a setup wouldn’t work fast enough to capture and reassemble anything but shadows and flickers.

According to surviving relatives, Farnsworth dreamed up his own idea for electronic—rather than mechanical—television while driving a horse-drawn harrow at the family’s new farm in Idaho. As he plowed a potato field in straight, parallel lines, he saw television in the furrows. He envisioned a system that would break an image into horizontal lines and reassemble those lines into a picture at the other end. Only electrons could capture, transmit and reproduce a clear moving figure. This eureka experience happened at the age
Farnsworth’s idea grew into an all-out obsession. In 1926, at age 20, he married a beautiful brunette named Elma “Pem” Gardner. The two boarded a train for California the next morning in order to be near Caltech and other centers for motion-picture sciences. They set up a makeshift television lab in the living room of their Hollywood apartment, moving a year later to an old warehouse at 202 Green St., on San Francisco’s Telegraph Hill. Now backed by wildcatting bankers who foreshadowed today’s Silicon Valley venture capitalists, Farnsworth was the 20th century’s skinny, pale, brilliant proto-nerd.

When he demonstrated a working model of his television in 1928 for a group of reporters, he was only able to show blurry images on a tiny screen. But the system delivered 20 pictures per second, enough to convince the eye it was looking at motion rather than a series of stills. The San Francisco Chronicle lauded the achievement under the headline: “S.F. Man’s Invention to Revolutionize Television,” and the story was picked up by wire services and papers nationwide.

Sarnoff, of course, was tracking these activities from afar. But he needed a closer look. To get one, he hired a fellow Russian immigrant named Vladimir Kosmo Zworykin, head of television research and development at Westinghouse in Pittsburgh. Zworykin had been working on television for years. He filed for a theoretical patent on such a system as early as 1923—still pending seven years later—even though he had no working model. Farnsworth had applied for two key patents of his own; Zworykin had already been in touch with him about visiting the San Francisco laboratory. By then, Farnsworth’s financial backers were putting pressure on him to sell the whole company—rather than just a license—to Westinghouse. After all, the stock market had recently crashed and burned.

“The bankers all wanted to cash out,” recalls Pem Farnsworth, now 92 years old and living with her son, Kent Farnsworth, and his family in a small house in Fort Wayne, Ind. No stay-at-home wife, Pem had worked along with her brother Cliff on her husband’s small lab staff. Despite the fact that these events took place some 70 years ago, her recollections seem sharp, especially when it comes to the colossal battles with Sarnoff.
“Dr. Zworykin was there for three days, and he saw everything,” Farnsworth’s widow says of that visit to the Green Street lab in April of 1930. Her husband even built an “image dissector,” essentially the first electronic television camera, right before his guest’s eyes. Farnsworth agreed to host the visit because he had hoped Westinghouse might license his patents for a substantial amount of money. Pem Farnsworth maintains that her husband didn’t realize the full extent to which Sarnoff and Zworykin were already collaborating.

Zworykin returned immediately to RCA’s Camden, N.J., labs and began trying to reverse-engineer what he had seen at Green Street. Apparently confident he was backing the right guy, Sarnoff gave his new employee a $100,000 budget—many times greater than all the money Farnsworth had been able to raise—and a one-year deadline to develop a working electronic television system. But despite all Zworykin’s knowledge and experience, the year came and went without much to show for it.

Frustrated by the lack of progress, Sarnoff decided to fly across the country and pay a surprise visit to the Farnsworth lab himself. It was April of 1931, and the RCA antitrust case had been droning on in Washington for months, making this trip all the more audacious. “At this point, RCA is in chaos,” says Alex Magoun, director of the David Sarnoff Collection, an archive of historical documents, in Princeton, N.J. “Radio and phonograph sales were plunging. The Depression led to a price war and the $10 radio. The government forced RCA to slash its licensing fees. And RCA’s stock lost more than 90 percent of its value. Sarnoff had this financial desperation. He was probably thinking, ‘I’m going to buy this Farnsworth guy.’”

When Sarnoff arrived at 202 Green St., Farnsworth happened to be out of town on business. The door was answered by George Everson, a philanthropist who had several years earlier become the first backer of the Farnsworth Radio & Television Company. Everson proceeded to show Sarnoff around and had the engineers conduct a special demonstration. At the end of the visit, Sarnoff expressed confidence that he could build TVs without infringing on Farnsworth’s patents and that there was nothing here that he needed, according to Everson’s written account. But shortly thereafter, Sarnoff offered $100,000 to buy the company outright. Under the terms, Sarnoff would own Farnsworth’s television patents, now formally granted, and
Farnsworth would come to work for RCA. The episode portended a remarkably similar Microsoft visit to Netscape in 1995, in which top executives from Redmond allegedly threatened actions that could put the startup out of business unless it cooperated.

When Farnsworth received word of the deal by telegram, he rejected it. And despite the fact that bankers were looking for an exit, they agreed that the lowball offer was an insult. “The bankers were pretty dim,” remarks Kent Farnsworth. “But even they could see more than a hundred grand in television.”

The rejection brought the full wrath of the mogul down on the inventor. “Sarnoff decided to break him in patent court,” says Pem Farnsworth. In other words, Sarnoff would do to Farnsworth what he did to those who had developed key radio inventions but had refused to cooperate fully with RCA. Sarnoff and his team of lawyers would launch a legal assault aimed at overturning the patents on appeal, which would tie up the inventors emotionally and financially for years. “That was RCA’s M.O. at the time,” says Kent Farnsworth.

The legal challenges to Farnsworth’s basic television-system patents lasted for nearly four years. They slowed development of television, delayed its introduction to the public, squandered the company’s already thin resources, drove Farnsworth to drink, and contributed to his developing a bleeding ulcer.

Sarnoff’s mischief didn’t end there. At the time of his visit to Green Street, Farnsworth was trying to make an end run around RCA, meeting with Philco’s senior executives on the East Coast. Philco was the largest manufacturer of radio sets in America, selling more units than RCA. But every time there was a flurry of publicity around television, its stock would drop. Investors saw television as the next big thing, and Philco wanted in. So it agreed to take out a license from the Farnsworth Company and produce TV sets—until Sarnoff stepped in.

Sarnoff and Zworykin learned of the collaboration by picking up test transmission signals from Philco headquarters, which sat just across the river from RCA’s Camden labs. Sarnoff threatened to rescind RCA’s patent licensing arrangement with Philco, according to Pem Farnsworth—just as Microsoft
would, decades later, allegedly use the Windows license to keep PC makers exclusively loyal to the company. Without that license, Philco would no longer be able to produce radios legally, and its core business would be gone. So Philco was forced to break off its dealings with Farnsworth, leaving him without a major U.S. customer. That’s the Farnsworths’ version of the story, anyway; RCA naturally doesn’t admit to such foul play. “There could have been a threat [from Sarnoff to Philco],” says Magoun. “But we don’t know that.”

To gain the advantage, Sarnoff orchestrated a public-relations masterstroke. Not only did RCA sponsor the World’s Fair Television Pavilion in New York City’s Flushing Meadow, but Sarnoff had also secured the rights to host and broadcast the opening ceremony, on radio and on its newfangled successor. He stocked New York department stores with newly minted RCA models.

The publicity leading up to the big event reinforced the stature of RCA. The New York Times asked Sarnoff to contribute an authoritative essay about the fair in a special section of the newspaper. Life magazine pictured RCA executives huddled around their newest model television, not mentioning that it may have been built illegally. Sarnoff billed the event as the beginning of commercial television broadcasting—a misleading claim, since in 1934 Farnsworth had conducted a 10-day series of broadcasts from Philadelphia’s Franklin Institute. Furthermore, in 1936, the Olympic games were broadcast live from Munich using equipment a German company had built under license from Farnsworth. But only a few dozen people in Germany had TV sets at the time and, since satellites had not yet been invented, the signal didn’t reach other nations.

At a press conference before the opening of the fair, Sarnoff strutted up to the podium, camera flashes bouncing off of his high forehead. “It is with a feeling of humbleness,” Sarnoff began, “that I come to this moment of announcing the birth in this country of a new art so important in its implications that it is bound to affect all society. Now, ladies and gentlemen,” he declared, with a grand flourish, “we add sight to sound!” Then he announced that RCA’s own NBC broadcast network would begin regular television broadcasts live from Radio City Music Hall. Several days later, at the opening ceremony, Franklin D. Roosevelt became the first president to be televised.

The ballyhoo of the event turned Sarnoff’s stunt into an official, historic event.
The gathered throngs of media ate it up and reported it far and wide. “Last week, of course, witnessed the official birth of television,” reported The New Yorker. RCA was responsible for bringing us television. This was the new reality that the public perceived.

“We could have sued his pants off,” says Pem Farnsworth. But her husband was hoping to license the rights for producing televisions to RCA at the time. The plan was to maintain closely the patent ownership inside the Farnsworth Company, but to charge RCA and dozens of other companies an ongoing percentage on the sets that they would sell. So as not to disrupt any negotiations, Farnsworth decided to avoid any legal action. And he ended up selling RCA a $1 million license later that year.

During World War II, the U.S. government suspended manufacturing of consumer electronics entirely. But Sarnoff, now dubbed “the General” by Dwight D. Eisenhower in recognition of his wartime assistance, was already marshalling his forces for the expected postwar boom. “He drummed up the marketing bandwagon,” says Magoun. Right after the war, Sarnoff went on the road to convince his NBC radio affiliates to begin airing NBC television programs. Government regulators were trying to keep up, and the FCC forced RCA to divest half its broadcast holdings, leading to the creation of ABC.

Reeling from years of severe stress, Farnsworth suffered a nervous breakdown and was bedridden for several months before the war. Afterward, he and Pem relocated to Fort Wayne, where his new factory began volume production of television sets. But time ran out. Farnsworth’s key patents expired in 1947, just a few months before TV began a sudden, rapid proliferation from just 6,000 sets in use nationwide to tens of millions by the mid-1950s. RCA captured nearly 80 percent of the market, while Farnsworth was forced to sell the assets of his company to International Telephone and Telegraph, an industrial conglomerate that quickly decided to exit the commercial TV business.

Farnsworth’s story is tragic, but he wasn’t the only casualty of Sarnoff’s delay tactics. In the late 1940s, Sarnoff sued to prevent CBS from broadcasting in color—a technology both RCA and CBS were racing to develop—on the grounds that it would disrupt the market for black-and-white television. In 1951, the Supreme Court finally ruled in favor of CBS. By then, RCA had seeded the market with millions of its black-and-white sets. Meanwhile, in RCA’s labs,
Sarnoff launched a crusade to devise an even better system for color, so as to control the all-important standard for transmission and marginalize the CBS format. A main bragging point was so-called backwards compatibility. Only RCA color broadcasts could be translated for viewing on the RCA black-and-white sets that most people had. If viewers wanted to watch CBS color broadcasts, they had to buy a special adapter for $100. It was similar to the unique position Microsoft would hold many decades later, when it would be the only company that could create a format, Windows, that could execute older MS-DOS programs.

When the FCC and the National Television Standards Committee made RCA's color transmission standard the official one, Sarnoff took out full-page newspaper ads declaring his “great victory.” Like the first version of Microsoft Windows, however, RCA color wasn't a big seller initially. But Sarnoff kept at it until the marketplace came around. So by the time RCA entered into a landmark consent decree with the Justice Department in 1958, agreeing to license its color TV technology freely to anyone for a reasonable price, the color war was over and RCA had crushed the competition—again.

As Sarnoff steamrolled his competitors, he rewrote history. RCA took every opportunity to trot out Zworykin as “the father of television.” Philo T. Farnsworth became the answer to an obscure trivia question. “The RCA public-relations department did a number on us,” says Pem Farnsworth. Both Sarnoff and Farnsworth died in 1971, and the contrast couldn’t have been greater. Farnsworth was broke, severely depressed and largely forgotten; Sarnoff was celebrated as a pioneer and visionary—and who could argue?

Like many moguls, Sarnoff believed that his actions were justified. “Sarnoff saw his monopoly power as a force for good,” says Magoun. “He took it very seriously. He hired the best engineers and took their word as to what was the best approach. Yes, he made enemies. But even if we say he did trounce people, it wasn’t as explicit as some would assert.” No doubt, the same could be said about Bill Gates. The subtle undercurrent in both Gates’ story and Sarnoff’s has to do with the control of innovation. Each man was known to appropriate ideas and technologies developed elsewhere, delaying their dissemination while his company tried to perfect them. But did consumers suffer because of this? While competitors would no doubt disagree, those who defend the moguls argue that it’s beneficial to have one company control the
pace of innovation. “Why do we assume that the more rapid the innovation is, the better it is for the consumer?” asks Magoun. “Why do we want endless, uncontrolled change in the way we live our lives?”

And that leads us to the overarching parallel between these two eras. The government spent 28 years trying to rein in RCA, and has pursued the Microsoft matter for more than a decade already. In both cases, the defendants used the intervening years to expand greatly the scope of their dominance. Which goes to show that the technology monopolist has one all-powerful force working to his advantage. Not ingenuity or technological superiority. Not legal firepower. Not even money. Unless it is somehow taken away by force, what the monopolist has on his side is time.