

The Original WWW: Web Lessons from the Early Days of Radio

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WWW

How do you evaluate a technology which has completely captured the public's imagination? One which has spawned thousands of articles in newspapers and magazines. A technology that has come to indicate innovativeness, where failure to appreciate it is taken as a sure sign of belonging to the wrong side of a generational divide. Which has led, almost overnight, to the creation of new companies, brands, industries, and fortunes. A technology which commentators claim will revolutionize not only public culture, but also education and commerce. And, in moments of excess, a technology which is hailed as the best new chance for creating a peaceful world.

Such a dilemma confronted the radio analyst in 1922. The technology was the original WWW, world wide wireless. When the RCA corporation took this logo in 1920, it felt that its new technology promised profits and a reasonable business opportunity in the wireless provision of telegraphy. In 1922 radio suddenly transitioned from a low cost niche alternative to transcontinental cable to a consumer phenomena. It was "top of the charts", and seemed to point the very way to the future.

Radio created much more than just a product or an industry. Although it now seems hardly more than a useful appliance, the impact of radio in the 1920s was huge. It changed the way the average person thought about distance and time. Global events could be experienced as they happened. Performances in distant cities could be heard in the neighbor's living room. Fast breaking stories, or simply news about impending weather, was available with a flip of the switch.



RCA Logo: 1920-1927

Radio also caused a wide range of spillovers and changes in the conduct of business. By using radio it was possible to accelerate dramatically the economy's push to a Mass Market. National brands could be created and sold. A firm could launch national marketing campaigns simultaneously, backed with a nationally created image.

As part of this transformation, we suddenly had the concept of scheduled mass culture. As early as 1923 the Happiness Boys had become famous as "Your Friday night

date, from seven thirty to eight”.¹ Timeslots, lead-ins, and prime time became familiar concepts. This change in the everyday life of millions of listeners affected every aspect of their lives, from church attendance to newspaper reading.²

In making the transition from hobby to industry radio struggled with the most fundamental requirement of any technology; generating a self-sustaining revenue base. This was neither a smooth transition or one which participants felt comfortable with. There were major differences and competing visions of the future. There was explosive growth and captivating possibilities. Even in the heady early days there was a gnawing awareness that the sources of fascination and growth fueling the early days could not last, and that a more permanent basis of support was needed. There were times participants felt the industry might be lagging, with the luster gone and the difficulties still present. There was both satisfaction and deep disappointment in the way the commercial foundations developed.

Modern day participants in a similar evolution, the commercial growth of the World Wide Web, can learn much from the early days of radio. There have been striking parallels in the timing of investment, the concerns surrounding the financial basis of content, and the importance that popular fascination can play in stimulating the takeoff of a new medium.³ There are likely to be further parallels as well. Radio’s experience of shakeouts and eventual maturity seem to be specially relevant.

Radio’s Commercial Beginnings in America

Radio was originally known as wireless telegraphy or wireless telephony. This reflected its main early market. Between the original innovations in 1897 and the outbreak of World War I, the British Marconi interests created a global capability for wireless messaging, which effectively competed against telephones and telegraphy. Key markets were those where it was either expensive or impossible to lay a cable; between ships, from ship to shore, across a long expanse of difficult terrain, and through undeveloped areas.

The commercialization of radio telephony showed many of the characteristics that have come to be expected of a network technology. A single company, Marconi, emerged as the *de facto* standard. Central to their success were first mover advantages, investment ahead of demand, and a growing stable of protective patents.

This commercial dominance was disrupted by World War I. During the war many combatants nationalized and controlled the use of radio. This military application “froze” the commercial side of things, but also created many of the preconditions for the explosive growth of radio which would happen in the 1920s. Numerous technical

¹ Smulyan, (1994), p, 93.

² Lazarsfeld (1940), .

³ Other observers have made a link between radio and our current technology innovations. They have also noted the profound role that radio played in capturing the public’s imagination.

“The Web is going to be very important. Is it going to be a life-changing event for millions of people? No. I mean, maybe. But it’s not an assured Yes at this point. And it’ll probably creep up on people. It’s certainly not going to be like the first time somebody saw a television. It’s certainly not going to be as profound as when someone in Nebraska first heard a radio broadcast. It not going to be *that* profound.”

Steve Jobs Wired Magazine, February 1996.

improvements in broadcast and reception sensitivity owed their existence to military needs for distance or miniaturization. Perhaps most importantly, a cadre of technically training individuals were created which would not forget their skills when they returned to civilian life. This created a considerable pool of skilled amateurs, willing to continue using radio as an interesting hobby and potential career.

As the world emerged from global conflict it appeared that Marconi would be able to reestablish its almost complete control over this wireless global communications medium. However, as part of negotiations following the end of the War, elements of the U.S. government came to demand an end of British control over this strategic asset. This led, in 1919, to the forced sale of American Marconi assets and patents to the Westinghouse company.⁴

It quickly became apparent that successful radio development required alliances. Technological advances in radio had been made by several key companies. General Electric controlled vital patents in areas of both radio transmission and reception. The Bell System control key patents on vacuum tube technology, which made amplification of signals and quality reception feasible for the first time. United Fruit had been active early in using radio to communicate with its Central American plantations, and had vital technology for powerful broadcasting.

By 1921 the Radio Corporation of America had been created with the charter to be the sole legitimate seller of radio reception equipment. Alliances were cemented through stock ownership, with ownership stakes shown in Table 1.

Table 1: RCA Ownership 1921			
Partner	Common	Preferred	Percent of Total
GE	2,364,826	620,800	30.1%
Westinghouse	1,000,000	1,000,000	20.6%
AT&T	500,000	500,000	10.3%
United Fruit	200,000	200,000	4.1%
Others/Public	1,667,174	1,635,174	34.9%

Wireless telephony and telegraphy resumed its growth following the lifting of W.W.I restrictions. Table 2 shows the breakdown for the world messaging radio industry in this early postwar period. As 1921 closed, there were over 23,000 wireless stations in the world committed to wireless telegraphy and telephony.⁵ Radio was again a viable industry.

RCA executives of the time viewed their market as based on one-to-one or one-to-few communication, in competition with submarine cables. These wireless markets did develop, and formed a profitable and increasing market for RCA. Transoceanic communication revenues were \$2.1 million in 1921, with a half a million from marine service.

This success was based on a well-understood revenue model, fee for service. A fee-for-service structure was a natural counterpart to its wired competition. Messages were individually priced, and could be paid for by either the sender or the recipient. As

⁴ See Archer (1926, 1939) and Jome (1925).

⁵ Jome, op. cit., p. 69. Original data from the Bureau of Navigation, U.S. Department of Commerce.

messages always had a *pair* of interested parties, there was no problem in assigning benefits and charges or excluding nonpaying customers.

Table 2: Classification of Wireless Stations					
	1920	1921	1922	1923	1924
Amateurs	5,922	10,809	15,504	16,570	15,545
Special Land	164	383	525	566	665
U.S. Commercial-Land	94	139	185	236	289
U.S. Commercial-Ship	2,808	2,978	2,773	2,723	2,741
Government Stations	1,574	1,385	1,478	1,299	1,249
Foreign Stations	6,842	8,154	11,462	11,349	11,979
Broadcast (U.S. only)	-	-	382	573	535
Total	17,404	23,848	32,309	33,316	33,003

The competitive advantage was also understood. High power radio broadcast facilities had the capability for low cost communication to Europe, Asia, and South America. For example, the 1920 standard wire-based telegraph rates to England were 25 cents per word. The cost to Norway was 35 cents. RCA undercut this price by approximately 30%, to secure a valuable, but relatively modest niche market.

This focus on wireless messaging provides us with our first lesson from the radio story. Highly involved company and industry participants will often be caught unaware by fundamentally new sources of growth in their markets. While visionary exceptions can usually be found, the mainstream participants are commonly caught short by what is later realized to be a basic sea change in use.⁶

Broadcasting and the *Euphoria of 1922*

A fundamental change in the radio industry occurred in 1922. During that year the commercial role of radio made a transition from point-to-point communication to broadcast. As fundamentally, it made a transition from a clear-cut business model to a situation where industry participants knew there was incredible demand but couldn't see how to collect revenue.

At first it didn't matter. Merely the presence of a radio station in a town created a rush to buy radio sets. Radio receiver sales in 1922 quickly dwarfed revenues from all other of RCA's lines of business combined. This was a shock to many of the participants. Even the most interested parties, such as RCA, expressed amazement and shock at how fast the market exploded. The 1922 Annual Report of RCA commented:

⁶ David Sarnoff has received large amount of praise for his prescient forecast of the capabilities of the consumer market in radio generating huge amounts of sales in the 1922-1924 time period. In late 1920 he had forecast RCA unit sales to follow a growth path of 100 thousand units in 1922, 300k in 1923, and 600k in 1924. His revenue projections were \$7.5 million, \$22.5 million, and \$45 million. RCA's actual sales for those years corresponded to \$11 million, \$22.5 million, and \$50 million. This is quite amazing in its insight- although Sarnoff was also known for making numerous forecasts that were not nearly so accurate. However, as the Annual Report quote makes clear, the established wisdom at RCA was not anywhere as rosy as was Sarnoff's.

“At the time your Corporation was formed in 1919, for the purpose of building up a world-wide international wireless communication system, wireless telephony had not passed out of the experimental stage, and it was not at that time foreseen that the broadcasting art would ever reach the high point of popularity that it has in the last year. The engineers and scientists had anticipated the development of wireless telephony for communication purposes, but no one had visualized the phenomenal expansion of wireless telephony as used today for broadcasting.

In the last year the number of broadcasting stations has grown from less than twenty to almost six hundred. The art itself is advancing very fast, and the ultimate effect of broadcasting upon the economic, social, religious, political, educational life of the country and the world, is comparable only with that of the discovery of printing 500 years ago.”

Figure 1 shows how lucrative the sale of receiver equipment was. By 1922, RCA radio sales exceeded \$10 million dollars. It doubled to more than \$20 million in 1923, it doubled again to over \$50 million in 1924. Industry sales for radio receivers followed a similar pattern of doubling. They mushroomed to \$60 million in 1922, \$136 million by 1923, and an amazing \$358 million in sales in 1924.

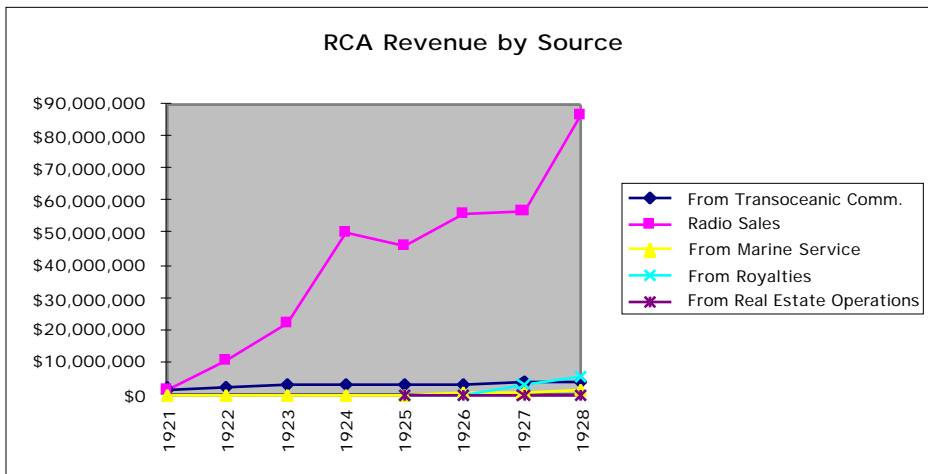


Figure 2: Sources of RCA Revenue: 1921-1928

What makes this level of sales so remarkable is the rudimentary state of radio receivers during this time of extraordinary growth. Figure 3 illustrates how “gadgety” these early radios were. Shown in the Figure is the first radio sold through Montgomery Ward’s catalogue. Notice the wires leading to the battery on the floor. It was not until 1924 that radios were sold with wall plugs. Radio users had to struggle with heavy batteries, typically 12 volt lead acid. Next, there were no speakers. All listening had to take place with earphones. Acceptable reception required an extensive antenna system. In this figure we can see the connection leading to a nearby barn. This made radio listening both a complicated, and in a summer thunderstorm, potentially dangerous pastime.

Fall catalogue, 1922: Montgomery Ward's first receiver.

**Our Special Complete
Radio Receiving Outfit**
Simple to Operate—Best Results



Our special complete Receiving Outfit is one of the very best on the market. It will most probably receive any receiving outfit of its type, regardless of cost. Everything is complete—nothing extra to buy. You may take the outside we send you, put up the aerial wire, easily connect the measurements, and in less than half an hour, you can be receiving signals, radio music, lectures, stock reports, market reports, or any other radio program being sent out within your range. Wavelength range, 180 to 600 meters, which includes broadcasting stations, amateur and cooperative ship and land stations.

The Complete Outfit Includes:
Tanks Combined Tuner and Detector which is so simple to operate, that a child can handle it.
Telephone Head Set—Our Special 2000-ohm Double Head Set—reproduces messages loud and clear.
Radio Storage Battery, 6-volt, 44-ampere hour capacity.
One Detector Tube.
One 15' Aerial.
Astronac Reel, including 150 feet bare copper wire, 35 feet enameled wire, porcelain base double throw switch, lightning rod, leads, ground clamp, two screw pins and 35 feet of wire for connecting instruments. Slip on, complete outfit, 48 lbs.
563 C 439—Complete Outfit: \$49.50

Less obvious is the difficulty most of these sets had in “locking on” to signals. Indeed, there was a constant need to “comb the ether” to keep a weak signal connected. All too often this signal was also varying, as improperly configured broadcast stations would wander around their basic frequency. And this whole process was much complicated by the fact that a single basic frequency was shared by almost all stations. This necessitated extensive time sharing arrangements between regional broadcasters to avoid mutual jamming of each other’s signal. Extensive listening guides had to be published in local newspapers for listeners to know which stations would be broadcasting and when. Low power stations would be followed by high power stations, causing listening discomfort and a rush to control the volume.

Why spend so much money on a flimsy, hard-to-use gadget? The first part of that answer is the very rapid growth of stations throughout the country. During this era essentially anyone wishing to launch a radio station could do so. The regulatory agency with any jurisdiction over the granting of licenses in the U.S. was the Commerce Department. But this regulatory power was very weak, essentially Commerce was compelled to grant a unique set of call letters and an operating license to anyone that requested and maintained a station. For the critical window of 1922-1926 anyone believing that they could benefit and profit from a radio station could enter the market.⁷

Many choose to do so. In 1922 it seemed that broadcast stations were appearing everyday, with wonderfully creative and adventurous uses of the time they had available. By the end of 1922, the first real year of broadcasting, there were 576 broadcasting stations in the U.S. These early stations were a mixture of amateurs, speculators, nonprofit centers such as universities, companies looking for good will from sponsorship, and radio manufacturers and retailers looking to further seed and promote the sales of radios.

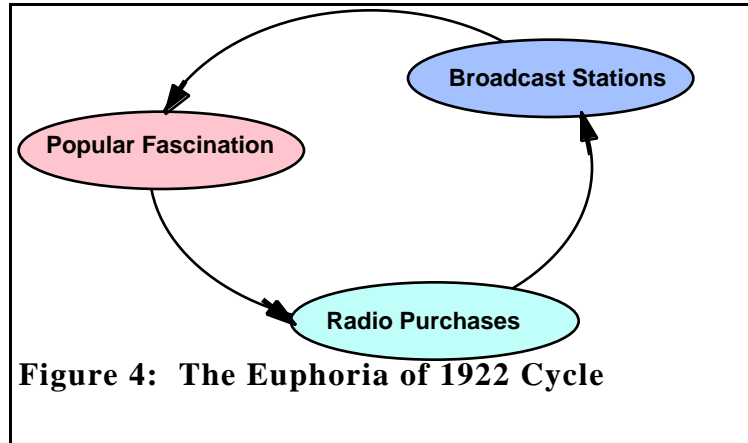
But the real driver of both set sales and broadcasting stations was the combination of hype, media coverage, and public fascination that came to be called the *Euphoria of 1922*. Popular discussion of radio was everywhere. This ran from newspaper accounts of any new radio station opening up, the achievement of some new record for distance listening, technical pieces in journals describing new radio developments, and get rich quick schemes popping up in investment circles.

The intellectual as well as the popular media were full of analysis and insights around the long term impacts of this amazing new technology. Questions were debated

⁷ In 1926 the Secretary of Commerce’s power was strengthened, and Hoover could take a more restrictive or directive role in assigning or denying station license petitions.

about the impacts radio might have on education, the music industry, politics, church attendance, and global understanding. Questions were being asked about the fundamental value of social interactions, when in the privacy of one's own living room many cultural events could be experienced.

The impact of three forces propelled the explosion of radio; rapid radio set sales, mushrooming growth in signal sources, and intense public attention. This is a powerful, autocatalytic process. Fascination leads to sales, sales lead to stations, new stations lead to more fascination.



The intensity of attention showered on the World Wide Web in 1995 and 1996, the explosion of servers (i.e. “broadcasters”), and the rapid expansion of Web connections and browser use (i.e. “receivers”) is highly reminiscent of radio in 1922-23. It is also highly likely that observers ten or twenty years from now will look back at the features, bandwidth, connection difficulties, and general “kludginess” of internet technology with bemusement and incredulity. But at the same time, it is unlikely that the level of societal focus will ever be as high. We *may* already have seen the peak of the Web positive feedback loop - but nowhere near the peak of its economic or true social impact.

Shakeouts and Business Models

The 23,848 radio stations in existence in 1921 were for two-way communication. The revolution about to occur was broadcast, where there suddenly were millions more receivers than transmitters. While the number of broadcasting stations during this period never exceeded 1000, the number of receiving sets expanded to dwarf the number used in all the previous applications. This one-to-many structure meant that the message sent needed to be sufficiently general that a widespread group of listeners would benefit. But the public good nature of the radio signal meant that the old model of pricing by individual message could no longer work.

Broadcast radio was such a fundamental change in the business use of radio that it is not surprising that radio executives were confused about its potential for commercial growth. Whereas the revenue model for direct communication was clear-cut, broadcast is a form of indirect communication. Somehow revenue must be generated back to the providers of “content” by the consumers of the content. In this setting there are many reasons why it is infeasible to engage in a pay-as-you-go system. Revenue must be generated through third parties, either by radio set sales, indirect goodwill benefits, or through advertising.

At first the goals of broadcasters were a combination of hard headed good business, wild-eyed speculation, and public-spirited altruism. Fortunately, a researcher captured this spread with a study conducted in 1924.

**Table 3:
Purposes of Broadcasters 1924**

Incentive for Launching Radio Station	Total	Only Purpose	1 of 2 or more purposes
1. To help maintain sale of receiving sets	31	2	29
2. To profit from good-will developed	44	8	36
3. To profit by direct sale of advertising time	2	0	2
4. To serve public generally	146	46	100
5. To serve some special group or clientele	26	6	20
6. Research purposes	13	4	9
7. Police information	8	2	6
8. University extension work	1	1	0

Several striking features are present in this survey. First is the role of the major radio “hardware” companies. They were among the key sponsors of many stations. The logic and benefit is simple - people will buy radios only if they have something to listen to. With a sufficiently large share of the market, key manufacturers and retailers will find it profitable to engage in “category development”.

Generalized goodwill was also a common motive. Many of the early sponsors of radio were well known regional retailers, such as department stores, car dealers, or newspapers. The name of the sponsoring organization would be occasionally mentioned, perhaps in the names of shows, or even in the call letters. Among the leading shows were the Everready Hour, the Happiness Boys, and the Michelin Troubadours.⁸ In Chicago the Tribune sponsored the radio station WGN - the World’s Greatest Newspaper. It was hoped that public relations and name recognition would somehow translate into loyal retail customers.

Participants at the time realized that both of these rationales were insufficient. Eventually the market would mature, and motivating replacement radio sales would be much less lucrative. Also, entry into retailing and manufacturing threatened to destroy the incentives for hardware manufacturers to support broadcasts. Below some critical market share, free riding becomes the dominant strategy and individual companies will not find it worthwhile to actively provide free content. Anticipating these realities, as early as 1922 many of the key companies providing broadcasting were actively raising the question of “Who Will Pay for Radio?”.

Of course, we know what the answer turned out to be - direct advertising. But in 1922 there were several very serious problems with advertising. One was public hostility. Comments by Commerce Secretary Herbert Hoover, RCA Chairman David Sarnoff, most

⁸ This was eventually spoofed on the floor of Congress by Representative Emmanuel Celler of New York, introducing a bill to the House:

This is BLAA, broadcasting station of the Jumbo Peanut Company at Newark, New Jersey. You will now have the pleasure of listening to the “Walk Up One Flight Clothing Company’s” orchestra. Their first number will be “You Don’t Wear Them Out if You Don’t Sit Down”.

industry magazines, and many members of the public were united in opposition to the growth of advertising as a support mechanism for radio.

It was also hard to tell if advertising worked. There was no infrastructure to provide meaningful measurement of audience size and demographics. Shows relied on postcards and letters sent in by listeners to provide some measure of the reach and frequency of their listening audience. There was little knowledge about the effectiveness of radio advertising. Existing ad agencies had no knowledge of how to make ads meaningful and effective in this new, nontext based medium.

But the most important factor was legal. At the time, direct advertising was only practiced by WEAJ and several small affiliates of WEAJ. The Bell system operated WEAJ, and through its interpretation of the initial patent sharing arrangements, claimed that all use of wireless telephony for hire (that is, direct advertising) was a direct violation of its monopoly of telephony retained under the patent arrangement. Any station's attempt at the sale of advertising was potentially incurring the wrath of the legal department of the mighty Bell system, and the termination of its access to long distance service.

While this threatening posture by AT&T didn't prevent all use of direct radio spots, it dramatically limited them. It wasn't until 1926, as a result of a binding arbitration between AT&T and RCA, that this restriction was effectively removed. The arbiter in the case ruled quite decisively for RCA, after which AT&T provided very low cost licensing arrangements to all takers. Thus, almost 5 years after the initial explosion of sales and interest, the stage was set for the modern American method of broadcasting.

In the meanwhile, there was a very active debate surrounding the "business model" for radio. A wide range of possible support mechanisms were proposed. The most popular among many of the observers, especially the trade publications, was public support through some method of tax support mechanism. Proposals included using general tax revenues, a receiver set tax, or a tube tax.

Those arguing for using general revenues stressed the public good nature of the broadcast signal. All potentially benefit, so why shouldn't all pay? At the same time, proponents argued that these general revenues could be augmented by direct appeal to listeners for support. This is essentially the structure of the modern day public broadcasting, and it was strongly advanced by set manufacturers such as RCA.

Others claimed that radio was only partially a public good, in that you needed to buy a radio receiver to benefit from the signals. This led to a proposed set tax, where radio buyers would pay an increment in the purchase price that would go to the general fund to support radio. This is the basic form of support for the British Broadcasting Company, and tended to be very popular among the trade commentators.

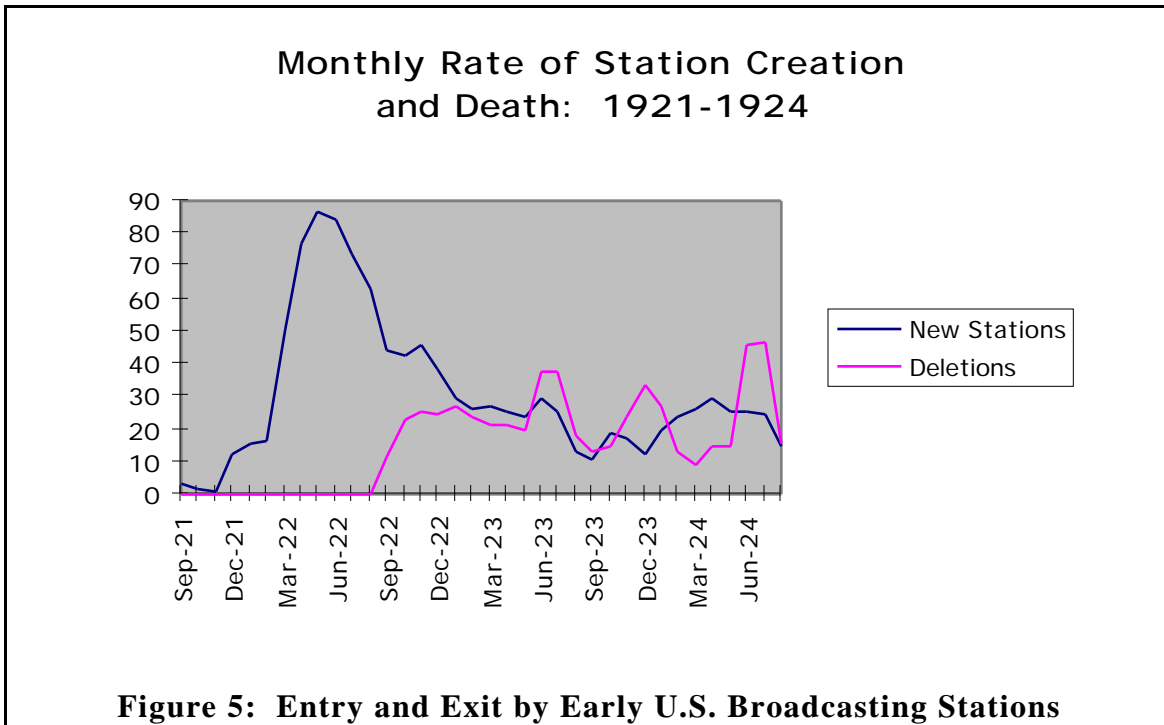
Supporters of a tube tax argued that it was an improvement over the set tax by better matching tax to use. As radios were based on the vacuum tube, which was depleted by use, those active users of radio would be indirectly paying for radio according to their intensity of use. One difficulty was separating out tubes meant for radio and those used for other purposes. The tube tax was, of course, opposed by manufacturers of vacuum tubes.

Influential members of industry and government opposed all of these mechanisms. Their opposition was fundamentally caused not by any fear of distortions or negative impacts of the revenue generating techniques. Rather, they did not wish to confer onto government the power to disperse funding. It was already clear that radio had large scale potential for shaping public opinion and debate. Few of the business people or

members of the Coolidge administration had any taste for granting the power of radio's purse strings to Federal government control.

In other countries, different arguments proved persuasive. The "American System" of broadcasting, based solely on radio as a commercial medium, was popular in North and South America. By 1936, 22 countries had embraced this approach. It stressed private ownership, and tended to result in a large variety of stations. The more popular method, as measured by adoption, was actually the set tax. The "BBC system" was adopted by over 40 countries, mostly in Europe and Asia. This led to fewer channels, owned and sponsored by the government.

As early as mid-1922 the lack of a solid financial foundation for broadcasting started to show up as stations folded. One of the few regulatory powers the Commerce Department had was the rubber-stamping of radio license approvals and deletions. Figure 5 shows how the exponential growth in stations during the first half of 1922 was soon followed by a steady stream of stations going off the air. Indeed, by late 1922 there was a roughly constant total number of radio stations broadcasting in the U.S.. However, this steady number hid a large amount of churn. Stations opened and closed at roughly the same rates, with deletions gaining the upper hand in 1924.



Another measure of this churn is what happened to the pioneering radio stations. All of the 48 States then in the U.S. had radio stations operating by the third quarter of 1922. Of the 48 stations that were first in their state, 17 of them are still active. Fully 27 of the other 31 went out of business before the end of 1924. The toll was 7 in 1922, 15 in 1923, and 5 in 1924.

A key reason for this turnover was the cost of maintaining a quality broadcasting station. Entry costs for most stations were relatively modest, ongoing operating costs were close to the initial costs for small stations. This led to churn at the low end of station

size. For high power stations the operating costs are relatively lower, and financial backing better, and this was reflected in the relatively lower failure rates among their members.

It is much more difficult to track the exit and deletions of Web pages. Web sites tend to disappear with a whimper, rather than a bang. A site is updated less frequently, innovative content is slower to arrive, and traffic tapers off. Only rarely does the site completely disappear. Even so, a growing number of obvious “ghost sites” emerging.

Successful Radio

Early on it was realized that affordable quality content was driven by audience size. The largest stations, such as those in New York and Chicago, could be more professional and have better talent. Artists were often willing to donate time for the image and sales stimulate if the audience was big enough. This led to the innovation of “silent nights”; where local radio stations would go off the air so residents could suddenly hear distant stations and the stars of Broadway or the Chicago Opera. Silent nights lowered the direct profits of local broadcasters, but were felt to stimulate the entire growth of the radio market.

There were also proposals for radio to rely on “super stations”, perhaps 10 or 15 in number, with a signal so strong that they could blanket the U.S.. This would mean a limited number of stations to staff and create content for. This was a strong favorite of Sarnoff and RCA, who viewed this as a reliable way to provide signal for their receivers. RCA also had high power transmission capabilities. But it was predicated on the restriction of other stations, which would be necessary to create enough spectrum space for clear channel operation.

Events quickly eliminated the clear channel possibility. By the end of 1922 there were close to 600 broadcasting stations on the air. They were not about to relinquish their investment. What was needed was a source of national content, but local broadcasting and viable business model. This was provided by the final piece of the financial puzzle, the radio network.

A national radio network was launched by RCA in 1926, as the National Broadcasting Company - NBC. In 1928 this split into two networks, the NBC Blue and NBC Red Networks. In 1929 entry occurred, when CBS was formed.

The growth of networks solved many of the financial problems of radio. The audience was now large enough to generate ample audience size and advertising dollars. This in turn allowed for radio to pay top dollar to the most popular stars. The growth of the networks was hand in hand with the growth of the star system. This “first copy cost” of talent could be spread over a large number of broadcast outlets.

The network system was also superior to the super station model in its ability to mix local and national advertising. Local affiliates could tap into the large number of local advertisers. National shows could be supported by national advertising by national brands. Generalized direct spot advertising that has become our standard model permits a much

more effective use of this national/local audience mix than a completely national or completely regional audience would.

Advertising was critical to the success of radio in the U.S. context, as other sources of support were running out of energy. And just as importantly, the hyperactivity caused by the positive feedback cycle was losing one of its main drivers - public fascination. By 1925 articles were already appearing claiming that radio was “old hat”.

It was becoming clear that radio would result in less than the revolutionary changes of early prognosticators. Many of the wild predictions and exaggerated hopes for radio can be traced to a trick of the technological imagination. Users confronting a radically new technology will often pay much more attention to the direction the technology is taking them than to the limitations that the current realizations are burdened with. They can experience snippets of music being broadcast from the Broadway stage, they extrapolate and imagine the global availability of only the best music. They hear an interesting 10 minute discussion of a scientific topic, they make the jump to imagining a “university of the air” which provides universal higher education. They learn about a distant event, they make the *non sequitur* connection that surely familiarity must lower barriers to people and support peace.

In all of these cases their perception of direction is not at fault. Neither, really, is the insight that these features will eventually be able to be included in the standard product. What is commonly the case is a combination of gross over-optimism with respect the perfection of the technology and also the gross misunderstanding regarding the economic incentives of individuals currently involved in these visions. They “see things clearly, but completely miss how far off they are”.⁹

As the World Wide Web enters the delicate transition between explosive imagination and normal industry, the search for an “NBC” continues. If it is again advertising, the potential of the Web is highly constrained. Incumbent technologies, such as radio, television, and direct mail have extensive infrastructures and momentum to overcome. Perhaps it will be micropayments, where individual copyrighted items can be charged out at the penny or less level. Perhaps it will be subscription packages and other demand aggregation techniques which tie tangible items and online items together. And there is always the possibility that it will be some unforeseen capability of the digital networks that brings stable revenue bases.

Whatever this successful innovation is, there is one more fundamental lesson from early radio. Modern society has a truly incredible ability to assimilate technology. What was revolutionary, becomes humdrum. What was a grand adventure of science and hobbyists, becomes an appliance. Business practices which seemed odd, and very disturbing, become part of the background noise of our life. Capabilities which changed the very way we viewed time and space, become as habitual to the next generation as reaching for the radio dial as we get in the car each morning.

⁹ I first heard a version of this phrase used by Jim Barksdale, CEO of Netscape Corp. in reference to a prediction about the growth of the World Wide Web.

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