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Television under construction: American television and the problem of distribution, 1926–62

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> 'The greatest successes of television have been triumphs of transmission, not of invention. . . .'
>
> Gilbert Seldes (1951: 171)

Leo Bogart opens *The Age of Television* with an account of what he believes to be an event marking television's cultural ascendancy and its coming impact:

> On the evening of March 7, 1955, one out of every two Americans was watching Mary Martin play 'Peter Pan' before the television cameras. Never before in history had a single person been seen and heard by so many others at the same time. (Bogart, 1958: 1)

Even today, in the age of satellites, cable, and internet video, television's 'liveness' is one of its most touted characteristics, at least in certain genres such as news and sports. This essay considers that 'liveness' from a historical standpoint by offering a particular history of the creation and development of the national television infrastructure in the United States – essentially, the wiring of the nation for live simultaneous broadcast.[1] Though often taken for granted today, television's possibilities as a 'live' medium were a key selling point to early audiences (for examples, see Denman, 1952; Hutchinson, 1946), and a key part of early television producers' self-understandings. Lynn Spigel quotes NBC producer-director Carroll O'Meara as saying that television's 'power of delivering direct presence, of transmitting a living scene into the home – NOW, as it happens' was its greatest attribute (1992: 137–8; emphasis in original). Yet this attribute of liveness did not simply inhabit the boxes people brought into their living rooms. A massive system of coaxial cables, microwave

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relays and switching stations had to be constructed in order to make live, national television a reality for viewers and a national television audience a reality for networks.

The physical 'stuff' of television was essential for it to function as a national mass medium. While recent media historiography has often noted television's liveness, it has not historicized it. Technologies like the television infrastructure reify social relationships – giving relations a degree of density, inflexibility or objectivity that they would not have without an abstracted principle and mechanism of repetition:

> The essence of the commodity-structure has often been pointed out. Its basis is that a relation between people takes on the character of a thing and thus acquires a 'phantom objectivity,' an autonomy that seems so strictly rational and all-embracing as to conceal every trace of its fundamental nature: the relation between people. (Lukács, 1971: 83)

When McLuhanite critics write of television's 'tactile' or 'instantaneous' qualities, they are mistaking the historical conditions of television for its fundamental nature (for example, see Baudrillard, 1983; Fry, 1993; McLuhan, 1964; Postman, 1985). These writers transform media history from a cultural, social, political and economic problem into a technological and psychological one, thereby begging the question of how media change. But mystification ('concealing the apparatus') is itself part of reification: the process by which relations among people become relations among things is itself erased as that relation is reified. The infrastructure of broadcast television was a principle by which 'televisual' relationships were organized. In part, then, the narrative of the development of television's infrastructure is a study in reification.[2]

Recent historiography of American television has tended to take for granted the brute fact that a television signal can get from city (A) to city (B), thereby providing an incomplete account of television's social formation. For instance, Lynn Spigel's seminal book *Make Room for TV* (1992) is both bigger and smaller than the problem of national distribution. On the one hand, her primary sources – women's magazines – already had national distribution. From this, we could conclude that television was a national medium ideationally, before it was viable practically.[3] But she actually argues (Spigel, 1992) the opposite, claiming that we cannot call television a national medium until 1955, when, for the first time, the majority of Americans owned TV sets.[4] Spigel's account effectively considers television and space *within the home*, but she simply takes the means of transmission for granted – even while the industry was preoccupied with building an infrastructure and representing its own 'liveness' in programming. Similarly, William Boddy discusses television as a national phenomenon by virtue of the fact that it was an object of industry and policy at a national level (1990). Yet the installation of national television broadcasting appears

in Boddy as the growth of stations throughout the country. Once again, the infrastructure remains in the historical background. The recent radio historiography also brackets infrastructural questions regarding the development of television: TV broadcasting is seen as an invention of the radio industry in the work of Susan Douglas (1987), Robert McChesney (1993), and Susan Smulyan (1994). While it is certainly the case that key developments in radio broadcasting had a tremendous effect on the development of television, I will show below that the context of television's development had its own contours, and therefore that television's national organization is not simply an epiphenomenon of that of radio.[5] In addition to the technical and economic problems of networking television in the same fashion as radio, home-based reception on the model of radio faced a brief challenge from the film industry, who had been experimenting with theater television as an alternative mode of reception (Gomery 1989, 1992). In the formation of American television, the creation of a national infrastructure was a problem and a project, not a given.

This article unravels the instrumentality, objectivity and givenness of television distribution.[6] Put simply, the history of television distribution provides insight into why American television was the way it was in the 1950s. The very possibilities for the experience of live television were shaped by a complex of social forces: struggles in the industry around proprietary technology and transmission rights; dispositions in the regulatory apparatus; the ideology and practice of corporate liberalism; postwar commercial culture; and the relations between federal, state and local jurisdictions. Thus, my particular history is as much about the career, permutations and neighborhood of the *idea* of 'distributing television' as it is about the development and deployment of coaxial cable and television repeaters. In addition to being a technological history, this essay is a kind of intellectual history of the medium that seeks to tease out the stakes of the language in which television was cast, as well as the stakes of its physical formation. Television infrastructure was a physical, technological and institutional development; it was also a set of ideas circulating among technicians, industry executives, programmers, congresspeople and audience members.[7] My narrative ends as television distribution becomes a background concern. By 1962, television was firmly established in the USA, the infrastructure was in place, and broadcast television's distributive characteristics began to take on a different and quieter valence at the national level, while it developed further on an international scale through other means than physical infrastructure. (Distribution would again become a national issue with the rise of cable and satellite television, as well as with the acceleration of globalization tendencies that occupy the present critical moment, but I intend to pursue an account of these later events elsewhere.)

The infrastructure embodied television's mode of distribution; it was a physical artifact of social relationships shaped by struggle. It was also a

necessary condition for the industry's dreams of a saleable national television audience to be realized. Geographer Ronald Abler (1991: 37; Abler and Falk, 1981) calls this the 'utility penetration paradox': for a medium to be a *mass* medium, it must have sufficiently pervasive infrastructure and a wide enough distribution of hardware and software for it to reach a large number of people simultaneously.[8] This is also a way of saying that the infrastructure was not a mere technical development, but was itself determined by the social processes that shot through it. At its basest, television was a set of simple technological principles whereby images and sounds were sent from one place to another. There is nothing inherent in the machinery to do this that required it to be overseen on a national level by a federal bureaucracy, managed in a capital intensive fashion by an oligarchy of corporations, or consumed in private homes as a fundamentally scarce service on a rigidly segmented schedule. In adopting this approach, I echo Thomas Streeter's discussion of the distinction between the *fact of* television and *facts about* television: rather than taking for granted the social, technological, institutional, legal and political existence of television (and then considering television as an already-formed force in the world), this essay takes historical practices of and around television distribution – the *fact of* television distribution – as its point of departure (see Streeter, 1996, for a fuller elaboration of his position[9]).

Although media historians have paid little attention to the television infrastructure, those preoccupied with the fact of television, such as engineers and broadcasting executives, took television distribution as a central concern from the very start. In 1929, two engineers wrote the first American book on television. It was primarily a technical manual, but the conclusion cited NBC President M.H. Ayelsworth as saying that television would be a home-based medium. Of course, the president added, the distribution of television is far enough in the future that every consumer should buy a radio for the present time (Sheldon and Grisewood, 1929: 185–6). Three years later, the conclusion of another engineering tract had already predicted the distracted viewing practices of the modern television viewer – going about his or her household business with the television on, occasionally looking at the set. The question at hand was how television would reach the private home (Dinsdale, 1932: 233).

The great chain: geoideology and national television before the fact

Television's infrastructure embodied a set of industry spatial strategies that developed out of and in response to the broadcasting industry's experience with radio. Planning for a national television infrastructure was characterized by a highly rational and instrumental view of the geography of local

television: locality was significant through its relationship to a larger national infrastructure, which itself would organize *all* the networks simultaneously. Corollaries to this strategy included essentially scarce programming centrally distributed, and a scarcity of stations to insure a coherent and economically useful audience.

These visions of and plans for the television infrastructure were themselves artifacts of corporate liberalism.[10] Thomas Streeter (1996: 22–58) describes corporate liberalism as a particular version of liberalism that developed after 1880 under the regime of corporate capitalism characterized by the following tendencies (among others): the desire to reconcile individualism and free enterprise with corporate capitalist demands for order; the regulation of the corporate economy through cooperative or governmental agencies; the preference for negotiation over industrial warfare; relatively stable corporate oligopolies occasionally reorganized by periodic competition; a preference for the largest possible social organization (bigger corporations, more centralized management, etc.); and a functionalist and systematic approach to large-scale social phenomena. None of these tendencies are all-pervasive; corporate liberalism was not simply an all-encompassing dominant ideology, but it was a set of operative tendencies and practical understandings lying beneath the surface of early television.

From the very beginning, local television broadcasts were represented by the networks as nodal events within a larger national network. Even before the means for networking television existed, the notion of networking was a key to the presentation of early broadcasts. As soon as they could, radio networks took steps to articulate and promote their vision of television as a nationally networked medium that distributed content from a few centralized sources. Already in 1930, television station W1XAV announced that it would air the 'video portion' of the CBS radio program *The Fox Trappers*. The announcement hailed this as a step into the future; as

> . . . the first definite indication of the commercial future of television synchronized with radio. Tonight's broadcast is probably the beginning of a trend which will bring us to the point in a short space of time when there will be a great chain of television broadcasting stations throughout the country in much the same manner as we now have the great national chains of radio broadcasting stations. (Quoted in Udelson, 1982: 44)

'The great chain' was an apt metaphor for networks' practical understandings of television. Television was to be licensed station by station, as was radio, but from the very beginning these stations were considered in terms of their potential as links in the grander project of a national television network. Each node was a point just over the horizon of reception from the next, so that NBC, ABC, CBS and Dumont could blanket the nation evenly and fully. In this logic, locality was a product of a larger structure. As early as the 1930s, the key actors all understood the nation as

the fundamental geographic unit of television. As NBC president Niles Trammel put it to the FCC in 1944,

> With national coverage we shall be able to attract the national advertisers to support major program productions. Simultaneous coverage of the nation will enable us to bring into the American home leading events as they occur, and to unite the nation as a single audience to hear and see the great personalities of Government, of education, of the arts, and of entertainment. (Trammel, 1944)

National planning, national advertising and a national infrastructure were to characterize the structure of American television. Consider this in contrast to radio, where networks came into play as an organizing principle only after the nation was peppered with radio stations. As Susan Smulyan has shown, the national character of radio was a point of contention within the broadcast industry that was eventually resolved as a compromise among several key players, and in a fashion that would appease local stations (Smulyan, 1994: 37–64). In contrast with that history, and in part as a response to it, networks approached local television in terms of its commercial potential on a national level from the very beginning.[11]

Even local stations that were not immediately hardwired into a national network represented themselves in this fashion. Consider the first night on the air for WDAY in Fargo, North Dakota (1 June 1953). The first night's schedule began with local talent performing a sort of variety show (Snyder, 1993: 8). Recorded network programming followed; the station had kinescopes from all four active networks. The night's lineup included 'I Love Lucy'; 'a comedy show featuring Charles Ruggles'; 'a kid's show with Mr. Wizard'; 'a wrestling show starring Gorgeous George'; 'and a smash finish with Jack Benny' (p. 10). This was followed by the 10 p.m. news (interestingly enough, beginning with sports, so as not to compete with the radio news), and a 10.30 movie before the station signed off (Snyder, 1993: 11). The first night's broadcasting is instructive when read in terms of location: we begin with the local, and move via kinescope to the national – as mediated through national star personalities. From there, the news appears, which explicitly links up local and national events. Finally, the schedule finishes with a Hollywood film entitled (amusingly enough) *Foreign Correspondent*. Local news continues as an example of this phenomenon to the present day (see Rapping, 1987: 43–61). To play on Nick Browne's (1984) argument that the totality of a television schedule offers a sense of temporal rhythm, we can also read television schedules spatially. Even before stations physically plugged into a national network, their programming often explicitly located the station's community within a larger national framework.

If the nation (in this case the contiguous 48 states) was the organizing geographical principle of broadcast television from the very beginning, the economics of distribution held the entire television industry as their funda-

mental unit. While the different networks and AT&T each had their own and sometimes competing interests, in terms of television distribution, it was the industry itself that was the point from which television would be organized. For example, battles around Federal Communications Commission (FCC) television policy were framed in terms of a single, highly centralized industry made up of smaller (sometimes competing) components. Although FCC television policy began as an outgrowth of radio policy, it quickly mutated. As Robert McChesney (1993) has shown, although there was significant popular opposition to the broadcast model of radio, by 1935, centralized, networked and mass-distributed radio broadcasting was enshrined in federal policy. Shortly thereafter, the broadcasting reform movement itself dissipated (McChesney, 1993: 188–238). This left little space in federal communications policy and little in the way of organized popular support for a model of television broadcasting that would differ in principle from the distribution of radio. Inasmuch as alternatives to broadcast depended on FCC allocation of channel space, they would ultimately come up against – and lose to – the interests of the broadcast industry. Preoccupied with battles over radio as well as the technical aspects of regulating television, the FCC took it for granted from the 1930s on that television would be a centralized broadcast medium supported primarily by advertising (Boddy, 1990: 18; McChesney, 1993).

Advertising revenue was itself a driving force in the organization of television distribution: since advertising revenue was based primarily on audience quantity (quality became a non-issue in the postwar era when AC Nielsen began assuming that anyone who owned a television set constituted a 'quality' audience), more markets with fewer stations in each market maximized potential revenue. If large audiences are needed, then not only must the programming be kept scarce and nationalized, but the media of dissemination would also ideally be organized according to a kind of managed scarcity. Local stations – links in the chain – had to be carefully rationed and rationalized. Dumont's *Television Allocation Maps Volume VII* (1950), prepared for FCC allocation hearings, exemplify this trend. Even the least economically powerful television network advocated carefully rationed television allocations by proposing fewer stations than outlined by the FCC. Similarly, CBS claimed in a 1955 report to the FCC, that only '600 of the over 1800 channels allocated by the FCC can be economically supported as program-originating stations under the conditions likely to hold over the next few years' (CBS, 1955). Although the Federal Communications Act of 1934 declared broadcasting to be a local responsibility exercised on an individual basis by local stations, it was clear by then that in actual practice the responsibility for keeping local licensees in business – in radio, and later in television – rested with the networks (on this point, see also Berman and Oettinger, 1976: 37). That relationship

provided an impetus for drastically limiting the number of stations in operation in any given locality.

Even the electromagnetic spectrum itself was divided up along a homologous pattern of managed scarcity and centralized control. The FCC's 1945 approval of the 13–channel VHF system effectively limited the number of possible local stations (Schiller, 1969: 26; Boddy, 1990: 44–5); and its subsequent machinations around the UHF question maintained this pattern throughout the 1950s. In 1954 hearings on UHF, FCC Commissioner Freida Hennock chastized the FCC and the federal government for their handling of UHF policy (Bogart, 1958: 288; Hennock 1955). She claimed that the sets then being sold (VHF-only sets) deprived the public of 85 percent of possible television; that the network monopoly in television controls and strangles the democratic development of television and works against the congressional objectives of 'a nationwide competitive system providing a free marketplace of ideas which is only possible through diversified program sources' (see also Boddy, 1990: 46); and that government inaction was dooming the existing 108 UHF television stations then on the air. She recommended closer regulation of television set production, a congressional investigation into monopolistic practices on the part of networks,[12] and that the Senate Committee on Interstate and Foreign commerce should 'direct the FCC to institute immediate rule making proceedings aimed at correcting the monopolistic scarcity[13] of network programming and equitable availability of such programming to UHF as well as VHF stations' (Hennock, 1955: introduction).[14] The FCC majority report, meanwhile, claimed that the nation had, by the absurdly early date of April 1955, 'achieved adequate television service', citing both the expansion of the television industry and the public expenditure on television sets (quoted in Hennock, 1955: 56). It was not until 1962 that the FCC finally required television sets to be built to receive both VHF and UHF, and then it used UHF primarily as a medium for underfunded 'educational' television (Schiller, 1969). Ultimately, the FCC's criteria for adequacy had more to do with networks' carefully modulated profit projections than they did with actual availability of television signals or diversity of programming content.

Even at the level of content, this regime of managed scarcity and vertical integration provided both the basis for a program of national development and its justification. Arguments for centralized television also hinged on references to 'quality' – though the reasoning behind this argument was entirely circular: capital intensive, corporate-produced programming is only necessary for insuring quality if one assumes that quality is somehow inherently linked to the characteristics of corporate programming.[15] In the minds (or at least the speech) of network executives, station allocation went hand in hand with a fundamental scarcity of programming. NBC president Niles Trammel, speaking before the FCC in 1944, claimed that

> the syndication and simultaneous broadcasting of programs through network facilities will provide the solution of many of the economic and talent problems confronting television broadcasters. Through network television we shall again be able to tap the talent-centers of the nation for program material. (Trammell, 1944: 8)

The 'quality' issue thus functioned to divert attention from a more fundamental economic problem for the industry – the need for large audiences, as discussed above[16] – and recast it as a public need for which the industry could provide. To perform this economic function, television needed a scarcity of 'quality' programming, or more precisely, a scarcity of *any* kind of programming.

The distribution of television content was thus based on an economy of managed scarcity that identified itself as an aesthetic and ethos of professionalism, nationalism and elitism. The 'talent centers of the nation' were all close enough to capital to insure that audience pleasures would produce a healthy surplus value for a national industry. Television performers would be professionals, just like stars in other media, thereby ensuring a scarcity and currency of 'talent'.[17]

American television's infrastructure was thus envisioned and justified through the language of corporate liberalism. Industry discourse took the lower 48 states as the fundamental geographical unit of television, the industry as the economic unit for distribution, and a relative scarcity of available content to audiences as operative goals that conditioned its rhetoric of universal service. In this case, both 'universal' and 'service' carried with it a whole range of caveats about the character, diversity and content of that service. Meanwhile, the television industry would switch from a language of 'universal' service to 'sufficient' service as its ability to actually reach audiences through live transmission grew over the course of the 1950s.

American television under construction

Corporate liberal ideology was not alone in shaping the distribution of American television: technology, economics, policy, geography and postwar commercial culture all played an important role. By winning common carrier status for television signals, AT&T was able to circumvent competitors and coordinate the development of a national television infrastructure in an orderly and rational fashion. As a result, the television infrastructure literally became part of an expanded telephone infrastructure (that was necessary to handle increased telephone traffic resulting from increased suburbanization). Television infrastructure thus became part of AT&T's information highway.[18] This comparison to the growing interstate system is more than a cliche: although the television industry was less

concerned with universal service than an approximation of it, once potential audience members saw an existing system and its limits, they demanded access on the principle that television was a kind of infrastructure, like roads or utilities. Issues of access and entitlement to television thus grew in importance precisely at the areas where profitability was most limited. This section offers a narrative of the development of television's infrastructure, focusing in turn on technological issues, battles for control of the infrastructure, industry expansion and public responses to the infrastructure's limitations.

As a technology, television infrastructure grew out of experiments driven by the interests of the broadcast industry. The networking of television presented technical problems that radio did not have to negotiate. While radio stations could network through standard telephone lines, television, because of the wider bandwidth occupied by its video content, could not. There were four practical solutions to television networking: coaxial cable, microwave relays, mobile airplane relays (named Stratovision, and never fully developed[19]) and teletranscription (filming of a picture tube for remote rebroadcast). As with radio, these different technical solutions corresponded with different corporate interests (see Smulyan, 1994: 37–64). AT&T developed coaxial cable as a supplement to existing phone lines that could also accommodate television: in 1935, they announced their intentions to spend $580,000 on building an experimental coaxial cable between New York and Philadelphia. The cable was successfully demonstrated in 1937 when it sent a motion picture between the two cities. Coaxial cable remained the province of AT&T because only companies with right-of-way privileges (i.e. the phone company) could build fixed cables. Microwave relay, on the other hand, was open to competition because it did not have these restrictions. Thus, a whole host of companies saw microwave relay as a possible alternative to coaxial cable for the networking of television. RCA began work on microwave relays as early as 1933, and by 1936 could relay transmissions between New York and Philadelphia using automatic relay stations at Arney's Mount and New Brunswick, New Jersey (Brock, 1981: 180–2; RCA, 1944b: 14; Udelson, 1982: 92–3). The late 1940s saw competitors acquiring licenses for microwave networks in the eastern USA: Philco linked Washington and Philadelphia in 1945, Western Union planned a national network and started with a New York–Philadelphia link later in 1945, and Raytheon obtained licenses for a Boston–New York–Chicago system as the foundation for a planned national network in 1947 (Beelar, 1967: 27–8). But these early attempts at networking could not overcome AT&T's already dominant position as a common carrier.

AT&T's coaxial cable interests would eventually win out and incorporate other options – and in so doing continue to promote the oligarchic tendencies found elsewhere in the industry. Not only did coaxial cable appear to have some technological advantages for networking (for instance,

weather conditions are less likely to affect signal quality in a hardwired network), AT&T had a great deal of economic leverage to help push their vision for networking infrastructure – specifically, their existing relationship with the broadcasting industry, as well as their related phone interests. In a video transmission tariff filed with the FCC in 1948, AT&T set the terms of television infrastructure policy: in addition to basic terms of service, the tariff also prohibited interconnection between AT&T and non-AT&T facilities, unless there was a delay of at least a half hour before relay (Brock, 1981: 183–4). This meant that in order to be truly 'live', television networking would have to be entirely within AT&T's system, or entirely outside of it. Although broadcasters challenged the AT&T tariff, the FCC offered only one major concession: AT&T should interconnect with microwave relay systems so long as those systems were temporary and linked up areas not yet covered by common carrier service (Brock, 1981: 185–7).

If FCC policy was not enough, economics further solidified AT&T's position. Initially, coaxial cable had a high installation cost, although much of this cost was assumed by AT&T. AT&T had previously handled almost all of the networking for radio stations, and as such, it already had a foothold in the industry. Microwave relay, on the other hand, had a lower startup cost (since coaxial cable had to be buried underground), but would have to be maintained by networks or individual stations, which in turn required expensive trained personnel and large capital investments. AT&T would install and maintain the coaxial cable themselves (Hale, 1948: 15–16). This was in no small part because AT&T intended to lay coaxial cable for its own purposes of handling more telephone traffic; that they could use coaxial cable as a lever into the television business simply made it that much more worthwhile (AT&T, 1957a: 151; Strieby, 1938: 430; Strieby and Wentz, 1941). But AT&T's coaxial plan came with its own side effects: AT&T's billing structure discriminated against smaller networks by charging a flat mileage rate (instead of per-affiliate) and by requiring renters of coaxial cable also to rent radio long (networking) lines (Boddy, 1990: 53). Clearly, the network at the greatest disadvantage here was Dumont, the others all having radio interests. Further, earlier versions of coaxial cable could handle only one television signal at a time, so that a city (wired with coaxial cable) with multiple stations could not handle more than one live national telecast at a time, with other local stations having to fill in with local or recorded programming (Denman, 1952: 40). RCA hoped that their technology of bending microwaves over the horizon would eliminate the need for coaxial cable altogether (RCA, 1944b: 14). AT&T's eventual dominance of the field eliminated this technical problem, since laying coaxial cable served both their telephone and television interests and was thereby a considerably more profitable enterprise for them than RCA.

AT&T resolved the technical problems with coaxial cable and essentially appropriated the necessary microwave relay technology. Additionally, AT&T developed other key technologies for television distribution such as switching systems for coaxial and microwave relay networking, local video relay systems (for TV signals prior to their transmission), and enhancements of existing long lines to handle color TV signals. Ultimately, AT&T's television infrastructure included multiple channel coaxial cables and microwave relays interconnected through a series of switching stations, which the networks supplemented with off-air relays. This system would continue to develop until the later advent of satellite broadcasting (AT&T, 1953, 1954, 1957a: 151; Barstow, 1954: 81; Durkee, 1947; Lewis, 1949).

In their quest to become the predominant provider of technology for television networking, AT&T began quite early with plans for a national television infrastructure. As early as 1944, AT&T unveiled a schedule for a transcontinental television infrastructure (RCA, 1944b: 15). The program was made public by NBC, and AT&T stated that this plan was 'pending the end of the war'. As will become apparent, the schedule was considerably revised. The original schedule was as follows:

> 1945: New York–Washington
> 1946: New York–Boston; Washington–Charlotte; Chicago–Terre Haute–St. Louis; Los Angeles–Phoenix
> 1947: Chicago–Toledo–Cleveland–Buffalo; part of the Southern Transcontinental Route including Charlotte; Columbia–Atlanta–Birmingham–Jackson–Dallas–El Paso–Phoenix
> 1948: Completion of the Southern Transcontinental Route; Washington–Pittsburgh–Cleveland; St. Louis–Memphis–New Orleans; Kansas City–Omaha; Atlanta–Jacksonville–Miami; Los Angeles–San Francisco.

This skeletal plan embodies the industry's geoideology of television. It clearly understands television as a single industrial unit, as far as its distribution is concerned – there aren't separate channels for different networks. Further, distribution is highly rationalized, so that the network grows in a carefully orchestrated fashion. Each city represents a new link in the chain that would extend possible transmissive coverage for the infrastructure as a whole. In contrast to later plans, this one plans the transcontinental axis of the network through the south; the backbone of the network would later be shifted northward.

Different localities used different means to hook into a national network system, but national television networking spread quite quickly. By 1945, the first physical television network linked stations in New York, Philadelphia and Schenectady (Radio Daily, 1945: 255). By 1946, AT&T had engineered a time-sharing system with Dumont televising live from New York three times a week, and NBC televising twice a week and every third Saturday. A 1948 map (Radio Daily, 1948: 1072–3) shows coaxial cables in existence or under construction connecting the southern United

States from Miami to Los Angeles, the west coast from Sacramento to Portland, the east coast from Charlotte to Boston, and the northeastern United States to the midwest from Philadelphia to St Louis. The map also shows future plans for cables connecting each of these regional interconnections. By this time, the central axis of the network had switched from the south to the middle of the nation.

In 1948, AT&T connected a network serving seven midwest cities from Buffalo to St Louis. In 1949, this network was connected with the network in the east (AT&T, 1953: 235). As the infrastructure grew, television networks diverged in their thinking from AT&T. While the latter continued to conceive of television distribution on an industry-wide scale, individual networks began plotting their own national coverage. In a way, this proceeds logically from the corporate-liberal model of development: only once the infrastructure reached a critical mass in the minds of network executives and planners could networks take on a geographical life of their own – the earliest network-produced maps of their own coverage through the infrastructure date from 1949. At this time, NBC was clearly in the lead: taking their in-house and shared facilities, NBC had coverage ranging from the northeastern United States (Boston to Richmond) to the midwest (Milwaukee, Chicago, St Louis). Additionally, they had connections under construction between Fort Worth and Los Angeles, and hoped to connect those with their eastern lines by the end of 1950 (Radio Daily, 1949: 1058). CBS and ABC, while strong in the northeast, were not as well connected with the midwest – ABC having considerably fewer stations on the long lines but connected all the way to Chicago, and CBS hoping to reach Chicago by the end of 1950 (Radio Daily, 1949: 1044–8). All the networks had affiliates throughout the country, but most had not been hooked into the infrastructure.

1948–52 marked a period of significant growth for television despite the FCC station allocation freeze (Boddy, 1990). This period was also key for the geographic proliferation of broadcast television: AT&T's infrastructure grew rapidly and through the freeze period. Between 1949 and 1950, television experienced a geographic explosion: in 1949, there were 57 stations operating in 30 cities; by the end of 1950, there were 101 TV stations operating in 59 cities (Radio Daily, 1950: 1087). By 1951, through the use of shared facilities, the networks were able to undertake live, simultaneous nationwide broadcasts (ABC Television Stations Dept, 1951; AT&T, 1953). An ABC Network line map (ABC Research Dept, 1951) shows that although the infrastructure was still most integrated in the northeast (and barely existent in the south, southwest and the midwest), there had emerged a clear pattern of interconnection throughout the United States. Thus, before the freeze was over, networks had a wide area of coverage – the infrastructure for national television had been founded.

This geographical boom in part explains advertisers' rush to television. Between September 1948 and April 1952, the number of VHF stations on the air grew from 50 to 108; the number of television sets rose from 1,200,000 to 15,000,000; the percentage of homes with television rose from 0.4 percent to 34 percent; and television's share of broadcasting revenue rose from 3 percent to 70 percent (Boddy, 1990: 51). Although the majority of Americans did not own television sets until 1955, the infrastructure for providing them with broadcast signals was in place and the *potential* commodity audience was tremendous. The boom in advertising revenue was thus fueled by speculation, and the networks encouraged this speculation based on appeals to the infrastructure. Already in 1951, NBC was telling advertisers (and anyone else who cared to listen) that with its existing facilities, it had the potential to reach 61.8 percent of American families, 60.7 percent of the total population. This potential audience represented almost $85 billion in annual retail sales (66.3 percent of the national total) and had an 'effective buying income' of almost $131 billion (68.3 percent of the national total). Keep in mind that these are estimates in 1951 dollars: these are serious (though quite possibly inflated) claims on the part of NBC. Not only had the networks created the infrastructure to reach the majority of the American population by 1951, they had targeted the segments with the most consumer dollars to spend (NBC, 1951). As noted above, merely possessing a set in the early 1950s marked a household as a desirable consumer as far as ratings and advertisers were concerned.

The infrastructure continued to grow. By 1955, networks had filled in some of the gaps in the central, southern and western USA. Additionally, off-air relays were made more practicable with the marketing of video tape by Ampex. Prior to that, the only technology for off-air relay was kinescope tapes, which took over three hours to process and were of substantially lower quality than the original picture (AT&T, 1954, 1955; Bogart, 1958: 275; RCA, 1944a: 37; Television Digest, 1955).

The national television infrastructure showed a distinct coastal and urban bias. While AT&T and the networks claimed to be quite excited about hooking up the nation and working zealously toward that end, development tended to target those sectors of the population with the greatest 'effective buying income' – that is, populations that could be best sold to advertisers (see Meehan, 1990). In the FCC's 1955 declaration that the nation had 'achieved adequate television service', adequacy was clearly a contestable and contested term. Through the rest of the decade, the infrastructure developed according to the same patterns. By 1957, the eastern half of the USA was not only hooked into the infrastructure but thoroughly interconnected, even in the south. Apart from the west coast, however, the west and southwest were largely unconnected, with a few lines running through to facilitate transcontinental transmission.

Television penetration in these less populous areas was considerably more erratic. Across the nation, less populated areas had proportionally fewer television stations in service, and fewer families owned sets. This trend continued into the 1970s (Bogart, 1958: 15–17; Lichty and Topping, 1975: 523). For instance, in 1959 Montana had five program-originating stations in operation while New York had 22 (Bureau of the Census, 1960: 520). Moreover, the combination of distant signals and uneven terrain in some areas made television reception difficult. The solution to this problem was the construction of booster stations or local cable systems that would rebroadcast distant signals at a greater strength.

The political and legal history of these repeater stations marks a gradual transformation of television distribution – from a tightly managed and relatively localized industry concern to a matter of grassroots action and public policy debate. To understand the significance of these booster stations, it is necessary to step back for a moment and consider the larger transformations television underwent in the 1950s. As television moved from an aspiration in the telecommunications industry to a social reality, the discourses that had been circulating in the limited field of television development gained greater popular currency. In part, this was a result of their popularization in other media – a phenomenon covered thoroughly in Lynn Spigel's work (1992). The result was that FCC television policy started to become a subject of national debate and political importance for an ever growing number of people because it had a direct impact on more and more lives as more people bought television sets.

Although we can talk about a national discourse about television dating back to the 1920s, at the close of the 1950s a significant number of Americans were still unable to receive television signals. This is why the will to a national infrastructure in the industry should not be mistaken for a will to universal service; profit was clearly a determining motive for the provision of service, both for network television's expansion and the FCC's guideline for 'adequate national service'. But the popular currency of television discourses led them to take on new valences in different contexts. Television was represented as a national resource; as a revolutionary technology; as if it could revitalize American home life: these claims began in service of broadcasters, authorizing and promoting the infrastructure and the sets. By the end of the decade, other groups would appropriate these claims for their own uses. Because of its status as 'new' (though it was in fact decades old) technology,[20] discourse about television could easily slip into the rhetoric of the electrical sublime that has accompanied new media in the USA since the telegraph (on constructions of new media by existing media, see Carey, 1988; Douglas, 1987; Marvin, 1988). For many people, television held promise for the future simply as the coming consensus medium; for others, it held out an almost utopic promise; for still others it simply symbolized the imperatives, dreams and

desires of postwar commercial culture (see Spigel, 1992). Although most Americans during the mid–1950s considered their television sets to be luxury items (Bogart, 1958: 121), by the end of the decade, groups denied television service – such as residents living in remote or isolated rural areas – took up the industry's language: policy discourse on television distribution moved from questions of 'sufficiency' to a language of entitlement.

By 1960, the discourse on television distribution had changed. Television had to be managed as something to which all Americans were entitled. This transformation is well illustrated by hearings leading to the passage of US Public Law 86–609, enacted in 1960, which effectively legalized previously illegal television booster (or 'repeater') stations in outlying areas by amending sections 318 and 319 of the Federal Communications Act of 1934. Certainly, rural audiences (the most common users of repeater stations) were on the margins of a national television infrastructure, but in the spirit of postwar liberal pluralism these areas had to be included in the distribution of national television, even though they were not its original object.

Already in 1950 (and probably before), television reception in rural areas was considered a significant engineering problem, especially given that UHF was the only available medium for booster stations (Embree, 1950: 59–60). By 1960, it was a policy problem as well. The FCC generally assigned repeater stations to the more available UHF frequencies, but there was high public dissatisfaction with that arrangement. According to testimony in the hearings, several technical problems presented themselves in the use of UHF stations for boosters. UHF signals move in a straight line, so that physical obstructions such as uneven terrain, tall buildings and changing atmospheric and environmental conditions can disrupt UHF signals. UHF signals have a shorter 'service range' than VHF signals, again because UHF moves in a straight line. UHF antennas were (and still are) more directionally sensitive than VHF antennas. UHF receivers were more expensive than VHF receivers; and, crucially, UHF booster stations were more expensive to erect and maintain than VHF boosters, although UHF boosters of equal power only covered 50–75 percent of the area covered by VHF boosters (James Beamer, Secretary, Tri-State TV Repeater Association, quoted in US House, 1960: 80–3). As a result of these problems, many communities took matters into their own hands and built VHF booster stations.[21]

These VHF booster stations in remote communities were the subject of S. 1886.[22] Essentially, these stations were constructed with the intention of simply rebroadcasting weak VHF signals that could not otherwise be received in these communities. They were largely automatic, requiring very little maintenance and they originated no programming of their own. According to sections 318 and 319 of the Federal Communications Act of 1934, such stations were, strictly speaking, illegal. Section 318 stipulated

that all transmitting apparatus must be run by a licensed operator. It allowed that under certain circumstances the FCC, if it found it in the 'public interest', could waive this requirement – but not if the station in question was involved in broadcasting. Insofar as booster stations did not have licensed operators, they were illegal operations. Furthermore, section 319 required a construction permit for all broadcasting facilities, with a few exceptions. Again, the booster stations in question had no such permits. The bill discussed, S. 1886, simply amended the two sections of the 1934 Act such that the FCC could waive the requirements for a licensed operator and a construction permit in the cases where a waiver would benefit 'the public interest, convenience, and necessity' (US House, 1960: 22). Without its passage, many of these illegal booster operations would have been shut down.

VHF booster stations (also called 'repeaters') were a widespread phenomenon, especially in the western USA. Although these stations were built without permits from the FCC, they were public operations and, in at least one case, a state-mandated undertaking: Utah enacted a law permitting local governments to build booster stations in areas that television signals would not otherwise reach. At the time of the hearings 19 of Utah's 29 counties had built unlicensed booster stations (US House, 1960: 8). In other cases, citizens' groups or even local chambers of commerce would get together to build these stations. Local governments issued bonds to cover the costs of construction. Booster stations affected (that is, that would be effectively legalized) by the proposed legislation were prevalent in Arizona, Colorado, Idaho, Montana, Nebraska, Washington and Wyoming, and other states as well (US House, 1960). The National Association of Broadcasters estimated that there were over 1000 unauthorized VHF booster stations in use at the time of the hearings (US House, 1960: 70).[23] Representatives from the above named states, local officials, and members of 'TV Repeater Associations' all testified that booster stations were the only means by which many communities could get any television broadcasts.

Many speakers before the subcommittee, especially those representing the states most affected by the legislation, made references to television as a necessary infrastructural element of communities, both as a local resource, and as an instrument hooking the community into the nation. A closer look at these hearings shows that the discourse of television distribution was surprisingly mobile and flexible, especially now that television had become – according to the speakers – a central part of American life. The very rhetoric that the industry had used to promote their interests was now taken up by another group directly interested in the distribution of television – the people served by illegal VHF repeaters and their elected officials.

In this way, we can see the process of reification at work: the infrastructure for live, simultaneous television broadcasting becomes part of practical understandings of 'television' itself. The normative force of the very idea of television distribution (as shaped by corporate liberalism) was taken for granted, and therefore could be put to ends somewhat different than the industry's. It became the *basis* for policy arguments. If the ideal shape of television (as per corporate liberalism) was to be understood as the centralized provision of content – a movement from core to periphery, so to speak – then the periphery could not be left out. For example, Senator Frank Moss of Utah claimed that

> . . . television has become almost as much a part of the American scene of the 1960's as the automobile, the supermarket, and the drive-in. It is axiomatic that people will find some way to bring television into their homes. Nobody is going to be denied its pleasures if they can be obtained reasonably.
>
> Every American home should be able to receive at least one free television signal and, eventually if FCC policies and priorities can make this possible, every American community should have its own television station. A TV station helps to give a community a voice, and its place in the neighborhood of communities, and in the State and Nation. (US House, 1960: 19)

Moss's testimony evokes an already well-established nodal understanding of locality within the television infrastructure. Here, the logic of WDAY in Fargo's first-night broadcast schedule reappears as an argument: the local becomes important in relation to the national network. But Moss's testimony takes this a step further – by problematizing isolation with respect to that network – as if to say that, since television has become a pervasive phenomenon, everyone deserves to be hooked in. Thus, a principal tendency of industry discourse about distribution is reproduced in another context: while stations use their programming to locate themselves with respect to a national phenomenon, localities argue to congress that a station will locate *them* with respect to the nation. In these hearings, stations become synecdoches for their localities.

Given the concern with nation-building and interconnection, it is not surprising that television's infrastructure was portrayed in the hearings as similar to other kinds of infrastructure. Television, according to Idaho representative Gracie Pfost, was not only essential to a community, but a *utility*: 'Television . . . serves to open a larger more educational and more interesting world to them – just as years ago the REA [Rural Electric Agency] brought light and power to rural America' (US House, 1960: 10). Pfost's invocation of programs like the REA suggests the distribution of television comes under the paternal rubric of the welfare state – that a nation taking care of its citizens does not deny them television.

Free television was also part of the growing consumer ethos of the 1950s.[24] Although VHF boosters generally served populations whose buying power was not as great as those served by other kinds of television,

it is clear from testimony that residents of these communities understood themselves as culturally isolated without television. They portrayed themselves as having few or no other sources of entertainment outside the home. A resident of Silverton, Colorado, wrote that

> in the first place you know we are a mining town and with the mining industry as it is at this time, there isn't a spare dime in the whole county for entertainment; even the movie here had to close all but two nights a week and then the picture is repeated, so there is little to keep our young folks entertained on snowy cold windy nights. (US House, 1960: 14)

The assumption of consumer-style entertainment underwrites the need for television here, in part because it is a rare kind of consumer entertainment that presents itself as 'free' to the individual consumer or household (after the purchase of a set, that is), but also because it represents a linkage back into the larger commercial culture. Thus we have the familiar conflation of the categories of citizen and consumer. Or perhaps a better way to frame the question is in terms of my earlier discussion of reification – here, a set of social relationships are crystallized through and experienced as relations among things (televisions, television stations and repeaters). The citizen is plugged into the culture because the television is plugged into the network. Because of this slippage, the discourse of television distribution could ultimately be framed in a language of entitlements – and in the most strident cases, rights.

The language of entitlement, animated by a group of potential audience members, complemented the economic imperative that had underwritten the industry's distribution of television thus far, as in the testimony of Washington Representative Walt Horan:

> An analogous situation [to radio] can be found in the history and progress of television. At first it, too, was a luxury, but today almost everyone can enjoy good, economical, and practical television reception. The passage of this bill will do much in helping to insure every family in America the right to economical and good television. (US House, 1960: 11)

Other congresspeople and other groups such as the TV Repeater Associations also explicitly used a rhetoric of entitlement. In the space of 15 years, television had moved from a revolution to a right. James Carey's discussion of 'electronic revolutions' would be apt here – television began its career being portrayed as a revolution but quickly moved to a rhetoric of necessity (see Carey, 1988: 113–41). Once the 'revolution' was accomplished to the satisfaction of the industry, it was up to others to treat television as a now integral part of American life, and therefore something to which everyone was entitled. Television was a vast and powerful cultural resource, both as a form of 'entertainment and information' (US House, 1960: 11) and as a form of social interconnection and location.

Again, the fundamental geographic unit of American television was the nation, and therefore anyone within the boundary of the nation state – any political subject – should be connected to the network. Of course, this is purely ideological reasoning, since the infrastructure itself only served the lower 48 states.

The only serious opposition to the legislation came from some local cable TV operators and operators of small local TV stations. In both cases, operators either considered existing repeaters to be bringing unwanted competition, or feared that new repeaters would do so in the future (US Senate, 1959: 544, 664). However, the legislation was passed almost unanimously over these objections. Television had been ratified as an entitlement, a right, an essential element of national infrastructure and culture.

The idea of national distribution mutated through the 1950s, beginning the decade as the province and promise of the industry, and ending the decade as a promise that audiences and 'constituents' had to fulfill for themselves. But the fundamental logic of television distribution did not change across contexts. Instead, the discourse of national distribution showed a great deal of mobility and utility – it was easy for policymakers, potential audience members, and other media to use the corporate-liberal discourse of distribution to what they perceived as their own ends, although in the process, they took an interest in television that was a logical extension of the social vision publicly presented by the industry. After all, the networks were quite happy to support illegal repeater stations paid for by someone else in hard-to-reach markets. It extended their reach without any effort on their part, thereby making national television appear as a self-fulfilling promise. But this promise was only self-fulfilling in retrospect. It took a different set of actors operating in a different part of the policy field ultimately to effect and make concrete the idea and promise of national television. The discourse of entitlement appeared in television discourse precisely at the moment when profitability dropped off.

Conclusion: implications and speculations

I would like to conclude on four short points: historical, practical, political and epistemological. Historically, I have shown that the infrastructure was a key force shaping the economics and experience of American television, on the one hand both founding and limiting the conditions for audiences' experience of 'liveness' in 1950s television, and on the other, providing the massive audiences sought by the industry to sell to advertisers. In the process of its growth, television's first infrastructure crystallized in physical form relations among the networks and AT&T, broadcasters and audiences, and the local and the national.

This article can also be read as offering practical advice for media scholars. Media distribution and especially television distribution have become major issues in the discourse on globalization (regarding television see, for instance, Appadurai, 1990; Garnham, 1990; Michaels, 1987; Morley and Robbins, 1995; Naficy, 1993). This history has offered a way of looking at distribution in another time and another kind of space. The simplest and apparently most instrumental element of television, the infrastructure for live simultaneous national rebroadcast, embodied and crystallized a set of values and relationships, thereby making them all the more effective. Too often, critiques of media take their spatial organization for granted – for example, when globalization becomes a point of departure for social critique rather than the object of that critique (see Appadurai, 1996, for an example of this tendency) – even though that spatial organization offers important clues to the economic, political and ideological contours of the phenomenon in question. Considering the development of media relations over time and over space offers a clearer sense of how and on what terms those relations might be transformed. Failing to consider the physical life of a medium risks an instrumental view of communication: it casts media relations (among industries, technologies, people) as simply a means to an end, rather than as themselves products of social life.

This essay also raises the political question of 'entitlement' in media discourse. As with the television infrastructure, discussions of entitlement too often take for granted the development of a media system based on maximum profitability for a small minority, and then seek to supplement the system for greater public access. In other words, questions of access tend to appear after the contours of the medium are already set up. In the last instance, this is an unacceptable for democratic communication. No doubt media activists have real limits on their resources and power to effect change, but even as we fight smaller battles, we should retain a more fundamental social vision of communication that encompasses not only access in terms of production and consumption, but the very shape of the media systems we are seeking to transform – the mode of distribution.

Finally, a speculative note: although one cannot simply attribute causality to historical sequence, it is worth noting that the diffusion literature starts taking hold in the USA at the tail end of a booming postwar growth in telecommunications infrastructure (for example, see Lerner, 1958; Rostow, 1964; Schramm, 1964). Critiques of the development literature have pointed out its presumptions of American media superiority and the desirability of an American system (see, for example, Preston et al., 1989). If the scientistic models of development theory took American media history as an ideal type, then perhaps turning this epistemology back on itself and historicizing that ideal type of media development, as I have endeavored to do here, will further contribute to its unraveling.

Notes

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1. By infrastructure, I simply mean the technical networks that were created for live simultaneous national broadcast. I do *not* mean to invoke the traditional Marxist notion of infrastructure (which I call the *base*), although readers may at times wish to infer this reference. Rather, I mean to consider television infrastructure as only one ingredient of its base – as well as an ingredient of its superstructure.
2. Thus, to say that television infrastructure is reified is not to imply that it is somehow *false* or somehow inauthentic – an unfortunate though frequent misuse of the term 'reified'.
3. Of course, television is not a purely ideational phenomenon. If it were, we could – for instance – make the classic structuralist argument that television can only be defined in terms of what it is not. John Hartley shades quite close to this argument, although he stops between the claim that a nation is defined in terms of what it is not (an equally suspect proposition), and making the same claim about television (1992). But that particular linguistic move in turn would lead us back into the problem that this article seeks to overcome: it would be to reify the actual complex of social relationships (as they are embodied in practices, institutions, technologies, etc.) that make up the medium.
4. Even this is not a particularly good index, because home ownership statistics elide the already common presence of television sets in taverns, hotels and other establishments (Bureau of the Census, 1960: 488). Moreover, as Spigel herself notes, statistics on the number of television sets owned throughout the 1950s are quite variable (see Bogart, 1958: 8, 10, 12; Lichty and Topping, 1975: 522; Steinberg, 1980: 142).
5. While none of the radio historians I mention here treat television quite as an epiphenomenon, there is certainly that tendency. Smulyan, for instance, writes that the wired network system developed in radio 'shaped what Americans heard when they turned on their radios, and later their televisions' (1994). True enough, but the 'wired network' for television developed in a very different fashion.
6. Certainly, there are other aspects of television's 'distribution' that one would cover for a comprehensive history, such as station allocation and operation, and the diffusion of television sets. I would simply refer the reader to other sources on these matters (Boddy, 1990; Spigel, 1992). For the purposes of this article, all references to 'distribution' are (unless otherwise noted) to the intended function of the infrastructure – the extension of broadcast signals across the continent.
7. A note on method: in addition to the usual building on or reinterpretation of others' historiography, this article makes use of several kinds of primary source materials: the writings of intellectuals; transcripts of congressional hearings; industry materials including house periodicals, engineering tracts, reference maps, and miscellaneous publications. Primary source materials are cited in standard parenthetical format wherever possible.
8. Abler uses the example of a person who owns the only telephone in the world. While such an object might be endowed with various forms of value (for

instance, a place in the Smithsonian as 'the only telephone in the world'), it would not be valuable as a communications medium.

9. Streeter's book considers at length the legal and cultural problems surrounding American broadcasting by founding a revisionist history of broadcasting on a critique of corporate liberalism. While corporate liberalism may in fact be a suitable analysis and description of the ideological aspects of television distribution considered below, I wish to isolate distribution as a problem somewhat separate from corporate liberalism to provide a sufficiently robust account of the development and importance of television's infrastructure and to explore fully this aspect of television.

10. Streeter cites Roberto Unger to suggest that liberalism is in many ways more than ideology – it is a way of life. While this is certainly the case in my study as well, the term ideology works well enough since I am primarily discussing it as a set of ideas in motion.

11. If local television was conceived as subservient to national goals on a national level, it was conceived somewhat differently on a local level. Questions around the culture, politics and dynamics of local television extend beyond the current discussion to issues that grew out of the local environments of which the stations were a part. For discussions of television and locality in the 1950s, see James Hay on Houston (1997) and Mark Williams's forthcoming book on Los Angeles.

12. Although these investigations never happened, rulings regarding cable television in the 1970s effectively ended the network oligopoly.

13. By 'scarcity' here, I am referring primarily to programming from a national standpoint; struggles over the availability of and access to local television facilities was itself highly contested throughout the 1950s, but is beyond the scope of the present project.

14. This, of course, never happened.

15. In discussing an analogous instance of the 'quality programming' issue in radio networking, Susan Smulyan appears to take it at face value. By arguing that the need for quality programming helped to create the crisis that led to nationalization of radio content, she essentially takes the industry at their word (1994: 37). But Smulyan's narrative is largely based on anachronistic reasoning. While it is certain that listeners wanted programming they would enjoy, there is no immutable law that requires 'quality' content to be capital intensive in its production, nationally distributed and standardized, and based on a for-profit economic scheme. In other words, the need for 'quality programming' has no necessary connection to the need for a national network. Rather, that connection was itself manufactured by the proponents of a national radio industry.

16. As audience/marketing analysis has become more carefully refined, the largest gross audience numbers are no longer necessarily the only key to financial success in broadcasting – as demonstrated by the success of the Fox network (see also Meehan, 1993). By the time this shift took place, practices of television programming were already well enough entrenched that 'narrowcasting' did not significantly alter television production practices.

17. This point has been best developed in discussions of music: the rarity of so-called 'talent' in an expressive medium is socially manufactured through a professional ethos, and has little to do with inherent human qualities or creative capacities. See Small (1977), and Keil and Feld (1994) for a further development of this point.

18. I use this term deliberately: AT&T had been using explicit transportation metaphors in its advertising since the 1910s, a topic I explore further elsewhere.

19. Stratovision worked on essentially the same principle as satellite would later. Airplanes circling major cities would become giant flying relay antennas for television signals. The plan was impracticable for a variety of reasons: in addition to the expense of keeping a set of airplanes (and their crews) in flight on a regular basis, the relay antenna extended from the bottom of the plane, and took about half an hour to expand and retract. Thus, emergency landings became more or less impossible.

20. The scarequotes around 'new' are worth noting here, since television existed for over 20 years in relatively modern forms before it became a 'new' technology in the 1950s. As Gilbert Seldes pointed out in 1938 (and many critics since then), the result of this lag was that most of the important decisions concerning American television were made well before television was of much concern to anyone but the industry and the FCC.

21. And by 1960, there was a well-entrenched cultural bias against UHF which effectively reinforced FCC decisions made over a decade earlier.

22. S. 1886 was one of several bills introduced into the Senate regarding this problem. The other bills also concerned themselves with the FCC regulation of cable TV. At the time the only feasible alternative to repeater stations was a local cable system; these systems, along with the repeater stations, were the subject of the other Senate bills. However, the FCC supported 1886 specifically because it did not believe its charter allowed for the regulation of cable. FCC regulation of cable would come much later (see US Senate, 1959).

23. Since the stations were not authorized, no definitive national data exists on their number or prevalence prior to their legalization.

24. This is not to suggest that consumer culture *began* in the 1950s, only that it took on a particularly powerful valence for an unprecedented number of people after the Second World War (see, for instance, Cohen, 1990; Fass, 1977; Lears, 1988; and Ohmann, 1996, on the rise of consumer culture in earlier periods).

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