

From Channel to Network: Will New Delivery Systems Overturn Existing Economic/Regulatory Models for Utilities?

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Abstract

The traditional regulated utility existed as a monopoly provider of a vital good and/or service, with the pricing and mode of delivery overseen as part of the regulatory process. This delivery “channel” was either the exclusive domain of the utility, or was opened up to third parties under very controlled conditions defined by the utility and/or the regulator. While “open access” became a popular byword during the phase of deregulation in many industries, the underlying concept was still wedded to the channel paradigm.

An alternative delivery paradigm, which has existed since the rise of mercantile economies, but which has gained much more prominence since the emergence of the internet, is that of the network. Entrepreneurs adopting a network model earn income by facilitating the delivery of products and services, rather than simply by exercising control over the delivery channel. Many if not most of the phenomenally successful start-ups of the past couple of decades, including Amazon, Netflix, and eBay, have achieved their success by utilizing a network strategy.

As electric utilities (and their regulators) face the transformation of traditional business model, from one involving centralized dispatch of electricity through a distribution channel to one that must accommodate a decentralized network with multiple energy service providers, they will have to rethink the business and regulatory strategies that will accommodate such a model. This paper will explore the ways in which a regulatory system might be adapted to manage a network model, and the business strategies that utilities must consider in order to continue to thrive within it, by examining how businesses that rely upon a network strategy have successfully applied it, and by reviewing transformations in other regulated industries from channel to network constellations that offer potentially informative parallels to the electricity industry.

Background

Channels and Networks

The subject of this paper is channels and networks, and their roles in present and future electricity systems. What are they? Why are they important? In essence, each represents a mode of transmission in an economic system: a method of conveying goods and services between buyers and sellers. But – at least in their extreme forms – they are starkly different in how they perform this function. A channel tends to be a clearly defined pathway between buyer and seller, with a unidirectional flow of goods and services from provider to consumer, or perhaps a bidirectional flow if trading or exchange is involved. A channel is generally under the control of an economic or governmental entity (or both), and it is control over access to the

channel that enables its owner/proprietor to extract profits in the form of rents from the users. A network, on the other hand, as its name implies, consists of a series of interconnected pathways, with less clearly defined avenues of transmission of economic goods and services. Economic agents participating in a network are essentially “nodes” on the system, and are potentially connected – at least indirectly – to every other “node”. Paths that are part of the network may be continually coming into and going out of existence, and there need not be clearly defined flows of goods and services along any of the paths. A buyer along one path at any time may be a seller along the same path at a different time, or an economic agent may act as both buyer and seller simultaneously along different connected paths. Because of their inherent fluidity and organic natures, networks are not amenable to ownership or control by single entities, and therefore the potential to profit from them through rent-seeking is diminished. Rather, the greater opportunity for earnings tends to lie in the role of facilitation rather than control, as agents within the network act to broker more effective and efficient interactions among participants.

The Channel in Historical Context

The channel has played an important role in economic development since the dawn of human history. As economies evolved from simple bartering at the local level, to the trading of goods over longer distances, and between countries and empires, the value of establishing routes that could be commonly used by those who delivered and exchanged these goods was immeasurable. Such routes were generally controlled by the dominant regional power, and when it was effectively done, traders could travel in relative safety over great distances, taking their wares to foreign markets, and bringing back products from distant regions to sell into their domestic market. One of the oldest such routes was the “Silk Road”, which linked China with the West as early as the beginning of the 1st millennium BC, and provided an avenue for the sale of Chinese silk into other markets, as well as for the trading of a variety of goods, including other fabrics, perfumes, jewels, and porcelain, not to mention human slaves. Another important trading channel, which emerged into significance around the 3rd century BC, was the Incense Route, where frankincense and myrrh was transported by camel caravan westward from Arab nations such as Yemen. Several centuries later, the Spice Routes linking India and the Greco-Roman world rose in commercial importance and remained so through the Middle Ages.

The classification of trade routes as channels seems intuitively obvious, given that they are characterized by geographical pathways or conduits. However, the power exercised over trade routes was not generally derived from control over the entire channel, but rather over important transmittal points that were located at the end of or within the route. In medieval times, for example, while Arab traders dominated the overland spice route, when these spices reached the Mediterranean Sea, it was Italian city-states such as Venice and Genoa that exercised virtual monopoly power over their sale to regional markets. Before its fall in 1453, the city of Constantinople was a critical point of juncture between traders in the east and west, and profited from this role. Fifteen hundred years earlier, the city of Gerrha, located in the Arabian Peninsula, controlled the incense trade that passed through its territory. Hence, the channels and underlying channel strategies that produced profits were really subsets of the overall trade pathways, but channels nonetheless. However, as will be seen, the technological successors to the trade route, such as railroads and pipelines, more clearly exhibited both the appearance and the behavior of channels.

While trade routes provided relatively safe and established venues for the long-haul transportation of goods and services, other channels of increasing importance evolved for the long-distance transportation of these, as well as human passengers. These included horse-drawn carriages for overland transportation, and sailing ships for overseas routes. In 16th century Germany, wooden rails were laid down upon which horse-drawn wagons could ferry passengers and freight, making the passage much more convenient than upon conventional dirt roads. By the 18th century, iron rails had replaced the wooden ones and spread throughout Europe, covering longer distances and expediting travel with flanged wheels especially suited for use on these rails. In the early 19th century, steam-powered locomotives began to appear in England, with passenger locomotive service appearing there in the 1820s. Similar railroad services began to appear at about the same time in the United States, and in the ensuing decades of the 19th century a railroad building boom ensued, with the development of the Pullman “sleeping car” in 1865 making them particularly suitable for long-distance passenger transportation. The first transcontinental railroad was completed in 1869. While multiple rail lines were built in Europe and the U.S., the cost and expense of building these limited their number, and resulted in each operating as a quasi-monopoly. In part because much of this construction in the U.S. had been aided by government subsidies, Congress felt empowered to respond to consumer complaints about abusive pricing practices by establishing the Interstate Commerce Commission in 1887, which had the authority to ensure that rail rates were “just and reasonable”. The ICC was the first agency granted such oversight over industrial pricing practices in the nation.

Perhaps one of the most ubiquitous channels that have been a feature of civilization is the postal service. The earliest recorded system of mail delivery is attributed to the Persians in the 6th century B.C., when the reigning monarch, Cyrus the Great (or, by some accounts, his successor, Darius I) decreed that every one of his provinces should make provisions for the delivery and receipt of mail among its citizens. A system of stations was established, and long-distance messages were delivered by carriers on horseback, traveling from one to another of these, braving the elements so that, in the words of the Greek historian Herodotus, “these are stayed neither by snow nor rain nor heat nor darkness from accomplishing their appointed course with all speed.” In the centuries that followed, postal systems were implemented in other kingdoms and empires, including India, China, and imperial Rome.

What is common to nearly all of these postal systems is that they were established and overseen by the central government, and delivery rates were set under the direction of the government or its delegated regulatory authority, with the postage stamp evolving as the nearly universal method of charging for mail delivery. There was an assumption – even before formal economic models began to evolve – that mail delivery constituted a monopoly service, and that the level of cost recovery should be primarily determined by an assessment of what was needed to maintain the delivery system.

The most pervasive modern incarnation of the channel model is the standard regulated public utility. Electricity, natural gas, and water service all follow variants of this model, with clearly defined pathways from source to end user, owned and controlled either by a regional governmental authority, a cooperative, or a regulated, private monopoly. Access to these products is generally only possible through the exclusive channels provided for them. (There

are, of course, exceptions. Large commercial/industrial companies have occasionally constructed their own pipelines to bypass the local natural gas distribution company, and many have built combined heat and power facilities to serve at least part of their electricity loads. And we all have the option of buying water in bottles, in whatever quantity we choose.)

The channel model was adopted in the electricity industry at the very moment of its birth, when Thomas Edison's Pearl Street Station coal-burning generator powered a few hundred electric lamps in New York City, in 1882. In the decades that followed, similar small systems emerged throughout the country, and these in turn became consolidated into larger systems, with multiple generators serving a diversity of loads. As it became evident that regions tended to be served by only single electricity grids, and that this lent itself to market abuses by the owners of these grids, regulatory models evolved to rein in pricing practices, and to set standards for quality of service. The culmination of this evolution was the passage of national legislation, the Public Utility Holding Company Act of 1935, which established regulation at the state level as the fundamental means of oversight for the distribution of electricity.

Natural gas service in the U.S. followed a path similar to that of electricity. The first natural gas distribution company was created in Fredonia, New York, not long after natural gas deposits had been discovered there in 1821. The first municipal natural gas company was formed in Philadelphia in 1836. Hundreds of natural gas companies came into existence over the course of the next century, but rarely were any of these in direct competition with one another. Rather, as natural monopolies, each of these tended to be a sole provider within its territory of service, and in the early decades of the industry the scope of this territory was generally limited to the local municipality. Because of the monopoly power enjoyed by these companies, each was generally regulated by the municipal government. However, by the early 20th century, natural gas was being delivered over longer distances through pipelines, and as delivery systems became more common that spanned several cities, regulation of these systems moved to the state level. A number of interstate natural gas pipelines were coming into existence as well and, like the rail lines, the tendency of each of these to have an exclusive presence in any particular region, and few competitors in adjacent regions, gave these pipelines the ability to exercise quasi-monopolistic power in their pricing practices. To rein in these market power abuses, Congress passed the Natural Gas Act in 1938, which granted to the Federal Power Commission (later the Federal Energy Regulatory Commission) the authority to regulate the pricing practices of interstate pipelines.

The supply of water, including its collection, purification, and distribution, has generally been a public enterprise, with about 90% of the water supplies in the world currently under the direct control of government agencies. In the United States, they are regulated at the state level as utilities. In some countries, such as England, Wales, and Chile, the water supply industry has been privatized, but in other regions of the world, cities have been engaging in "remunicipalizing" their water companies. Water companies usually exist as sole suppliers within their franchised territories (with private companies under some form of contractual arrangement with their respective local jurisdictions), but in spite of the natural monopoly condition that this implies, it is interesting to note that a 2006 World Bank study has estimated that only 50% of water utilities in the developed world, and 30% worldwide, recover all of their costs of service.

While public utilities invariably share the common trait of franchised, monopolistic control over territories, hence exhibiting the classic channel characteristic of deriving rents by controlling access to an important delivery conduit, there is clearly a quality of the network that is also common to them. In most cases, utility service literally involves physical networks of interconnected pathways, and the service is made possible by patching customers into this network. Shouldn't even traditional utilities, then, really be considered as examples of the network model? What is missing here is the transactional fluidity among standard utility customers, who are relegated to the role of simply receiving the underlying commodity (electricity, gas, water). Although these commodities may in point of fact be coming to each customer from multiple sources, through multiple pathways, the ultimate service still is ultimately one of basic delivery. The argument for this categorization is much more difficult to sustain in the case of regulated telecommunications service, however, as will be discussed below.

It is interesting to observe that in all of these historical examples of channels, states, national governments, and, in some cases, empires have played a significant role in creating, supporting, or regulating them. Often this has been because the underlying service is perceived as a "public good", and so must be fostered and maintained by the government. Sometimes this has been done to serve the national interest, as when nations and empires protected trade routes, or when European governments actively supported the activities of 15th and 16th century explorers to discover alternative routes of trade. And, in cases where a service was developed as the result of private innovation and enterprise, which subsequently acquired a critical role in the general economy, government stepped in to regulate it, to ensure that reasonable access was assured to all or most who might benefit from it, and also to ensure that exorbitant rates were not charged for it.

It must be emphasized, however, that not all regulated natural monopolies are channels, nor are all channels natural monopolies. As will become clear in the next section, even some networks have come under regulatory jurisdiction because of their inherent market power, and, on the other hand, many contemporary services exhibiting the channel strategy face significant competitive pressures. Cab companies, for example, can be in direct, head-to-head competition with other cab companies. And while the phenomenon of disintermediation, as discussed below, sometimes results in the upheaval and perhaps complete replacement of an incumbent channel by a newer, more efficient one, in many cases the newer channel merely takes its place alongside the old, which still manages to survive and retain a sufficient volume of business to support itself. Clearly this is the case with message delivery services, which are available in a variety of different channels, ranging from old-fashioned postal service to electronic messaging, although, as will be discussed, all services involving communication, including physical delivery of messages, have had features characteristic of both channels and networks.

The Network in Historical Context

The network probably had its earliest notable incarnation in the bazaar: an open-air market and focal point of exchange which came into existence sometime around the 4th century AD in the Middle East. Ironically, bazaars originally sprang up along the major trade routes, which, as indicated above, represented early examples of the channel strategy. Traders could

buy, sell, or swap goods there, and as these sites grew in prominence as social hubs, they became magnets for other activities that went beyond the simple exchange of wares. Restaurants and coffee shops often were established in or near established bazaars, as were mosques, and these areas often hosted live entertainment as well. Because the effectiveness and success of these venues was derived from the active participation of a network of merchants, financiers, and artisans, the word “bazaar” itself, which is of Persian origin, was sometimes used to refer to the network of participants, rather than the physical market.

The traditional version of the bazaar survives to this day, in the incarnation of “flea markets” and swap meets. Of course, this mode of bringing several products together into a single location is now the exception rather than the rule, due to the ubiquitous presence of retail sales outlets, ranging from “mom-and-pop” stores, to large brand name department stores, such as Sears and J.C. Penney’s, along with grocery stores and specialty outlets – like Best Buy or Staples – that carry specific categories of goods. The retail “brick-and-mortar” outlet represents an instance where a pure network evolved into something that also had channel properties, as the physical store played the role of the delivery conduit linking consumer and product seller. Technically, this is still a network, and provides many of the benefits and advantages inherent in a network, as the store is linking a web of consumers to a web of producers, and providing a larger universe of choices and opportunities to members of both groups, but it does not have all of the features of the classic network, since the consumers and producers do not engage in transactions amongst themselves, but only with the store. As the Medici case will illustrate below, however, this type of “channelization” of a network by its proprietor is precisely one of the most effective strategies for making it profitable.

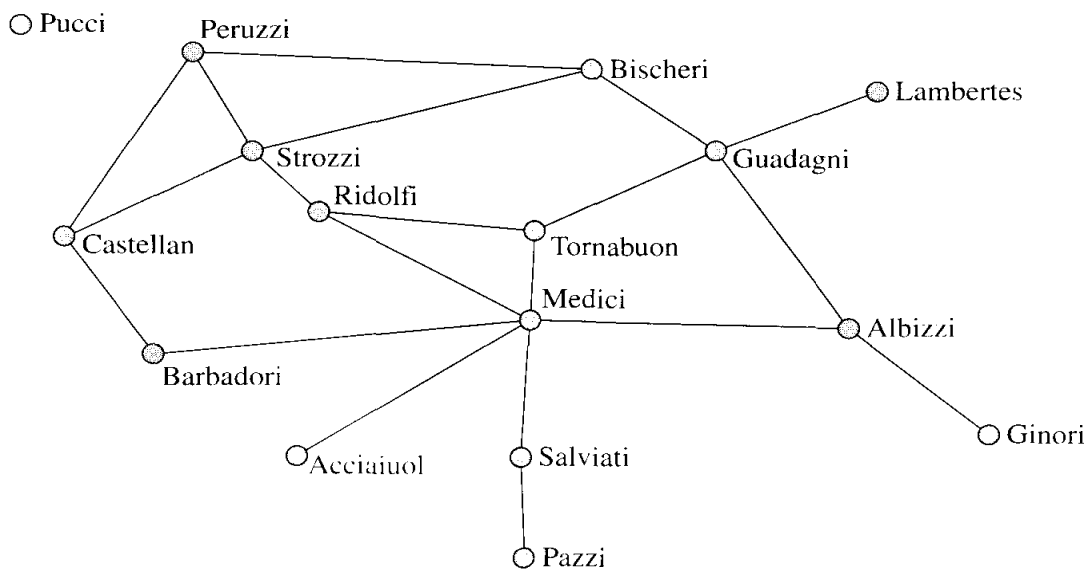
An interesting, and more contemporary, variant of the bazaar and open market is the professional network. Some form of the phenomenon of “professional networking” has probably existed since market economies came into existence, but its critical role in both personal advancement and the forming of productive business contacts has been more explicitly acknowledged in recent decades. In the early 20th century, civic fraternal organizations such as the Lions Club and Kiwanis were formed, and their meetings and other activities provided a venue for businessmen to meet potential clients, customers, and working partners. Professional associations, which link persons in common occupations and/or academic disciplines, serve the same ends, in addition to sharing information on issues of current importance. “Professional networking” social hours are now a standard feature of workshops, conferences, and seminars hosted by industrial and academic institutions. Facebook successfully launched its now famous social networking site on the internet in 2004, and LinkedIn, another internet-based service which is devoted specifically to professional networking, was started one year earlier. It is interesting to observe that most of these professional networking venues did not levy an explicit charge for membership or participation. Earnings were made either in collateral activities (such as from admittance fees for the events that they were attached to), through advertising revenue, or through the offering of premium services within the network.

A fascinating historical case of a social/professional network occurred in Florence, Italy, in the 15th century. Florence, in the Middle Ages, had developed a very vibrant mercantile economy, along with a banking system that provided services throughout Europe, and by the 13th century had become one of the richest and most powerful cities on the continent. While the

city's government was formally a democratic one, in point of fact it was run by a number of contending powerful families, characterized by intense rivalry among the most prominent of these. At the beginning of the 15th century, Florence was under the control of the Albizzi family, but its power was gradually undermined, and ultimately usurped, by its bitter rival, the Medicis.

While initially not the most powerful clan in Florence, the Medicis were part of a long-established aristocratic line, and oversaw a lucrative banking practice that provided capital and other services to a wide network of clients, including the Pope. But the networks that they developed went far beyond simply providing banking services to a broad clientele. Through extensive intermarriage with many of the other prominent families in Florence, the Medicis placed themselves at the center of a social network, through which they could play the role of intermediary in brokering business agreements, or resolving disputes, or forming alliances among these families. And they did not limit their social network to the established elites: by providing financial support to Florence's "gente nuova" – its new immigrants – they formed bonds through patronage that spanned all social classes.

Figure 1: 15th Century Florentine Marriages



Source: Padgett, J.F., and C.K. Ansell (1993) "Robust Action and the Rise of the Medici, 1400-1434," *American Journal of Sociology* 98:1259-1319

But the key to the Medicis rise to power did not lie in simply forming extensive networks. Rival aristocratic families also intermarried extensively. There were two key features that made the Medici system of networks particularly instrumental in that clan's eventual rise to power, and to understand what these were, a little background into the culture of 15th century Florence is required:

In Florence at that time, there were two classes of social elites: the patricians, which were established, aristocratic families that inherited much or most of their wealth, and the “new men”, consisting of those who had gained their riches as entrepreneurs and merchants in Florence’s evolving and thriving mercantilist economy. The “new men”, in spite of their wealth, were generally shunned socially by the aristocrats, and intermarriage between these two groups was virtually non-existent. The Medicis, who were themselves part of the aristocratic class, also avoided intermarriage with members of the “new man” class, for to do so would have cost them social prestige among their traditional peers.

What set the Medicis apart in their relationships with both the aristocrats and “new men” were this: First, they tended to intermarry only with aristocratic clans that were located outside of the region in Florence where they resided, the San Giovanni quarter. By doing so, they became a vital point of connection between powerful families that did not generally associate with the Medicis or with each other due to geographical dispersal. And second, unlike their peers, the Medicis were quite willing to engage in economic relations with the entrepreneurial class: making loans, forming business partnerships, and employing members of this class in Medici banks. What made this structure of networks so particularly empowering was the critical role that it conferred upon the Medici clan: Since the aristocrats and the entrepreneurial class were loath to deal with each other directly, they were compelled to rely upon the Medicis as intermediaries, and found it tangibly beneficial to do so. A simple network of extensive intermarriage, as practiced by rival aristocratic families, did not confer the same power upon them.

A telling demonstration of this occurred in 1433, when the head of the Medicis’ principal rival clan, Rinaldo Albizzi, attempted to seize control of Florence by military force. He had hoped that his clan’s extensive network of marital ties with other Florentine aristocratic families would constitute a ready army of “supporters”, but when the critical moment to strike arose, he found lackluster support among them, with only a fraction of the families sending men to join ranks with him. When the Medicis learned that this attempted coup was underway, the response of their own supporters was much more effective. In fact, the Albizzis were so stunned by both the size and level of coordination of the resistance, that they immediately abandoned the coup, and no armed conflict occurred. What was particularly impressive about this counter-strike was that the leaders of the Medici clan, the brothers Cosimo and Lorenzo, were not even in Florence at the time, having been temporarily exiled. They had coordinated the response entirely through communications smuggled into Florence to their allies. The difference in the responses to these rival clans lay in the fact that those who were part of the Medici network derived a significant, tangible benefit that was contingent upon the Medici role as the administrator of that network, whereas the Albizzis were simply one aristocratic family among many that were interconnected through ties of marriage. There was no special benefit to supporting the Albizzis’ rise to power: not one, in any case, that for most of their connected clans would justify a risk of life and limb.

In their study of the Medici power network, “Robust Action and the Rise of the Medici”, John F. Padgett and Christopher K. Ansell sum up the strategy this way:

The Medici party was an agglomeration of doubly disarticulated parts: structurally isolated new men living within San Giovanni, whom the Medici mobilized directly

through economic relations, and structurally isolated patricians residing outside San Giovanni, whom the Medici mobilized directly through marriage. Conscious residential segregation, as well as “natural” social class segregation, were keys to the inhibition both of independent ties among followers and of multiplex ties with the Medici themselves. The result was an awesomely centralized patrimonial machine, capable of great discipline and “top down” control because the Medici themselves were the only bridge holding this contradictory agglomeration together.

A variant of the Medici strategy played itself out in America’s Gilded Age, when political machines rose to power in big cities such as New York and Chicago in the late 19th and early 20th century as the result of alliances forged between disparate immigrant ethnic groups by crafty political organizers. These groups, whose members had often been loath to associate with each other socially, collectively gained political empowerment through their support of the party machine. And, like the Medicis, the party maintained its power because of its critical role as the focal point in maintaining this collective political clout.

In a sense, academic journals serve as “bazaars” or exchange points for ideas, and as in physical networks, the roles of those who are associated with them are flexible and interchangeable. Readers, writers, commenters, and referees can change places across issues of the publication, or even within the same issue. Of particular interest is the “attribution” network that emerges over time, as particular articles are recognized as seminal ones in the evolution of theories, and assume places of significance in the relevant academic community. As with other networks, the value of any particular academic journal is at least partially proportional to the size of its participants (i.e., readership), although another dimension of quality is the number of attributions that its contributing authors receive. And, as with other networks, there is overlap between the participants associated with different academic journals, with writers in some citing writers in others, and readers shared among them, hence adding to the fluidity of the web of interconnections.

In the year 1698, in London, a man named John Castaing began posting stock and commodity prices at Jonathan’s Coffee House. Here were the humble beginnings of what would become the London Stock Exchange, the first exchange that allowed stockbrokers (who had been barred from earlier such institutions in England, because of their boorish behavior) to actively participate in the purchase and sales of stocks and commodities through open bidding. Modern stock exchanges and futures markets have replaced much of the frenetic activity of the floor traders with electronic communications, but continue to serve the same role as that served by Jonathan’s Coffee House: to provide a central point of contact for the sharing of information and the negotiation of purchases, sales, and exchanges among multiple participants based upon that information. These exchanges bear all of the classic features of a network: There is a fluid system of continually changing interactions between participants, with reversible roles of buyer/seller and multiple trading partners. The exchange serves more as a facilitator of transactions rather than a controller or regulator of them. And the value of the exchange increases as the number of participants in it increases (i.e., due to the higher liquidity of the underlying markets).

Stock exchanges and futures markets highlight a feature common to most if not all networks. One of the principal commodities of value produced by these systems is information,

and much of that information is generally available for free, or for a nominal fee through secondary sources. (Before the internet, the general public could track daily stock and futures prices in the business section of the local newspaper, which is still the case today.) Of course, there are often different tiers of information, and information that is of particular value to active participants of the network, such as “real time” reporting, may be limited to them, or only available to non-participants for a fee.

The sale of real-time price data is, in fact, one of the means by which the owners of stock exchanges derive their income. A collateral revenue source is the sale or leasing of trading software to institutional investors that allows them to receive and process this data. The other principal sources of revenue are the listing fees charged to companies that trade on the exchange, and the trading fees charged to buyers and sellers of the company stocks. Beyond the exchange itself, a myriad of revenue opportunities are created for intermediaries, such as brokers, who advise upon and facilitate trades for individual investors. The exchange also creates opportunities for institutional advisors to sell their services for a fee, and for outlets such as print media and data services to resell its price and trading information. A veritable business “ecosystem” has in fact evolved that is supported by the activities of exchanges.

In recent years, the internet has not only provided the means by which radical innovations could be made in existing networks, but it has also served as a platform for the creation of a myriad of new network-based businesses. Of these, Amazon.com is probably the iconic example of one such business. The company was founded by Jeff Bezos in 1994, after he had read a report about the internet that projected growth in e-commerce of 2300% per year. His initial strategy was to focus solely on selling books, and within two months the company’s sales volume had grown to \$20,000/week. The immediate advantage that Amazon offered over “brick and mortar” stores was a much larger “inventory”, which of course was a virtual inventory, as Amazon was functioning as a broker, acting as an intermediary between physical suppliers and its online customers. At this stage, Amazon’s strategy was really just a sophisticated version of the channel, with a clear conduit still existing from seller to buyer.

But as Amazon’s business platform evolved, it took on more of the characteristics of a network. Rather than simply acting as a retail service outlet for books in its inventory, it began to provide direct links to alternative book suppliers if it could not provide the book itself. Eventually, a listing of new and used versions of any particular book, along with price and quality information, and links to the third-party providers, became a standard feature of the Amazon service, whether Amazon offered the book itself or not. Consumers were invited to provide ratings and reviews of their purchases, along with other feedback, such as prioritized lists of best books in any particular subject, and they could also comment on the input of other consumers. Amazon has found other means of using information to add value to its business platform, such as making recommendations to customers of items to buy, based upon their past purchase behavior, and prioritized rankings of items in any selected category, based upon price, number of sales, average customer feedback, or relevance to the subject area the customer had identified. And, building upon its success in the book market, Amazon gradually expanded its menu of service offerings, and now sells a broad range of products, making it a virtual online department store. Amazon is not a perfect network, as there is not complete flexibility to be both a buyer and a seller. (There is nothing, for example, comparable to the exchange-a-book service

that is offered in many physical used bookstores.) However, Amazon continues to search for ways to soften the boundaries between different participants on its network. For example, it now provides a service for writers to actually have their books published by Amazon, and then sold on its website.

The Amazon strategy has been duplicated by other internet firms – notably Netflix, which provides rentals and video streaming services online that include a variety of movies and television shows. Netflix, like Amazon, capitalizes on an analysis of its consumers' past transactions in order to produce recommendations for future ones, and also enables its customers to share feedback on the shows and movies that they have watched. eBay has managed to go farther than either of these two companies in blurring the line between buyer and seller, in that users of its services can put things up for sale, or bid for products that other users have posted on its website. In this way, it is more like the bazaars and flea markets that provided a physical network for the trading of goods and services. Noteworthy, too, is PayPal, which has capitalized on the network model and the use of the internet to facilitate the purchase of goods and services from just about anywhere online.

The various network-based businesses on the internet provide a very lucrative universe of case studies that highlight the means of success underlying these strategies. A cursory inspection of these reveals that the recipe for success essentially entails 1) identifying a particular product or service that could be more effectively provided through a network, 2) building up the breadth of that network as quickly as possible through a growing supplier and customer base, 3) establishing a brand identity to dissuade competitors who might attempt to provide an identical service, and 4) building up the depth of the network by developing collateral and/or value-added services, perhaps involving technological innovation, that will augment the overall value of the platform to its patrons. As described below, there is often a very significant “first mover” advantage in establishing a network enterprise, but even an extremely successful network may still be assailable from an innovative competitor.

The examples above highlight the salient features of a network. At the base of any network is a locus of contact and exchange, whether this is a physical location, such as a bazaar or a stock exchange; a club, association, or fraternal organization; or the internet. Regardless of how broad the network is, and how fluid the roles of its participants, there is always a “core” – something that serves as its focal point. At the very least, this locus acts as the gateway through which outsiders can gain admittance to the network. Another feature of the network is that it tends to result in the production of emergent and collateral values, many of which can be enjoyed by participants (and, in many cases, by non-participants) at no cost. Information is one such emergent value. Casual shoppers on the Amazon.com website, for example, can gain a wealth of information about products and services without actually purchasing anything. A third feature is the phenomenon of “tiering”: there are often discrete levels of membership or participation, with the “premium” levels consisting of a smaller group of participants, who generally have access to more services or advantages, but at a cost. Hence, this tiering phenomenon can be visualized as simultaneously vertical and horizontal, with higher levels corresponding to the more valuable ones, but more exclusive and therefore of smaller size, so that each successively higher tier is like a higher layer of a wedding cake, narrower in radius than all of the lower layers. In the New York Stock Exchange, for example, there is the exchange itself, and from this radiates a

succession of concentric tiers, beginning with members who buy a seat on the exchange, out to brokers and institutional investors, and finally to the individual traders. Participation in the periphery of the network tends to be more “ephemeral” than closer to the core, in that the membership is often much more fleeting, and the activities less formalized and more spontaneous.

The examples also highlight how a network strategy can be a lucrative one. As the case of the Medicis illustrated, the ultimate success that this clan enjoyed in obtaining wealth and power in Florence did not come from simply creating a large network of familial, political, and economic contacts, nor even by being at the center of the network, but rather by making their presence on it a pivotal one. Those who were part of one or more of the Medici interlocking networks could generally only derive value from them by dealing with a Medici as an intermediary. Similarly, successful internet businesses such as Amazon, while cultivating a broad network of product providers and customers, ensure that they are involved in most if not all of the actual transactions that occur in their network. Profitable network strategies share this with profitable channel strategies, in that the practitioner of each is able to exercise control over transactions with market participants by playing a critical intermediary role in them. But while the channel strategist does this through ownership and/or control of a discreet delivery conduit – a pipeline or wire or physical passageway – the network strategist does it by being a necessary point of contact. Rarely does the network strategist exercise monopoly power in the conventional sense, as its particular intermediary role could generally be duplicated by other network strategists. However, through a combination of branding, first mover advantage, and innovation in the manner that the network is created and managed, the network strategist is able to derive benefits that are characteristic of a conventional monopolist.

Disintermediation/Disruption

Channel-to-Channel

Historically, the most common form of disintermediation has involved a new, more effective channel strategy supplanting an established, cumbersome or costly, one. In fact, channel/channel disintermediation was one of the main causes contributing to the Age of Discovery which began in the early 15th century. Many of the major trade routes linking Europe, Asia, and Africa at that time were tightly controlled – either in whole or in part – by nations or empires that were able to profit from those who used these routes or to limit access to the routes by members of rival or enemy powers. This provided the incentive to search for alternate channels. Prince Henry the Navigator of Portugal, for example, engaged in extensive sea exploration in the early 1500s, which was largely motivated by the desire to discover and establish new sea lanes that would give Portuguese traders more direct access to West Africa and the Indies. The motivation for Prince Henry and the explorers who followed him to engage in such searches intensified with the fall of Constantinople – a critical link between markets in western Europe and regions eastward - to the Ottomans in 1453, and by the end of the century sea routes were discovered and established that linked the Atlantic Ocean to the Indian Ocean, hence bypassing the need for an overland trade route to India.

The postal service has seen a number of inroads from alternate channels for the delivery of messages, with one of the earliest being the wireless telegraph (and the very first commercial line, ironically, being owned and operated by the U.S. Postal Service), which began to offer long-distance messaging service in the middle of the 19th century. The United Parcel Service (UPS), which began as the American Messenger Company in 1907 (its first delivery vehicle was a Model T Ford), began offering its own alternative delivery service in Seattle, Washington. UPS expanded to other major cities, and then larger territories, during the following decades, finally becoming national in scope in 1975. Federal Express is a more recent alternative delivery service, which was the brainchild of Fred Smith, who as a student wrote a paper proposing a more efficient system of delivery that involved using a hub-and-spoke model for sorting and dispatching. Smith was aware of the increasing value of time to both consumers and manufacturers, and argued that his proposed system would result in the faster, more efficient delivery of small manufactured goods to a large, geographically dispersed base of consumers. He put this theory into practice by founding the Federal Express Corporation in 1971, introduced overnight package delivery in 1973, and began competing directly with the U.S. Postal Service's "Express Mail" in 1981 by offering an overnight letter service. The fax (or "telefax") machine, another popular alternative to postal delivery, has actually been in existence since the 19th century (predating the invention of the telephone by eleven years), but did not receive widespread commercial application until Xerox introduced the Magnafax Telecopier in 1966, which could be connected to any standard telephone line. The superiority of this virtually instantaneous form of written communication to the standard mail-delivered letter in terms of time saved was substantial.

Channel-to-Network

Historically, the most extreme cases of disintermediation involve the overturning of a channel by a network. In many of these cases, the underlying change does not involve a radical shift from what had been an unequivocal channel strategy to one characterized by a pure network, but rather a change in degree, to something less "channel-like" and more "network-like". Consider, as an example the supplanting of long-distance passenger rail service by the automobile. This change was catalyzed by the development of the interstate highway system in the mid-20th century. But, as with the development of railways in the 19th century, the service emerged after a large-scale investment in transportation infrastructure that spanned the entire continent. Both services involve passengers using vehicles that traveled large distances along established routes. The difference is that with rail service, the routes (tracks) were under the direct control of the railway, and customers traversed them as passengers, paying the rail service for each trip. Highway transportation, on the other hand, can be conducted by drivers who own their own cars, who do not pay (unless tolls are involved) for traversing specific routes, and who exercise complete control in both the ultimate and intermediate stopping points for their trips. In addition to drivers, the routes can be traveled by passengers who accompany the drivers or else contract for commercial transportation through buses, hence making the role of "service provider" and "service receiver" more fluid and interchangeable. The highway system enables the traveler to engage in collateral economic activities, such as buying food from roadway diners, or souvenirs from highway vendors, and to take detours for sightseeing or other personal reasons at any point that they choose. As with any network system, its presence makes possible the existence of a variety of collateral services. But again, when compared to the railway system,

this is a difference in degree rather than kind, as the railroad also supported the growth of tangential economic services, and even the growth of entire regional economies.

The postal service has faced the onset of many competing channels for message delivery service, as described above, but its most potent competition has come from a network model: that of e-mail and other electronic messaging services. In its current form, e-mail has all of the fluid features of a network. Messages can be sent simultaneously to multiple recipients, and forwarded to others. Documents and other electronic files can be easily attached as well as unattached to them, and electronic links to internet websites can be included. Smart phones have an electronic messaging service, and social networking websites and internet chatrooms allow for instant messaging. Twitter has produced the most extreme version of network communication by allowing any remark to immediately become a widespread conversation among large numbers of “listeners” and active participants. Of course, all mail and messaging services contain features of a network, including the postal service itself: again highlighting the fact that the channel and network are not dichotomous systems, but rather elements that are present in all delivery systems to varying relative extents.

Network-to-Network

Networks can also be supplanted by other networks. In some cases, this is more of an evolutionary rather than a revolutionary process, as with stock exchanges and futures markets, where the traditional system of human traders shouting out buy and sell orders is gradually being replaced with computerized systems. Open air markets and bazaars, where merchants and shoppers could meet to buy, sell, and exchange goods, and their modern incarnations, such as “flea markets” and “exchange-a-book” stores, while still in existence, have had much of their business supplanted by internet-based services such as eBay and Amazon.com. In fact, as described above, retail “brick and mortar” stores in general really owed their success to the network properties inherent in their system of bringing together a variety of products, from multiple vendors, to a single site, where interested shoppers could choose among these, and to the extent that these stores have lost business to internet retailers, which have done the same thing more efficiently and conveniently, it constitutes a supplanting of one network by another. Amazon is the prime example of this, and the impact that the Amazon network model has had upon bookstore chains has been devastating. An even more devastating disruption of this kind occurred when Netflix began to offer movie rentals via the internet, which eventually led to the complete downfall of Blockbuster, which had relied almost entirely upon brick-and-mortar stores to provide its own video rental service.

In general, however, it is much more difficult for one true network to supplant another. Channels are more vulnerable to disintermediation because their very existence is contingent upon control over a well-defined delivery conduit, and all that is necessary for a potential interloper to succeed is to provide an effective means of bypassing this conduit. Since a successful network does not maintain its existence through mechanisms of control, it presents a much more difficult target to upend. As Jeff Bezos once remarked about his company, Amazon.com, “There’s nothing about our model that can’t be copied over time.” Indeed, any company could enter the same market domain as Amazon.com, with exactly the same model. But unless it could provide some distinctly superior functionality in something like order

processing or the presentation of product information, it would have little chance of displacing Amazon's market share. In addition to the traditional advantage of branding that is enjoyed by many successful companies, Amazon has the benefit of a well-established network of buyers and sellers, the size of which confers to each of the participants benefits in the form of information and mutual accessibility. An interloper would have to build such a network virtually from scratch, and its comparative value to participants in the incumbent network would be as proportionally diminished as its smaller size.

Networks often have a "first mover" advantage that goes beyond simple brand popularity, and a very notable example of this is in commodity futures markets. One of the principal roles of a futures contract is to provide a hedge against price movements in the corresponding physical commodity, and for this to be possible, there must be a correlation between movements in the price of the futures contract and movements in the corresponding commodity price. However, a characteristic feature of futures markets is that each commodity type tends to have only one futures contract corresponding to it in any particular country, even if multiple, unconnected markets exist for that commodity type, characterized by uncorrelated price movements between the markets. When there are distinct regional markets for a commodity, this would seem to justify the existence of more than one futures contract, with a contract corresponding to each of the separate regional markets, in order to ensure that an effective hedge is available for the commodity in each of those markets, but this is rarely if ever the case. Historically, attempts to create additional futures contracts for any commodity after one has already been established for that commodity generally meet with failure. An example of this is the failure of the natural gas futures contract which was introduced by the Kansas City Board of Trade (KCBOT) in 1995. A natural gas futures contract already existed at the time, having been introduced five years earlier by the New York Mercantile Exchange, which had become highly successful and heavily traded. The KCBOT contract had been introduced because there was compelling evidence that two distinct regional natural gas markets existed in North America: one in the eastern half of the continent and the other in the western half, with a low correlation in their respective price movements. The belief was that the NYMEX contract had a stronger correlation with the eastern natural gas market, and that the KCBOT contract would therefore provide physical traders of natural gas with a more effective hedging tool for the western market. But within four years of its introduction, KCBOT suspended trading of the contract, because of low volume. The apparent cause of this failure was the new contract's inability to develop a level of liquidity anywhere comparable to the already established and heavily traded NYMEX contract, and the new contract's higher correlation with gas price movements in the west could not compensate for this critical shortcoming in traders' eyes – particularly speculators who placed a much lower premium on the contract's effectiveness as a hedging tool, but a very high premium on liquidity.

Internet ventures such as Amazon and Netflix have certainly benefited from being first movers to create seemingly unassailable and enduring businesses, and one wonders just how they could be upended. One strategy a potential interloper might use is "counter-branding", where one has an established brand identity already, but in a different (perhaps more traditional) venue, which can be leveraged by tagging it to the new internet service. Barnes and Noble, which had a popular chain of physical bookstores, tried this strategy as a defensive tactic against Amazon, by creating its own book-buying website, but met with limited success. Blockbuster also considered this defensive tactic against Netflix (in addition to the tactic of buying Netflix outright), but

ultimately decided against it, believing (incorrectly, in retrospect) that its traditional brick-and-mortar system of video rentals would not be seriously undermined by the internet challenge. There have been established internet ventures that have failed or met serious challenges from other internet competitors, however. Myspace, for example, was once the world's most popular and successful social networking website, but has gone into decline in recent years as many of its customers have migrated to Facebook. One probable cause for this decline is that Facebook has been much more agile in increasing the depth of its network service, finding new ways to augment the social-networking experience on its website, while Myspace continued to focus on entertainment and music as the points of connection among its users. And Myspace, which relies on internal resources for the development of new applications – unlike Facebook, which is open to outside developers – has been relatively slow to innovate. Apps such as Tinder are also providing new challenges to established social networking sites, particularly matchmaking services such as Match.com, as they use product innovations such as geographical location technology to allow users to find dates in real time, rather than through the cumbersome process of seeking out prospects through a sequential exchange of information. These kinds of apps have proven to be particularly appealing to younger consumers. Hence, even a successful network business with a first mover advantage and a brand can still face ultimately devastating competitive challenges from an interloper. The challenge generally arises from the ability of the interloper to capitalize on some new product or service innovation which will make its own network service more convenient, more useful, or simply more entertaining for participants.

Lessons from the Telecommunications Industry

Channel or Network?

The telecommunications industry provides an interesting case in the examination of channels and networks. Which one is it – channel or network? A superficial appraisal of the traditional telephone system might suggest that it is a network, since it is literally a connected network of millions of individual phones, each of which has the fluid capability of connecting with any other. And yet for most of its history, the telephone system has been regulated in a manner very similar to that of gas, electric, and water utilities, which are clearly channel models.

A clue to this paradox lies in the history of the telecommunications industry itself. When Samuel Morse's telegraph system was commercialized in the U.S. in 1844, the U.S. Post Office managed the original line connecting Washington, D.C. and Baltimore, Maryland. Private telegraph lines began to be developed after this one, and these generally tracked the system of railroads that were being built at the same time. But in all cases, the telegraph served as more of a communications conduit between discrete locations, rather than as a fluid network. In this respect, it resembled interstate pipelines or long-distance electricity transmission lines. And as telegraph lines proliferated, the dominant business models that supported them were monopolies (e.g., Western Union) and collusive cartels.

Although telephone service initially showed the promise of being a highly competitive one, with thousands of separate companies being formed in the U.S. by the end of the 19th century, this quickly changed. The Bell Telephone Company, which had been organized in 1877 by the father-in-law of the telephone's inventor, Alexander Graham Bell, created a subsidiary

called American Telephone & Telegraph in 1880, charged with forming a nationwide long-distance network of phone lines. (AT&T eventually became the parent company of the Bell System.) AT&T proceeded to buy up other phone companies throughout the country until it acquired a dominant market share. When AT&T's growing market power attracted the attention of federal anti-trust authorities, the company's President, Thomas Vail, argued that telephone service constituted a natural monopoly, and should therefore be regulated as such. (He popularized his position with the motto of "One Policy, One System, Universal Service".) Congress concurred, and, in the Mann-Elkins Act of 1910, put AT&T under the regulatory authority of the Interstate Commerce Commission. This regulatory authority was later transferred to the Federal Communications Commission, when it was created as part of the Communications Act of 1934.

AT&T, in addition to being the sole long-distance provider of telephone service, was also dominant in local markets, and while it had agreed, under pressure from the Justice Department in 1913, to allow local competitors to interconnect with its long-distance lines, it was not similarly obligated to interconnect its local service with that of competitors. Moreover, those users who were connected to AT&T lines were compelled to use only AT&T equipment until an inventor named John Carter successfully challenged this prohibition with his "Hush-a-Phone" device in 1956 and "Carterfone" in 1968. This opened the way for a "plug and play" telecommunications system which permitted the interconnection of a myriad of devices that were not sold or leased by AT&T. In 1984, a court decision led to the divestment and break-up of AT&T's local service providers, the "Baby Bells", and in 1996 the Telecommunications Act paved the way for a completely competitive market by mandating total interconnectivity between any of these local service providers and other third-party competitors.

But has the deregulation of the telecommunications industry really eliminated every last vestige of the channel aspect of its market design? In its basic features, telephone service still resembles that of the other utilities, particularly electricity. One pays for access to the grid, and then can utilize the services of the grid at any time. When a customer uses a phone, however, the customer is not simply receiving a commodity, like electricity. The customer truly becomes an agent on a network, and can conduct business on that network, as both a buyer and a seller. And certainly, when one moves beyond basic services to the other services that are supported by contemporary telecommunications companies, such as smart phones and the internet, these are characterized much more by the properties of a network than that of a channel. The evolution of telecommunications service, then, represents a transition from a model that began as a channel (telegraph messaging) to something that has become almost exclusively a network. And with this transition has come a change in the level of regulatory oversight, along with a change in business strategies, which have shifted from trying to maintain exclusive control over the vital conduits of service, to competing with rival providers by offering various packages of bundled products and services to consumers.

The Internet

The Internet has become the most ubiquitous modern platform for network activities. Its creation and development has been an interesting mix of central planning and grassroots emergence. It had its origins in the ARPANET, an interconnected network of a handful of

university research facility computers in the U.S. that came into being in the late 1960s and early 1970s, which expanded to include connections with other data processing centers, including ones in foreign countries, during the ensuing decade, and in 1986 linked with supercomputer sites that were part of the National Science Foundation Network. In 1987, the NSF created NSFNET, the first high-speed Internet “backbone”, operating at 1.5 Mbps (million bits per second), and which consisted of 170 smaller interconnected networks. Internet service providers, which enabled users to gain access to this network for a fee, began to appear in 1989. ARPANET was decommissioned in 1990, and NSFNET in 1995, leaving behind an infrastructure of interconnected computer systems which were no longer bound by any restrictions upon the use of commercial traffic.

The Internet has no central governing authority, nor is there any particular entity responsible for maintaining it or improving it. The Internet Society (ISOC), founded in 1992, has taken on much of the mantle of developing the Internet and establishing standards of operation. Membership in the society is voluntary, and is open anyone who wishes to join.

The Internet continues to be an essentially decentralized network of interconnected computer systems, and there is no central control, nor any coordinating facilities to direct its activities. The system’s resiliency stems from the redundancy which exists among its component parts, and its efficiency lies in the sophisticated routing protocols that channel traffic along optimal pathways to avoid congestion. At the base of the system is a “backbone” of multiple networks, each owned by separate companies, generally consisting of fiber optic cables, which are the preferred method of data transmission because of their capacity to allow for fast data speeds and the transmission of data over large distances with little attenuation, their high resistivity to electromagnetic interference, and the large bandwidth that they can handle. The largest networks in the backbone are known as “Tier 1 providers” and these include providers in the telecommunications industry. As of 2013, there were seven tier 1 telecommunications providers: Level 3 Communications, TeliaSonera International Carrier, CenturyLink, Vodafone, Verizon, Sprint, and AT&T Corporation. Each network within the backbone is physically connected with each of the others at Internet Exchange Points (alternatively known as Network Access Points), which can be administered by either private companies or non-profits. Within a major city or region, a Tier 1 provider will set up a special access site, called Point of Presence (POP), where local users can access that provider’s network.

The pyramidal, “tiered” structure of organization that governs the construction and operation of the internet also guides the process by which the internet is financially supported. The general user pays an internet service provider (ISP) for access to the grid, and each ISP, in turn, pays for data transmission across local high-speed lines to one or more “middle tier” companies that own and operate them. Middle tier companies then pay Tier 1 and Tier 2 companies for long-distance transmission. Very large users, such as Netflix and YouTube, transact directly with the upper tiers, but as the internet demand of some of these huge users, such as Google or Facebook, has continued to grow, they have begun to build out their own internet backbone rather than contract for it from other providers. Pricing for internet access at all of these levels is determined by a number of factors, including the level of competition among access providers (which is a function of the extent of internet build-out in any particular region), the level of demand and quality of service required, and, in the case of very large users, the

degree to which these users can leverage their buying power to acquire favorable terms of service. On this last point, among large users, and in the middle and upper tiers, expenditures on internet activities often come down to a “lease or build” decision, with the future build-out of additional internet infrastructure increasingly being carried out by entities that had formerly leased that infrastructure from other providers.

The Electric Utility Industry

The Traditional Model (Channel Strategy)

Historically, the regulated electricity utility clearly followed a channel strategy. As the sole provider of electricity within its franchised service territory, the utility could set rates for delivery service above marginal cost, which allowed for recovery of a reasonable rate of return, as determined by its state regulatory authority. Because earnings for delivery service were essentially capped by these regulatory restrictions, utilities did attempt to augment their incomes by providing additional services to customers via unregulated subsidiaries, such as home security, heating and air conditioning maintenance plans, and even the sale of appliances, but such ventures generally met with limited success, and rarely if ever did they alter the fundamental channel structure of the primary service: delivery of electricity. Even in those states where regulatory restructuring occurred, and the role of the regulated utility was limited to simply delivering electricity, rather than selling and delivering it, the channel structure of this delivery service remained essentially the same, except in the case of larger manufacturing customers with combined heat and power facilities that were permitted to resell their excess power to the utility.

Disintermediation Threat

What potential form would a disintermediation threat take for electric utilities? It is hard to imagine a system that could be more efficient at providing the fundamental service of electricity than that which is operated by electric utilities. Customers receive all of the electricity that they need, and exactly as much as they need, all of the time, and it is always of the proper quality in terms of voltage level and frequency such that there is never any danger of damage to the applications that are being powered by it. Customers do not have to worry about where their electricity comes from, or how long it will be available. In fact, they don't have to really think about it at all. They flip the switch to any electrical appliance, and the appliance comes on.

But there are three potential inroads by which a tangible threat could be made to this model. The first is price. If a competitive electricity provider could deliver the electricity at a lower price, then this might induce competitors to switch to them. The second is reliability. There have been a number of high profile electricity outages in recent years that have affected very large numbers of customers, and that have lasted for long periods of time – even days. Customers might actually be induced to pay more for an alternative, more reliable source of electricity. The third is environmental impacts. Customers who believe that their utilities are not moving far enough or fast enough in mitigating the negative impacts on the environment of electricity production might seek out alternative sources of “clean energy”.

What Would an Electricity Network Strategy Look Like?

Clearly, the electricity system, in a physical sense, is already a network, with multidirectional power flows between millions of discrete grid components. In its traditional configuration, however, even the physical system supported the channel economic model that was at the base of it, with a hub-and-spoke arrangement consisting of committed power sources (electrical generators) and customers who (with the exception of some large industrial facilities) only received power and never produced it. The Public Utility Regulatory Policies Act (PURPA) of 1978 and the Energy Policy Act of 1992 laid the groundwork for the growth of non-utility generation sources, and both deregulation (where it occurred) and the falling cost of solar panels and other renewable energy sources has only accelerated this trend, so that the system is becoming much more network-like, with an increasing number of participants who can both produce and consume electricity, and also engage in bilateral transactions that do not involve the central electricity provider. While the evolution of this modern electricity network does not parallel that of the internet (which involved a coming together of once separated computer networks, rather than an internal transformation of an already existing interconnected system), the internet probably provides the best comparative model of what the electricity network will eventually become.

In a decentralized grid, electric utilities may play a role comparable to Tier 1 service providers in the internet. These companies provide the “backbone” of the internet, including routers and cable. While some of these Tier 1 providers, such as Verizon and AT&T, offer internet access service directly to general consumers, all of them generally contract with smaller, downstream companies that also provide this service. In this model, utilities would continue to provide the basic infrastructure requirements of the electrical system, and would also be a direct provider of electricity within the system, but there would be other – perhaps significant – non-utility participants on the grid, providing electric generation and other services, and these might include a number of microgrids. These other participants, like lower-tier service providers on the internet, could contract with the utility for certain capabilities that will enable them to fully utilize the grid, but they will also have a great degree of independent latitude in how they operate on the grid. It should be remembered, however, that there are only about a half dozen Tier 1 companies in the U.S. If this does become the network model for utilities, it raises the interesting prospect of whether a shakeout will occur involving mergers and acquisitions that will eventually leave just a handful of large companies managing the national grid. One critical distinction between electricity and the internet is that there is no requirement, with internet service, for a “provider of last resort”, nor for “universal service”, so that there is less of a perceived need for regulation – either at the state or federal level – of the internet. Because these requirements will continue to have to be fulfilled on the electrical grid, the role of the regulator – both at the state and federal level – will continue to be an important one.

Business Opportunities

As the electricity grid becomes more decentralized, the role of the utility – in addition to the inherent earnings opportunities available to it – will be contingent upon the degree of this decentralization. It is very possible that in some if not most of the electricity distribution systems of tomorrow, the present business and regulatory model will persist in its present form,

with the distribution utility owning and operating the grid, and most of the electricity generation coming from large, central station generators. In those cases where a true network evolves, with a proliferation of two-way power flows and smaller scale distributed generation and storage facilities, the utility may still own the grid, and may also bear primary responsibility for operating it, although neither of these outcomes is a certainty. If the utility does persist in being both the owner and proprietor of the grid, then it will probably bear the responsibility for ensuring that all customers connected to the grid have access to a continuous electricity supply. This will be a critical difference from the internet, in which there is no single, monolithic entity that ensures that all customers in a region receive internet service if they want it. Rather, it is the system of rules, interconnection standards, and protocols encoded into that system that tend to support the operation of the network. There are just a few large telecommunication companies that play a dominant role in any particular region, but the motivation for providing and ensuring service is strictly an economic one, and there is no inherent guarantee of universal service for all customers, nor anything like an “allowed rate of return” for infrastructure investment carried out by these companies. It is possible that such a system could eventually evolve for electricity distribution, although the risks inherent in replacing the current model with this one will probably make it an unpopular prospect for consideration among regulators.

Any channel strategies that utilities will be able to maintain will be contingent upon what features of the grid it still exercises control over, and from which economic rents can be extracted. One of these might be customer information, including information about usage patterns, which might be shared with non-utility service providers on the grid for a price. The extent to which this information can be shared, however, will have to be determined by a legislative or regulatory body, and to the extent that it can be shared, utilities might be compelled to make it available at no cost to market participants. If a utility maintains responsibility for overall grid functionality, then this itself represents a source of control, as the utility will be the proprietor of interconnection standards and other requirements that must be abided by to ensure the continuation of a reliable electric system with suitable power quality. New entrants to the grid, such as energy producers or storage service providers, might have to enlist the services of the utility to ensure that they are locating their services on the grid and operating them in a manner that does not in any way compromise the system. And again, unless utilities are mandated to provide this guidance at no cost, it represents a potential source of earnings that arises from its unique position of control over the system.

Of course, the fundamental service traditionally provided by the owner/proprietor of a network is *access* – the ability of a user to patch into the network and thereby participate in the consumption and/or offering of products and services that are exchanged there. Internet service providers provide the best contemporary example of this offering: for a fixed monthly fee, their customers can gain complete access to the internet and everything that comes with it, including information, the opportunity to communicate with other occupants of the network, and a venue for engaging in both buy and sell transactions. Although the fee for internet access is generally in the form of a simply monthly fixed charge, there are often different levels of fees, corresponding to different levels of service – usually associated with uplink and downlink speeds. Cellular phone service also generally includes access to the internet, in addition to the ability to send and receive e-mails and text messages, and of course engage in telephone conversations. Here, too, the standard offer involves a flat monthly fee, although this is usually

paired with a variable charge that corresponds to the number of calls and/or amount of data that is transmitted by the user.

An owner/proprietor of an electricity distribution grid could adopt a similar pricing structure based upon the concept of compensation for providing access to the grid. This, too, could be a flat monthly fee, with the actual purchase and/or sale of electricity contracted for separately with other grid participants. A variable charge corresponding to the volume of electricity flowing to/and from the customer, similar to the charges incurred by cellular phone users for data transmission (in some cases, above a certain level that is included as part of the fixed charge) could also be applied, and a demand charge as well. This, of course, is essentially electricity delivery service in its current form, but with a complete removal of any kind of compensation for the electricity itself or for ancillary electric services, as well as a removal of any obligation on the network access provider's part to be an electricity supplier of last resort.

The opportunity – and challenge – beyond merely being a provider of access is to identify products or value-added services that can be offered to customers who are part of the network. The opportunity lies in the creation of avenues for the grid owner/proprietor to create new revenue streams which, since they will probably correspond to products and services that are of incremental benefit to consumers, will be subject to limited price regulation, if any regulation at all. The inherent challenge is that the very fact that these products/services are offered by the grid owner/proprietor will invite regulatory scrutiny. Consider, as an analogy, Amazon.com. Amazon is given a virtual free hand in the pricing of its products and services. The reason for this is that Amazon does not own the network on which it relies to carry out its business transactions, nor does it have any ownership in the various channels (USPS, UPS, etc.) which it enlists to deliver its product. In fact, Amazon has no special control over the internet or over any of its delivery channels. The situation would almost certainly be significantly different, however, if this were not the case: if Amazon, for example, was actually the owner of the internet, and charged other entities an access fee for participating in it. In such a case, any supplemental products or services that Amazon offered would probably come under heavy scrutiny, as legislators and/or regulators asked whether Amazon's control over its transaction network gave it special advantages in the offering of products or services over this network which third-party competitors would not have.

Certainly any services that had been performed by the electric utility under the traditional channel, such as provider of last resort and maintainer of power quality, if now offered as unbundled services, will be subject to regulatory scrutiny, and may still have to be priced based upon conventional regulatory principles of cost recovery. But there are other opportunities that could arise that did not exist under the traditional model, such as transactions management and brokering between buyers and sellers of power, the construction and leasing of distribution generation facilities (perhaps in partnership with third parties), and onsite energy management services. The degree of latitude which a grid owner/operator would have in pricing these services will be contingent upon the perception of how vital these services are (transactions management, for example, while non-existent in the old model, will be a vital service in a decentralized network, and if only the grid operator is offering it, the price will have to be controlled) and upon the degree of potential or actual competition that exists in the market for these services.

Conclusions

In this paper, two alternative market models have been described which serve as the basis for delivering goods and services to customers. While the paper's title, "From Channel to Network", suggests that the channel model predates that of the network, and that in fact there has been an evolution from the one to the other, the historical examples provided indicate that this is not in fact the case. Both models have existed since the earliest development of economic systems in civilization, and both continue to thrive today. Further, as has been evident in examining actual delivery systems, the line of demarcation between these two models is not a sharp one, and in fact in many if not most cases the question of which model best describes a particular system is one of degree rather than distinction. The rise of the internet, and the many successful business platforms that have been erected upon it, all partaking in some form of a network strategy, might create the impression that the network model is indeed the model of the future. But a closer inspection of the historical models, particularly the ones involving the rise of the Medici family and the telecommunications industry, along with the network internet ventures that did not meet success, show that this assertion must be qualified.

As an entrepreneurial strategy, simply building or forming a network is not enough. Success lies in assuming a critical, axial role in the network. This is achieved by establishing oneself as the nexus upon which the success of any critical transactions relies. In this sense, the strategy is simply a variant of that which underlies the channel. There are, however, significant features that distinguish the two strategies. A pure channel approach is static: it is contingent upon maintaining control over access to a critical delivery conduit. A network approach, on the other hand, is much more dynamic. It entails expanding the network, both horizontally, in terms of the number of "nodes" or participants that it includes, but also vertically, in terms of the variety of services that it provides. A channel tends to provide products and services that the customer already wants or needs; a network, on the other hand, often produces emergent values that had not existed before its creation. The balancing act for the network entrepreneur is to foster an expanding web of connections among a variety of clients, along with an evolving portfolio of services, while at the same time managing to establish and maintain oneself as a hub whose presence is critical in order for any participant to derive most or perhaps even all of the potential benefits of joining this web. This is what made the Medici clan the ruling family of 15th century Florence, and Amazon.com the ruling internet retail merchant in the 21st century.

Postscript: A Note on Network Strategy Theory

The rise of a multitude of highly successful internet ventures in recent years, all of which have been based on some type of network strategy, highlights the almost universal importance of this strategy for contemporary entrepreneurs. Peter Thiel, co-founder of PayPal and a venture capitalist, has identified network formation, along with branding, scale economies, and technological innovation, as one of the four most important strategies for the establishment of a successful new business.

It is surprising, then, that in spite of the large amount of attention given to the theory of social and economic networks in the economic and sociological literature, the specific

phenomenon of entrepreneurial network strategy has seemed to have been given little notice. In Matthew O. Jackson's 2008 book *Social and Economic Networks*, for example, which is over four hundred pages in length, only one single paragraph is devoted to the hub-and-spoke network model that is characteristic of many if not most of these entrepreneurial network strategies.

There has been some research which has begun to explore the periphery of this field. In the 1990s, Ronald Burt examined how entrepreneurial opportunities arise through brokering the flow of information and/or controlling the form of collaboration between parties that exist on opposite sides of what he called a "structural divide". In 2001, Kranton and Minehart introduced the idea of networks, rather than markets, operating as a medium of exchange between buyers and sellers. Serrano and Boguñá (2003) looked at the "world trade web" and how the development of this economic network parallels that of the internet. And James Rauch has written a number of papers on the relationship between networks and entrepreneurial activity, although he has not addressed the entrepreneurial network strategy specifically used by companies like Amazon.com and other internet ventures.

That particular entrepreneurial strategy, in essence, comes down to the following relationships:

1. The expected gains to sellers by participating in the network exceed the expected losses due to increased competitive pressures by being placed in closer proximity to rivals. (In retail stores, for example, Coke faces increased competitive pressures from having its product placed right next to that of Pepsi and its lesser rivals, but the very fact that there is a large volume of customers coming to that location to buy a number of unrelated products that are all conveniently located at the same place increases the net volume of sales to Coke.)
2. The savings in search costs to consumers exceeds whatever price is paid (perhaps indirectly, in product mark-ups) to purchase these products or services in a network.
3. The entrepreneur's role as network proprietor is an essential one, or at least a beneficial one, in that it maintains the existence of the network and/or makes possible the creation of emergent values that would not exist – or not exist to the same degree – if these transactions were carried out in some other venue.

The formalization and systematic exploration of entrepreneurial networking strategies presents a field that is ripe for future research.

Bibliography

- Burt, Ronald. "The Social Capital of Entrepreneurial Managers". *Financial Times*. 5/10/1996
- Caldwell, John W. 2001. *Basis Risk, Liquidity Costs, and Survival of the Fittest in Energy Futures Markets*. Ph.D. Dissertation. The University of Illinois at Chicago.
- Jackson, Matthew O. 2008. *Social and Economic Networks*. Princeton University Press.
- Kranton, Rachel E., and Minehart, Deborah F. "A Theory of Buyer-Seller Networks". *American Economic Review*, Volume 91, No. 3 (June, 2001), pp. 458-508.
- Paggett, John F., and Ansell, Christopher K. "Robust Action and the Rise of the Medici, 1400-1434". *American Journal of Sociology*, Volume 98, Issue 6 (May, 1993), 1259-1319.
- Rauch, James E., and Watson, Joel. "Clusters and Bridges in Networks of Entrepreneurs". National Bureau of Economic Research. December 2005.
- Serrano, Ángeles, and Boguñá, Marián. "Topology of the World Trade Web". *Physical Review*. Volume 68 (July 2003)
- Thiel, Peter and Masters, Blake. 2014. *Zero to One: Notes on Startups, or How to Build the Future*. Crown Business.
- ["Water, Electricity and the Poor: Who Benefits from Utility Subsidies?"](#). The World Bank. 2006. p. 21.