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HOW VALUABLE IS A PIECE OF THE SPECTRUM? DETERMINATION OF VALUE IN EXTERNAL RESOURCE ACQUISITION

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ABSTRACT

Based on an in-depth study of third generation mobile telephony licenses in the UK, we explore the process through which externally acquired resources generate value for the acquiring firm. We find that value is determined both pre-acquisition as well as post. Pre-acquisition value is influenced by the competitive dynamics, as well as the discourse that surrounds a particular resource, whereas post-acquisition value creation is influenced by the development of collaborative networks around the resource. Our analysis has important implications for firm-level capabilities

Key words: Resource-based and Dynamic Capabilities views; Mobile telephony; Value-creation; Competitive Dynamics; Collaborative Dynamics; Discourse.

1. INTRODUCTION

Strategy scholars studying the genesis of rents now widely accept a basic principle of the resource-based view (RBV) (e.g. Barney, 1991; Wernerfelt, 1984), and the dynamic capabilities view (DCP) (Brown and Eisenhardt, 1997; Helfat and Peteraf, 2003; Teece et al., 1997; Teece, 2003; Winter, 2003; Zollo and Winter, 2002), namely that superior rents derive from the firm's unique ability to acquire, deploy, and reconfigure potentially valuable resources to serve the changing needs of a dynamic environment. Strategically successful firms are thus capable of creating greater value from resource combinations than could have been predicted given the *ex ante* value of the resources (Barney, 1986; Lippman and Rumelt, 2003a; 2003b; Peteraf, 1993).

Without question, research in the RBV and DCP streams has enormously enhanced our knowledge of how resources assume value. However, as some recent studies have pointed out (Lippman and Rumelt, 2003a and 2003b; Mathews, 2003) much research in this stream has focused on value generation from the internal development of 'un-priced resources' and the importance of potential synergies between existing and new resources (Conner, 1991; Mahoney and Pandian, 1992; Teece, 1986). With the growing importance of external resource acquisition in firms' strategic options (Ahuja and Katila, 2001; Arora et al, 2001; Matthews, 2003; Thomke and Kuemmerle, 2002), it is becoming increasingly important that more attention is devoted to externally acquired resources.

While researchers have pointed out the importance of strategic calculation in acquiring external, 'priced' resources (e.g., Lippman and Rumelt, 2003a and 2003b, Mathews, 2003), it remains less clear how the managerial perceptions of resource value are influenced by the material and discursive strategies of external actors. In particular, we need to understand how value is created, or destroyed, during the process of resource acquisition. How does the evolving societal discourse (Fairclough, 1992) about the common value of a resource affect the value of a resource to its owner? And how do particular configurations of actors, resources and capabilities, needed for value creation around any particular resource, come into existence? In this paper, we attempt to fill these gaps by examining the process of

value-creation, and destruction, around a priced, externally acquired resource, namely, third generation (3G) spectrum licenses awarded to UK firms. The 3G case reveals fascinating dynamics associated with the acquisition of a resource, and the creation (and destruction) of value around it, both before and after the resource was acquired.

This paper makes a number of contributions to the study of 'value' in the Resource-based View. First, by emphasizing the 'contextual' and socially constructed nature of value creation (March and Olsen, 1972; Mintzberg, 1978; Zajac and Westphal, 2004) by 'boundedly rational' managers (March and Simon, 1958; Daft and Weick, 1984), it furthers existing understanding of value creation dynamics around externally acquired resources. Second, it highlights the role of external actors such as the State, financial analysts and the media on firms and investors (Lounsbury and Glynn, 2001; Pollock and Rindova, 2003; Rindova et. al, 2006; Rao et al., 2001; Zuckerman, 1999) that frame information and form beliefs by orchestrating a particular discourse (Abrahamson & Fairchild, 1999; Fairclough, 1992; Green Jr., 2004; Phillips and Hardy, 2002; Strang & Meyer, 1994**).** This, in turn, illustrates how the value of a resource to a firm is not just a function of the price and complementarity with other resources, but also the material and discursive actions of the 'referent' others that influence capabilities at assessing and building value through a "social referencing" process (Abolafia, 1998; Zajac and Westphal, 2004). Finally, in contrast with firm level strategies for maintaining resource 'immobility' (Barney, 1991; Rumelt, 1987) it emphasizes the importance of industry-level strategies, both competitive and collaborative (Anand and Khanna, 2000; Brandenburger and Nalebuff, 1996; Child and Faulkner, 1998; Dyer and Singh, 1998; Powell et al, 1996; Sanchez and Heene, 1997) in order to develop 'resource sharing' capabilities for value creation (Conner, 1991; Das and Teng, 2000). By studying these dynamics we aim to enhance the understanding of the dynamics of value creation and dissipation around an externally acquired resource, both *ex ante* and *ex post*.

2. THEORIZING 'VALUE' IN THE RESOURCE-BASED VIEW

While the RBV and DCP have provided very useful insights into how heterogeneous resource endowments and firm level capabilities can become the source of competitive advantage (Amit and Schoemaker; 1993; Barney, 1991; Eisenhardt and Brown, 2000; Helfat and Peteraf, 2003; Rumelt, 1984; Teece, 2003; Teece et al, 1997), the emphasis has largely remained on firm-level capabilities in cultivating, nourishing and harnessing internally grown, and hence difficult to imitate, resources. In contrast, there is much less emphasis on the role of managerial capabilities in the acquisition and deployment of external or purchasable resources (Mathews, 2003) and building value around them. This is despite the fact that in corporate reality (Chandler, 1990; Mowery and Rosenberg, 1998; Mowery and Nelson, 1999), a lot of effort is continuously devoted to the acquisition of various resources and capabilities (Lippman and Rumelt, 2003a and 2003b; Matthews, 2003).

In this section, we lay the conceptual foundation for studying the creation (and destruction) of value around externally acquired resources. In particular, we discuss how the competitive environment and dominant discourse in which a resource is acquired may impact its value. Moreover, we discuss how sharing of a resource, as opposed to its 'immobility' may also enhance its value.

2.1 The Value of a Resource

The value of a resource to the acquirer has both an exogenous element based on the evolving context (Miller and Shamsie, 1996) and an endogenous one (Barney, 2001; Makadok, 2001a), such as 'absorptive capacity' (Cohen and Levinthal, 1990), asset 'interconnectedness' and the synergies and complementarities generated with the firm's existing asset stock (Conner, 1991; Dierickx and Cool, 1989: Mahoney and Pandian, 1992; Teece, 1986). These dynamics differ for external and internal resources. While the value of internally developed resources can only develop diachronically that is it is subject to "time compression diseconomies" (Dierickx and Cool, 1989), external resource value, especially novel

technologies is subject to "time compression economies" (Matthews, 2003) where a firm can quickly gain advantage through resource acquisition.[1]

In order to put a price on a potentially attractive external resource, managers must be able to competently assess their existing resources and capabilities, as well as the commercial possibilities involving the resource to be acquired. At the same time, they must be able to acquire it at a 'reasonable' price, so as to avoid spending all future revenues upfront. For externally acquired resources, the last point is especially important since the acquisition process is usually intensely competitive, where, the psychology of bidding created during the bidding process (Jemison and Sitkin, 1986), can generate a momentum of its own. In such a competitive scenario it is in the interest of competitors to destroy value for their rival bidders by increasing the price of the resource (Milgrom and Roberts, 1982; Shapiro, 1989; Teece et al. 1997:510). Similarly, value of a resource that has already been acquired by a firm can be diminished by active promotion of substitutes or 'disruptive' innovations (Christensen, 1997).

Apart from 'Machiavellian' strategizing to keep rivals off-balance (Teece et al., 1997), the price paid for a resource is also influenced by what auction theorists (Kagel and Levin, 1986; cf. Milgrom and Roberts, 1982) call the 'common' and 'private' value of a good. Common value is the value of a good regardless of the acquirer's existing assets or capabilities, while private value reflects the bidders' idiosyncratic preferences for it. A useful analogy would be an art connoisseur bidding on an artwork to hang in his living room as against a representative of a commercial art gallery bidding on it for the purpose of reselling.

While for an art collector who happens to be a billionaire, private and common value may be separate notions, for most commercial organizations looking to maximize shareholder wealth, private value tends not to be completely independent of common value. The synergies that a firm can create with

[1] For example a football club can acquire a talented player (resource) from the market to gain a quick advantage rather than invest in the training and development of a 'home-grown' player.

existing and new resources may make a resource more valuable to it than reflected in the common value. Still, since the bidding is competitive, it may end up paying more than the entire value of the resource.

In order to avoid such a situation, firms must be able to establish that the potential value of a resource to them is greater than the price they pay for it. Techniques such as the calculation of net present value (NPV) assume a predetermined course of action, thus failing to properly incorporate managerial capabilities to adapt and revise later decisions in response to unexpected developments in stochastically changing environments (Kogut and Kulatilaka, 2001; Trigeorgis, 1996). By incorporating the uncertainty inherent in decision-making, Real Options theory (Adner and Levinthal, 2004; Bowman and Hurry, 1993) provides a superior technique in this respect. Still, this rather infrequently employed technique also requires a strategic assessment of the likely competitive and technological scenarios in the industry. Indeed, whatever the technique employed, in order to create a competitive advantage, firms need capabilities to competently assess the 'true' value of a resource in order to avoid compromising the resource's rent generating potential.

However, given the inherent uncertainty of the external environment (Dixit and Pindyck, 1994) when strategic factor markets are massively imperfect and complex (Stiglitz, 1993), investing firms find it difficult to determine, *a priori* what resources might lead the firm to have a sustainable competitive advantage, (Black and Boal 1994; Fiol, 2001; Peteraf, 1993). Moreover, even after such resources have been identified, it is difficult to establish a 'fair' price for these. This creates strategic opportunities for firms to influence the price at which a competitor or the firm itself acquires a resource (Denrell, et al., 2003).

Such 'valuation' capabilities, similar to what Makadok (2001b) calls "resource-picking" skills, are essential to value creation from externally acquired resources. Paying the right price for a resource is a capability for value *creation* just like setting the right price for products and services is a capability for value *appropriation* (Dutta et al., 2003: 619). Indeed, as Barney

(1986a) pointed out, a competitive advantage can accrue to a firm that acquires new resources at less than the going rate. However, the conceptualizations of how potentially valuable a resource is, depends on how it is understood, or made sense of. We discuss this in the following section.

2.2 Discourse Surrounding Resources

By a discourse we mean an inter-related set of texts (which could be written texts, spoken words, pictures, or any other interpretable artifact that allows people to make sense of a particular event, object, technology, or phenomenon (Chalaby, 1996; Grant et al, 1998; Parker, 1992). Accordingly, the prevalent discourse or rhetoric surrounding a particular resource leads to particular types of actions on the part of managers (Green Jr., 2004; Rindova and Fombrun, 1999; Zbaracki, 1998). It can produce a context in which they may 'under value' a particular resource. Equally, it can lead to a context where managers feel 'irrationally exuberant' or unrealistically optimistic (Taylor and Brown, 1988), despite 'objective' information and exercises in 'due diligence.' In other words, the discourse of other market participants affects the managers' estimations of value and the financial valuation of resources may not reflect their true economic value (Abolafia, 1996; Westphal and Zajac, 1998). This is perhaps best exemplified by the 'war of discourses' that was witnessed around the 'real' value of Amazon.com. As Beunza and Garud (2005) point out, armed with the same financial information, some 'heavy weight' analysts framed Amazon.com as an Internet retailer, whose losses were actually investments into its future, while other, equally influential analysts projected Amazon.com as a bookseller whose losses were indicative of its weak business model.

Any dominant discourse, whether it is about Internet stocks, or the next technological 'revolution', is based on a particular conceptualization of the phenomenon in question (Phillips and Hardy, 2002). These conceptualizations are produced and perpetuated by various stakeholders, which include not only the managers bidding to acquire the resource, but also shareholders, media, analysts and the state. Thus investment behavior (bidding for a resource) is a "social referencing" process (Abolafia,

1996; Westphal and Zajac, 2004:434) that is governed by the beliefs and actions of other market participant participants. Pollock and Rindova (2003) for instance have written about the significant influence of the media. By 'framing' information through the selection and interpretation of events, the media provides "social proof" (Rao et al, 2001) and helps form impressions and beliefs as it imbues organizational fields with meaning and symbols (Hayward et al., 2004: 637; Rogers, et al., 1993). Moreover, as Fombrun and Shanley (1990: 240) observed: "The media themselves act not only as vehicles for advertising and mirrors of reality reflecting firms' actions, but also as active agents shaping information through editorials and feature articles". Besides the media, various other actors, including brokers, (Pollock et al., 2004; Zuckerman, 1999), analysts (Beunza and Garud, 2005), academics[2] (e.g. Rynes, 2001) and the State[3] also offer particular sense-making devices to managers. Since decision-making is always contextualized (Cohen, March and Olsen, 1972; Mintzberg, 1978), prevalent discourses within the context can easily entrap managers within a course of action for a valued resource (Brockner and Rubin, 1985).

The constitutive role of discourse in the attribution of a particular 'value' to a resource, while salient in determining its price, continues even after the resource has been acquired. Obviously, while firms would like to influence this discourse in line with their interests (Beckert; 1999; Meyer and Rowan, 1977; DiMaggio, 1988), it is usually beyond the control of any single organization. For this reason, value generation from a resource is essentially a social process involving the creation and maintenance of mobilisation structures, organizations and informal networks that extend the influence of the resource-

[2] For example business professors strongly supported the emission of reductions in the Global Climate Control regime and became the movement's 'organic' intellectuals in impacting the environmental strategies of major corporations (Reinhardt, 2000).

[3] For example, by defining environmentally friendly technologies as a corporate asset, the US Department of Energy lay a key discursive foundation for major reshuffles in corporate strategy as firms invested in emission reducing technologies (US DoE, 1996 in Levy and Egan, 2003).

owner. Achieving this mobilisation in turn requires capabilities from a variety of actors in framing processes and creating shared and socially constructed meanings amongst members of these organizations and networks (Abolafia, 1996; Zajac and Westphal, 2004). In other words, firms may also need to share their resources with external actors so as to allow others to embody their interests in them (Bijker and Law, 1997).

2.3 Resource 'Immobility' vs. Resource Sharing

The role of external actors has been emphasized by a number of studies in the alliance and network literatures, emphasizing value creation and capability building through collaborative arrangements (Anand and Khanna, 2000; Child and Faulkner, 1998; Doz, 1996; Khanna et al,. 1998) between firms with complementary resource endowments and interdependencies (Pennings, 1981). This is consistent with the RBV. Effective inter-organizational networks across organizational boundaries can create "relational rents" through the "synergistic combination of assets, knowledge or capabilities" (Dyer and Singh, 1998:662) and the pooling of resources (Afuah, 2000; Hamel, 1991; Gulati et al, 2000) in the context of 'syncretic' rent generation. A notable example is that of the Star Alliance that provides a model for how competing organizations can co-operate in the pursuit of a common good. Competing airlines not flying particular routes can offer their customers extended network benefits as well generate "relational rents" for the alliance partners (Dyer and Singh, 1998).

However, the dynamics around sharing of resources and 'syncretic' rent seeking (Jarillo, 1988; Lado, et al. 1997) have certainly not received as much attention as the importance of immobility and idiosyncrasy of resources for value creation has in the literature. Indeed, as industry boundaries blur (Sampler, 1998), and existing competencies are rendered less useful (Abernathy and Clark, 1985) as is often the case in Schumpeterian competition (Garud, 1994; Rosenbloom, 1985; Schumpeter, 1934) firms need to partner, collaborate and share resource constellations (Sanchez and Heene, 1997), in order to create and appropriate value from the resources they own. As Foss (1997: 356) suggests: "One should

exercise much care when analyzing resources on an individual and free-standing basis…. It may often not be the uniqueness or rareness of the resource that matters, but rather its ability to fit into a system."

Sharing of resources that require capabilities in collaboration becomes particularly important in markets with network externalities (Katz and Shapiro 1985; Sheremata, 2004), increasing return to adoption (Arthur, 1989) and 'positive sum' games where firms stand to benefit from collaboration (Klein, 1977; Lado et al, 1997) or in emerging technologies with no dominant standard (Abernathy and Utterback, 1978; Utterback 1994). For example in franchises, firms need explicit, easily transferable and communicable routines, or 'causal clarity' (Mathews, 2003), as against ambiguity (King and Zeithmal, 2001; Reed and DeFillippi, 1990) because routines are "one of the primary assets sold to the franchisees" (Knott, 2003: 931). To illustrate further the benefits of sharing resources, consider how the Internet browser, Netscape Communicator posted the source code for its browser software on the web for public access in order to attract a critical mass of programmers to contribute in its software development (Yoffie and Cusumano, 1999). Similarly, von Hippel and von Krogh (2003) argue that open source programmers often revealed their 'code' in order to earn greater private benefits than they would by adopting a strictly proprietary approach to software development. Thus in these cases rarity had to be "sacrificed to availability" (Mathew, 2003: 1176).

In other words, value is something resources generate in the context of other resources[4]. For instance, despite possessing a potentially valuable resource that was critical to the development of a mass-market around photography in the late 1880s, Kodak was unable to build that entire market by itself. The birth of the 'Kodak Moment' was a result of a shift in the larger discourse that 'explained' photography to the people (Munir and Phillips, 2005) and the active enrollment of a network of actors (camera and film manufacturers, photofinishing services etc) that allowed (or allows) one to capture a Kodak Moment (Callon, 1986; Latour, 1987; 1999).

[4] We are grateful to a reviewer for this insight.

To summarize, we would expect the generation of value from a particular resource to at least partially depend upon the price which is paid for it, the prevalent discourse which allows people to appraise its value, and the configuration of other resources around it. We explore these dynamics in our study of the 3G mobile telephony market paying particular attention to the competitive and collaborative dynamics surrounding the acquisition as well as leveraging of a 3G license.

3. METHODS

Our central concern in this study is the examination of the process through which resources assume or shed value. Several complicating factors and the actions of various stakeholders influenced the value of 3G licenses. These stakeholders mainly included competing firms (mobile network operators, both incumbents and new entrants), regulatory agencies (Office of Telecommunication (OFTEL), the State (Treasury Department of the British Government) and financial and other intermediaries (investment banks and consultants).

Our qualitative methodology was in line with calls within the RBV to use a broader set of research methods to tackle issues associated with the resource-based view (Rouse and Daellenbach, 2002). Since our central concern was capturing the processual dynamics, and because the context of our study was in many ways unique, the use of a case study based method was particularly relevant (Yin, 1991).

3.1 Sources of Data

Data concerning the actions of all these stakeholders was acquired primarily through three sources. First, we interviewed several key executives in many of the firms, which were affected by, or directly influenced, the value of these licenses (Appendix A lists the organizations which the interviewees (names

withheld for confidentiality) represented. Through semi-structured interviews, we examined these executives regarding their motivations and strategic role in the process during and after 3G license auctions in the UK. Wherever the auction process in other countries was germane, we interviewed the relevant people in those countries as well. Similarly, executives in financial and other intermediaries, who served in advisory positions to participating firms, were interviewed regarding their role in the process.

Secondly, we also participated in several conferences on a variety of aspects of mobile telephony. These conferences were attended by key decision-makers representing all stakeholders in the field. The topics included the future of 3G, the need to develop supporting infrastructure, the auctioning mechanism, and strategies to create a market around 3G.

Thirdly, we carried out an exhaustive survey of archival and secondary material available on the topic. As the topic is politically charged and current, there was copious material available. We downloaded all relevant articles from 1997 to 2003 from a number of publications sensitized by out study (e.g. Financial Times, The Guardian) and trade magazines (e.g., Wireless Review, Wireless News, Wired News). We also accessed data from company websites, internal reports, dedicated websites (e.g. www.telecom.com, 3Gnews.co.uk, Zdnetuk.co.uk), online databases (e.g. Lexis-Nexis, Reuters) and scholarly journal articles. We also accessed press releases, white papers and articles pertaining to 3G from the UK telecommunication regulatory agency OFTEL. Similarly, the UK Radiocommunications Agency and its official Auction website (which provides a detailed record of the bidding process in each of the 150 round of auction), the Department of Trade and Industry (DTI), Universal Mobile Telecommunications Systems (UMTS), and the International Telecommunications Union (ITU) were immensely useful sources of information. Documents available from these sources provided extensive information on 3G-related technologies, important milestones in their development, the licensing process, and the competitive dynamics surrounding the licenses. Finally, we read and took notes from several books on cellular telephony's various technical as well as socio-economic aspects.

3.2 Analysis of Data

We systematically analyzed all notes gathered from interview transcripts, archival sources, informal interviews and observations. We assessed the nature of change in the field as a result of the discontinuity caused by 3G license auctions and its aftermath. We then juxtaposed the archival accounts with the actors' evaluations of events. This helped us identify broad themes in the data and reduced them into more precise categories, (Miles & Huberman, 1994; Yin, 2003), noting patterns where they emerged (Kvale, 1996). We constructed a database of salient events in chronological order, the sources from which we had identified these events and our interpretations (Glaser and Strauss, 1967; Miles and Huberman, 1994). The process of interpretation itself was emergent and iterative between data and theory (Eisenhardt, 1989; Pettigrew, 1997). For most part, interpretations of the events were very consistent between the two researchers involved. In presenting and developing our developing findings, we attempted to ensure that the steps by which we came to our conclusions were clear, replicable and reliable (Yin, 2003).

4. WHERE DOES VALUE COME FROM? THE CASE OF 3G LICENSES

In fixed-line telephony market, rents for operators have long been based on the exclusive ownership of the copper wire network. Similarly, in mobile telephony, they have traditionally been based on the exclusiveness of owning spectrum or bands of radio frequencies. The operators however need to share the available space on spectrum with television and radio broadcasters, the military and private users (such as taxi operators). This makes spectrum a physically scarce resource. And because it is finite[5] the number of firms (operators) using it must also be in order to prevent congestion and interference. Moreover, since spectrum is also used by the military and emergency services, it is strategically important (Levinthal,

[5] While space on the spectrum is finite, it is subject to better 'farming' through technological innovations. The efficiency of spectrum utilization improved with successive generations of technological improvements.

1998). Thus its use by private firms needs to be managed and controlled by the government through issuing licenses. Thus is done either administratively (beauty contests) or through market mechanisms (auctions).

Spectrum space for first generation (analogue) mobile telephony was allocated in the UK by the state regulator Oftel, which 'awarded' licenses to 'capable' network operators (BT Cellnet – the mobile arm of the fixed line operator British Telecom and Vodafone - a pure-play'[6] mobile operator) while charging a nominal fee to cover administrative costs. At the time, mobile telephony was limited to business users. With the introduction of digital technologies (commonly known as second generation or 2G) mobile phones began their transformation into a consumer good (Agar, 2003). Adoption by consumers was also helped by improved sound quality, lower prices, and Europe's decision to adopt a single 'open' standard (GSM), creating significant network effects (Katz and Shapiro, 1985) as it became the *de facto* global standard.[7] These developments created significant rent earning opportunities for the operators as the industry grew at an average of over 60% from 1995 to 2000, with penetration rates peaking at over 80% in most of Western Europe, including the UK.

Spectrum for 2G was also awarded administratively by issuing licenses to the two incumbents from 1G as well as two new entrants; T-Mobile (the mobile arm of the German telecom giant Deutsch Telecom) and Orange (a pure-play mobile operator now owned by France Telecom). The ownership of a state regulated scarce resource (spectrum licenses) helped these four operators erect resource barriers that yielded significant Ricardian rents from the exclusive provision of mobile telephony services.

However, during the second generation as in the first, mobile telephony remained voice-centric - essentially the wireless equivalent of fixed-line telephony. For the operators, value creation was mostly a

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[6] Pure play refers to specialization in a particular service such as an operator offering only mobile and no fixed-line telephony services.

[7] GMS is the dominant standard worldwide with over a billion subscribers and over 70% market share.

matter of making people 'talk' more. The almost saturated penetration rates had precluded further growth in customer numbers while the intense competition between the service providers had begun to commoditize 'voice' services. While network operators could own the customers unambiguously they seemed no longer able to increase usage or the average revenue that each user generated (ARPU). Figure 1 depicts the network of players involved in providing mobile telephony services during 2G.

Insert Figure 1 about here

The increasing pervasiveness of the Internet led mobile telephony firms as well as others to view mobile phones as another possible channel through which the World Wide Web could be accessed (Fransman, 2002). Such a prospect was appealing for it promised additional revenue and differentiation in service. However, while the idea quickly gained currency, there were numerous constraints, such as the limited capacity within the existing spectrum. A new set of technologies, popularly known as third generation or 3G somewhat alleviated the technological constraints, promising, in addition to web-access, faster downloads, and video telephony facilities. All this had the potential to transform the mobile phone into a hybrid device functioning as a camera, a music player and a more sophisticated business tool (Durman, 2003).

For the operators, the 3G model offered many more types of revenue streams, although with the possible influx of a large number of 'content' providers, 'ownership' of these streams was not going to be as straightforward as it had been until then. Moreover, a major attraction of 3G was the use of a single standard worldwide that would provide operators with substantial economies of scale and scope in contrast to the fragmented 2G global market. The enormous potential for profits associated with 3G

compelled the UK government to auction this resource through its regulator, Ofcom.[8] The aim was to seek rents from firms seeking to build capabilities for the next generation of mobile telephony (Kogut and Kulatilaka, 2001; Lewin and Volberda, 1999). See Figure 2 for the evolution of the three generations (1G to 3G).

Insert Figure 2 about here

4.1 The Auction

Auctioning of the 3G licenses put the mobile phone companies in a quandary. Their customers and other stakeholders expected them to 'graduate' to 3G. However, there was, at the time at least, no market for 3G services. Moreover, it wasn't clear if the benefits of 3G would really be that valuable. Indeed, it was possible for operators to differentiate their services within 2G through new domains of application (Levinthal, 1998) by upgrading it to 2.5G[9] (sometimes called '3G-lite' in the industry). These technologies offered many of the 3G[10] benefits for a fraction of the cost and could serve operators well in the short-run at least. Many argued that 3G technologies did not represent a dramatic breakthrough. For instance, Alan Harper, Group Strategy Director of Vodafone stressed at the 3GSM World Congress in 2003, that 2G and 2.5G would continue to deliver many of the services that the industry once thought could only be delivered by 3G (Telecom Review, 2003).

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[8] Office of Communications. The regulator Oftel (Office of Telecommunications) was renamed Ofcom as 3G was expected to transform 'telephony' into 'communications' that would involve many actors from outside of telecommunications.

[9] 2.5G were basically upgrades for 2G technologies, operating in the same spectrum and using the same infrastructure while using packet-based data that allowed faster downloads (Fransman, 2002).

[10] The only service that was exclusive to 3G was video telephony.

4.2 Initial Estimations of Value

Despite the uncertainty surrounding the value of the licenses, all incumbents and several new comers participated in the auction with the intention of opening up options for themselves. The auction involved selling a total of five licenses of various capacities, with the highest capacity license being reserved for a new entrant. Minimum prices were set for each license (these prices are provided in Table 1, which lists all participants in the auction held in the year 2000, the licenses they acquired (or not), and the eventual prices that they paid.

[Table 1 About Here]

The auction participants, despite being mostly telecom companies, were significantly heterogeneous in terms of their resource endowments or competitive positions (Teece et al., 1997:518). For instance, Hutchison 3G had diverse interests in shipping, construction and telephony while Virgin was a well diversified company with interests in music and travel and also operating a 'virtual' mobile network operation by renting spectrum from the incumbent, T-Mobile.

4.21: Value estimation: New entrants versus incumbents: While the primary goal of the heterogeneous group of participants was the same, i.e., to stake a claim in the windfall profits that 3G technology was expected to bring, their motivations were different depending on whether they were newcomers or incumbents (Hoopes et al, 2003: 894). For the incumbents, with a well established customer base in 2G, the valuation for the license for incumbents was based on the expected generation of synergies from asset interconnectedness and resource complementarities (Dierickx and Cool, 1989; Mathews, 2003), while ensuring backward compatibility (Gawer and Cusumano, 2002) with the 2G platforms. As they were running up against the limits of their existing spectrum assignments, the objective was to strengthen their competitive positions by investing in additional 'capacity,' while leveraging their assets in marketing and distribution (Teece, 1986). A senior executive from Vodafone explained to us:

> "Valuation was based on firm-specific factors included the current stage of network and customer relationships, systems and capabilities" (Interview with authors, 12/04/01).

To begin with, almost all participants, incumbents and new entrants utilized the well-established Discounted Cash Flow (DCF) method for calculating the value of the license. The CEO of PA Consulting Group that acted as a consultant to a major participant emphasized:

> "I know of no better way of analysing the value of such licenses than using a straightforward discounted cash flow valuation of the cash profits flowing from such licenses" (quoted in Moynihan, 2002).

Similarly, various other executives whom we interviewed acknowledged the use of formal financial models to arrive at a 'reasonable' economic value for the resource. It was easier for incumbents to calculate the value of this 'additional' capacity than it was for new entrants who had no existing assets to leverage. The new entrants considered themselves at a disadvantage given little previous experience, and looked for templates or reference points to come up with the 'true' value of the license. Thus, a large new entrant looked at UK-based Freeserve as a benchmark. Freeserve, one of Europe's biggest Internet service providers, was a very different business model but, as an investment banker advising a large new entrant pointed out:

> "Since there was no existing customer set or network, Firm X, looked at an ISP, Freeserve. If an ISP, which has weak control over Internet users, is worth about $12 billion, then certainly this thing has more value because you have more control over customers. Plus you have subscription streams coming from users, which Freeserve doesn't, so it is a more valuable franchise to have" (Interview with authors, 04/26/01).

Also, the reasoning went, as mobile operators had stronger brands and closer relationships with their customers with their products constantly in the hands of their customers and the capacity to bill individual terminal users, rather than households or companies that have fixed lines, they would be worth more. As the Managing Director of Hutchison UK stated:

> "I think the mobile operator with the capability to bill for telephony but also for 'service packages,' has a big advantage over Internet service providers with no direct billing relationships

and even the fixed operators who normally bill a home or an enterprise, rather than an employee or a person" (Interview with authors, 01/12/2003).

4.22: Auction Dynamics and Discourse: All participants went into the auction armed with their own estimates of how valuable a 3G license would be to them. However, once the auction began, new dynamics materialized, with prices and expectations of 'common value' (Kagel and Levin, 1986) becoming profoundly influenced by the prevailing discourse and strategic actions of competitors. Aggressive bidding for the five licenses while going for this 'land grab' became increasingly disassociated from the financial models that had been constructed earlier. Indeed, most participants were seen to be revising their forecasts. At the time of the UK auction, the consensus was that each license would sell for roughly £500 million (Hong Kong Shanghai Banking Corporation Report (HSBC), 2001). However, when the auction took place in 2000, it lasted two months and after a staggering 150 rounds of bidding, the five licenses collectively sold for £22.5 billion. This sum was roughly 4,000% higher than the minimum price set by the UK government.

A key reason for this rather dramatic price hike was the discourse that bidders and their stakeholders drew upon to make sense of the situation (Rindova and Fombrun, 1999). These scenarios were put forward by a variety of actors - the government, academics, consultants and the participating firms, each of whom had a stake in the proceedings. The state, for instance, had strong motivations for auctioning these licenses, and the creation of a new market in mobile telephony. The UK economy would conceivably benefit by means of the new ventures and jobs that would be created by the convergence of media, telephony and Internet computing. As UK had pioneered the auction[11], its institutions could export

[11] While auctioning spectra licenses was unprecedented in Europe, the UK regulators had taken a cue from the spectacular success of the US spectrum auctions, described as the 21st century equivalent of the Oklahoma land rush" (Wheeler, 1993) where the US Federal Communications Commission had raised an astonishing $42 billion[11] between 1994 and 2000. The figure of $42 billion had far exceeded the US Congressional Budget office projection of $10 billion - a figure that itself had been considered over-inflated by the telecommunications industry with the

expertise in mobile multimedia and in auction design and management to other countries. At the same time, the exchequer would benefit from the licenses' sale at high prices[12]. While the government always publicly denied conducting the 3G auction merely to raise funds, it was a major contributor to creating the positive sentiment that sent prices soaring.

In the UK, the state had hired renowned academics, Paul Klemperer and Ken Binmore to help design a 'clever' auction format – an Anglo Dutch design that was purported to maximize revenue generation for the treasury. Besides designing a 'smart' auction, the UK academics also openly advocated the use of auctions for the allocation of a public resource, while the government engaged in a sustained marketing campaign to attract entrants (Binmore and Klemperer, 2002). The following quotes from UK government officials represent the state's attempts at creating a favorable impression about 3G.

> "The auction offers a unique opportunity to be part of a revolution in digital mobile information technology. High speed access on the move to the Internet, high quality video, and multimedia, electronic retail, banking and information services, are just a few of the potential uses of Third Generation Mobile technology" (Michael Wills, Telecommunication Minister quoted in RadioCommunications Agency report, 1999).
>
> "Third Generation (3G) mobile technology will transform how we access information, creating applications and opportunities, we are only beginning to imagine. Along with Interactive TV, it will bring the Internet to people who would never dream of having a computer at home" (Patricia Hewitt, Small Business and E-Commerce Minister, quoted in Financial Times,1999).

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chairman of a major operator, MCI stating: "The government is smoking something to think that they are going to get $10 billion for these licenses*"* (McAfee and McMillan,1996).

[12] Although the UK government always denied conducting the 3G auction merely to raise funds, one indication of its interest in maximizing the proceeds was the rather fortuitous timing of the Stewart Report. This was a report commissioned by the government on the potential hazardous effects of using mobile phones. While the report was not conclusive it pointed to potential health problems arising from prolonged usage of mobile phones. This report was released exactly one day after the auction was completed. All the managers interviewed for our study confirmed that had the report been released earlier it would have had a dampening effect on the prices.

The UK government was not the only stakeholder promoting the many virtues of 3G. An excerpt from a report from the industry's own standards body, the International Telecommunication Union (ITU) also gives a sense of the high hopes for 3G:

> "…..The new mobile handset will become the single, indispensable 'life tool', carried everywhere by everyone, just like a wallet or purse is today" (Quoted in *The Economist*, 2004).

Intermediaries such as 'independent' analysts and consultants were too engaged in raising expectations about 3G's potential. The motivation behind the security analysts' and consultants' promotion of 3G seemed to be the desire to 'atone' for the past mistakes of grossly underestimating the rise of mobile telephony, apart from the attraction of higher commissions which would result from higher prices.

The success of the mobile telephony revolution had taken most analysts by surprise. In the early 1980s, for instance, a McKinsey & Company study estimated the number of cellular phones in 2000 to be 900,000 globally (Cairncross, 1997; Fransman, 2002). The actual number of cellular phones in 2000, however, was in excess of 400 million globally. McKinsey was not the only consulting company to have been caught by surprise, most firms were caught on the back foot. A number of managers pointed out how "under-forecasting" had been the problem with 2G mobile and dial-up Internet.

Understandably, just prior to the bidding in the year 2000, security analysts found themselves under some pressure to come up with optimistic estimations of the 3G market, and to make them even more optimistic as the bidding proceeded. For instance despite the numbers of its earlier revenue forecasts not 'stacking up' to justify the high license price, the firm Jardine Fleming (advisor to the new entrant Hutchison 3G) subsequently revised its estimates under pressure to come with up with more optimistic findings (Jardine Fleming Research, 2000).

In many cases, completely new ways of framing the license's potential were devised by advisors in order to justify the high prices being paid by clients. For instance, in their 2001 report on the UK

license winner, Orange, HSBC claimed that the initial forecasts for the prices that the licenses would fetch were vastly underestimated because bidders were looking at the resource from an 'overlay' perspective rather than a 'holistic' view. From an 'overlay' perspective, the report argued, 3G services were treated as just one layer of additional services. Such a view overlooked the fact that 3G represented a leap for the entire mobile market (HSBC Report, 2001).

Such buoyant attitudes were echoed in the popular press, where journalists reinforced the emerging discourse around licenses (Pollock and Rindova, 2003; Rao et al, 2001), portraying 3G mobile telephony as a gigantic shift in the way people communicated with each other. Thus, the Daily Telegraph (1999) highlighted how "the telephone will be an intelligent universal gadget that we use far more for shopping, video-conferencing and watching video than for making voice calls." Other notable business leaders such as Jeff Bezos of Amazon.com added to the hype by predicting that by 2010, all of his firms' customers would use wireless devices to make purchases and described mobile-commerce, enabled by 3G technologies as the "most fantastic thing that a time-starved world has ever seen" (The Economist, 2001). Finally, contributions to the hype were also forthcoming from equipment manufacturers such as Nokia and Ericsson, which also stood to benefit from the development of the 3G market with their 2Gproduct lines nearing obsolescence.

The highly optimistic narratives that were being spun constantly around 3G did not always lead to managerial action directly. Indeed, in many cases we discovered that managers themselves did not entirely believe that the high prices were justified, but under stakeholder pressure (Deephouse, 1996) felt compelled to play along. An *Orange* executive referred to the highly optimistic market sentiment prevalent at the time, which made it 'unthinkable' to be left out of the race and ultimately destroyed value:

> "A financial market related factor is how much of a hit you take on your share values, if you don't get the license that would far outweigh the price that you have actually paid for the license. At the end of the day a debt of £4 billion is massive but if your share price drops 40% it's a lot more than £4 billion. The share prices did fall after buying the license, but it's better than if you

> didn't buy the license. The market was so keen on 3G that, either you die instantly *if you don't get it or you die slowly if you do get it*……You have to please your shareholders! We started with a business plan like everybody else and then ended up, throwing it in the trashcan." (Italics added).

Thus, at each stage, increasing prices were justified by citing those 'in the know' (such as Jeff Bezos), framing the potential of 3G differently or simply treating the acquisition, with all its uncertainty, as a land grab. The government, consultants, analysts and the like played their role well in positively influencing the perceived 'common value' of the resource and send the prices skywards. The eventual winners, with vastly different existing capabilities, were always in hot pursuit, sometimes of their own volition, at others under pressure from their shareholders.

4.23 Strategic Bidding: Apart from the prevalent discourse, another determinant of eventual prices appeared to be strategic bidding. The behaviour of participants during the auction was revealing. It emerged that participants were not only trying to acquire the license as cheaply as possible, but also ensure that competitors paid exorbitantly high prices for it. Take the example of BT Cellnet's change of tactics during bidding (Borgers and Dustmann, 2001). In Round 17, when the difference between the minimum required bids for the larger license (B), and a smaller one (C) was £280 million, BT gave up bidding for the larger license and started to bid for the smaller one. However, in Round 142, when the difference in the minimum bid for the two licenses was £1,860 million (more than 6 times as much) BT again started bidding for the larger license. Eventually, BT settled for the smaller (and cheaper) license.

BT's strategy is difficult to rationalize from the standpoint of bidding theory. Indeed, Borgers and Dustmann (2001:28) concluded, "BT's bidding behavior was driven by considerations other than an evaluation of the difference between large and small licenses." While BT did not get the larger license eventually, its strategy of bidding for it raised the price for the eventual winner and its main competitors, Vodafone, by another £2 billion. After the auction BT claimed that through bidding tactics, it had

deliberately pushed up the price that its archrival Vodafone had paid (Cane and Owen, 2000). Many other interviewees were equally straightforward in their description of these dynamics.

Just as firms recognized that their interest lay in raising the price of a resource for competitors, they similarly acknowledged the value of acquiring a resource at the lowest possible price (Barney, 1986). Thus, there is always a possibility that competitors may collude to keep the price of a resource low. While in the UK case, there was no evidence of such activity; in other European countries there were reports of signaling and collusion, which could partly explain the generation of less-than-expected revenues[13] in the Dutch and Italian auctions (Klemperer 2002a; Roberts et al, 2000). In the Netherlands, with just 5 licenses for the 5 incumbents, the only new entrant, VersaTel did not fancy winning and was eager to get concessions from the incumbents as was indicated by the following pre-auction press release (Van Damme, 2002):

> "We would however not like to see that we end up with nothing whilst other players get their licenses for free. Versatel invites the incumbent mobile operators to immediately start negotiations for access to their existing 2G networks as well as entry to the 3G market either as a part owner of a license or as a mobile virtual network operator"

To the rival Telfort (an incumbent) this seemed 'unfair tactics' as it accused Versatel of malafide bidding to drive up competitors' prices (Klemperer, 2002a; Van Damme, 2002).

> "Expert opinion indicates to Telfort that you will soon reach a bid level that is not in the interest of your company and its shareholders. The ulterior motive for such a bid must be that Versatel is attempting to raise its competitors' cost or to gain access to their 2G or 3G networks…… A bid

[13] For example, the Netherlands auction with just five licenses for six bidders raised a quarter of what the Minster of Finance had expected, achieving US$159 per capita in comparison with US$580 per capita in the UK. The situation represented a "closed shop" arrangement (Van Damme, 2002) where there are as many licenses as incumbents, and new entrants have little chance of winning.

> strategy with such a motive constitutes a tort towards Telfort, who will hold Versatel liable for all damages as a result of this……

Under pressure from the threat of legal action from Telfort, Versatel quit the auction early and the final prices were much lower than expected. In Italy on the other hand, Blu, a firm backed by British Telecom, quit the auction prematurely and was accused of collusion by the Italian government. In both the Netherlands and in Italy, legal battles ensued but lack of conclusive evidence prevented indictments (Van Damme, 2002).

The dynamics associated with resource acquisition through a competitive process extend our understanding of value. Strategic posturing, whether through timing of entry or exit from the acquisition process or bids, for instance, served to increase or decrease the price of the 3G license to the acquirer. Naturally, more cheaply the license could be acquired the higher its value would be to the owner. Conversely, overpaying would destroy potential value for the resource-owner.

4.3 Value and Post-Acquisition Dynamics

By the time the auction ended, and vast sums of money were paid for the licenses, a market for 3G services still did not exist. In a trigger-happy financial market context, the absence of a ready market, or even hardware, combined with efforts of all non-winners of the auction to develop alternative technologies cast a long shadow over the prospects of 3G licenses. It was perhaps not surprising then, when soon after the auction closed, most analysts pronounced the licenses to be 'ridiculously' overpriced:

> "It's increasingly obvious that the whole 3G vision isn't going anywhere, at least as the industry has imagined it. The telecom industry has always done a bang-up job with voice service, but attempts to add radically different kinds of service have fallen apart (Sullivan, 2000).
>
> "Call it the biggest bath ever….. It's the end of an era. Phone companies had no choice but to ante up for third-generation mobile licenses or risk kissing their future good-bye. And national governments got greedy with 3G auctions that fattened their coffers but nearly bankrupted the industry they were trying to ignite" (Reinhardt, 2002).

A few academics, such as the US-based Dr Nicholas Negroponte also criticized the auction calling it "a mistake," based on "shortsightedness" and "not economically viable." He opined that the high costs of licenses would impede investments in infrastructure rollout and retard the uptake new mobile networks that would cost Europe its best chance of countering American dominance of the Internet (The Economist, 2000). Thus, while there were hardly any articles exhorting caution at the time of the auction, immediately afterwards there was a spate of material pouring freely, about the auction being a gamble, with 3G "Universal Mobile Telecommunication Services" (UMTS) being sarcastically referred to as "Unproven Market, Technology and Services." A former *BT* executive, Peter Cochrane told BBC television's Money program (quoted in BBC news, (2001)) that the 3G auction was "a serious game of poker," and described the bidding process as a bit like "lemmings going over the edge of a cliff."

While it is difficult to postulate the direction of causality, such pessimistic forecasts were accompanied by a general decline in the market valuations of telecommunication companies which fell by an average of 60 per cent from their high point just before the auctions. The Financial Times summed up the situation in these words: "Taking into account the write-offs, bankruptcies and closures worldwide, probably $1,000 billion has gone up in smoke" (The Financial Times, 2001).

Most analysts as well as shareholders were now openly skeptical about the future of 3G. Combined with the fall in the market this forced out many executives, including the Chairman and CEO of British Telecom. The chief executive of BT Cellnet, stated:

> "There is a recognition that too much was paid for 3G licenses three years ago at the top of the market, and since then, time in which to recoup that investment has shortened."

The firm wrote down the value of its third generation licenses in 2003 by £5.9 billion, of which £2 billion was for the UK license that its former parent, British Telecom had bought for £4 billion. However, with escalating commitment to the new technology and a 'valued' resource (Brockner and

Rubin, 1985), the other operators, Vodafone, Orange, T-Mobile and Hutchison 3G continued to value the licenses at the purchase price.

However, even these optimistic actors realized that rents would only accrue once a market developed around 3G technologies (Kay, 1993). Specifically, in the transforming competitive landscape with new configurations of the actor-resource architecture that 3G was inevitably going to introduce, the license winners needed to ensure that rents accrued proportionately to the investments that had been made.

4.31 Process of value creation and appropriation ex post: In order to understand the dynamics surrounding value appropriation from the licenses, it is important to realize that they were the two main currents in the field. One was the expanded 3G domain that allowed the entry of outsiders and the other the competition between license winners (haves) and losers (have-nots).

First, with phones becoming 'hybrid' devices (offering voice, video, Internet access and so on) and entering the realm of consumer electronics, the boundaries of the telecommunication industry were being altered significantly. Apart from the traditional 2G telecom players, who were still leading infrastructure development, there was an influx of several new competitors in the manufacturing sector. Challenging Nokia's or Motorola's traditional dominance were formidable consumer electronic giants such as Samsung and Sony- Ericsson (The Economist, 2004). Similarly, the industry swelled with the emergence of several new content providers (just like the Windows operating system requires innovative application development for its success, 3G needed effective 'content'). These included, among several others, firms such as Jamster (musical ringtones, logos and games designed especially for the mobile) and First Direct, a financial institution which offered 'regular' online banking services through the mobile device.

While in 2G, all customer revenues went to mobile operators, with the influx of content providers in the expanded domain of 3G, this revenue would have to be shared. Also, with end customers paying for content, the operators would need to 'divide the spoils' not just with the content providers but also with credit card companies and banks that had competencies in payment processing and finance. See Fig 3 for a 3G network.

Insert Figure 3 about here

Thus, at one level, operators could no longer count on generating Ricardian rents from resource ownership alone as had been the case for 2G. Instead, they needed to develop new business models and build new capabilities by collaborating with other actors in order to generate Schumpeterian rents (Levinthal, 1992; Rumelt, 1987). As the CEO of Hutchison acknowledged at a FT Mobile Communications conference that there was a fundamental difference between running 2G and 3G networks:

> "3G operators need to be pluralists. You are in telecoms. You are in retail music. You are in games. You are in broadcast. The old strategies that worked well in 2G are no longer applicable. You need to be able to understand all these markets not just one of them……..(quoted in Daniels, 2005).

Since none of the mobile telephony firms possessed all the resources and competencies to create a 3G market, they had to enter into mutually beneficial relationships with others (Borys and Jemison, 1989; Contractor and Lorange, 1988), entailing a complex set of horizontal and vertical interdependencies (Aiken and Hage, 1968; Pennings, 1981). In other words firms had to enroll a wide range of stakeholders, in order to increase the value of the network (Latour, 1987). Vodafone signed a deal with Sony Music Entertainment to provide content (music) to its customer base, increasing the potential ARPU while allowing Sony, access to multiple markets on the global Vodafone network, with over 200 million

subscribers. To generate such value, Vodafone was willing to share 40% of the additional revenues generated.[14] It was obvious to these firms that they couldn't go it alone (Powell et al, 1996) and that the value of each firm's resource could be synergistically improved. An Orange executive in an interview concurred:

> *"*We have come around thinking that we can be everything all at once. We cannot be a bank or an Internet content provider. Fostering relationships is absolutely crucial to the success of our business model" (Interview with authors, 11/05/01).

While the need for such resource sharing in the changed 3G network were new to European operators, the very successful i-mode service (a 2.5G technology), launched by Japan's NTT DoCoMo had already demonstrated its success (Ratliff, 2002). From the very onset of its launch, DoCoMo kept its platform 'open,' as it was also willing to share a large portion of revenues generated through the use of third party applications on its network. In contrast, the 2.5G equivalent in Europe, WAP[15] adopted a 'walled garden' approach as the operators wanted to establish a proprietary hold on the content offered on their networks. The service failed to attract many content providers to the platform and performed well below expectations.

It was clear that in the expanded domain of 3G, firms needed to collaborate with others and access resources from outside the firms' boundaries (Powell et. al, 1996; Sanchez and Heene, 1997). Without such capabilities, the networks of these firms could be reduced to 'plumbing' pipes with little control over what 'flowed' through those pipes – a scenario the 3G operators were eager to avoid. Thus resource value did not depend solely upon the capabilities of the firm acquiring it, but on the ability to

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[14] www.vodafone.com and www.the3gportal.com.

[15] WAP (Wireless Application Network) enabled mobile consumers to access audio-visual 'content' through the Internet but at far lower speeds than 3G.

compete, collaborate and enroll other actors (Brandenburger and Nalebuff, 1996) in order to generate 'relational' rents (Dyer and Singh, 1998).

4.32 The competition between the haves and the have-nots: At the same time, however, there was a second current of competition between telephony firms which also influenced value appropriation. Within this evolving field ownership of the 3G licenses had split the field into haves and have-nots. The haves, or the 'winners' of the licenses, had an obvious interest in maximizing the value of this resource, with incumbents seeking to renew their competitive advantage through "creative accumulation" (Breschi et al, 2000). On the other hand, the have-nots' interest lay in minimizing it by disrupting the 3G market (D'Aveni, 1994).

Within the 'haves,' as in resource acquisition the heterogeneity in the "positions" of the incumbents and the new entrant led to the pursuit of different "paths," ex post (Teece et al, 1997). For instance in 2002, the only new entrant, Hutchison, with no 2G legacies or fears of cannibalization (Henderson, 1993) was the first to launch 3G services in the UK. The firm re-branded itself as '3' and offered voice telephony (typically an established 2G service[16]) at dramatically low prices[17] relative to competition, with 3G services initially bundled in for free to induce trial. These aggressive tactics benefited consumers as incumbents were also forced to reduce tariffs for voice services. At the same time, Hutchison offered 'value-added' services such as exclusive UK Premier League soccer coverage to its customers (Budden, 2002) in a bid to pioneer innovative 3G services in the UK and establish first-mover advantages (Lieberman and Montgomery, 1998). The UK Managing Director of Hutchison 3G stated:

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[16] While the market is still evolving with more emphasis on content and applications, many analysts have argued that the 'killer' application for 3G remains voice (chat) rather than content.

[17] An important advantage of 3G technologies is that they can offer cheaper voice (about one tenth of the cost of 2G networks).

> "As Hutchison was a pure-play new entrant, it had more 'headroom' in its strategic approach. Others were embedded in voice technology (2G) and it made economic sense for them to protect it for longer. Having no legacies of 2G networks, we will have significant first-mover advantages and help define what 3G telephony means to people and exclusively occupy the space for video telephony" (Interview with authors – 01/12/2003).

While the new entrant, Hutchison sought to benefit from moving first in 3G, the incumbents with a significant installed base of 2G customers opted to upgrade them to 2.5G before launching full blown 3G in 2004, almost two years after the new entrant. The idea was to "free ride" on the pioneering firm's investments in developing the market for 3G (Lieberman and Montgomery, 1988:47).

Just as the winners, both incumbents and the new entrant were acting to minimize the value of 3G licenses; the losers were trying to ensure that the licenses did not become a barrier to entry to the evolving 3G. Failure to get the resource did not mean that the power of the 'losers' to influence the value of the resource had been eliminated. While in 2G, operators without a license were effectively shut out from telephony services, in the expanded domain of 3G and to some extent 2.5G, they (the losers) were afforded the opportunity to create 'strategic equivalents' (e.g. Barney, 1991) to compete the rents away from winners.

This was done, for example, by promoting alternative solutions (Cane and Owen, 2000) - something that NTL, a losing incumbent, was trying to do. Soon after NTL quit bidding in the UK auction, it launched the first TV-based UK Internet service and claimed that the TV rather than the mobile phone would likely become the preferred mode of Internet access for most online activities. BT (now without a 3G license) on the other hand was betting on the continuity of the PC as the principal mode of Internet access by investing heavily in broadband technologies. Similarly, a senior executive from One.Tel, which quit bidding late in the process, claimed that not obtaining a 3G license had been a blessing in disguise:

> "Consumers have no need for 3G….Companies that won licenses overpaid for them, had no strategic position and have distressed themselves financially. We can gain a competitive edge by

> focusing on what customers need now, as compared to what they may need in the next 10 years. One.Tel's expected valuation of the license was £1billion but when prices reached surreal levels due to bidding frenzy, we thought it prudent to quit. By not bidding for 3G, we will not be excluded from any service method, only the opportunity to obtain more spectrum capacity" (Interview with author, 01/05/01).

Another potentially disruptive technology for 3G was Wireless Fidelity (WiFi) that uses free or unlicensed spectrum while providing mobile information access in designated locations, known as 'hotspots.' While at this stage, hotspots were limited to airports, coffee shops, or universities, where laptops and PDAs were generally used, there was speculation in the industry that in the near future, all the hotspots could be linked together to create a seamless universe for users. While some firms with 3G licenses such as T-Mobile were also offering WiFi access on their networks, it was likely that WiFi could siphon data traffic away from 3G networks.

Finally, firms that had lost out in the auction could opt to become a Mobile Network Virtual Operator (MNVO) and bypass 'resource' ownership (Sanchez and Heene, 1997) by renting spectrum from license holders to serve the mobile needs of their customers under their own brand. In 2G for example, Virgin Mobile had successfully used the strategy of buying airtime (spectrum) from the license-holder, T-Mobile and leveraging its brand name for attracting customers to the mobile services it provided. Having failed to win a license in the auction, the firm through employing 2.5G upgrades was able to deliver much of what 3G promised. Steven Day, Virgin Mobile's corporate affairs director stated:

> "You don't need to own your own train tracks to own a railroad company; you don't need to build your own planes to have an airline; and you don't need your own network to run a mobile phone company, either" (quoted in Lauchlan, 2001).

Recently, there been a spate of activity, with established brands in completely unrelated industries such as Tesco (supermarket chain) and MTV (music and media) setting up as MVNOs. These brands see themselves as more effective than "boring, technology-driven" mobile firms in filling up the expensive excess capacity of their 3G networks (The Economist, 2004). The strategy is to bring about a reversal of roles, similar to what had happened in the PC industry, with Intel and Microsoft capturing most of the

total profits with the Wintel standard (Hart and Kim, 2002), while the pioneers (e.g., IBM and Apple) were left behind.

It is evident from the discussion above that the value of the resource continued to evolve even after it had been allocated in the market. The two destabilizing currents of competition changed the rules of engagement (Hamel and Prahalad, 1994) as well as the mechanisms of rent generation in mobile telephony. While operators sought to maintain a 'Ptolemaic[18]' world with resource (3G license) ownership central to rent generation, outsiders sought to make the compelling content and disruptive substitutes the essence of rent generation. In short, the reconfigured and enlarged field not only created new opportunities but also opened new competitive fronts for the distribution of rents between the various actors involved.

5. DISCUSSION AND CONCLUSIONS

As the pace of technological change intensifies in various industries, the external acquisition of resources is becoming a central concern for most organizations struggling to keep up with ever changing industry dynamics. The resource-based view, however, has so far mostly chosen to focus on internally developed resources and their contribution to competitive advantage. While this focus has led to important insights into the success and failure of firms the exploration of value dynamics around externally acquired resources adds new dimensions and theoretical insights to the RBV. First, a shift in focus from internally developed resources to externally acquired ones introduces Schumpeterian competitive dynamics into the discussion of resource value (Levinthal, 1992) that are markedly distinct from the usually emphasized Ricardian dynamics (Garud, 1994). Second, value - a function of the *ex ante* price paid for a resource and

[18] Essentially referring to operators seeing themselves as at the center of the mobile universe by virtue of owning spectrum licenses.

the *ex post* deployment of the resource - depends on the competitive and collaborative dynamics as well as the discourse constructed by market participants. We discuss these in turn, both *ex ante* and *ex post.*

5.1 ***Schumpeterian dynamics***

In Ricardian contexts, value is mostly generated from the proprietary ownership of naturally scarce resource, such as valuable land and patents by erecting resource competition barriers in stable environments. These dynamics were evident during the second generation in mobile telephony such dynamics. With changing technologies and converging industries however, a firm's competitive position and environment is destabilized as the innovative recombination or reconfiguration of resources problematize the existing advantages from the proprietary hold of resources. Insofar as the value from such reconfigurations is not widely known or anticipated, it creates a wedge between the *ex ante* appraisal and the *ex post* realization of value. In other words it creates room for Schumpeterian dynamics or the exercise of entrepreneurial insight into an uncertain and complex environment (Garud, 1994; Mahoney and Pandian, 1992). The third generation in mobile telephony introduced such dynamics around 3G licenses. The decision to adopt a market mechanism (auctions) for the hitherto 'awarded' resource created new competition for its acquisition while the 3G technology redefined the industry boundaries, extending them well beyond telephony. Generating value from the resource under these conditions of change and uncertainty needed both competitive and collaborative interactions not just with existing actors but also with new actors from other industries. The emphasis on actors and Schumpeterian dynamics is consistent with the Austrian school of economics (Jacobson, 1992; Kirzner, 1997) emphasizing managerial agency as against the more neoclassical economics reasoning of erecting resource barriers for Ricardian rent generation (Mathews, 2003). Under such Schumpeterian conditions, value creation (or destruction) around an external resource, *ex ante* is a function of the price paid for a resource. This involves both competition and collaboration.

5.2 ***Ex ante competitive and collaborative dynamics***

The actions of competitors in influencing the *ex ante* resource value for a particular firm play an important role as they attempt to create options for future survival. *Ex ante* capturing of value is thus not just a function of luck or superior foresight about the resource in imperfect markets (Barney, 1986; Denrell et al, 2003). Moreover, firms strategize not only to maximize the value around their own resources - a typical focus of RBV, but also to destroy value for their competitors' resources. Solely focusing on the dynamics of value creation at best provides only a partial understanding of the competitive dynamics underpinning the process.

Indeed, as we observed the strategic posturing by firms, aimed at improving their own resource positions by upping the cost of acquisition for rivals, drove prices up for various players. In externally acquired resources then, the 'winner's curse' becomes an important consideration. For instance, BT's bidding strategy raised the price of a license for Vodafone by an estimated £2 billion. There are many examples of exclusionary practices involved in strategic investments that can include bidding up costs for rivals. Take the case of the recent battle between Vodafone and Cingular for the acquisition of AT&T. Some industry observers believed that Vodafone's bidding patterns were an elaborate game of poker, with the aim of forcing Cingular to pay more (Durman, 2004). Vodafone's 'tactics' eventually made Cingular bid $41bn to snatch AT&T Wireless from Vodafone, even though it had initially valued the under-performing AT&T Wireless at $30bn (a premium of 37%). From a competitive standpoint, having a competitor overspend would constrain its ability to make the necessary investments to generate rents from the resource. While such Machiavellian tactics may destroy overall value by retarding long-term market development, the short term objective of weakening the competitor through the winner's curse can dominate in highly competitive environments.

Our observations regarding the winner's curse, while made in the context of 3G auctions, are by no means limited to it. Despite years of evidence demonstrating that most mergers and acquisitions (firms acquiring a bundle of resources) don't create value for the acquiring company (Hitt et al, 1998), many

executives in their obsession to win at all costs end up paying 'too much' for a resource that reduces the likelihood of value creation (Datta et al, 1992). For example in 2001, the Tyco CEO bought CIT Financial for $9.5 billion and ended up selling it for $4.6 billon in less than two years. Despite vocal criticism of the deal at the time of purchase, the CEO had argued that "CIT (the purchase) will be one of the best deals we have ever done" (Symonds, 2002).

In short, *ex ante* dynamics involve competitive interactions that influence resource value. However, the construction of value during investing for resources also involves collaborative dynamics. We highlight an important but relatively under explored dimension of *ex ante* where not only rivals cooperate to keep prices low through capabilities at cooperation such as mergers and joint ventures. For example, the a high level of cooperation was achieved amongst participating firms in many European contexts to keep license prices low through forming joint ventures and agreements for resource sharing. One reason was that he auction format and lessons from the pioneering and excessively competitive UK auction allowed some European firms (for instance in the Netherlands and Italy) to develop better capabilities at cooperating in order to keep prices down (Van Damme, 2002).

Firm capabilities at cooperation are however influenced by other market participants such as the state. Since value creation for firm by keeping prices low was value destruction for the state, the cooperation among bidding firms was construed by states as illegitimate collusion. While the UK state was able to generate higher than expected revenues from the sale of licenses by preventing cooperation among the bidding firms, the governments at various other European locations fell far short of their revenue targets. Unlike the effective UK auction which took three years in planning and development, with the state hiring prominent academics for auction design, the subsequent European actions were "rushed, last minute affairs" (Klemperer, 2002b). For instance in the Netherlands, the state came up with an 'inefficient' and 'non transparent' auction design that failed to generate competitive dynamics. The Dutch firms on the other hand drew on the expertise of auction theorists that enabled them to bid wisely and keep prices low.

Just like *ex ante* dynamics determine resource value by influencing the price paid for its acquisition, *ex post* dynamics also affect resource value through capabilities at appropriation. Again, they involve both competition and collaboration.

5.3 ***Ex post competitive and collaborative dynamics***

As Schumpeterian competition often destabilizes a firm's existing competitive position in an environment of changing technologies and reconfigured industries, it can provide rivals (even the non-winners of a resource) the opportunity to influence its value, *ex post.* Competitive dynamics involve developing alternatives or 'strategic equivalents' to compete the rents away from resource winners. In our context, one of these potentially disruptive alternatives to 3G was Wireless Fidelity (WiFi) that used unlicensed spectrum for providing many of the 3G services. Another alternative for non-winners to reduce the value of resource ownership was to bypass it (Sanchez and Heene, 1997) and become a Mobile Network Virtual Operator (MNVO) by renting spectrum from license holders.

Besides competition, collaboration also becomes imperative for firms when an innovation threatens to radically shift the basis of competitive advantage and render obsolete existing competencies by creating new industry space (Hamel and Prahalad, 1994) and a complex set of interdependencies. While firms have a shared interest in creating a market for the innovation, rarely would they single-handedly possess all the required resources and competencies (Garud, 1994). Firms thus stand to benefit by making their resources mobile and available (Knott, 2003; Mathews, 2003) to others in order to appropriate value. This is in contrast to the typical emphasis in RBV on building isolating mechanisms (Lippman and Rumelt, 1982) and creating and sustaining uniqueness (Barney, 1991).

In our study, the resource winners (telephony specialists) while pressing ahead with maximizing resource value had no special competences in the new industry space that the technology stood to create and needed to engage in collaborative arrangements with firms in other sectors (content specialists). The mutual benefits of such relationships (Contractor and Lorange, 1988) were recognized when Vodafone had decided to share revenues with Sony. Thus instead of viewing competition and cooperation as

opposite ends of a continuum we analyze the dynamic interplay between competitive and cooperative phenomena (Garud, 1994; Teece, 1992). A purely competitive outlook in value creation efforts would lead firms to a zero-sum orientation that could blind them from the positive-sum games that enhance resource value in 'syncretic' rent seeking (Lado et al, 1997).

It follows from the arguments above that it is more appropriate to consider the 'field' level or an inter-organizational context (DiMaggio and Powell, 1983) to understand resource value. This argument is in line with Dyer and Singh's (1998) suggestion that the more appropriate unit of analysis should be the network in which the firm is embedded. Our study makes it clear that by focusing on a single firm, say Vodafone, we would have missed the competitive dynamics that led to Vodafone's repeated re-evaluations of the 'value' of the resource it was planning to acquire. Also it would have led us to overlook the contentious process of value appropriation that ensued after the resource was acquired.

Besides the competitive and the collaborative dynamics, both *ex ante and ex post*, resource value is also influenced by the discourse constructed by the various market participants that make value determination and investment behavior a "social referencing process" (Abolafia, 1996; Zajac and Westphal, 2004).

5.4 ***Discourse and resource value***

An argument central to our study is that the perception of value for a firm seeking to invest in a resource, *ex ante* is influenced by a broad community of actors, such as the competitors, the media, the analysts and the state whose actions and discourse helps set expectations about value (Pollock and Rindova, 2003; Rao et al., 2001). This insight about the social construction of value is in contrast to the tendency within the RBV to assess the value of a resource through rigorous exercises in due diligence and in terms of its synergy with a firm's existing asset base (Conner, 1991; Teece, 1986). While firms ascribe a 'private' value on the resources they intend to acquire, these external actors construct a 'common' value by

bringing value to the public domain. The 'common' value element interacts with the firms' private conceptions of value and influences their 'valuation' capabilities. In our study, the decision by the UK government to hold back on the publication of an important report on the adverse health effects of mobile telephone usage, until after the auction had closed, almost surely played a part in sustaining the inflated prices that were eventually paid for the licenses. Moreover these actors actively 'framed' the 'hype' preceding the auctions by portraying 3G as a particularly attractive proposition leading to an escalation in perceptions of value.

The material and discursive actions of the actors in trying to reconfigure the socio-technical network to their own advantage[19] significantly influence perceptions of value, not just before acquisition but also after acquisition. In the post 3G license scenario, the media that had so vocally advocated the case for 3G prior to the auction performed a *volte face* with most reports playing down 3G and declaring it as a 'stillborn' technology. While the 3G licenses were expected to serve as the basis for the creation of a new market, as our study indicated, there was no inevitability about this. Indeed the losers were relentless in pursuing actions and constructing a discourse in which all customer needs could be met through alternative and potentially disruptive technologies (Christensen and Rosenbloom, 1995).

By examining the creation and destruction of value around externally acquired resources, involving both competitive and collaborative dynamics and the role of discourse - area that has not received attention in the RBV, our study advances existing conceptions of resource value (Bowman and Ambrosini, 2000; Foss and Foss, 2005; Makadok and Coff, 2002; Priem, 2001; Priem and Butler, 2001). From price and value being synonymous, to value being something that resources generate in the context of other resources (synergies), to a perspective in which resources generate value in adapting to a dynamic environment (dynamic capabilities), we develop a new perspective that resource value is both

[19] We are grateful to a reviewer for this insight.

internal and external.[20] Regarding value attribution as a social and political process involving a broad community of actors and not simply a proprietary technical activity can lead to a better understanding of resource value. By synthesizing insights from RBV with various other literatures, we develop a more a more environmentally nested and less disembodied perspective for understanding the dynamics of value creation and destruction around a resource and the capabilities involved in the process. While our data and level of analysis does not permit making any categorical claims about firm level capabilities, our insights nevertheless carry important implications for such capabilities.

One of our central arguments that managerial capabilities are influenced by the actions and discourse of external actors is in line with scholars that question the use of hyper-rational assumptions and emphasize the contextual nature of decision-making (Daft and Weick, 1984; March and Simon, 1958; Mintzberg, 1978; Zajac and Bazerman, 1991). While such contextual influences can often result in suboptimal rather than 'value maximizing' choices, we would argue that firms can play a more active role in establishing a strategically favorable set of conditions that privilege their own position and abilities (Lawrence, 1999). An important implication is that when managers invest in 'future' capabilities, they need not only better skills at acquisition and collaboration but also in actively crafting a discourse in the enactment of particular strategies (Eccles and Nohria, 1993) that benefit their own resource positions. Such discursive agency was seen when the extensive lobbying and advertising by tobacco firms helped stem the tide of disadvantageous regulations (Miles and Cameron, 1982).

Another implication of our study is that in the initial, fluid state of technological innovations, it is in the interest of firms need to focus on collaborative efforts and support the development and diffusion of the innovation. The erection of resource barriers at this initial stage would impede the creation of a successful market for the innovation (Garud, 1994).

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[20] We are grateful to a reviewer for this insight.

Our research extends the RBV and DCP by providing insights into the process through which value around a resource is constructed both internally and externally. The study can be extended to other firms in Europe, Asia and Americas, where it would be revealing to compare how, and whether, the various mechanisms that were used to allocate or sell licenses influenced the emergence of the mobile phone market. The study is limited in its generalisability because of its focus on one specific industry and one type of resource. Also, we did not explore how external resources interacted with the existing resource base of a firm. This would have revealed further interesting insights. Further research should investigate these questions for other types of resources, asking how resources are acquired and to what extent the price paid reflects the value in combination with the existing asset base of firms.

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APPENDIX A: LIST OF INTERVIEWS

No	Country	Firm	Type	Position	Date (s)
1	UK	Orange (France Telecom)	Operator	International Strategy Manager	04/04/01 11/05/01
2	UK	Vodafone Plc	Operator	Director Strategy Programme Management Executive	12/04/01 11/05/01
3	UK	Vodafone Plc	Operator	Group Technical Services Director	16/0501
4	UK	BTCellnet (mmO_2)	Operator	Director of International Affairs & Strategy / Vice President	04/05/01 06/10/03
5	UK	BT (British Telecom)	Operator	Senior Executive	25/05/01
6	UK	BT (British Telecom)	Operator	Senior Executive	02/04/01
7	UK	One2One (DeutscheTelecom)	Operator	Corporate PR Manager	02/05/01
8	UK	Hutchison 3G	Operator	Senior Executive	25/05/01
9	UK	NTL Mobile	Operator	Senior Executive	22/03/01 02/05/01
10	UK	NTL mobile	Operator	Chief Technologist	22/05/03
11	UK	OneTel	Operator	Public Relations Manager	01/05/01
12	UK	WorldCom	Operator	Senior Executive	16/05/01
13	UK	Telefonica	Operator	Senior Executive	26/03/01
14	Netherlands	Libertel	Operator	Senior Executive	03/05/01
15	Netherlands	Telfort	Operator	Senior Executive	03/05/01
16	UK	Investment Bank	Bank	Senior Executive	26/04/01
17	UK	Sony Ericsson	Vendor	Managing Director	26/11/03
18	UK	Hutchison 3G	Operator	Managing Director	01/12/03
19	Finland	Nokia	Vendor	President	26/01/04
20	Finland	Nokia	Vendor	Director of Strategic Planning and Programs	27/01/04
21	UK	Walt Disney Group	Content Provider	Managing Director	18/07/03
22	UK	BT Retail	Service Provider	Chief Technology Officer	19/11/03
23	UK	McKinsey and Company	Consultancy	Director	19/03/04
24	UK	University of Cambridge	Academic /Consultant	Academic and Consultant to Nokia	03/08/03
25	USA	The Yankee Group	Consultancy	Director, Wireless Mobile enterprise and Commerce	04/09/03
26	UK	Vodafone	Operator	Strategy Executive	05/02/04
27	UK	BT	Operator	Ex Senior Executive	05/11/03
28	UK	Ericsson	Vendor	Senior Executive	07/11/03

FIGURE 1: THE 2G NETWORK

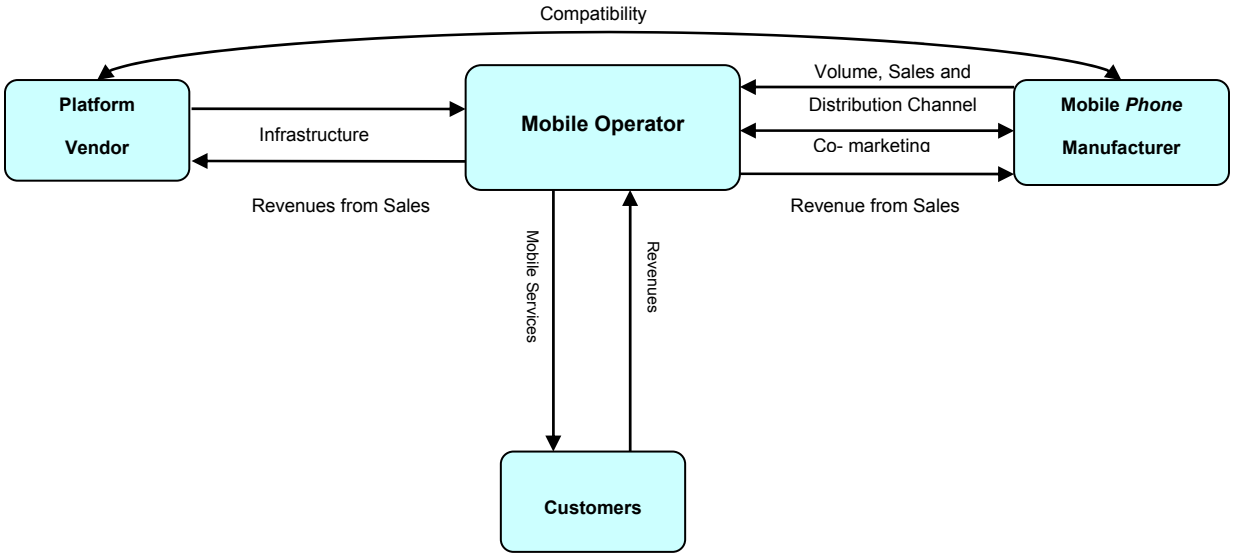
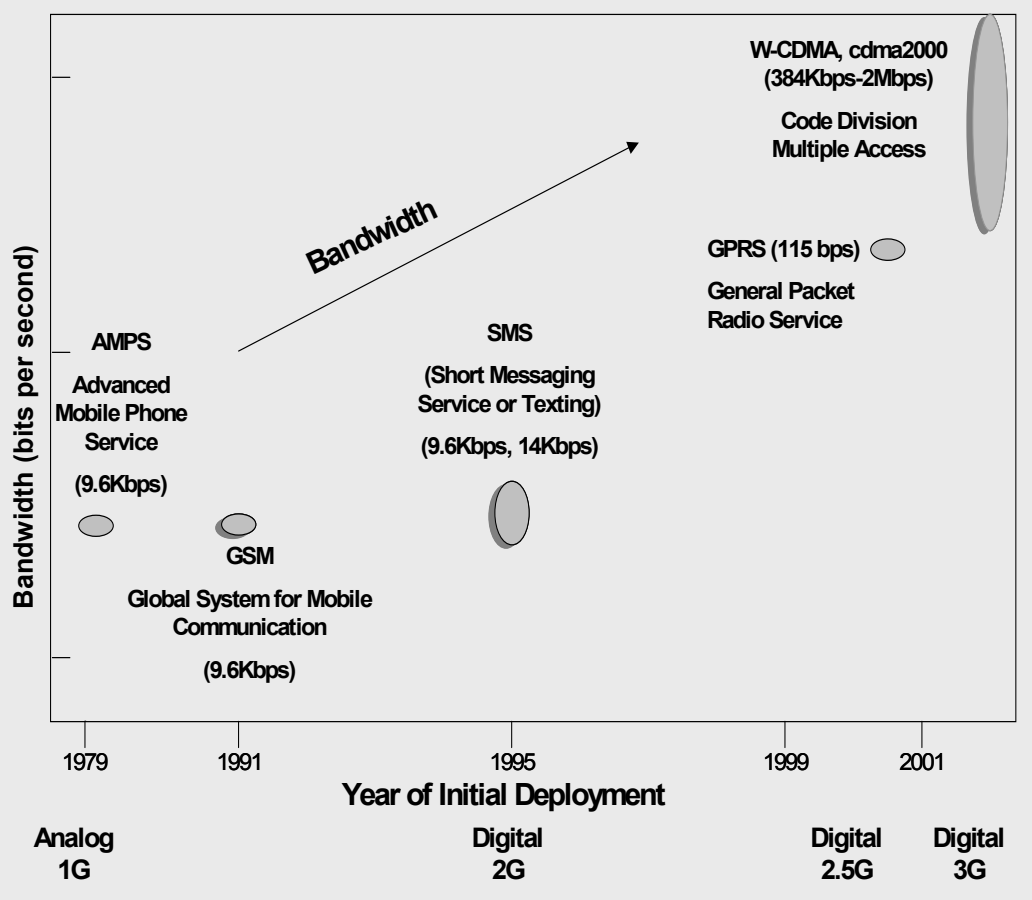


FIGURE 2: EVOLUTION OF MOBILE TELEPHONY STANDARDS[21]



[21] Adapted from PriceWaterhouseCoopers Technology Report, 2002.

TABLE 1: PARTICIPANTS IN THE UK 3G AUCTION IN 2000

Bidder	Status	License	Minimum Bid (millions)	Winning Bid (billions)	Withdrew in Round	Last bid before withdrawing (billions)
Hutchison 3G (Now 3)	New entrant (Winner)	A (Largest capacity, reserved for new entrant)	£125	£4.38	-	-
Vodafone Plc (Market leader)	Incumbent	B (Largest capacity available to incumbent)	£107	£5.96	-	-
BT Cellnet (Now mmO_2)	Incumbent	C (Less capacity than license B - but nearly £2bn cheaper)	£89.3	£4.03	-	-
One2One (Now T-Mobile)	Incumbent	D (Same capacity as licence C)	£89.3	£4.00	-	-
Orange (FranceTelecom)	Incumbent	E (Same capacity as licence C).	£89.3	£4.10	-	-
NTL Mobile	New entrant	Withdrew from auction	-	-	150	£3.97[22]
Telefonica	New entrant	----ditto----	-	-	133	£3.67
WorldCom	New entrant	----ditto----	-	-	121	£3.17
One. Tel	New entrant	----ditto----	-	-	101	£2.19
Epsilon	New entrant	----ditto----	-	-	98	£2.07
Spectrum (Virgin Group etc)	New entrant	----ditto----	-	-	97	£2.10
3G UK	New entrant	----ditto----	-	-	95	£2.00
Crescent Wireless (Global Crossing)	New entrant	----ditto----	-	-	94	£1.71
			Total of minimum bids ≈ £ 500 million	**Total amount raised ≈ £ 22 billion[23]**		

[22] The last bidder to quit the auction that decided the winners

[23] Total amount raised was almost 40 times the minimum opening bid

FIGURE 3: THE 3G NETWORK