Chapter Six

Marketing Maps of Internet Networks

> The advertiser generally uses the map both to enlighten and to persuade and only rarely to distort. The map is often the quickest, clearest, and most neatly organised method of conveying a geographical idea in advertising.
>
> -- Douglas K. Fleming and Richard Roth, *Place in Advertising*, 1991.

6.1 Introduction

The focus of analysis in this chapter are marketing maps used in the commercial promotion of Internet infrastructure, particularly during the phase of rapid growth in the second half of the 1990s through a case study of WorldCom. A large number of maps of Internet infrastructures have been produced by commercial network operators for the purposes of marketing services and as an element in their corporate branding strategies. As such, they are the latest incarnation of a long lineage of marketing maps used to promote communications networks, including railways, highways and the airways. This genre of mapping is interesting theoretically as it drops the ethic of cartographic independence by serving an overt commercial purpose, namely to attract prospective customers and investors in what are often highly competitive business environments. The maps created seek to communicate persuasively to potential customers and investors the benefits of using the network operators' services above another company by highlighting key aspects of their infrastructure, including its geographic extent, the range of important places connected and its capacity.

The analysis in this chapter is structured in four distinct parts: it begins by discussing the nature of marketing maps in general terms, considering how cartographic rhetoric can be employed in commercial promotion strategies for a variety of networks. The second part of the chapter is an overview analysis of the extent of marketing map usage to promote Internet infrastructure based on data from a content study of the websites of the fifty most important network providers. In the third part a framework of cartographic design strategies is developed to analyse the rhetorical power of the network marketing maps. This framework is then applied to examine in the detail global scale network marketing maps deployed by five of the largest

telecommunications corporations. The forth and final part of the chapter analyses a time series of network marketing maps produced by WorldCom, a corporation that dominated Internet infrastructure provision through much of the late 1990s before going bankrupt in 2002. The analysis uses the same framework of cartographic design strategies as in the previous section, along with other contextual business data and interview material from the manager responsible for map production, to understand how the marketing maps of one corporation evolved over time, considering the extent to which design modification improved the rhetorical capacity of the maps to match WorldCom's global ambitions. The concluding discussion considers the role of network marketing maps in the promulgation of unrealistic views of Internet growth, which in the late 1990s fuelled a disastrous speculative bubble of investment in infrastructure that lost shareholders billions when many networking companies went bankrupt in 2002.

6.2 Maps for marketing

Given the ways that maps can be made to 'lie', it is perhaps not surprising that they are a commonly used visual trope in consumer advertising, corporate marketing and place promotion. As has been well noted, all maps are selective in what they show because they take a particular viewing position, in that they are essentially *selling* a viewpoint on space that serves certain interests. And like advertising, the best maps work when the viewers do not really feel they are being sold a selective view.

In scholarly discussion of the forms and purposes of Western cartography it is frequently asserted that a distinct genre of propaganda mapping can be usefully discerned. Such maps are categorised separately from 'normal' cartography on the basis that their goal is consciously political and their design is deliberately and maliciously manipulated to present views of space that advance one particular message above all others. Fundamentally, maps are propagandist in nature when they wilfully deceive people to change their behaviour. Yet, attempting to draw a sharp and practicable distinction between propaganda maps and other supposedly 'objective' cartography is obviously a problematic task. As Pickles (2004a, 39) points out, "notions of propaganda are ... centred on an unexamined boundary between 'truth' and 'falsity', an unstable boundary at best." In fact all maps have persuasive and

deceptive qualities – and a part of the practice of 'scientific' cartography is to police the norms on acceptable deception (through, for example, the recommendations given in textbooks and best practice guides, along with the criticism and gate-keeping work of journal editors and reviewers.)

The most evident propaganda cartography is the mapping used by the state in asserting claims for the territorial naturalness of the nation, for the geographic right of territorial expansion or to exaggerate foreign threats (cf. Biggs 1999; Burnett 1985; Herb 1997). Propaganda maps produced for mass consumption in times of war offer particularly egregious examples of cartographic artifice, often overlaid with crude racist symbolism, to generate fear of the enemy and engender greater efforts from citizens (see Monmonier 1996, chapter seven; Tyner 1982). More subtle and insidious ethnocentric propaganda is said to pervade the world maps of many national atlases (cf. Fremlin and Sebert 1972; Kent 1986). The devices of cartographic centring and biased size distortions, fostered through projection choice, are used to create an advantageous sense of national superiority that seems to be geographically ordained (Henrikson 1994). Overtly propagandist mappings are not the sole preserve of government, of course, and in recent decades non-state actors have created consciously political cartographies in counter-hegemonic discourses opposing, for example, nuclear weapons (cf. Burnett 1985). While commercial marketing maps, as a form of propaganda in support of capitalist accumulation, carefully use the pretensions of objectivity in selling a respectable representation space.

Clearly, decoding the propagandist connotations given off by maps depends to a great degree on the discourses in which they are used. When the discourse moves away from informing to *influencing* the reader, the map is evoked as an intentional means to change behaviour in one particular direction, resulting in what Tyner (1982) usefully terms persuasive cartography. It is evident that the growth in persuasive cartography in the twentieth century has seen a shift in emphasis from politically-motivated propaganda mapping to profit-driven promotional cartography. The shift is evident in the use of maps in consumer adverts that seek to channel customers to the benefit of private capital rather than national interests. "Whereas maps were once used to expand nation building they now build commercial empires that, in a very real sense, are eclipsing the nation-state in importance" (Francaviglia 2005, 11). Yet, the

effectiveness of maps in the service of commercial promotion has been, surprisingly, little examined in the cartographic literature, with only sporadic coverage since the Second World War (e.g., Harrison 1953; McDermott 1969; Monmonier 1996; Schulten 2001). Growth in the commercial use of maps has been significant, particularly as new means of cartographic production enabled a much wider range of more attractive graphic representations (e.g., Richard Edes Harrison's celebrated hemispheric map views), some of which were the direct result of new technologies created in the Second World War and subsequent Cold War arms race (cf. Cloud 2002).

6.2.1 Advertising visual rhetoric

At one level, advertising works semiotically through iconic images that show what the product or service looks like and indexical images that show how it can be used - car advertisements being a good exemplar, with close-up views of the form of the vehicle and then seductive shots of it being driven. Obviously, maps can serve indexically as a good way to show a complex, space-extensive product such as a transportation network to potential customers, the archetypal case being the airline route map found in nearly every in-flight magazine (discussed below).

However, much modern advertising rhetoric is about creating a brand identity rather than demonstrating specific products and how they are used. Marketing is about generating a desirable image - the brand - that consumers will aspire to be part of. People *desire* goods and services from the brand in the hope that the positive cache associated with brand is transferred onto them. Consequently, rhetorical messages in branding tend to be more subtle than 'straight' product advertising, (for example lifestyle imagery used in establishing the brand values of car manufacturers and their models - young and fast, luxury and business, families and flexibility, and so on). Even though there is resistance and cynicism from many consumers to these lifestyle marketing efforts, powerful brands, particularly those with global appeal, are recognised as hugely valuable assets. For some businesses, the building of the brand is arguably their primary activity as the products by themselves are largely indistinguishable (e.g., the drinks industry). Many multinational companies spend hundreds of millions developing a brand identity and marketing it through numerous media channels. The most successful have become global icons recognisable virtually

everywhere. Indeed, these branding strategies themselves have come to be seen as a defining element in contemporary globalisation and threatening in terms of cultural homogenisation (Klein 2000).

The production of brand imagery in a marketing campaign relies much more heavily on symbolic representations, rather than iconic or indexical semiotic forms. Commonly the product or service is not shown at all - it does not really need to be. Instead, the goal is to conjure up the right mood using symbolic visual forms that resonate with readers through base human instinct, ingrained cultural conventions or positive associations (e.g., celebrity endorsement or sporting sponsorship). Maps, when used adeptly, can have powerful symbolic qualities, able to exude a multiplicity of connoting moods required for effective brand marketing. At one level, a familiar map can symbolise a sense of pride in territory, taping into national identities and reassuring feelings of hearth and home, but they can also be used to connote messages of adventure, exploration and the exoticism of distant lands. Antiquarian-looking maps, on the other hand, can be used to suggest endurance, authenticity and traditional wisdom; while sweeping satellite views overlaid with glowing grids radiate a modernist sense of techno-power and transcendence over nature.

In corporate brand advertising of ‘hi-tech’ firms, maps are a common visual trope used purposefully to tap into the cartographic fetish of expansionism and the pseudo-militarist aura of command and control over territory (see Goldman *et al.* 2003). Corporate marketing designs mesh with business desires to “wrap the world in complexes of arrows, networks and cages to represent their own ‘global’ presence” (De Cock *et al.* 2001, 217). World maps, map-like overhead satellite views and Earth globes are now so thoroughly ingrained visually in globalist business discourses that their use can easily tip into cliché. The image of the Earth, in particular, is an enormously powerful symbol that can connote myriad different meanings and has been exploited by a wide range of interests (cf. Cosgrove 1994; Edsall 2007; also chapter four).

Besides globes, a panoply of other geographic imagery is used for its symbolic power. These can include expansive landscape views of the countryside displayed on the threshold between map and picture, dramatic panoramic cityscapes, typically

represented at night-time as vistas of lights, and increasingly popular use of high-resolution aerial photography. Cartograms and map-like pictorial graphics are also common in marketing, often employing elements of fantasy or whimsical humour to produce a positive rhetorical effect (see Edsall 2007; Holmes 1991; McDermott 1969 for examples). Spatial rhetoric can even be conveyed simply from territorial outlines, as they are proven to be "a highly recognizable shape that cannot be confused with anything else" (Francaviglia 2005, 5).

6.2.2 Marketing maps for transportation networks

The use of marketing maps in the establishment of the brand identity of commercial transportation networks has a long lineage and one of direct relevance to understanding the commercial promotion of Internet infrastructure. As Fleming and Roth (1991, 288-289) note, "[r]elative locations, distances, types of itineraries, transit times, and costs of transit are factors of significance in the advertising of railroad, ocean, and airline services." All these factors can usefully and persuasively be visualised in cartographic form[1]. Showing the geographic structure of routes offered is an especially powerful selling point and one that can best be conveyed semiotically through network maps and diagrams. This is well demonstrated in nineteenth century railroad cartography, for example.

The growth in railroads in the United States from the 1850s, especially during the speculative building boom following generous land grants from the government, led to fierce competition between companies on routes between major metropolitan centres. High quality network maps were a significant element in competitive marketing strategies (cf. Modelski 1984; Musich 2006). Initially derived from construction surveys and engineering plans, the output became ever more presentational in design and persuasive in purpose, such that "manipulating scale, area, and paths of railroads became common practice in advertising maps of the 1870s and early 1880s and in railroad timetable maps" (Modelski 1984, 4). Besides long-distance railways, the growth of mass transit subways, trams and buses at the end of the nineteenth and beginning of the twentieth century in large cites required a new

[1] For typical examples, see the collection of transportation and communication maps from the nineteenth century provided by the maps division of the U.S. Library of Congress, <http://lcweb2.loc.gov/ammem/gmdhtml/trnshome.html>.

mapping idiom to inform passengers, and also to promote new ridership. The development of complex metropolitan networks and the need to forge a public identity for an integrated system gave rise to one of the celebrated maps of the twentieth century, the London Underground 'diagram' (Garland 1994).

Harry Beck's supremely successful Tube map not only made a chaotic mass of lines under London into a legible system, it also created a powerful visual-cognitive template of the spatial layout of London in the minds of many visitors and residents. The cartographic design, drawing on ideas from electrical wiring diagrams, pioneered a new genre of schematic subway maps, which sacrificed locational accuracy for topological clarity and has been widely copied across the world (cf. Avelar and Hurni 2006; Ovenden 2003). The Tube map also established itself as marketing symbol par excellence for the Underground, and now enjoys symbolic power world-wide as a marque of London and quirky Englishness.

In promoting the network in the way it did, the Tube map also played an important part in promoting the actual form of London's urban growth (Hadlaw 2003). Extending the simplification and generalisation of cartographic practice to the extreme, Beck completely denied the twists and turns of topography by straightening route lines; stations became uniformly spaced, and - most (in)famously - differential distance scales were applied across the map to expand the crowded centre and greatly shrink the periphery. The result was to *sell* a selective spatial layout of London, a layout that is cartographically *marketing* a much more compact, orderly and accessible city than really exists. The remote suburbs, in particular, only look to be a short distance from the centre of town in Beck's vision of London, when in fact they are a rather long ride away.

Another noteworthy example of persuasive network cartography was the role of route maps in selling the desirability of automobile travel in the U.S. in the 1930s. Detailed analysis by Ristow (1964) and Akerman (1993, 2002) has ably decoded the marketing rhetoric in the production of these widely used route maps, directed and subsidised by oil companies and motoring clubs[2]. The free 'gas map,' Akerman (2002, 187)

[2] The Petrol Maps website curated by Ian Byrne provides a comprehensive catalogue of examples for Britain, <www.ianbyrne.free-online.co.uk>.

observes, “promoted specific brands by associating them with positive social aspects of automobile travel and good customer service”. Most state governments also produced official highway maps as a potent form of tourist promotion, with selected historic and scenic places of interest prominently marked. The manipulative techniques in service to marketing included “representing highways in thick, clean lines emphasizing connected populated places and cross-routes” (Akerman 1993, 16) along with clear route identification through numbering schemes. Importantly, the promotional elements did not in themselves diminish the need for clear, reliable route information to facilitate navigation - although “railroads ... were generally omitted” (Akerman 1993, 16), which conveniently worked to ‘silence’ the competition to the automobile. Similar techniques continue to be used to help drivers and sell road travel in the latest, advertising-supported, interactive route planning services available on the Web. Today, the extent to which car culture dominates in most developed countries means that the persuasive road rhetoric underlying general reference mapping is masked and rendered unquestionable (see Wood 1992, chapter four).

In addition to rail and road, the most obvious application of the marketing maps is the promotional cartography of the airlines[3]. Virtually all glossy in-flight magazines contain a route map that informs and above all persuades passengers of the space-transcending power of the airline. The map’s “rationale seems to be to create an impression of the airlines entangling, even appropriating, the world in their own webs of commercial influence” (Thurlow and Jaworski 2003, 586-588). The route maps have been around since the start of commercial aviation as an obvious - and from a marketing perspective, absolutely intrinsic - way to make intangible schedules of flight times and lists of destinations into a coherent, believable and *real* network, capable of carrying people quickly, reliably and safely. An interesting feature of airline route mapping over the years has been its willingness to experiment design-wise, particularly with unconventional projections as a means to get the optimal promotional look for the map. Cartographic manipulation has been put to the service of corporate centricism, necessary to position the airline’s hub of operations at the central point of the map view, and to connote a convincing visual appearance of the

[3] The Airchive curated by Chris Sloan presents an impressive array of route maps, <www.airchive.org>.

desirability of its routes by making them look to be the shortest or most direct (Fleming 1984). In the last decade, the printed route maps in in-flight magazines have also been significantly augmented by the airshow moving map provided as one of the entertainment television channels on many long-haul flights. This map dynamically updates the position of the plane to inform passengers of the progress of the flight, but it is also subtly promotes a particular sense of the air travel experience through a privileging, God's-eye, view of the world for passengers.

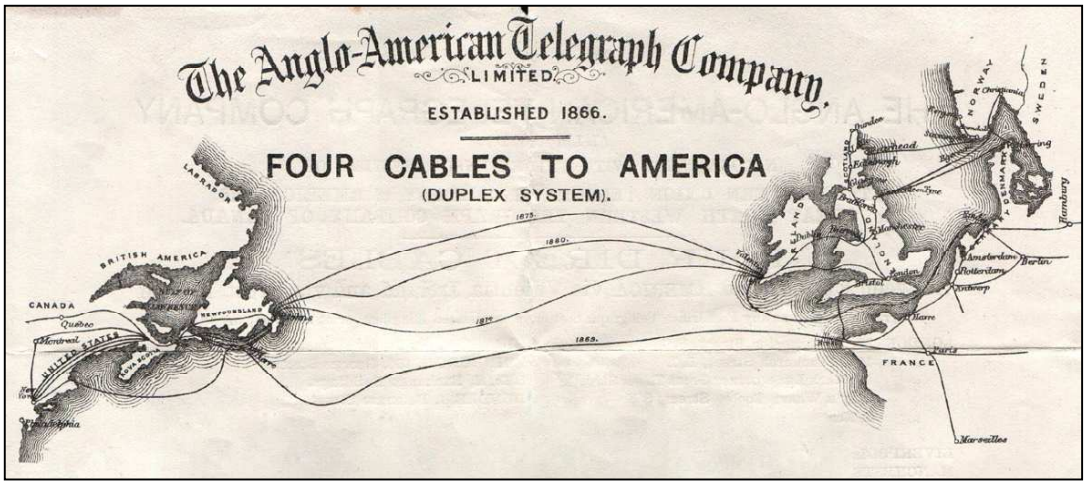


Figure 6.1: Network marketing map from the telegraph era. (Source: Bill Burns, <www.atlantic-cable.com/Maps/index.htm>.)

Figure 6.2: An attractive azimuthal projection map of the world produced to market the globe spanning Cable & Wireless telecommunications network in 1945. (Source: Cable & Wireless Archives, Porthcurno, Cornwall, <www.porthcurno.org.uk/>.)

6.2.3 Marketing maps for telecommunications networks

Transportation marketing maps in their profit-driven agenda and cartographic strategies have much in common with examples produced by telecommunications companies to promote the extent of their networks to prospective customers and investors. Going back to the telegraph era in the mid nineteenth century, a number of competing companies used maps in their advertising to demonstrate the extensiveness of their network infrastructure by plotting the geographic pathways of cables and emphasising the cities connected[4]. The beginnings of intercontinental telegraph services from the 1860s resulted in a range of promotional cartography, both to attract investors and to celebrate the success of new cable connections[5]. A typical example is the map from the Anglo-American Telegraph Company (Figure 6.1 above). In many cases, these ambitious and expensive engineering schemes were initially intimately bound to the needs of imperial communications. Servicing the telecommunications needs of the British Empire, for example, was the responsibility of the Cable & Wireless company linking the territory on the 'red routes' and becoming one of the largest operators of networks across the world by the middle of the twentieth century (cf. Barty-King 1979). The company commissioned designer MacDonald Gill to produce the 'Great Circle Map' (Figure 6.2 above), a particularly refined example of telecommunications marketing genre, with its promotional cartouches showing scenes of building the network infrastructure and how it operated. The map also provides a seminal example of projecting the company (and in an imperial sense, the British nation) at the centre of the map, with cable route lines radiating outwards from Britain to connect distant lands.

The task of network mapping for telecommunications companies is in some respects harder than for transportation, but at the same time more important for marketing. As discussed in chapter four, the invisibility and intangibility of the infrastructures for telecommunication, as opposed to those for physical movement, mean there is little for people to see and feel. The telegraph, the telephone and the Internet lack the iconic

[4] A range of examples for North America can be found online in the David Rumsey map collection <www.davidrumsey.com> and the U.S. Library of Congress's collection <http://lcweb2.loc.gov/ammem/gmdhtml/trnshome.html>.

[5] Examples maps and memorabilia associated with these engineering feats are available on Bill Burns' 'History of the Atlantic Cable & Submarine Telegraphy' website, <http://atlantic-cable.com>.

architectures of railway viaducts, wide highways carving through the landscape and monumental modernist airport terminals that can be exploited for advertising imagery. (The prominence of BT Tower in central London is an exception to the rule and only reinforces the great extent of the invisibility of telecommunications infrastructure). Furthermore, the most conspicuous visible element in telecommunications networks, the telephone handset, has none of the dramatic visuality of fast cars, thundering trains and soaring jetliners.

Besides the invisibility of infrastructure, telecommunications networks are also intangible from the consumer experience perspective (see also chapter four). In transportation, the friction of distance can be readily turned into fictions of experience by the marketers. Passengers and drivers have innate, physical knowledge of transportation networks through the journey. Positive elements of this physicality - the smoothness of the ride of the new car, the relaxing comfort of wider seats on planes and so on - is commonly exploited in promotional narrative that attempt to positively connect customers to brands[6]. Telecommunications, in their inherent virtuality, are completely lacking such experiential customer knowledge. The *lack* of human kinaesthetic involvement defines *tele*-communications. Telephones and the Internet provide customers with mere interfaces to the network, through physical devices like the phone handset and computer screens, not experience of the network itself. No knowledge of the network structure and physical construction is gained from browsing the Web, for example - it gives off little physical sensation, except perhaps the sense of delay when waiting to connect or the odd bout of frustration when it fails temporarily.

Marketing telecommunications, therefore, tend to construct its own symbolic imagery in the form of route maps, in part to compensate for the lack of other iconography and direct customer experience that can be more easily exploited (see the discussion in chapter four of major types of spatial metaphors used to represent Internet infrastructure). Route maps of telecommunication networks, while of no practical value for navigation, construct a sense of tangibility, a kind of second-hand

[6] Of course, the all too common mismatch between customer experience and the projected images of marketers is the basis for much contemporary cynicism about corporations.

experience of the network to compensate for the lack of directly observable activity. This was particularly so when the technologies were new and customers and investors needed evidence of what they looked like and how they worked. This has been repeated with the development of the Internet from 1990s onwards when maps became a useful tool for making a novel, unusual and unproven technology seem real.

6.3 Internet marketing maps

In many respects promotional Internet network maps as a genre can be traced back to those produced to document the growing extent of ARPANET from the early 1970s through to the late 1980s. In terms of their cartographic design there is little to choose between the maps produced by BBN[7] to virtually witness the logical structure of links and hubs of ARPANET and the contemporary Internet marketing maps detailed in the following section.

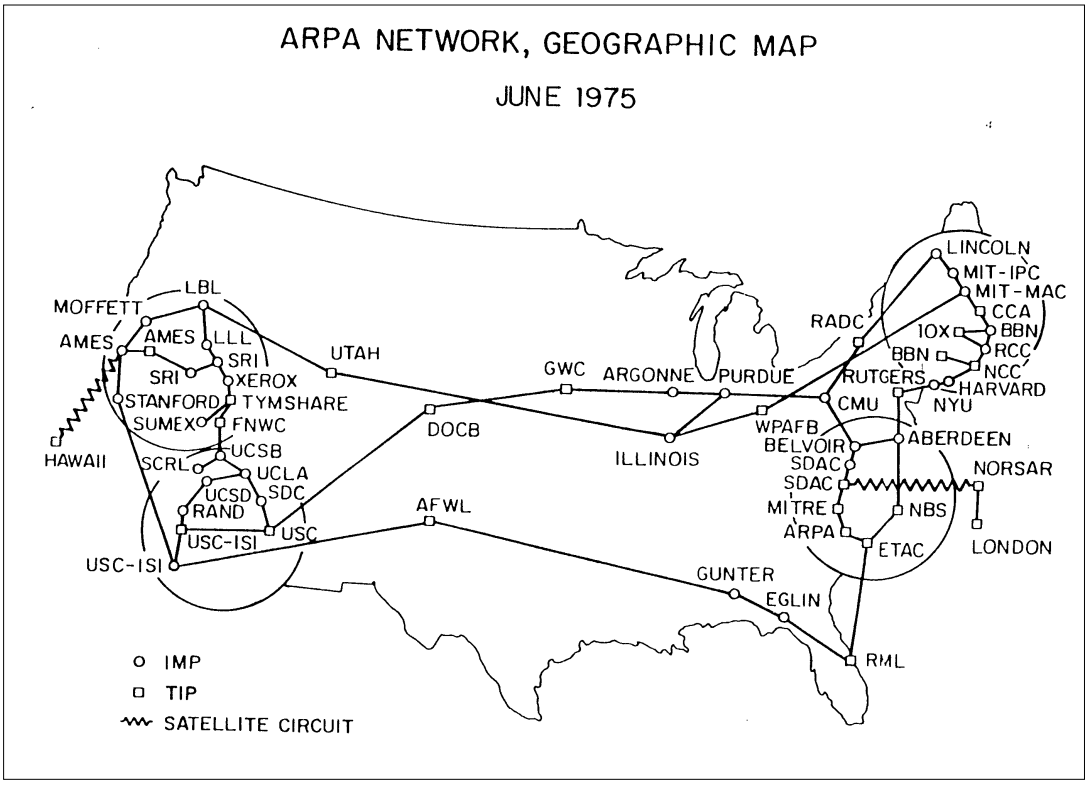


Figure 6.3: ARPANET network map created by Bob Brooks and the BBN graphic design department to promoted the growth of the infrastructure. (Source: scanned from Heart *et al.* 1978.)

[7] The private company contracted by the U.S. government to design, build and maintain the network.

ARPANET pioneered wide-area computer networking in the U.S. and laid much of the foundations of the Internet in terms of both the technical infrastructure and social practices of internetworking (cf. Abbate 1999; Hafner and Lyon 1996). A series maps of ARPANET were created at regular intervals throughout its operation to document its network structure (e.g., Figure 6.3). (Many maps have survived in published records, reports and scholarly articles, e.g., CCR (1990) and Heart *et al.* (1978)). It is important to note that these maps show the ARPANET at the level of data linkages (termed 'level 2' in terms of the hierarchical layer model of communications protocols). They do not plot the actual geographic routes of the cables (so called 'level 1' facilities). While the nodes are relatively accurately positioned, the paths are merely relational, designating a link between sites. Hence the acceptability of generalising transmission paths between nodes to straight lines in the maps. It is also apparent from the maps that ARPANET was, tentatively at least, international in scope, with sites overseas connected via satellite links, represented by the two wavy lines projecting out beyond the continental coastline. Interestingly, the these links went towards the east and the west, rather than perhaps more obvious north or south direction to the United States' immediate continental neighbours. One satellite link towards the west, crossed the Pacific to connect with the network research group at the University of Hawaii. The link east crossed the Atlantic, to London and then onto an ARPA-funded seismic monitoring facility near Oslo, Norway (called NORSAR).

In terms of cartographic design, these maps are quite crude, being simple black and white line drawings using the functional form of arc-node representations (Figure 6.3). They employed magnifying circles as a graphic device to enhance legibility in the four core ARPANET regions in northern and southern California, and the Boston and Washington DC. This scale distortion makes the maps look fuller than they are. In reality, many sites were clustered geographically (e.g., the sites in the Washington DC area were all within a few miles of each other).

The presentation of the territorial base itself in these marketing maps of ARPANET as an empty canvas is also noteworthy. The U.S. is represented by a simple border line which has the effect of creating an inert container, an archetypal *terra nullius*, ready to be filled with infrastructure and remade into a modern networked space. Indeed, for

the engineers involved, the ability to draw the network on a blank map parallels the unencumbered construction of the infrastructure itself: "the ARPANET did not have to interconnect with other existing and/or decrepit communications systems; it was possible to establish … standards *de novo*, in the best ways that could be devised" (Heart *et al.* 1978, III-111). Fitting into the U.S. tradition of Manifest Destiny, ARPANET could literally be mapped out over a blank landscape.

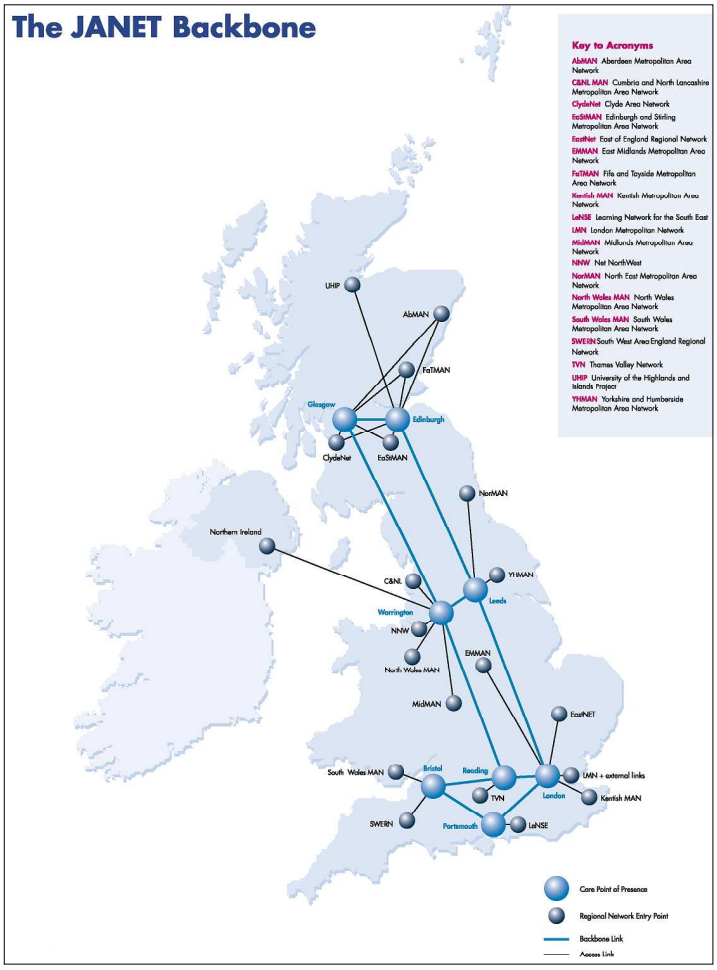


Figure 6.4: An example of a contemporary network map produced to promote a non-commercial research and education network. Shown is the geographic topology of the core of the SuperJanet3 network in Britain, circa 2000 (source: <www.ja.net>).

The maps were significant in the virtual witnessing of ARPANET, supporting the 'matter of fact' of novel packet-switching computer networking technology[8].

[8] One element of this was to win over traditional telecommunications engineering, which is based on the circuit-switching concept. This debate continued for next two decades. Today packet-switching has won out, as voice telephony is being rapidly being absorbed to become just another service running on IP networks.

ARPANET maps worked as a credible form of visual proof of, firstly, the material existence of a network that was beyond the limits of human vision and, secondly, the superiority of the engineering by showing a network that was dominant in size and spanning the nation. This kind of information dissemination and promotional 'pride' role for technical network maps, established as a distinct genre of cartographic discourse by ARPANET, continues today with contemporary research and education networks across the world producing backbone maps that provide virtual witness to their engineering prowess. For example, maps of the Joint-Academic Network, known as JANET, in Britain are frequently deployed in its publications for the technical user community (Figure 6.4).

The contemporary role of the ARPANET network marketing maps is really an archaeological one, as they serve as evidence of a past infrastructure that no long exists and also as emblematic visual symbols of pioneering engineering. The maps are now perceived as historical artefacts and they have became easily packaged into narratives of the Internet's development (e.g., Abbate 1999; Hafner and Lyon 1996; Salus 1995). This symbolic role is aided graphically because they easily connote as 'old' maps with their crude line-drawing design.

6.3.1 Survey of the prevalence of Internet marketing maps

To compete for new customers and investors, and differentiate themselves from competitors, Internet infrastructure companies use a range of marketing techniques. This extends well beyond conventional advertising, and includes the overall 'look and feel' of the company's public image, its pricing strategies, special offers and discounts, along with the response of sales representatives and customer service staff. Network maps are deployed as a component of this marketing mix of activities.

To gauge the prevalence and significance of network maps in the marketing of Internet infrastructure, a website survey of the fifty most important corporations[9] was conducted in August 2007. A subsidiary aim of the survey was to evaluate the

[9] Ranking of corporation by importance used to select the sample for the survey was based their capacity to route traffic across the Internet. This was determined by a measure of degrees of connectivity (given in column two in Table 6.1) to other corporations in an adjacency matrix calculated by active surveying of Internet topology undertaken by the Cooperative Association for Internet Data Analysis. Further details and the full ranking data available from <http://as-rank.caida.org/>.

appearance of any network marketing maps present in terms of their geographic scale and user functionality. The survey methodology involved the identification of the main corporate website used to promote networking services[10] and then a thorough manual search was conducted to determine the presence of any network maps; results were recorded in a spreadsheet and a digital copy all maps located was taken (where interactive and dynamic maps were present representative screenshots were taken and stored).

The tabulated results for the fifty corporate websites surveyed, summarised in Table 6.1, showed that seventy-six percent had some form of network marketing map present. (A comprehensive set of the different marketing maps discovered from the survey is provided in appendix three.) In some regards, it seems that having a infrastructure map available is seen as necessary in itself, irrespective of what the map shows. For marketing bravado, it is the ability to produce such maps that symbolises the company as a 'serious' player in the Internet infrastructure industry. A useful parallel can be drawn here to the airline industry, where Thurlow and Jaworski (2003, 586, original emphasis) note in their study of promotional in-flight magazines: "it is not so much what is *in* the magazines which is important, as the fact that the airlines have a magazine clearly identified by its ascription to a range of generic 'in-flight magazine' features. .... it appears that the in-flight magazine is a textual practice which marks an international airline as an 'international airline' - evidenced most obviously by its ubiquity."

[10] Note, this was not always the primary consumer-facing website. For example, BT has a dedicated website for its network infrastructure (www.btglobalservices.com) that is quite separate from its for domestic customers (www.bt.com).

Table 6.1: Use of network marketing maps on the websites of the top fifty Internet infrastructure operators, August 2007. (Source: Author survey. Ranked list of corporations provided by Cooperative Association for Internet Data and Analysis, <www.caida.org>.)

					Map Scales				Map Functionality					
Rank	Degree	Corporation (headquarter location)	Website surveyed	Map presence and prominence	Global	Regional	National	Metropolitan	zoom / pan	Layer selection	Query / search	Dynamic data	Date indicator	Topology diagrams
1	3,008	Verizon Business (USA)	www.verizonbusiness.com											
2	2,079	AT&T WorldNet (USA)	www.att.com											
3	1,689	Sprint (USA)	www.sprint.net											
4	1,660	Cogent Communications (USA)	www.cogentco.com											
5	1,436	Level 3 Communications (USA)	www.level3.com											
6	1,260	Qwest (USA)	www.qwest.com											
7	967	Global Crossing (USA)	www.globalcrossing.com											
8	934	Time Warner Telecom (USA)	www.twtelecom.com											
10	680	Hurricane Electric (USA)	www.he.net											
11	564	Abovenet Communications (USA)	www.above.net											
12	528	Verio (USA)	www.verio.com											
13	521	XO Communications (USA)	www.xo.com											
14	499	Savvis (USA)	www.savvis.net											
15	482	Telia Sonera (SE)	www.teliasoneraic.com											
16	466	COLT Telecommunications (NL)	www.colt.net											

17	464	LambdaNet (DE)	www.lambdanet.net												
18	432	VSNL International (CA)	www.vsnlinternational.com												
19	406	Deutsche Telekom (DE)	www.deutschetelekom.com												
20	394	Swisscom (CH)	www.swisscom.com												
21	392	Tiscali International Network (DE)	www.tiscali.net												
23	341	WV Fiber (USA)	www.wvfiber.com												
24	324	KPN (NL)	www.kpn.com												
25	323	LG DACOM (KR)	www.lgdacom.net *												
26	315	Interoute Communications (UK)	www.interoute.com												
27	306	Korea Telecom (KR)	www.kt.co.kr *												
28	304	Bell Canada (CA)	www.bell.ca												
29	298	PCCW (USA)	www.pccwglobal.com												
30	291	KDDI Corporation (JP)	www.kddi.com												
31	248	TransTeleCom (RU)	www.transtk.ru												
32	239	Cable & Wireless (UK)	www.cw.com												
33	227	Net Access Corporation (USA)	www.nac.net												
34	216	IIJ Internet Initiative Japan (JP)	www.iij.ad.jp												
35	216	Asia Netcom (CN)	www.asianetcom.com												
37	205	Golden Telecom (RU)	www.goldentelecom.ru *												
38	195	British Telecommunications (UK)	www.btglobalservices.com												
39	194	REACH (HK)	www.reach.com												
40	193	Port80 (SE)	www.rixport80.se *												
41	191	PIPEX (UK)	www.pipex.net												
42	185	Internap Network Services (USA)	www.internap.com												
43	183	Yipes Communications (USA)	www.yipes.com												

44	178	New Edge Networks (USA)	www.newedgenetworks.com												
45	178	Romania Data Systems (RO)	www.rdsnet.ro *												
46	175	RTComm (RU)	www.rtcomm.ru												
47	174	Cablevision (USA)	www.cablevision.com												
49	167	France Telecom (FR)	www.francetelecom.com												
50	162	Cox Communications (USA)	www.cox.com												
51	161	GTS Energis (PL)	www.gtsce.com												
52	156	Flag Telecom (UK)	www.flagtelecom.com												
53	153	SingTel (SG)	www.singtel.com												
54	143	Integra Telecom (USA)	www.integratelecom.com												

* Indicates non-English language website

Note: The following entries from the CAIDA list were excluded because the corporation no longer exists:

9 SBC Internet Services (USA)

22 Broadwing Communications (USA)

36 WilTel Communications (USA)

48 Adelphia Business Solutions (USA)

Legend

= Network maps featured prominently on homepage

= Network maps featured prominently on product pages

= Network maps can be found by browsing around

= Network maps are hidden, found by keyword search

= No network maps evident on corporate website

6.3.1.1 Website sample

The fifty corporations surveyed provide a cross-section of commercial providers of Internet infrastructure services. Some of these are well-known telecommunications companies which offer consumer phone services (such as AT&T and British Telecom), whereas others specialise in Internet infrastructure services (e.g., Interoute Communications). Even though this is the top fifty ranked corporations, it should be noted they do vary in the size and scale of their operations, ranging from global scale corporation with transcontinental infrastructures, millions of customers and many billions in revenues (e.g., Verizon and Deutsche Telekom), down to smaller, niche operators serving particular regional or national markets (e.g., GTS Energis in central Europe). The degree column in Figure 6.1 indicates the scale range of connectivity across the sample. From the original rank list it was found during the survey process that four corporations no longer existed as distinct businesses[11]. It was decided to exclude these four corporations and to substitute the next four highest ranked corporations to maintain a consistent sample size. As a consequence of this, the numbering in the rank column in Table 6.1 goes down to fifty-four and has gaps at nine, twenty-two, thirty-six and forty-eight indicating the excluded records. Another caveat with five of the corporations in the sample was the unavailability of their corporate website in English which hindered an in-depth search (these are indicated in Table 6.1, column 4).

Geographically, the sample is weighted to U.S.-based corporations (twenty-two out fifty surveyed); of the other twenty-eight corporations, the majority were headquartered in Europe (nineteen) and southeast Asia (seven). There were no corporations headquartered in Africa, Oceania or South America in the survey. This distribution is unsurprising and reflects the uneven geography of global telecommunications and the political economy of Internet infrastructure which is dominated by U.S. based corporations.

[11] These were: SBC Internet Services (ranked 9th), Broadwing Communications (ranked 22nd), WilTel Communications (ranked 36th), Adelphia Business Solutions (ranked 48th). They were all U.S. based and have either merged with or been taken over by corporations.

6.3.1.2 Website survey results: map prevalence and prominence

The survey found network maps present on thirty-eight out of fifty corporate websites examined (seventy-six percent). This basic count of presence demonstrates that maps are widely employed and clearly deemed worthwhile to produce and display for marketing purposes. Looking at the results for presence of maps in more detail (see Table 6.1, column five), it is apparent that the higher ranked corporations are more likely to have marketing maps. The top quartile of most important corporations, in terms of degree of Internet connectivity, all had some form of network marketing map deployed on their websites. In the bottom quartile, over a third (thirty-eight percent) of corporations had no network maps visible on their websites.

Beyond simple presence/absence, the website survey assessed the prominence of network maps on the websites and by implication the weight attached to them in marketing terms. Prominence was quantified through how easy they were to find and how highly positioned they were in the website page hierarchy. Corporation's use of maps was then coded into a five-level categorisation (represented by different hatching styles in Table 6.1, column five):

1. Network maps prominent, featured on or directly linked from the homepage,
2. Network maps featured prominently on secondary product pages,
3. Network maps can be found by browsing around subsidiary pages,
4. Network maps are hidden away, found by keyword searching,
5. No network maps evident on corporate website.

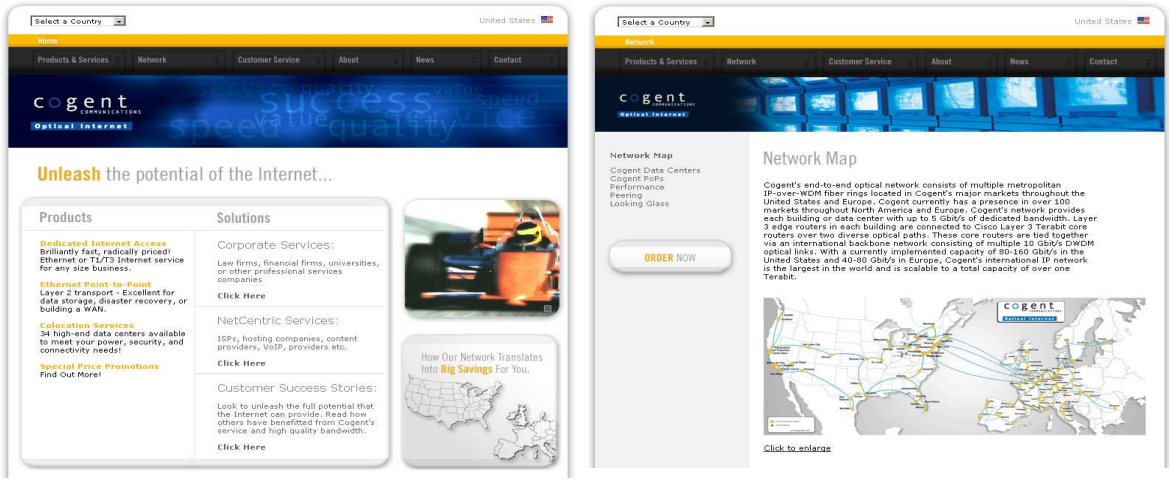


Figure 6.5: Evidence of the high regard of network maps for infrastructure marketing by Cogent Communications. Left image is the homepage of the corporate website, right image is the network map page. (Source: <www.cogentco.com>, August 2007.)

The most prominent and visible category - featuring network maps on the homepage - provides a strong indicator that these corporations see maps as a highly effective tool to promote their infrastructure to potential customers and investors. Remembering there can only be one homepage for the corporate website, screen 'real-estate' on this page is, consequently, at a premium and only the most significant items can command space. The survey results showed that of the thirty-eight corporations with some kind of marketing map, twenty-nine percent gave them high prominence by featuring them on the homepage. One of the best examples of this is on the homepage of Cogent Communications, that is ranked as the fourth most important corporation in terms of degree of Internet connectivity, which gives over a significant portion of available display space to a thumbnail maps of the USA and Europe (Figure 6.5), accompanied by a somewhat clichéd sales pitch: 'How our network translates into big savings for you'. This invites people to see more about the company's infrastructure and clicking on the map panel provides a direct hyperlink to a dedicated 'Network Map' web page displaying a large network infrastructure map and descriptive text highlighting technical capabilities (Figure 6.5, right-hand image).

The eleven corporations with the most prominent use of network marketing maps on their homepages tended to be the more important ones. Seven of them were

located in the top twenty-five corporations surveyed according to their degree of Internet connectivity. While the bottom quartile had only one corporation, GTS Energis, featuring network maps directly on its homepage (Figure 6.6). As in the case of Cogent, clicking on the map on the GTS Energis homepage takes users to a dedicated network map web page.

Figure 6.6: The homepage of GTS Energis features maps prominently for marketing its infrastructure. (Source: <www.gtsce.com>, August 2007.)

The second category of prominence - maps readily displayed on subsidiary product or 'about us' web pages - accounted for over forty percent of corporations with some kind of infrastructure marketing maps (sixteen out of thirty-eight websites surveyed). In these cases, network maps are deemed to be effective for infrastructure marketing, but are perhaps not sufficiently important in the overall corporate strategy to command valuable screen space on the homepage.

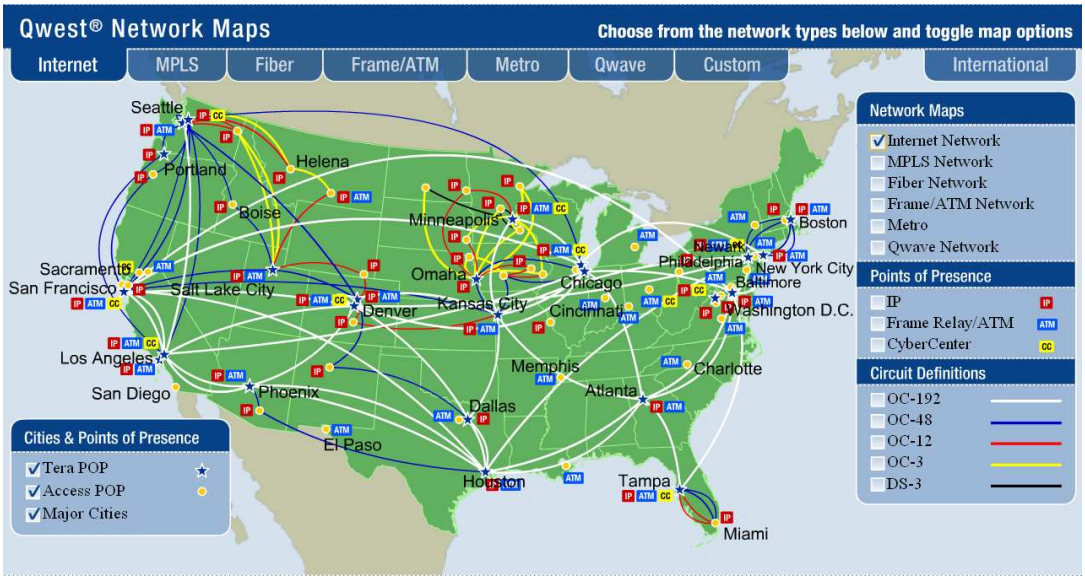


Figure 6.7: Example of the high quality network marketing maps available on the Qwest website. (Source: Author screenshot from interactive Flash-delivered map from <www.qwest.com>, August 2007.)

The third category encompassed corporate websites where infrastructure maps were present, but were not prominently displayed (i.e. the manual search required several minutes of browsing around and potentially clicking down through multiple layers in the website's information hierarchy). Eighteen percent of corporations were found in this class (seven from thirty-eight), which included well known U.S.-based companies, such as AT&T and Qwest. Both these corporation produce high quality network maps and make them available (e.g., Qwest's map shown in Figure 6.7; AT&T maps are analysed in section 6.4 below), but their lack of visibility in the website indicates they are not at the centre of marketing strategy at the time of the survey.

The bottom category are the corporate websites that literally hide their maps away and these could only be located by specific key word searching (for the phrase 'network map'). This applied to only four out of thirty-eight websites with some kind of marketing maps present. While a small minority, it rather surprisingly did include Sprint the third most important corporation in the survey according to its ranking on degree of Internet connectivity. So in a minority of cases mapping is not regarded as a particularly effective tools for marketing network infrastructure.

6.3.1.2 Website survey results: map scale and functionality

The survey of fifty corporate websites also considered other relevant contextual information about the nature of the marketing maps deployed. Four aspects were recorded: scale of maps; availability of interactive functionality to users; the presence of currency flag for the map; and the presence of topological (i.e. non-geographic) diagrams. These results are also summarised in Table 6.1 above by a binary display (filled = presence/ blank = absence).

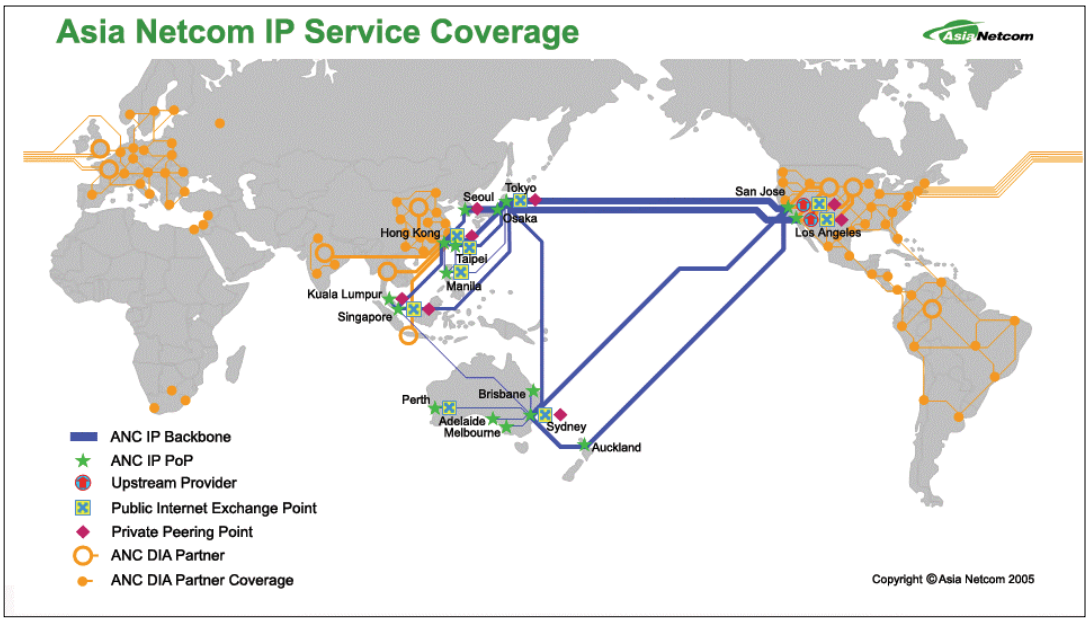


Figure 6.8: Small scale map presented on the Asia Netcom corporate website to promote its infrastructure. (Source: <www.asianetcom.com>, August 2007.)

The scale of maps deployed was recorded in four classes: small scale world maps, regional scale, national scale and large scale metropolitan maps. Twenty-four from the thirty-eight corporations presented world scale network maps of their infrastructure. (It should be noted that this partly reflects that these are typically large corporations with international operations.) A typical example from the corporate website of Asia Netcom (Figure 6.8) shows a highly generalised network representation of routes and hubs drawn on a generic world map. (Other examples can be consulted in appendix three and in section 6.4 below.) The map is centred on the Pacific to focus attention on the company's core operating territory, encompassed by the prominent blue lines of their backbone network. The design is conspicuously diagrammatic with angular routes reminiscent of the

Tube map, and without easily identifiable countries, the visual focus is given to the few named cities in which Asia Netcom has infrastructure. There are no details on the capacity of the network links. The currency of the data displayed is not specifically indicated but the image is copyright 2005, so already dated at the time of the website survey.

A greater percentage of corporations with some kind of network marketing maps deployed regional scale maps (twenty-nine out of thirty-eight websites). Fewer provided maps at the national scale (twenty-one out of thirty-eight) reflecting, in part, that the survey focused on larger networking corporations rather than more local oriented corporations, but also the additional time and effort required to produce individual maps for each country in which a multinational company has infrastructure. There is similar in design approach used in many regional and national maps, taking what might be termed the default airline route map style of smoothing curving network links between prominent city nodes (e.g., Figure 6.9; see other examples in appendix three).

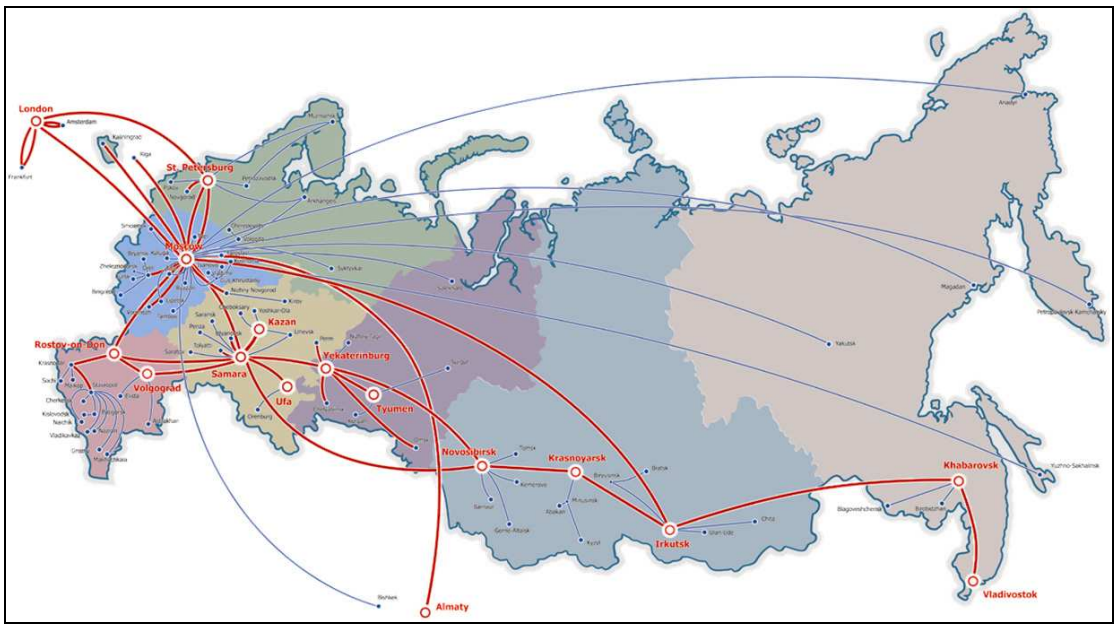


Figure 6.9: The network marketing map deployed by the RTCOMM corporation showing its infrastructure spanning the Russian Federation. (Source: <www.rtcomm.ru>, August 2007.)

The map is produced by RTCOMM providing Internet network services in the Russian Federation, and is prominently featured on its website. The map is

dominated visually by the curving network link shown in red. What appear to be secondary hubs and links are shown in grey and fade into the background. The size and elongated shape of the country creates a challenge for representing the whole network infrastructure legibly on a single map; the international link to London is rather fudged and the weight of information is very unbalanced around Russian heartland leaving Siberian expanse as virtual blank.

The most detailed mapping showing infrastructure on a large scale in relation to metropolitan geography is relatively uncommon from the survey. Barely ten percent of websites with maps displayed metropolitan level mapping and these were almost all highly ranked corporations. This scale of mapping is not widely deployed for several reason, including the cost of production, security/confidentiality concerns, and because they are seen as having limited effectiveness for marketing. Yet the mapping provided by two companies, Colt and AboveNet, belies this trend by providing a surprisingly wide range of very legible and detailed street-level infrastructure mapping. Colt sells its networking services across western Europe and provides, on its corporate website, street-level maps of network routes for thirty-four different cities in sixteen countries, including London, Birmingham and Manchester (e.g., Figure 6.10 top). The way the red line, representing the network route jinks around, suggests the actual route of the fibre-optic cable in the ground, including branches and stubs, has been used as the source for these maps. Equally impressive coverage is provided on the AboveNet website, with thirty-five detailed maps for fifteen different metropolitan areas in the U.S., including for example routes through Boston's CBD (Figure 6.10 bottom). The AboveNet maps have the 'look-and-feel' of engineering schematics with neat-boxes, scale bar and revision numbers common on these types of representation rather than a more abstract and anodyne presentation found in small scale marketing maps.

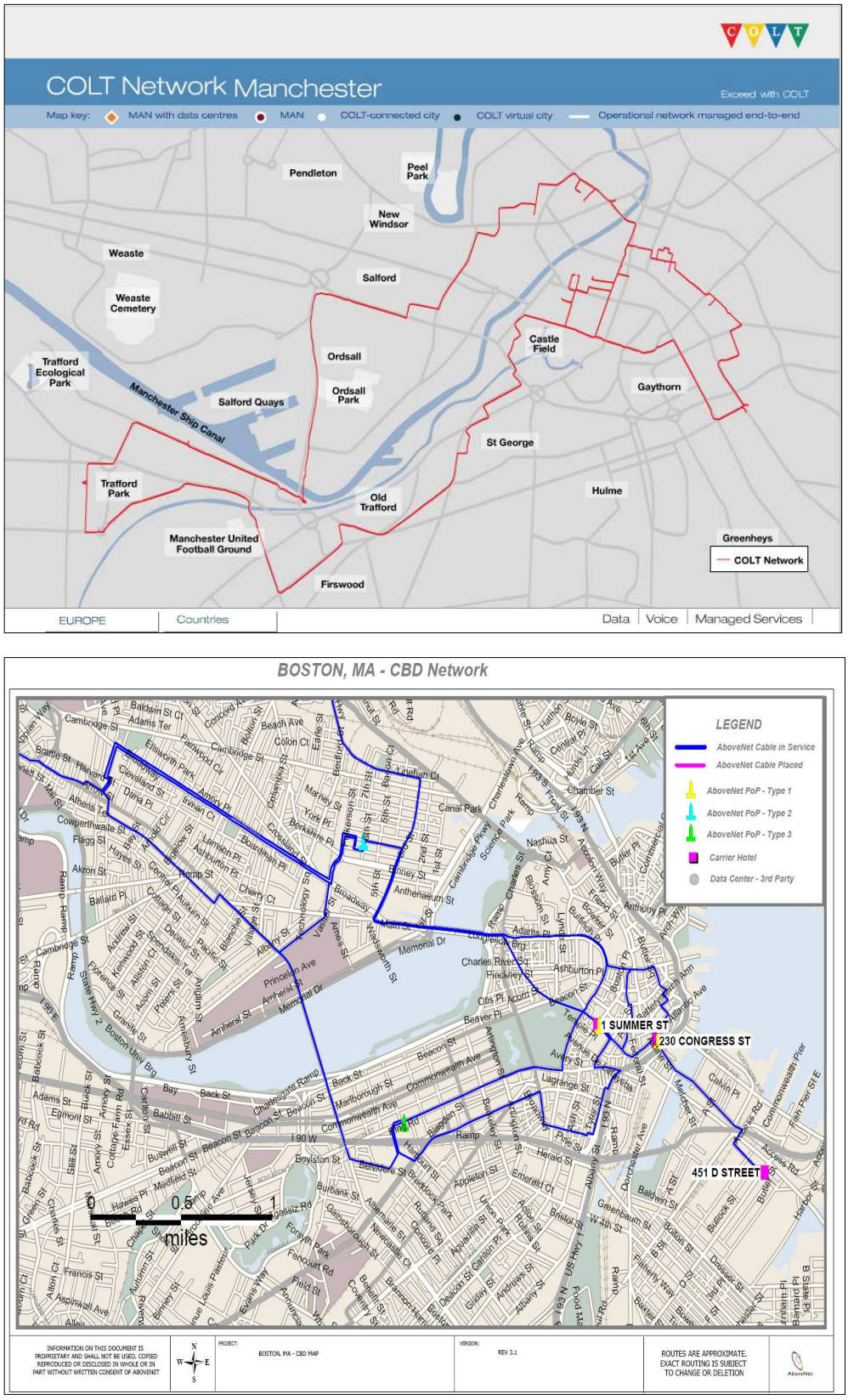


Figure 6.10: Metropolitan scale network marketing maps from the corporate websites of COLT (top) and AboveNet (bottom). Infrastructure represented as cable routes along streets. (Source: <www.colt.net> and <www.above.net>, August 2007.)

The second contextual aspect of the network marketing maps audited by the survey was the use of interactive functionality. The focus was on whether the potential of the web as a media is being exploited by the corporations to extend the usability of their maps beyond inert representations (delivered as a raster image).

A fourfold classification of functionality was applied:

1. scaleable zoom and panning,
2. selection control over layers displayed,
3. interactive querying of features and/or keyword search,
4. dynamically generated maps features from 'live' data feeds.

In some senses this categorisation represents increasingly sophisticated functionality that requires more programming effort on the part of the cartographers / web designers. The final category of dynamic map generation, in particular, also requires significant behind-the-scenes software engineering to produce the actual graphics delivered to the users.

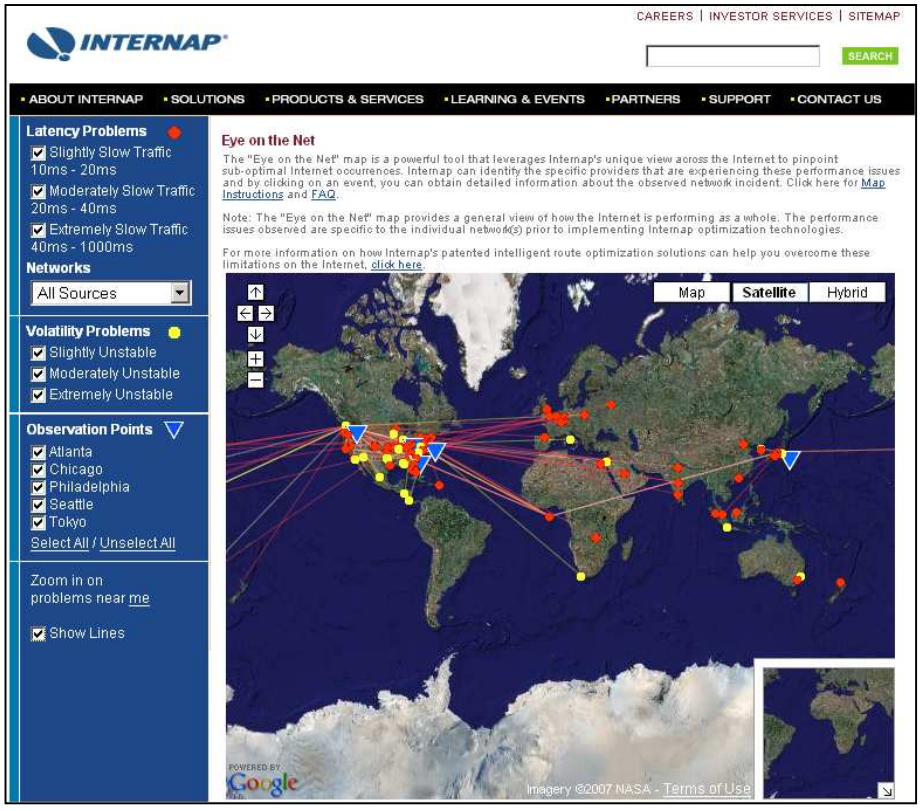


Figure 6.11: A screenshot of the interactive network mapping application provided by Internap. (Source: author screenshot of interactive application, <www.internap.com>, August 2007.)

Overall, forty-two percent of websites with some kind of network marketing maps utilised at least one of the four interactive features in displaying their maps. Unsurprisingly, the most widely deployed was the pan/zoom facility. Nearly all interactive maps were in packaged and delivered Flash applet, a popular web technology for authoring and delivery complex package of graphics. (Flash has been quite widely utilised for online cartography, cf. Taylor and Caquard 2006). One of the advantages of Flash over raster images is that it can deliver high-quality scaleable vector graphics, allowing pan and zoom by default. Given the greater costs to produce it is not unexpected that they are more prevalent in the larger, more important corporations in the survey; ten out of sixteen of the websites with some level of interactivity in their marketing maps were found in the top half of the ranked corporations. Although, interestingly the only corporation in the survey to provide a map offering all four interactive features, including dynamically generated data, was Internap Network Services, ranked at number forty-two out of fifty (Figure 6.11).

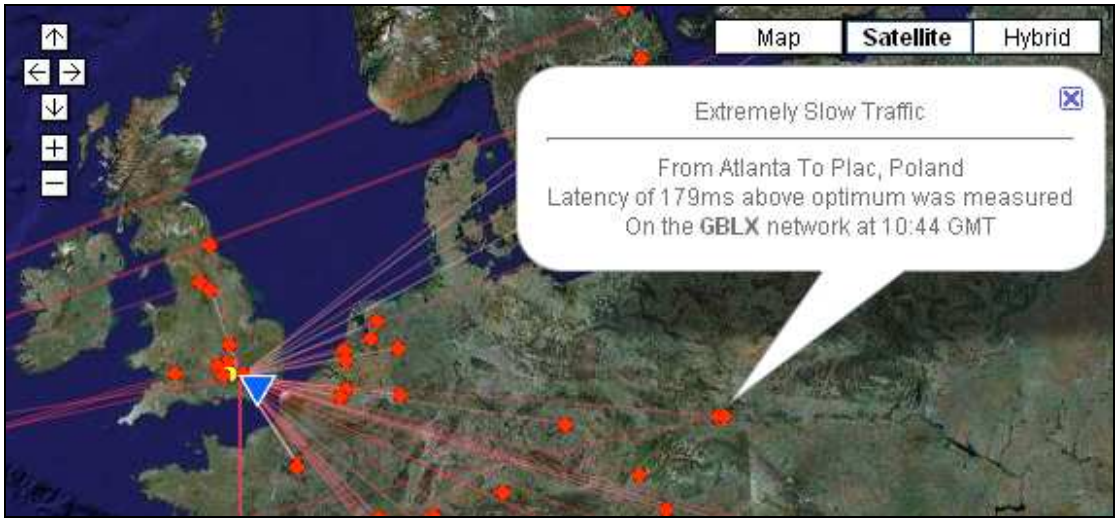


Figure 6.12: Detail of the Internap mapping system showing the result of an interactive user query on a data point on the map. (Source: author screenshot, <www.internap.com>, August 2007.)

The interactive mapping application is called ‘Eye on the Net’ and ingeniously seeks to promote Internap’s own infrastructure and services by highlighting poor network performance being experienced by other commercial network providers. The underlying cartographic ‘engine’ in the application is Google Maps, currently

dominating online mapping with its seamless global map and imagery layers, and offering smooth zoom down to street level and high-resolution aerial photography backdrops in many metropolitan areas.

Internap's 'Eye on the Net' mapping application allows users to select which data layers are displayed and also toggle on/off different classes within each layer. Points of data traffic congestion (in terms of latency and volatility) are measured by Internap's 'observation points' (shown as blue triangles) and displayed dynamically as red and yellow dots. Indicator links from the observation points to the points of congestion can also be drawn, although its not indicated if the colouring of lines encodes any meaning. The user can also interactively query the congestion dots to obtain summary details on the time, location and nature of the performance problem, displayed in a small pop-up window (Figure 6.12).

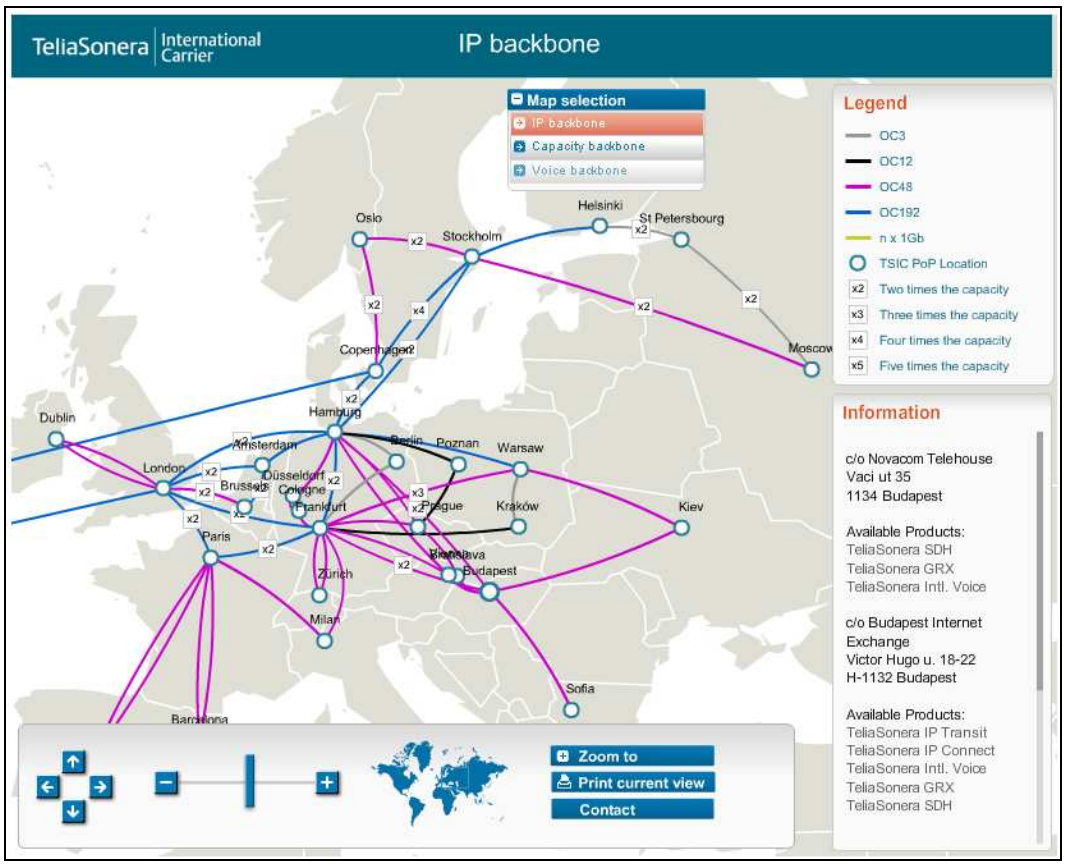


Figure 6.13: The interactive mapping application provide by TeliaSonera to market its network infrastructure. (Source: author screenshot, <www.teliasoneraic.com>, August 2007.)

Another noteworthy example of a well designed interactive marketing map is that provided by TeliaSonera (Figure 6.13). The company serves the Scandinavian and Baltic regions, and features the map prominently on its homepage. Although, it does not offer dynamic data generation of the Internap system, its link mapping is both aesthetically pleasing and more functional as it is classified by bandwidth. The symbolisation of bandwidth is achieved by colour coding link lines as well as using multiplier icons for routes with several links of a given capacity. The map is delivered in a simple-to-use Flash application that offers visitors the capacity to zoom and pan, to make layer selections and to interactively query nodes. The panel along the bottom of the display provides intuitive controls for the pan and zoom functionality. The 'map selection' menu allows users to choose one of three possible data layers (IP backbone, capacity backbone, voice backbone). The hubs in its network infrastructure (called 'TSIC PoP locations') can be interactively queried to give the street address and details on the particular services available through this location (in Figure 6.13 details for the Budapest hub are displayed in the bottom-right hand panel).

A further aspects noted during the survey was the presence of a date of production on the network marketing maps. Given the high profile role of these maps in the public communication for many corporation it was surprising that only a fifth (eight from thirty-eight) had some form of currency indicator to show how up-to-date the map data was. Why are so few maps given a date? It could simply be oversight in some cases, but one might also suspect that in many other cases it is consciously done to mask the fact the maps are not updated regularly and only partially reflect the dynamic state of the corporation's infrastructure. (Indeed, a few include a 'small print' caveat to this effect; e.g., Verizon's map says: 'Network routes and speeds are subject to change'.) The lack of dates on the map is a small but significant design feature that perhaps marks out marketing map from other independent cartographic products for information purposes. It is perhaps not surprising given that many of the maps are designed to give 'an impression' of the infrastructure rather than 'be precise' mirrors of reality, however this can be problematic when people choose to interpret them as representing being mirrors and not impressions (see also section 6.5.1 below).

This impressionistic aspect is made explicit by the legal sounding disclaimer made in small print on the Cable&Wireless maps: “This image is representative only and, to the extent permitted by law, Cable & Wireless plc makes no representation or warranty of any kind, whether express or implied, that the information contained in this image is accurate, complete or current. All liability for any loss or damage that may result from the use of this information as a consequence of any inaccuracies in, or any omissions from, the information, is expressly disclaimed.” (see Figure 6.17 below).

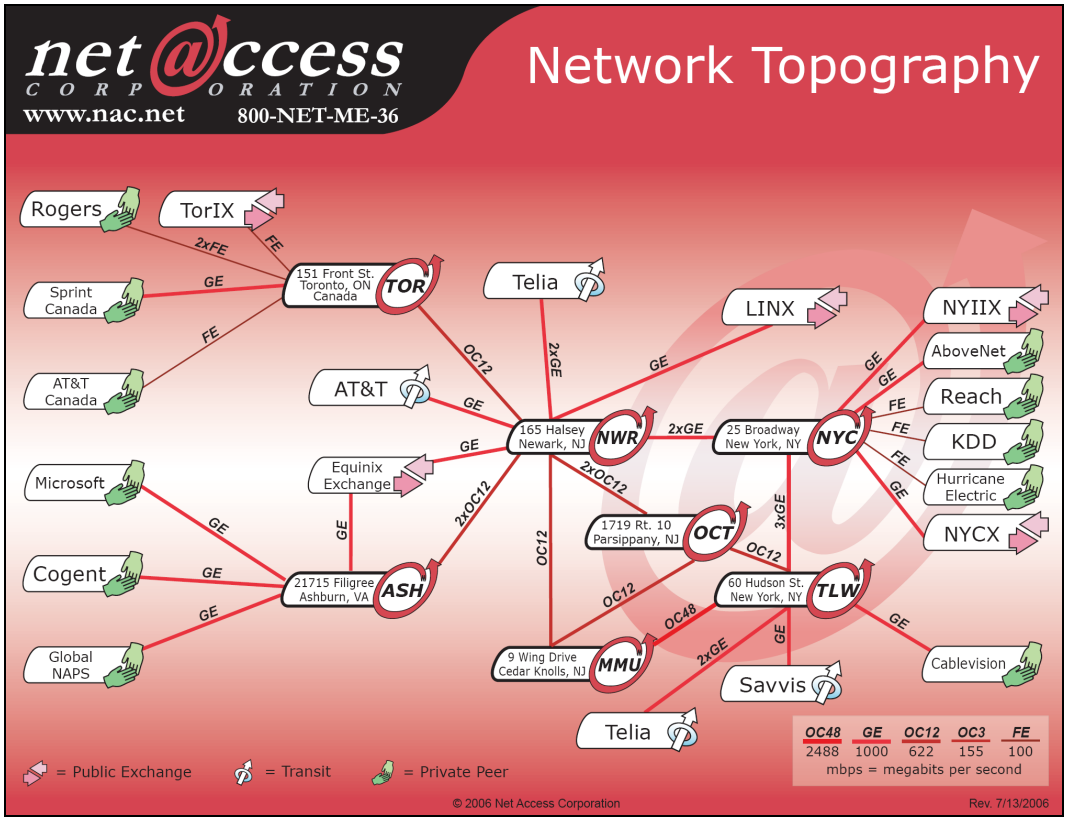


Figure 6.14: One of only two examples of topology diagrams employed to represent network infrastructure in the fifty websites surveyed. (Source: <www.nac.net>, August 2007.)

The final element noted in the website survey was the deployment of topology diagrams to market the corporation’s network infrastructure. As discussed in chapter four, the use of topology visualization rather than cartography is a common trope for representing the structure of Internet infrastructure in different contexts. However, from the auditing the fifty websites it is clear that non-geographic representation are hardly ever used for network marketing. Topology

diagrams were only found on two corporate websites; in one case, Net Access Corporation, only had a ‘network topography’ diagram and no geographic maps (Figure 6.14). The Net Access diagram has a quirky, rather unattractive, design common of topology diagrams. While it does give valuable detail (including bandwidth of links) it is apparent that this type of approach to representation is little used because it is ineffective for marketing. Topological diagrams and network graphs lack necessary visual rhetoric and do not matching peoples’ expectations in wanting to see where the corporation’s infrastructure is physically located in relation to a familiar geographical frame. These alternate kinds of diagram fail for marketing because they cannot ‘ground’ the intangible nature of the Internet.

6.4 Design strategies in network marketing maps

> Advertising says to people, ‘Here's what we've got. Here's what it will do for you. Here's how to get it.’
>
> -- Leo Burnett, advertising guru.

The study of transportation and telecommunication marketing maps reveals a number of consistent cartographic design strategies used for cartographic persuasive representation of network infrastructures. These strategies - of selectivity, simplification and amplification - are really no different from the practices of ‘objective’ cartographies and their desire to produce representations that are as clear and unambiguous as possible. Importantly, I would concur with Fleming and Roth (1991: 290) that “[t]he advertiser generally uses the map both to enlighten and to persuade and only rarely to distort.”; there is no evidence of outright cartographic lies in such infrastructure marketing maps - there is no need. The job of selling the network can be achieved more subtly through visual emphasis and suppression of map features.

Through a detailed interpretation of many network maps, including those audited in the website survey discussed above, a range possible representational choices - exploiting the full range of graphic variables for map features, along with textual elements (titles, labels, legends, etc.), projection and the overall layout – can be identified. These choices can be grouped into eight distinct design strategies:

range, reach, directness, centrality, abundance, capacity, silencing competition and exclusivity. (Usually, some combination of these strategies are employed; some strategies are easily combined, others are incompatible.) To establish how these strategies work it is useful analytically to distinguish between denotative signs (i.e. explicit information representation) in the map and the more connotative messages that are inferred from these by readers of the map. Cartographers may seek to connote positive messages to promote the corporation's infrastructure and services, but these may not necessarily be interpreted correctly, if at all (cf. Vujakovic 2002b). I briefly describe each strategy, noting the primary connotative meanings they seek generate:

- *Range*: 'our routes are the longest'

Fundamentally, the marketing goal of the map is to demonstrate, in compelling visual ways, the extensiveness of the network coverage offered by the company. Extensive range is best denoted cartographically by long route lines shown criss-crossing the whole map extent (or as much of the extent as is plausible without fraud). Line length is paramount as it draws the reader along the route, connoting a network with a powerful capacity to traverse distances and to transcend space. If the company is positioning itself as the premier national network, the map must try to show all of the country to be well covered with long route lines. Likewise, if the company is pursuing a globalist strategy, the map should demonstrate a fully world-wide range of routes, stretching across continents and effortlessly spanning oceans.

- *Reach*: 'our routes connect to all the right places'

Closely allied to impressions of extensive route coverage, is the need to demonstrate the reach of the network on the map. The reach of a network is assessed by how well it connects to *important* places. Importance, here, is determined by the target market for the network.

- *Directness*: 'our routes run straight and true'

The network should not only connect to all the important places, it should also denote as clearly as possible that it provides *uninterrupted*, point-to-point, links between these places). Networks with lots of interchanges connotes slower

transmission - remembering that in Internet terms delays of a few hundred milliseconds can be significant to customers.

- *Centrality*: 'our routes are at the heart of the action'

The combination of a wide ranging network, directly reaching all the right places, should also connote the impression of a network offering all the advantages of centrality to customers, a network naturally positioned at the heart of things.

- *Abundance*: 'we have many routes'

"[N]umerousness indicates success, and success indicates a superior product" (Monmonier 1996, 68). Effective promotional network cartography, should not only show how much of the terrain is spanned or which places are connected, it must also powerfully demonstrate the sheer *abundance* of routes offered by the company. In prosaic terms, the company which is best able to show many routes, projects in connotative terms an image of strength through abundance, a sense of security through numerousness.

- *Capacity*: 'our routes can cope with demand'

Well proportioned lines denote lots of capacity and connote a strong, healthy network easily capable of meeting all demands without the risk of clogging or congestion. Conversely, 'skinny'-looking links can connote insufficient capacity to carry bulky loads and imply a risk of an under-strength network. Solidity of lines, through their graphic weight on the map, can also be useful in connotative terms as it implies the network is well engineered, it is secure and, above all, it can be trusted.

- *Silence Competitors*: 'show only our routes'

The silencing of competitors is the key characteristic differentiating informational cartography (serving the interests of consumers by mapping all available options) and promotional cartography (serving the interests of one company). Unsurprisingly, commercial network operators resist comparative mapping, particularly when their infrastructure, in terms of range, reach, abundance and capacity, does not stand up well against competitors.

- *Exclusivity*: 'privilege our routes above all else'

The role of a marketing map is to focus squarely on demonstrating the impressiveness of the network and it should not be cluttered with any extraneous contextual details that could distract readers. A degree of selectivity is, of course, inherent in cartography; however, in persuasive mapping, selectivity goes further to exclusivity - producing privileged views of world to service the needs of network marketing and the interests of capital.

6.4.1 Decoding the design strategies in five network marketing maps

The eight fold schema of cartographic design tactics proposed in the previous section is now applied to the network infrastructure deployed by five large telecommunications corporations that serve international markets and espouse globalist rhetoric. Summary details on the size five corporations examined is given in Table 6.2.

Table 6.2: Details on the size of five sample corporations, 2005. (Source: OECD, 2007, table 1.1.)

	Corporation	Revenues (USD millions)	Employees	Access lines (millions)
1	AT&T	43,862	190,000	86.9
2	British Telecom (BT)	35,480	104,000	36.5
3	Cable&Wireless	5,873	8,150	4.6
4	France Telecom	50,048	203,000	145.2
5	Verizon	75,112	250,000	105.0

These corporations publish high quality maps, at various scales, for marketing purposes. Four are delivered on their websites as interactive maps (using Flash applets), whereas Cable&Wireless also provides then as high-quality JPEG images for download (analysed here due to access problems). An example of the world maps offered by each corporation, displaying the maximum available data on their Internet infrastructure, was obtained for analysis in December 2007; these are reproduced as Figures 6.15 – 6.19 below. (Appendix three also provides a number of examples at different scales for these five corporations.) Superficially there is much in common between all five in terms of cartographic design for representing network infrastructure. They are all based on conventional layouts for world maps with North orientation and Atlantic centred projections.

All five corporations publish marketing maps at a range of different scales and offering readers various data layers. None of the five maps in the sample has specific authorship information displayed they are all, except BT's, adorned prominently with corporate names and logos. AT&T and BT's maps gave explicit date of issue/revision; AT&T, Cable&Wireless and Verizon provide some form of disclaimer as to the validity of the information shown on the map (as noted above the Cable&Wireless disclaimer, written literally in small print, is particularly fulsome).

The maps also had varying levels of significance in the marketing strategies of the five corporations analysed. According to the fivefold schema of map prominence in the website hierarchy set out in section 6.3.1 above, three corporations, BT, Cable&Wireless and Verizon, deployed their marketing maps at the second level ('network maps featured prominently on product pages'), AT&T had their marketing maps at level three (not especially prominent use of maps but can be found by browsing around), while France Telecom 'hide' their maps away from readers to some degree and they were only located by keyword search. Given that none of the five featured marketing maps on their homepages one could conclude that they were not essential to promotional agenda of the corporations.

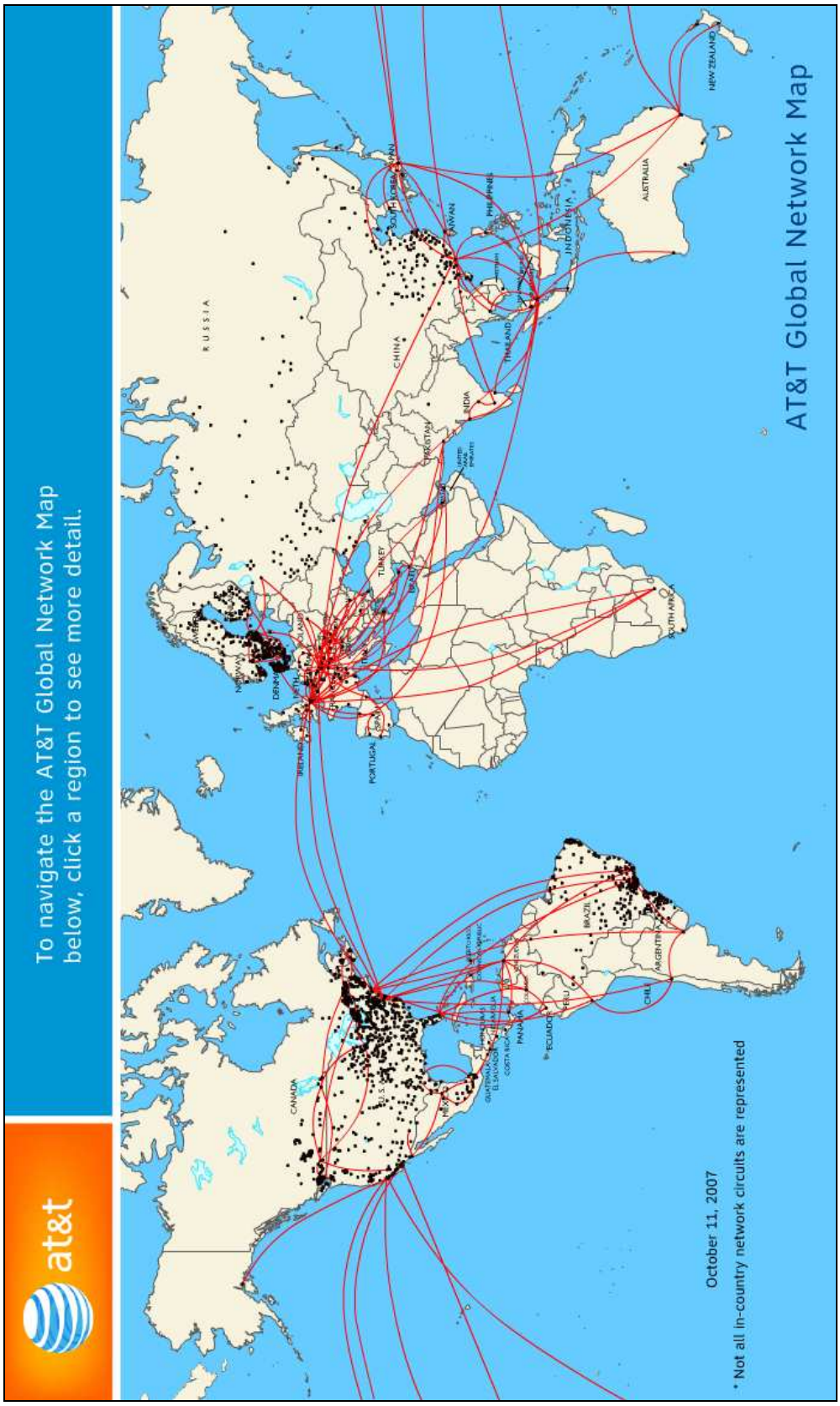


Figure 6.15: Global scale network marketing map for AT&T. (Source: author screenshot, <www.corp.att.com/globalnetworking/media/network_map.swf>, December 2007.)

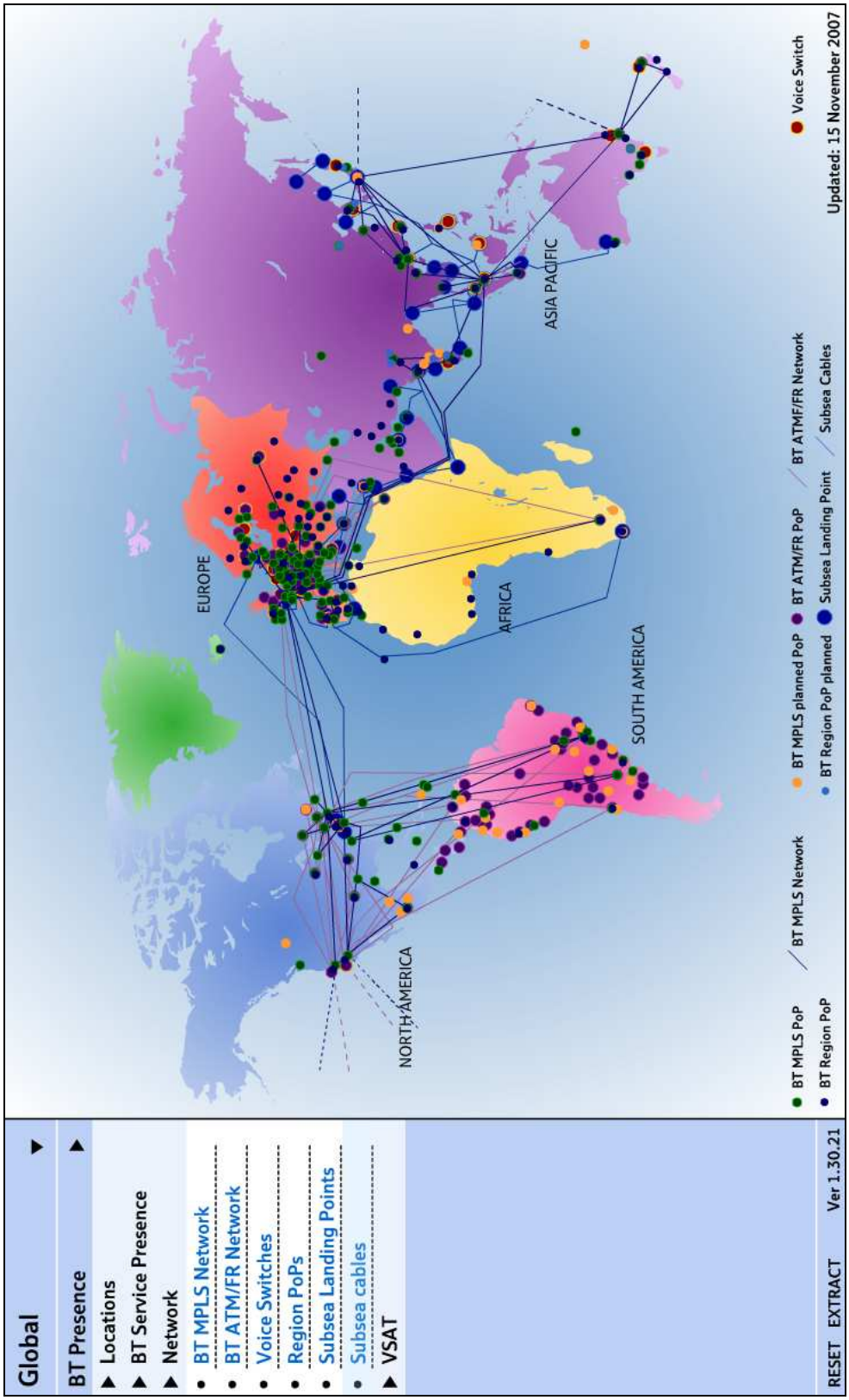


Figure 6.16: Global scale network marketing map for British Telecom. (Source: author screenshot, <www.btglobalservices.com/business/global/en/about_us/global_connectivity>, December 2007.)

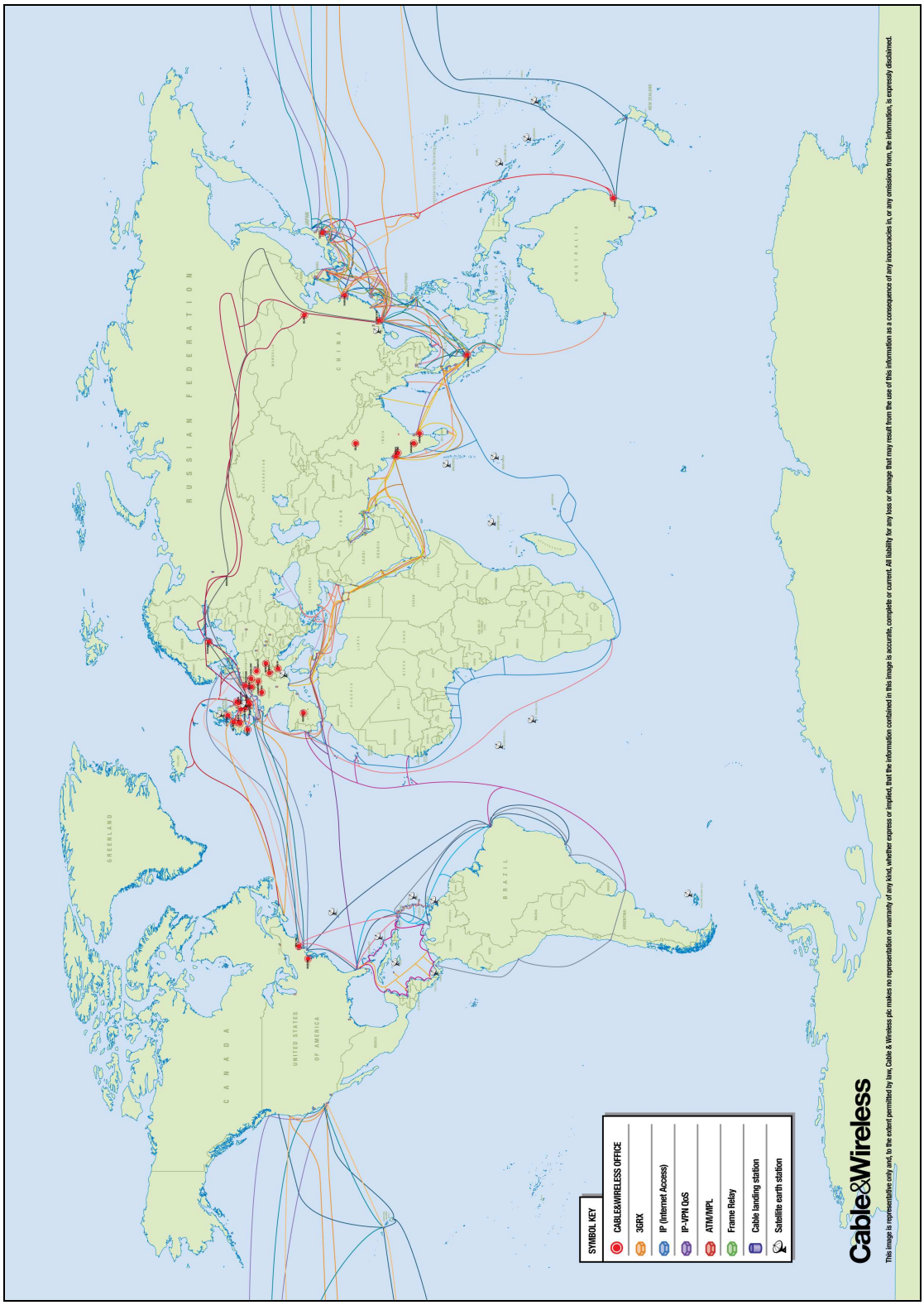


Figure 6.17: Global scale network marketing map for Cable&Wireless. (Source: <http://portal.cw.com/wps/wcm/resources/file/eb34020c09dfbe0/All_Cables.zip>, December 2007.)

Figure 6.18: Global scale network marketing map for France Telecom. (Source: author screenshot, <www.francetelecom.com/en/our_solutions/wholesalesolutions/about_us/>, December 2007.)

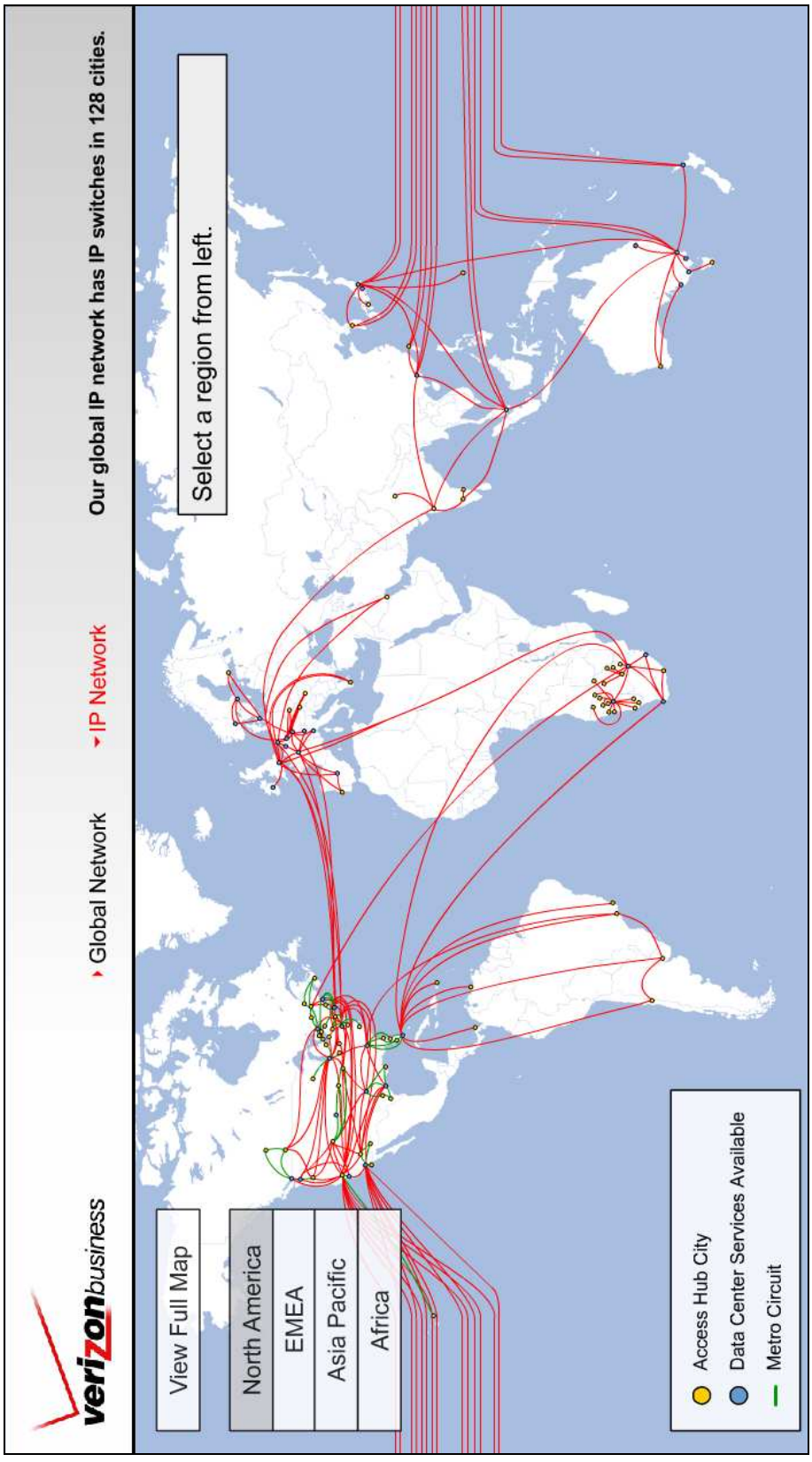


Figure 6.19: Global scale network marketing map for Verizon. (Source: author screenshot, <www.verizonbusiness.com/us/about/network>, December 2007.)

6.4.1.1 The long range of network infrastructure

All five of the corporation's marketing maps deploy range as a necessary design strategy in an attempt to demonstrate the extensive, globe-spanning, network services they provide. The most effective in this regard are the long curving routes on the AT&T and Verizon maps which sweep across several continents and oceans (Figures 6.15 and 6.19). Both map designs also chose red lines as a strong visual statement to represent their routes. The Verizon map is especially noteworthy for the raft of arrow straight route lines driven across the Pacific and, in the centre of the map, the extended routes arcing out from the east coast of the U.S. across the south Atlantic to connect to cities in South Africa. The effectiveness of range on the Verizon map is somewhat weaker on the crucial north Atlantic zone where the cartographer has bunched the company's route lines together reducing the denotation of range. In this area of the world the AT&T map, arguably, is better able to tap into range visually with three long smoothly curving lines from Europe over the Atlantic to the U.S. northeast cities (Figure 6.20). The AT&T map also benefits in terms of demonstrating range by several very long lines stretching out from western Europe to southeast Asian cities that run right across the Middle East and Indian subcontinent. However, there are the Canadian and Russian northern territories as vast blank spaces literally out of range of the company's network.

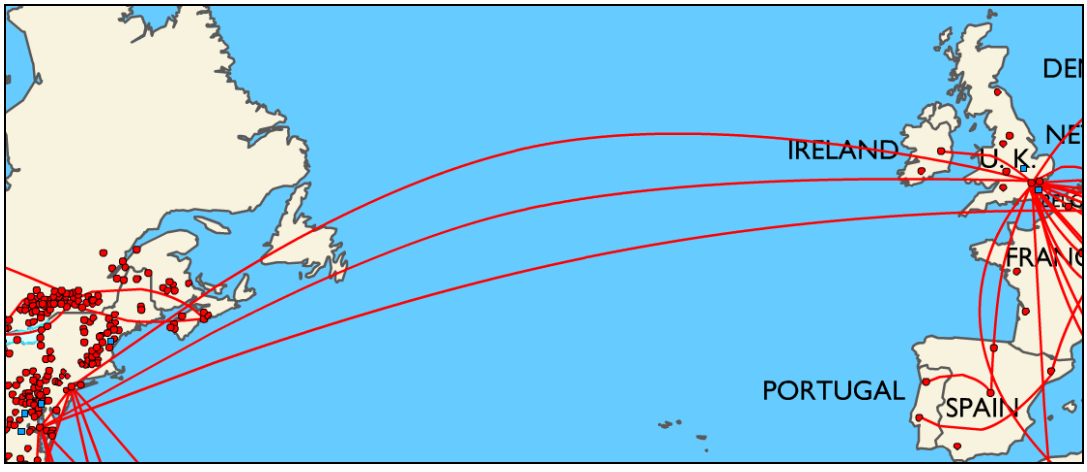


Figure 6.20: Effective demonstration of network range through long route line across the north Atlantic. A subset image taken from the AT&T map. (Source: author screenshot.)

Turning to the other three corporations, it is apparent that the maps deployed by BT, Cable&Wireless and France Telecom (Figures 6.16 – 6.18) are significantly weaker at demonstrating the powerful range of their infrastructure. The design of the Cable&Wireless and France Telecom maps consciously focuses on following the approximate geographical routes of submarine cables rather than tracing out notional point-to-point paths in the style of airline marketing maps. Submarine cables tend to hug the continental coastlines and consequently do no produce long route lines which are most effective for connoting range. France Telecom's map, in particular, is also lacking in visual impact in terms of range because it has no elongated routes crossing landmasses in many parts of the world, as such it appears that its infrastructure is not able to get beyond the shoreline. Cable&Wireless is marginally better in this regard with several long route lines on land, most notably those snaking across the vast expanse of the Russian Federation and northern China (also shown in inset Figure 6.24 below).

The somewhat different cartographic design of style of BT's map for representing network links results in shorter, straight and much more angular routes rather than continuous curves that appear to be longer. Such short lines are problematic for confirming the range of BT's infrastructure. Furthermore, like Cable&Wireless and France Telecom, BT utilises submarine cable routes that tend to follow the shoreline (e.g., through the Mediterranean) and thus cannot conjure up a sense of long range connections. BT's map also suffers from the lack of any long routes travelling across the Pacific, which the vast expanse of central Asia and Siberia are uncrossed as well - connoting these spaces as out of range. Overall, the BT map has failing in many areas in making the range of its network infrastructure manifest to potential customers and investors.

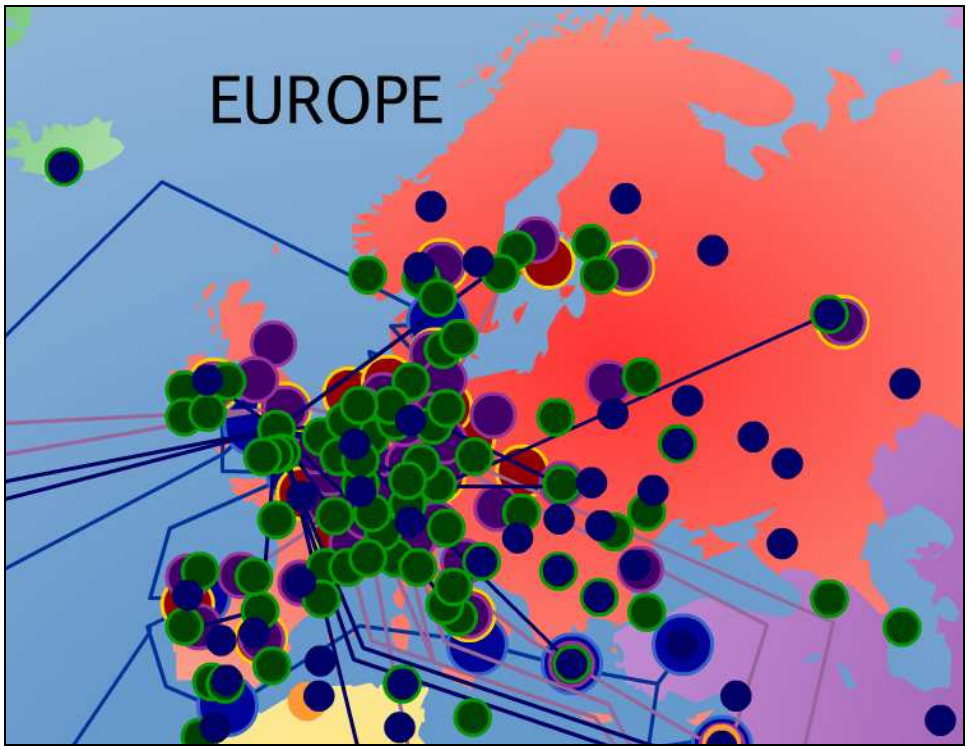


Figure 6.21: Europe is lost under a mass of nodes making it impossible to determine whether the network reaches the right places. A subset image taken from the BT map. (Source: author screenshot.)

6.4.1.2 The wide reach of network infrastructure

It is important in marketing terms that maps can prove the network has wide reach to connect to the most important places across the world. Arguably, none of the five maps examined perform particularly well at denoting reach. While both AT&T and BT (Figures 6.15 and 6.16) display a great many nodes across the world, none of the points are identifiable as specific and important cities, and the majority of these places are not visibly linked by the company's routes. Indeed, one could argue this lack of visual connections breaks the intuitive narrative of these marketing maps that the lines represent real cables carrying data to and from actual places. The message connoted from these maps is that a node without a link is disconnected, completely at odds with needs to convey network reach. In a few areas the sheer number of nodes are over-plotted and merge into an undifferentiated mass that again is unhelpful in expressing where specifically in world the network reaches, for example BT's mapping of its infrastructure in Europe (Figure 6.21).

The Cable&Wireless map (Figure 6.17) is better in some respects in that it tries to show how the network reaches key cities in Europe and Asia. Hubs are explicitly named and prominently drawn with red target symbols. However, there is simply not enough of them for Cable&Wireless to convincingly portrait itself as offering customers real global reach (the dearth of hubs across North America is particularly problematic).

France Telecom's map (Figure 6.18), with its focus on submarine cable routes, manages to display a good distribution of coastal nodes, drawn prominently as black points, but it is all too apparent that its network does not reach major cities within the interior of continents. In some respects then the map produced by Verizon of the sample in demonstrating reach, with a fairly even distribution of nodes across the world (except in Russia and China). All Verizon's hub cities are clearly displayed and definitely connected by a network link. Unfortunately none of them are named so as to unambiguously identify them as key cities, however zooming the map into a regional scale allows users to interactively query nodes to find out the city name and also its network connectivity (an example is shown in Figure 6.22)[12].

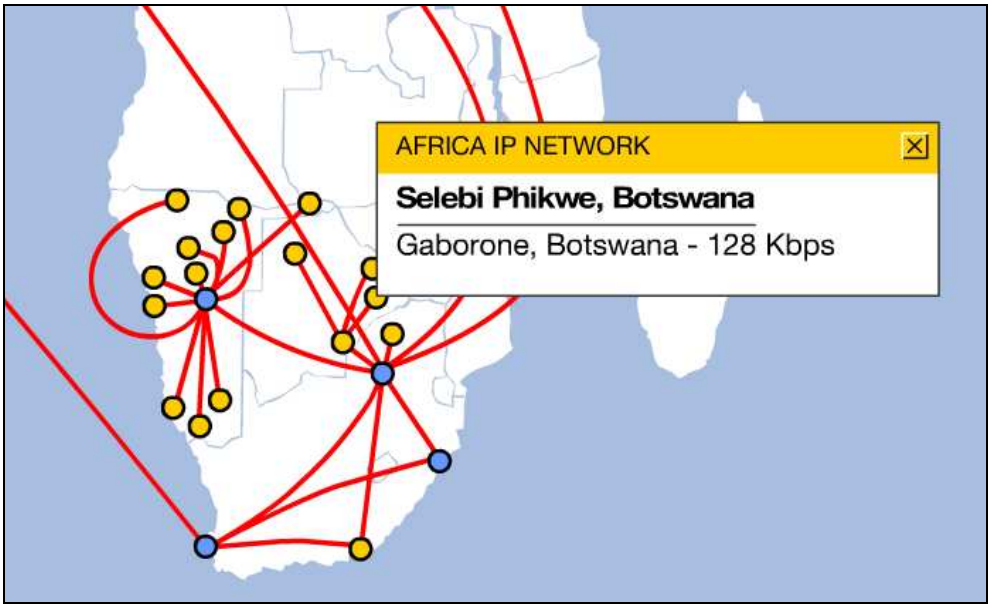


Figure 6.22: Querying a hub city on Verizon's network. A subset image of a zoomed version of the Verizon world map. (Source: author screenshot.)

[12] This example illustrates well the added value that interactive maps have over static images.

6.4.1.3 Direct network connections are indispensable

Besides reaching the right places, the most effective network marketing maps need to be able demonstrate how directly connections are made. Regarding the directness of network infrastructure, the Verizon map again scores best out of the sample analysed (Figure 6.19). There are a plethora of route lines projecting out from Verizon's core U.S. hubs to provide uninterrupted connections to multiple destinations in Europe, Asia and South America. Miami, for example, has seven direct routes to cities in Central and South America, along with connections across the Atlantic to Cape Town and Johannesburg (Figure 6.23). Such a quantity of direct city-to-city links denotes strongly that a network able to deliver data swiftly and reliably as there are no unnecessary detours or diversions. AT&T's map (Figure 6.15) is also fairly effective in this regard, displaying direct routes from its U.S. core to peripheral markets in Central and South America.

Figure 6.23: Example of direct connections from Verizon's Miami hub to multiple cities in Central and South America. A subset image taken from the Verizon world map. (Source: author screenshot.)

The representation of networked infrastructure mapped by BT, Cable&Wireless and France Telecom (Figures 6.16 – 6.18) appear much weaker at denoting direct routes to key cities. Indeed, France Telecom's map offers few unbroken connections, and the visual impression connoted from how the routes are represented is that the journey of data from the European core out to Asia promises to be circuitous and slow one, hopping between numerous cable landing points. One could argue the cartographer has produced a too realistic a representation full of wiggles and meanders taken by the actual cables. Cable&Wireless' route mapping also connotes of being sinuously languid, suggesting prolonged journey times as data must navigate all those curves – the overland route from the UK to China across the Russia Steppes is a particularly problematic case (Figure 6.24). The route line on the AT&T map, in comparison, just 'flies' from Europe to Hong Kong and looks considerably shorter and more direct.

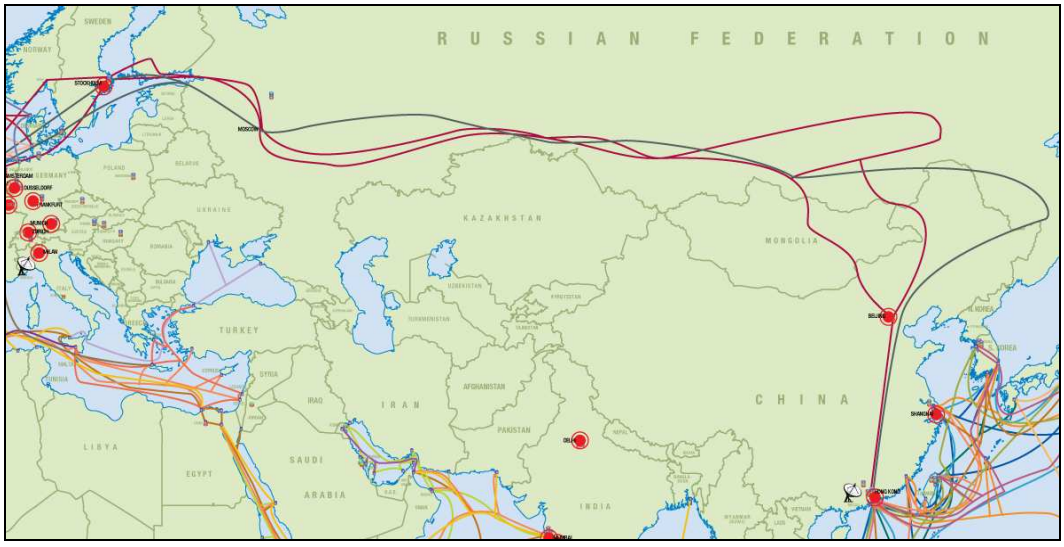


Figure 6.24: These routes from Europe to China do not suggest direct connectivity. A subset image taken from the Cable&Wireless map. (Source: author screenshot.)

6.4.1.4 The centrality of network infrastructure

Another key aspect of promoting the Internet for global scale corporations is to prove their network infrastructure is able to serve the core regions of the world economy. It is helpful if these regions are suitably displayed at the centre of the map as well. In a conventional reading, the core regions needing good infrastructure coverage would be North America, Western Europe and Southeast Asia, although this is expanding with the growing economic power of the so-

called BRIC nations (Brazil, Russia, India and China) and also the powerful petrodollar economies in the Middle East. None of the maps in the sample cover all regions with equal effectiveness, reflecting the partial infrastructure provision of even the largest global telecommunications corporation and also the political economy of infrastructure ownership that still favours state monopoly providers (or privatised monopoly corporations) in many countries.

BT's map demonstrates good centrality, with it strong coverage of Europe with dense mass of hubs and a busy array of short angular network links (Figure 6.16). This impression is enhanced as this region is positioned in the middle of the map and at the focus of reader's visual attention. BT also exhibits reasonable coverage in North America and South Asia, visually important to any claim to centrality. In terms of the BRIC economies, BT appears from its marketing map to have a relatively good amount of infrastructure in Brazil and India and some nodes in Chinese coastal cities. However, BT is much weaker in covering Russia, which is largely a blank landmass. The petrodollar economies in terms of the mapped infrastructure appear to partially served, with network routes running down the Red Sea and out into the Gulf of Aden.

Verizon exhibits very good centrality in terms of North America and Europe is fairly well covered, but has rather sparse network links to the BRIC nations (Figure 6.19). For the crucial Middle East region, Verizon is also limited with only one access hub in Kuwait City with direct network connections to London and Amsterdam. The infrastructure in the other established core region of southeast Asia is also surprisingly restricted for Verizon, despite the large number of direct network links the corporation has heading into this region from the U.S. west coast.

In contrast, Cable&Wireless has a surfeit of cabling running throughout southeast Asia and Japan along with the appearance of adequate network coverage in northern Europe, but fails in asserting the centrality of its infrastructure because the key North American market appears under-served as there are no internal links or nodes (Figure 6.25). Surprisingly, the same serious failing applies to AT&T

which falls down in demonstrating centrality on its world map because it display no network links covering its U.S. heartland (Figure 6.15). This contrasts with Europe which AT&T covers well. The reason for the failure to display network links is a pragmatic design one, explained in part by the caveat under the date - 'Not all in-country network circuits are represented' – but in terms of connotations of centrality given to readers this is problematic.

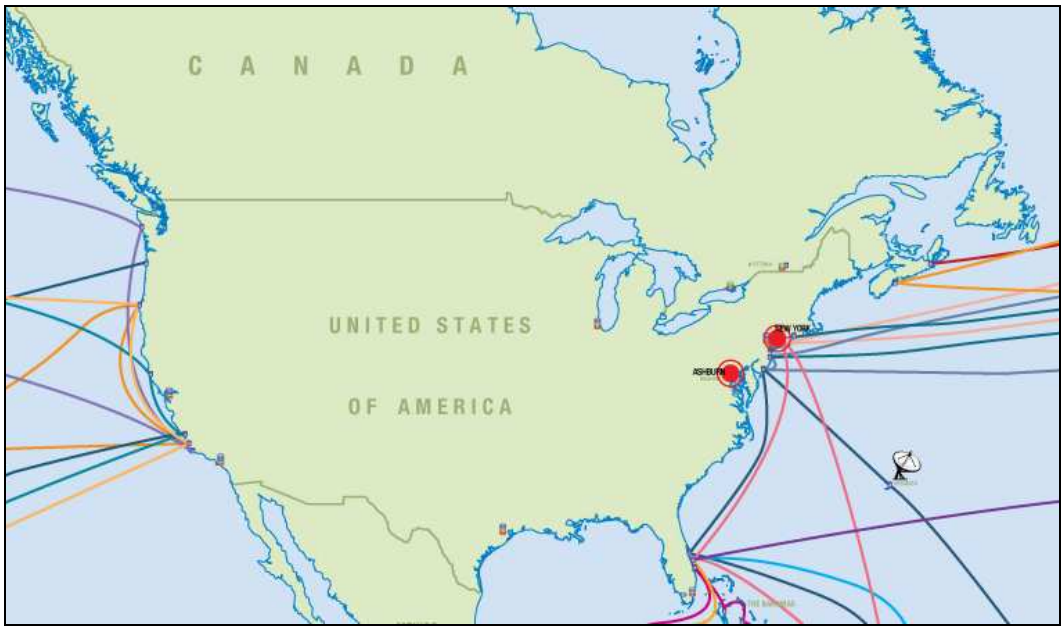


Figure 6.25: Blank North America region is a serious weakness in demonstrating centrality of network provision. A subset image taken from the Cable&Wireless map. (Source: author screenshot.)

6.4.1.5 An abundance of network infrastructure

In combination with centrality, the ability to demonstrate an abundance of infrastructure connotes trouble-free service availability as well denoting a sense of strength and reliability through redundancy. Again, BT does well with significant parts of its world map literally filled to overflowing with infrastructure nodes and links (Figure 6.16). Europe is completely covered, which for demonstrating abundance is very good, but as noted above, it is problematic for the specificity needed to illustrate the network reaches key places (Figure 6.21 above). However, the good work done with abundant European infrastructure coverage is immediately undone by the connectivity hole at the centre of BT's map – the stark emptiness of Africa (Figure 6.26). The almost complete lack of coverage stands

out visually with the bright beige-coloured continental outline resting below Europe almost completely unconnected apart from a couple of routes that pass over the top of most of the population to link to South Africa and a submarine cable skirting conspicuously around the outside without making landfall. Greenland is also visually prominent in the middle of the map but devoid of any BT infrastructure whatsoever, as is the vast Russian landmass.

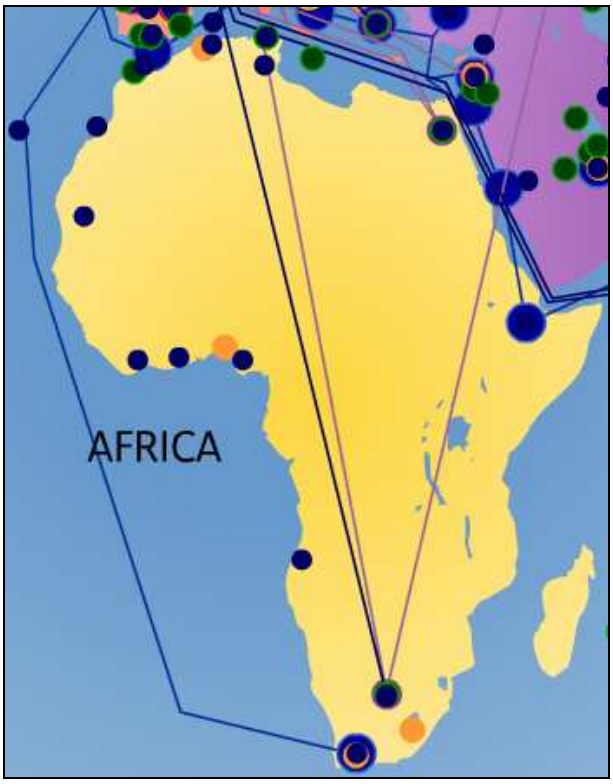


Figure 6.26: The emptiness of Africa in terms of infrastructure is antithesis of abundance. A subset image taken from the BT map. (Source: author screenshot.)

Both the U.S. based corporation AT&T and Verizon score relatively well on abundance, but only in restricted regions (Figure 6.15 and 6.19). Their maps utilise robust-looking red route lines crossing land masses and have many nodes shown prominently as black symbols that standout against the white country outlines. As with BT, however, both corporations suffer when considered in the whole because of the unconnected northern lands in Canada, Greenland and Russia seriously undermine the connotation of *global* infrastructure abundance.

France Telecom's marketing map is significantly weaker than these three because

of its focus on undersea cable routes gives the appearance that it has no coverage across the continental landmasses of Africa, Asia, Australia or South American. Apart from some infrastructure sited in Western Europe and a skeletal network across the U.S., France Telecom's map fails to convince that the corporation has an abundant network able to meet demands of customers (Figure 6.18). Cable&Wireless is arguably the weakest of the sample as its map design has node symbols that lack visual bulk to make an impact and the line style used to represent network routes is too slight to suggest abundance in most regions (Figure 6.17). The only exception, and slight bright spot on the Cable&Wireless map, is the crowding of submarine cables in a narrow strip in the East and South China Seas region resulting in an over layering of lines to connotes abundance. The scale of the un-networked world, presented to prospective customers or investors trying to interpret Cable&Wireless's map, is exacerbated by the curious design decision to include the Antarctic continent which, because of the projection, looms as a vast empty landmass across the whole bottom portion of the image. It is apparent that Cable&Wireless designers chose the most geographically complete and detailed world base map but this is not necessary the most effective for denoting focused marketing narratives. All the other marketing maps in the sample exclude Antarctica and three of them (AT&T, France Telecom and Verizon) cut-off a portion of higher northern latitudes in an attempt to reduce extraneous territory that is largely unpopulated and, therefore, unconnected (see Figures 6.15, 6.18 and 6.19 above).

6.4.1.6 Confirming network capacity

Are routes suggestive of capacity to cope with growing global traffic in the marketing maps of these five telecommunications corporation? In most cases the answer is no, as the line styles employed lack the visual weight necessary to connote large carrying capacity. Furthermore, none of the five maps use the conventional design device of varying line symbology (either width, style or colour) to explicitly denote differential bandwidth capacity.

As in the case of the abundance strategy, the Cable&Wireless map is notably weaker than the others with its especially delicate looking network links between

continents not connoting high capacity. While the lines are differentiated through colours this simply indicates the transmission protocol employed and not bandwidth capacity.

The marketing maps offered by BT and France Telecom are slightly better at connoting high capacity with somewhat stronger line styles and colours for the representation of submarine cables (Figures 6.16 and 6.18). While AT&T and Verizon's map make a markedly stronger visual claim to capacity with their routes drawn in a solid and readable red (Figures 6.15 and 6.19). However, neither take the opportunity to maximise the impact of capacity for marketing their infrastructure by proportionally increasing the line weight to show greater bandwidth on important routes. So on the Verizon map, for example, the high capacity transatlantic routes are denoted in the same way as the links in southern Africa which are an order of magnitude smaller in bandwidth. (Note, users of the Verizon map can determine bandwidth on different routes when zoomed into a region by an interactive query on city nodes; see example in Figure 6.22 above for Selebi Phikwe, in Botswana which has a connection of 128kbps, less than a typical domestic broadband connection in the UK.)

6.4.1.7 The silencing of alternatives

AT&T, Cable&Wireless and Verizon enact the silence prerogative completely in the design of their marketing maps by not admitting, in the slightest degree, the existence of Internet infrastructure that is not their own (Figures 6.15, 6.17 and 6.19). BT's map appears initially be silent of competitors and alternative networks, but on closer inspection the descriptions of infrastructure types in the legend tacitly admits that submarine landing points and certain undersea cables are not exclusively owned or operated by the corporation (Figure 6.16). Finally, France Telecom's map more seriously undermines the logic of the silencing through the highly visual labelling of every submarine cable system as different (Figure 6.27). This conscious naming invites speculation that France Telecom does not own or control these vital infrastructures and connotes that its network service merely piggy-backs across other systems. This is overly honest, one could argue, on the part of France Telecom as other corporations certainly buy transmission capacity on many of the same cable systems, but do not admit in

their marketing maps to this dissolution of primary control over infrastructure. Such an admission in the map weakens the position of France Telecom to offer customers the total solution to their needs and to guarantee security of data delivery.

Figure 6.27: Silence is broken in the labelling of submarine cable systems. A subset image taken from the France Telecom map. (Source: author screenshot.)

6.4.1.8 The exclusive exhibition of the network

All the marketing maps have a strict focus on representing just the network infrastructure and avoid extraneous details in their overall designs. None of the five examples includes the technical paraphernalia common on many other world maps, such as a graticule or scale. They all use blank, and one might say ‘default’, Eurocentric outline maps showing just the shape and position of continents and nothing more. They are in some senses quite bland, lacking embellishment and having consciously excluded all topographic contexts (e.g., relief or vegetation), all thematic information (e.g., population distribution or economic activity), and all other modes of transportation. No natural features are named as these are irrelevant to marketing the Internet, a network existing apart from nature. This

then is a primitive world of landmasses and unnamed oceans, a *terra nullius* onto which corporation can parade their wares.

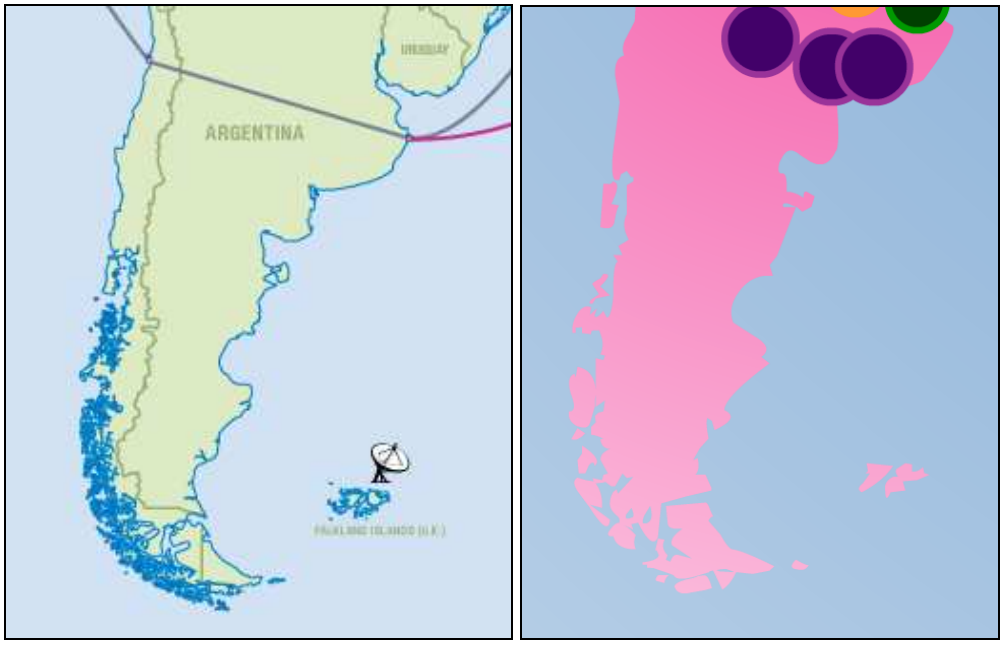


Figure 6.28: Differential levels of cartographic generalisation. Simpler cartography focuses attention exclusively on the network infrastructure. Subset images from the Cable&Wireless (left) and BT (right) maps. (Source: author screenshots.)

In evaluating the employment of exclusivity as a cartographic design tactic it is apparent that all the maps score well. BT and Verizon are the most effective of the five. BT's map, for example, even assuages country boundaries, plotting its network on top of stylised continental outlines, each of which is distinctively coloured (Figure 6.16). The shape of the continents themselves has also been significantly generalised which aids clarity of display and connotes them as mere containers for the corporations infrastructure (Figure 6.28). BT's map also has very little text on it, adorned with only five regional labels – nothing else it deemed important enough to name.

Verizon's map also exhibits a strongly exclusive focus and does not allow much else to distract readers from the core marketing narrative of demonstrating network geography (Figure 6.19). The continents are coloured virginal white, with only faint country boundaries. No countries, cities or other geographical features

are named. The corporation's infrastructure itself is represented in a simple, yet visually strong, pallet of colours and symbols that envelopes an otherwise empty world.

The other corporation's maps are slightly weaker than the paired down minimalism of BT and Verizon. Cable&Wireless's map in particular is quite a bit busier in design terms one might argue (Figure 6.17). Their designer/cartographer has employed an unnecessarily detailed backdrop (probably bought as a generic vector world map outline 'of-the-shelf'). The continents are drawn with joyously fractal coastlines and true multitude of tiny islands (Figure 6.28). Such geographic detail distracts from the exclusive display of the network structure. The infrastructure itself is also represented in a more complex fashion than on the other maps in the sample, with multiple coloured links and several different kinds of nodes symbolised. There are small satellite receiving station icons that appear to be scattered across the globe, including some on near invisible islands in the middle of the ocean; arguably this appears as somewhat of a visual oddity and is a distraction perhaps from reading the network routes themselves.

6.4.1.9 Summary

While it is hard to give a quantified summary of the performance of the five maps analysed, it is apparent that their utilisation of the eight cartographic design strategies (range, reach, directness, centrality capacity, abundance, silence, exclusivity) was variable and, consequently, that they had varying degrees of success at connotatively generating positive impressions of the corporations' global network infrastructure coverage and capability to potential customers and investors. There is no clear winner as to the most potent marketing map in the sample, although it is noticeable that in a number of denotative areas the maps of AT&T and Verizon had superior performance over their competitors in the sample. Equally apparent was the relatively weaker performance of the France Telecom map at connoting positive messages needed for marketing. The somewhat curious design decisions made by the Cable&Wireless cartographer means its maps are also problematic at connoting a powerful and reliable network infrastructure that potential customers could trust.

6.5 WorldCom case study - backbone boom and the doubling myth

> There is no way to give us an understanding of any society, including our own, except through the stock of stories which constitute its initial dramatic resources. Mythology, in its original sense, is at the heart of things.
>
> -- MacIntyre, 1985, quoted in De Cock *et al.* (2001, 209).

Companies operating dedicated Internet backbones emerged in the late 1980s in the U.S., offering connectivity to businesses who were not able to use the academic networks, such as the NSFNET backbone. Many of these were small start-up companies, rather than established telecommunications carriers, and some grew out of regional consortia set up to connect local universities together (e.g., PSINET from NYSERNET in New York). One of the earliest commercial Internet network providers was UUNET, founded in 1987. Initially, UUNET was selling access to Usenet and grew to become a dominant U.S. Internet backbone operator by the mid 1990s, eventually being bought by WorldCom in 1996.

Table 6.3: Growth in potential bandwidth on U.S. domestic inter-city routes, 1999-2002. (Source: TeleGeography 2002, 9.)

Rank	Route	1999 (Gbps)	2002 (Gbps)	Multiple Increase
1	New York – Washington DC	7.5	137.4	18
2	Los Angeles - San Francisco	5.1	129.9	25
3	Sacramento - San Francisco	NA	124.9	NA
4	Atlanta - Washington DC	4.2	111.1	27
5	Chicago - New York	4.0	110.3	28
6	Dallas Fort Worth - Los Angeles	3.8	72.9	19
7	Philadelphia - Washington DC	0.7	68.9	94
8	San Francisco - Seattle	3.9	68.3	17
9	Dallas/Fort Worth - Houston	5.3	67.9	13
10	Portland - Seattle	0.7	64.9	88

(Gbps = gigabits per second)

The provision of fibre-optic network infrastructure in general, and Internet backbones in particular, experienced enormous growth in the 1990s, with the second half of the decade seeing an especially frenzied pace of new building in the United States and also in Europe. In what can now be seen as a classic example of bubble economics, billions of dollars were speculatively invested in laying thousands of miles of new cables, creating gigabytes of additional bandwidth. On many routes, available capacity doubled again and again in the

space of a couple of years (Table 6.3), and several companies built wholly new national networks in the United States (e.g., Qwest, Level3 Communications) with the hope of capturing the lion's share of Internet traffic and positioning themselves as the dominant player in the so called 'New Economy'[13]. Technical advances in fibre-optic systems were important enablers of this infrastructure growth (see Hecht 1999), but the major driving force, at least to start with, was the undoubted 'bandwidth crunch' in the mid 1990s. Traffic on the Internet grew extraordinarily quickly in the period 1995-96, when many millions of new users came online in a very short space of time (Odlyzko 2000), and there were worries of a shortage of available capacity on key routes. Predicting ongoing traffic growth of this scale held out the inviting promise of rich financial rewards for those quick enough to meet burgeoning demand. Subsequently, the rapid growth in backbone building, paralleling the 'irrational exuberance' in the e-commerce sector, became a self-sustaining rush as companies sought to position themselves favourably, and investors hastened to avoid missing the opportunity. Unsurprisingly, there were many new entrants into the backbone market with ambitious plans, but little experience of running network infrastructure, who nonetheless attracted sizeable investments (Brody and Dunstan 2003).

Much of the new building was duplicative, covering the same routes and interconnecting much the same matrix of hub cities (Greenstein 2003). In a time of boom few seemed worried about problems of oversupply - this was time when 'New Economy' talk was rife and almost evangelical belief in never-ending exponential growth was prevalent. The key question about who exactly would use (and pay for) all this new capacity was never seriously asked. "[I]t was assumed that demand for the basic commodity, bandwidth, was unlimited, the recipe appeared to be 'can't miss!" (Brody and Dunstan 2003, 127). The hype-fuelled myopia from *within* the bubble, clouded judgement and the simple and convenient

[13] Besides new networks in the U.S., major investments were also made in intercontinental bandwidth with many ambitious new submarine cables systems. Billions more were spent on constellations of low-earth orbit satellites to provide data network services (such as Teledesic).

rationale of 'if we build it, they will come' was sufficient to lure many eager investors[14].

The problem was that the peak in Internet traffic growth in 1995-96 turned out to be a short-lived aberration. Customer demand thereafter, while still growing quickly at about 100% per year, was nowhere near rampant enough to absorb all the available new bandwidth being built (Odlyzko 2003). It is estimated that less than four percent of the fibre optic cable that was laid during the boom in the late 1990s was activated (Brody and Dunstan 2003, 146). The predictable outcome was a glut of bandwidth, resulting in falling prices and steep decline in revenues for network operating corporations. By 2001 many new entrants into the backbone market were in financial trouble, unable to service their large debts. The high-profile crashes of many dot-com companies in 2001 announced that the 'New Economy' was not so different from the 'old' economy after all, repeating much the same patterns as earlier cycles of speculative technological boom and bust (e.g., railways in the 1840s and broadcast radio in the 1920s). Yet, the sheer scale of the telecoms crash in 2002 was unprecedented, encompassing many of the best-backed companies (for example, the bankruptcy of Global Crossing cost shareholders $25.5 billion). The widespread bankruptcies of backbone providers also impacted on the large telecommunications equipment manufacturers such as Lucent, Nortel, and Marconi. In all, the bandwidth bust has been estimated to have cost investors around one trillion dollars (Brody and Dunstan 2003). The indignation of over eager investors at the poor judgement of company executives would be inflamed further by subsequent revelations of serious corporate deception and wholesale fraud in the backbone sector.

6.5.1 Deficient data on the Internet traffic growth

A serious problem for those planning and investing in Internet infrastructure in the 1990s was the lack of network knowledge on which considered calculations could be made. "It's not like transportation engineers putting down hard numbers for

[14] The 'luring' was also aided by some dubious practices and bad advice given by an unscrupulous minority of the bankers, technology analysts and commentators involved (Brody and Dunstan 2003). With hindsight, the 'independence' of the advice given is in doubt as some of the advisers stood to benefit directly, through consulting fees and stock holdings, from the companies they were recommending to clients.

expanding the interstate highway system." (Behr 2000, H01). The dearth of useful and credible Internet traffic statistics, in particular, encouraged an over reliance on what turned out to be poor data.

The Internet is poorly understood statistically and economically, especially compared to other utility and transportation systems, because of the lack of representative published statistics on network size and traffic utilization. There are a number of reasons for this, including the newness of the system, the pace of its growth, its distributed scale of operation, and its heterogeneous ownership structures. Further, network owners have few, if any, incentives to publish representative traffic statistics - particularly as these may aid competitors. An alternative approach is instrumental measurement of the Internet by independent researchers but these attempts are usually flawed by unrepresentative distribution of sample points (cf. Murray and Claffy 2001). In terms of assessing backbone networks, as built, a number of statistics such as route miles, fibre miles, number of hubs have been published, for example in reports from TeleGeography (2002) and OECD (2002). Malecki's (2004) analysis of investment in fibre optic network in the U.S. for example relied, primarily, on unverified bandwidth aggregates between cities derived from *Boardwatch Directory* maps and provider marketing maps. Bandwidth is a useful but ultimately unsatisfactory variable (it is like developing road policy based on the width of tarmac between cities with no knowledge of the number of moving cars).

A characteristic of most of the available published statistics is that they show the Internet is expanding quickly and in the boom of the late 1990s the *best* of these statistics, and those that got the most attention, were the ones showing the greatest degree of expansion. Yet, too often these growth statistics were of dubious quality based on unscientific methods and unrepresentative samples. While some were well-meaning guestimates and others merely speculative, a few were fabricated - numbers literally plucked out of the air to feed to technology journalists and to be disseminated out to the financial markets receptive for the latest statistics supporting the boom mentality. Such statistical 'evidence' encouraged people to believe growth was happening everywhere and knew no bounds. It directly fed the

dot-com hype and the hype, in turn, fed back to those generating evermore extravagant numbers (Jordan 2001).

The lack of representative data on data traffic growth opened the way for the biggest - and some claim the most fraudulent - piece of statistical evidence to circulate, that traffic Internet was doubling in size every 100 days or so. This corresponds to annual growth rates in excess of 1,000%. Importantly, the origin of this evidence is specific to traffic data at one time point and for one network, but it became accepted as universal truth. As with other technology myths, such as nuclear-war survivability of the early Internet (cf. Abbate 1999), once the statement circulates it gains credibility through retelling, particularly when the retelling is in high profile outlets, including in government reports, and by credible industry insiders (see Odlyzko 2003 for full discussion). For example, the doubling myth was stated as fact in a widely circulated 1998 U.S. Department of Commerce report[15], while the former chairman of the U.S. Federal Communications Commission, Reed Hundt, recited it in his book on telecommunications reform, *You Say You Want A Revolution* (2000). The power of such myths is, of course, that they tell people what they want to hear and in the late 1990s many people wanted to believe that the Internet was growing so fast that it was rewriting the laws of economics and would revolutionise society. And that the growth in traffic and infrastructure demands would continue to justify extravagant claims in business plans.

The origins of the 'traffic doubling every 100 days' myth have been traced, through forensic bibliographic analysis by Andrew Odlyzko (2003), back to comments made by UUNET chief scientist Mike O'Dell in 1996. It was subsequently repeated in a February 1997 WorldCom press release and further reiterated several times during the late 1990s by senior executives in WorldCom, including CEO Bernie Ebbers. Even as late as September 2000 it was the mantra of the company, with Kevin Boyne chief operating officer of WorldCom's

[15] *The Emerging Digital Economy* report (April, 1998) stated in its introduction: "Traffic on the Internet has been doubling every 100 days" (page 5). On page 11, the report also stated: "UUNET, one of the largest Internet backbone providers, estimates that Internet traffic doubles every 100 days" (see <www.technology.gov/digeconomy/EmergingDig.pdf>).

Internet division UUNET quoted in a Washington Post article saying unequivocally: "[o]ver the past five years, Internet usage has doubled every three months" (Behr 2000, H01). In promulgating the myth so widely it is clear that it was useful to WorldCom's business strategies and as such they must share responsibility for hype of the bandwidth boom (Economist 2002).

The roots of the myth of 'traffic doubling every 100 days' are situated in the unprecedented growth spurt for the Internet in 1995-96 when it might well have been true, at least for a time for UUNET's own network. However, detailed analysis by Odlyzko (2003) of a range of traffic data from different networks shows that over the period as a whole growth was only doubling annually. Yet, the 'doubling every 100 days' myth continued to be touted as truth for the rest of the decade and its simplicity and promise of potential revenues meant that it came to underlay the backbone boom (Dreazen 2002; Economist 2002). In this way, the myth was dangerously misleading and damaged the whole industry. "WorldCom's phantom growth caused once-mighty telecommunications companies like AT&T to cut prices and slash costs in the crippling race to keep up, from which they never fully recovered" (Belson 2005, no pagination).

6.5.2 WorldCom's rise to the 'World-Con' bust

WorldCom's relatively short corporate history began in 1985 with the arrival of Bernie Ebbers, then a small-time entrepreneur in Mississippi, as owner of a small telephone company called LDDS. Through numerous take-overs and aggressive business manoeuvres, Ebbers quickly grew LDDS into a multibillion dollar operation providing a full range of telecommunications services. In 1995 LDDS re-branded itself as WorldCom, a name befitting it globalist business ambitions. At its height, WorldCom was second only to AT&T in the U.S. long-distance telephone market and the dominant global player in the Internet backbone business. Importantly, this achievement was facilitated by neoliberal structural and regulatory changes that reconfigured the U.S. telecommunications landscape during this period. A key part of these changes was a lessening of government oversight of corporations' financial practices.

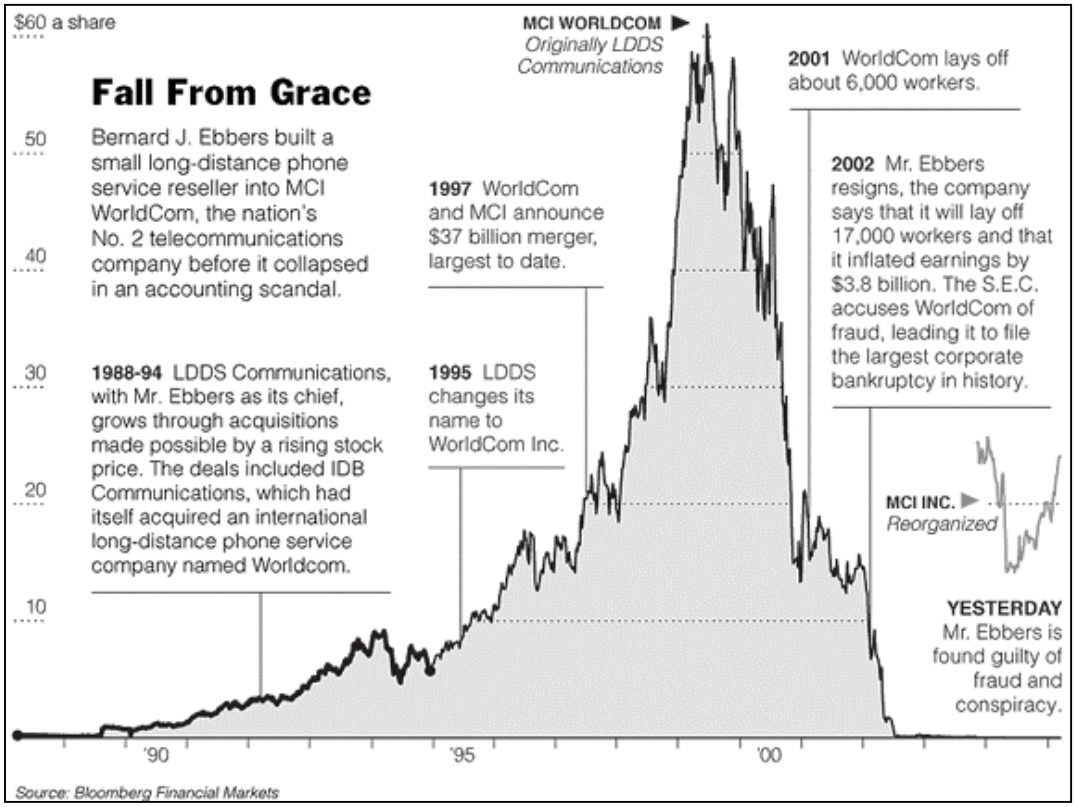


Figure 6.29: The fluctuating share price of WorldCom in relation to its corporate history. (Source: graphic accompanying Belson 2005.)

Table 6.4: Principal WorldCom acquisitions, 1995-2001. (Sources: Jeter 2003; Sidak 2003, 241; corporate press releases.)

Date	Target	Price (USD billions)	Core business focus
Mar. 1995	WilTel Networks	$2.5	Facilities-based CLEC
Aug. 1996	MFS, UUNET	$12.5	IP network provider
Jan. 1997	Brooks Fiber	$2.4	Facilities-based CLEC
Jan. 1998	CompuServe	$1.3	ISP
Jan. 1998	ANS Communications	$0.5	ISP
Aug. 1998	Embratel	$2.3	Brazilian long-distance provider
Sept. 1998	MCI	$40.0	Long-distance provider
[Oct. 1999	Sprint*	$129.0	Long-distance provider]
Oct. 1999	SkyTel	$1.7	Paging service
July 2001	Digex	$5.8	Hosting services

* This merger was effectively blocked by government regulators in the U.S. and EU.

WorldCom was a major contributor to the Internet backbone bubble in the second half of the 1990s, engineering corporate expansion on a monumental scale with a string of billion dollar acquisitions and mergers (Table 6.4). Key in these were the 1996 take-over of MFS Communications (which included UUNET, then the

biggest Internet backbone operator), swiftly followed by the acquisition of MCI for $42 billion, at the time the largest corporate merger in history. (This was an audacious move as MCI was over three times the size of WorldCom's capitalization at the time). The stock value of WorldCom peaked in 1999 at $64.50 a share, representing a return of more than 7,000 times the initial investment (Figure 6.29). Ebbers was widely feted as a leader in the new breed of 'bandwidth barons' and in 1999 was named by *Forbes* magazine as one of the richest Americans with net worth of $1.4 billion, based largely on value of his WorldCom stockholding (Jeter 2003). Hindsight also shows that 1999 turned out to be nadir of the boom for WorldCom[16] and to some extent the wider telecommunications sector.

WorldCom's tremendous fifteen year growth spurt really began to unravel in 2001 when revenues fell sharply and the stock price plunged (Figure 6.29), and in the spring of 2002 the U.S. Security and Exchange Commission began investigating the corporation's accounts. Soon after WorldCom's reputation was brought crashing to earth with the public exposure of huge accounting irregularities of $3.8 billion[17], confirmed in a June 25 2002 company press release. The stock price plunged to 20 cents and many thousands of employees were laid off overnight. On July 21 2002 WorldCom was forced to file the largest bankruptcy in the world, amidst allegation of criminally fraudulent practices on the part of the senior executives. The media quickly re-branded the company as 'World-Con'.

WorldCom's fraud, along with the collapse of ENRON in December 2001 and the associated failure of the global accountancy firm, Arthur Anderson, represented a significant blow to confidence in the financial probity of U.S. business and prompted calls for new legislation on corporate governance. There were other repercussions: "[a]s people from all walks of life watched as WorldCom's betrayal devastated their investments and retirement nest eggs; they wanted to know what went wrong – when, why, and how?" (Jeter 2003, xxi). WorldCom's

[16] Note, at the end of 1999 WorldCom planned a massive merger with Sprint a deal that would have been worth a staggering $129 billion. The merger was blocked by threatened monopolies investigation from U.S. and EU regulators.

[17] The total fraud was eventually tallied to $11 billion (Belson 2005).

fall was also part of an industry-wide collapse in the market for network services in what has been called the 'great telecoms swindle' (Brody and Dunstan 2003). In the ensuing fallout, some commentators have focused blame on WorldCom for deliberately exaggerating the extent of Internet growth (e.g., Dreazen 2002; Economist 2002) and Sidak's (2003) detailed analysis of failures in regulatory oversight of the telecommunications market, uses the 'traffic doubling' myth as a key element in his legal arguments on the potential liabilities of WorldCom. He argues that WorldCom's market power brought a duty to report honestly: "In retrospect, it appears that WorldCom used this asymmetry of information to exaggerate the value of its stock by overstating the growth in Internet traffic volumes" (Sidak 2003, 230).

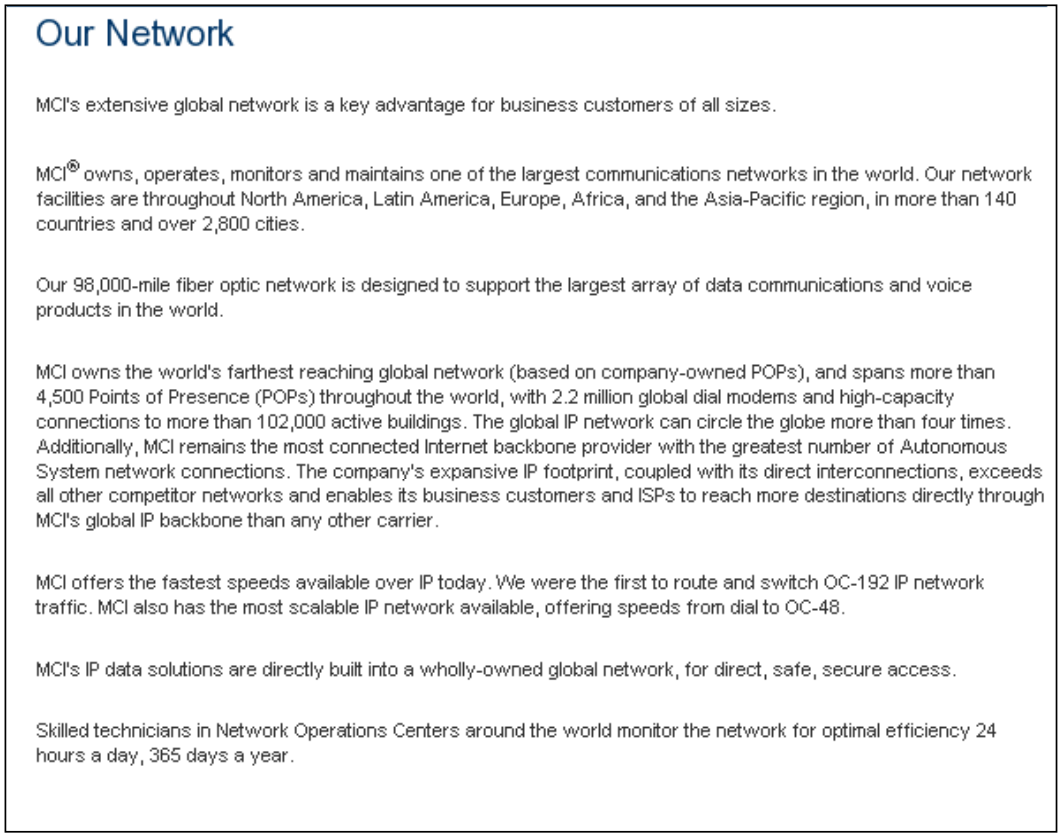
The proceeding story of backbone boom, deficient data and traffic growth myths is significant context in which to examine the representational politics of Internet infrastructure map. The marketing maps that WorldCom produced to promote their businesses played an important part in shaping the geographic imaginary of the Internet as a whole, and furthermore, some of this cartography was also complicit in highlighting the boom and denying deceit underlying it.

6.5.3 Decoding the design strategies in WorldCom's marketing maps

> The network maps are a critical sales tool for us - throughout the world.
>
> -- Henry Ritson, global marketing manager, UUNET - An MCI WorldCom Company, 2000.

The cartographic design strategies of the marketing maps used to sell network infrastructures will now be considered in detail in relation to one specific Internet backbone company, WorldCom. The focus of the analysis is on a sequence of different global scale marketing maps published online by the corporation 1997 to 2001. The comparison of maps over time reveals the evolution of the design strategies to best promote the corporation's growing network infrastructure. WorldCom's maps are also noteworthy because they cover a significant period in the Internet's development and represent an economically significant sample of the whole backbone industry in the late 1990s.

A sample of seven different maps are analysed here using the framework outlined in section 6.4.1 above (Figures 6.31 - 6.36 below). In addition to the cartographic materials gathered periodically from WorldCom's public corporate websites, an email interview was conducted in April 2000 with Henry Ritson, then global marketing manager at UUNET, who had responsibility for the production of the maps for much of this period (more detail published in Dodge 2000c).



Our Network

MCI's extensive global network is a key advantage for business customers of all sizes.

MCI® owns, operates, monitors and maintains one of the largest communications networks in the world. Our network facilities are throughout North America, Latin America, Europe, Africa, and the Asia-Pacific region, in more than 140 countries and over 2,800 cities.

Our 98,000-mile fiber optic network is designed to support the largest array of data communications and voice products in the world.

MCI owns the world's farthest reaching global network (based on company-owned POPs), and spans more than 4,500 Points of Presence (POPs) throughout the world, with 2.2 million global dial modems and high-capacity connections to more than 102,000 active buildings. The global IP network can circle the globe more than four times. Additionally, MCI remains the most connected Internet backbone provider with the greatest number of Autonomous System network connections. The company's expansive IP footprint, coupled with its direct interconnections, exceeds all other competitor networks and enables its business customers and ISPs to reach more destinations directly through MCI's global IP backbone than any other carrier.

MCI offers the fastest speeds available over IP today. We were the first to route and switch OC-192 IP network traffic. MCI also has the most scalable IP network available, offering speeds from dial to OC-48.

MCI's IP data solutions are directly built into a wholly-owned global network, for direct, safe, secure access.

Skilled technicians in Network Operations Centers around the world monitor the network for optimal efficiency 24 hours a day, 365 days a year.

Figure 6.30: Promotional description of MCI's network infrastructure. The style and content is emblematic of the form of marketing rhetoric promulgated by WorldCom throughout the 1990s bandwidth boom. (Source: MCI website, March 2005.)

6.5.3.1 WorldCom's network marketing rhetoric

Before examining a sample of the marketing maps produced by WorldCom, it is instructive to first consider the kinder promotional context in which they were typically embedded. This is best achieved by looking at the structure and content of the corporate website describing the network and how this frames the maps

themselves. The March 2005 MCI[18] corporate website presentation is used as a representative exemplar.

The textual marketing narratives, unsurprisingly, describe the network in an emphatic fashion, stressing its capacity and extensive geographic reach (Figure 6.30). The tone of language used - dynamic verbs, fact-laden statements, 'punchy' phrasing - is textbook marketing speak. However, one can also see that this is carefully crafted language, for example with the conscious insertion of caveats and subtle qualifiers where necessary to avoid making factually false statements. The text is also peppered with engineering jargon, a direct call to scientific authority, signifying this as a technical sales pitch rather than a consumer one.

The narrative's primary aim is articulating that MCI's network as the best available, tapping into obvious rhetoric on size, scope, speed and so on (Figure 6.30). Archetypal claims include: "[t]he company's expansive IP footprint, coupled with its direct interconnections, exceeds all other competitor networks", "MCI offers the fastest speeds available over IP today." Other common marketing practices deployed by MCI in this narrative, include the claims that the company was the 'first' and is thus at the forefront of Internet development; that the company owns and controls the whole network; connoting that the company can meet all customer's needs – 'the complete solution'. Additionally, several statements directly outline the benefits to prospective customers, stressing not only 'biggest is best' but also security, reliability, and safety; for example, the closing assertion of the text highlights the fact that the network is monitored by skilled technicians to ensure "optimal efficiency 24 hours a day, 365 day a year." This kind of statement chimes particularly well in the current risk-averse climate of the so-called 'fear economy'.

Beside what the marketers choose to emphasise in the text, branding messages also work through what is left out. The most striking omission in this marketing statement is any mention of pricing. By not referring to low costs, the company is

[18] WorldCom re-branded itself as MCI in July 2002 following the bankruptcy.

positioning itself as a premium service that does not have to attempt to compete on cheapness. Also, omitted are customer testimonials.

Another core rhetorical strand underpinning the text is the stress on the global credentials of the company (thereby revealing clearly it's globalist business strategy). The word 'global' is used seven times and 'world' five times; emphasis is also given to the company's presence across the world with network facilities "in more than 140 countries and over 2,800 cities" (Figure 6.30). The corporation's marketing is clearly attempting to project an image of itself as being 'in the world' and positioned to dominate global telecommunications. The 'worldliness' of the rhetoric also implicitly offers the cachet of globalism to prospective customers and investors. The global rhetoric as a promotional device is very common in corporate brand marketing, particularly in IT, telecommunications and airline sectors (cf. De Cock *et al.* 2001; Goldman *et al.* 2003; Thurlow and Jaworski 2003). Indeed, being seen to be 'global' is often used as a key selling point to domestic buyers and investors. Clearly, if a company does not lay claim to be a global player in the age of globalisation one might question their corporate virility.

The network maps themselves were embedded on the 'Global Presence' Web page (Figure 6.31). The page directly spells out corporation's network sale pitch (what marketers call the 'unique selling proposition') to customers and, especially, investors, starting with the forceful opening tag line: "For reach, reliability, speed, and security, our global network is unparalleled." In just one line, the author tries to encompass pretty much all of the key product advantages. A hierarchy of maps from global to regional to national is then presented to the reader. The maps are directly cited in a process of 'virtual witnessing' (see chapter four) and "[f]or the experienced technical customer, they act as 'hard facts' to back up our marketing claims" (Ritson interview 2000). Essentially the invitation to the reader says: 'go on, look at the maps and *see* for yourself just how great our network really is'. This is the classic appeal to unimpeachable cartographic authority to justify the 'unique selling proposition' for the network. The evidential authority of the map is, itself, backed up by indexical 'facts' listed in the seven bullet points (Figure 6.31), that detail the 'strengths' in terms of some 'honest'

engineering numbers. Overall, then the marketing materials are designed to convey a sense ‘hard-headed’ seriousness and technological competence, and to achieve this connotation they draw directly on the authoritative visual and narrative rhetoric of engineering, cartography and statistics.

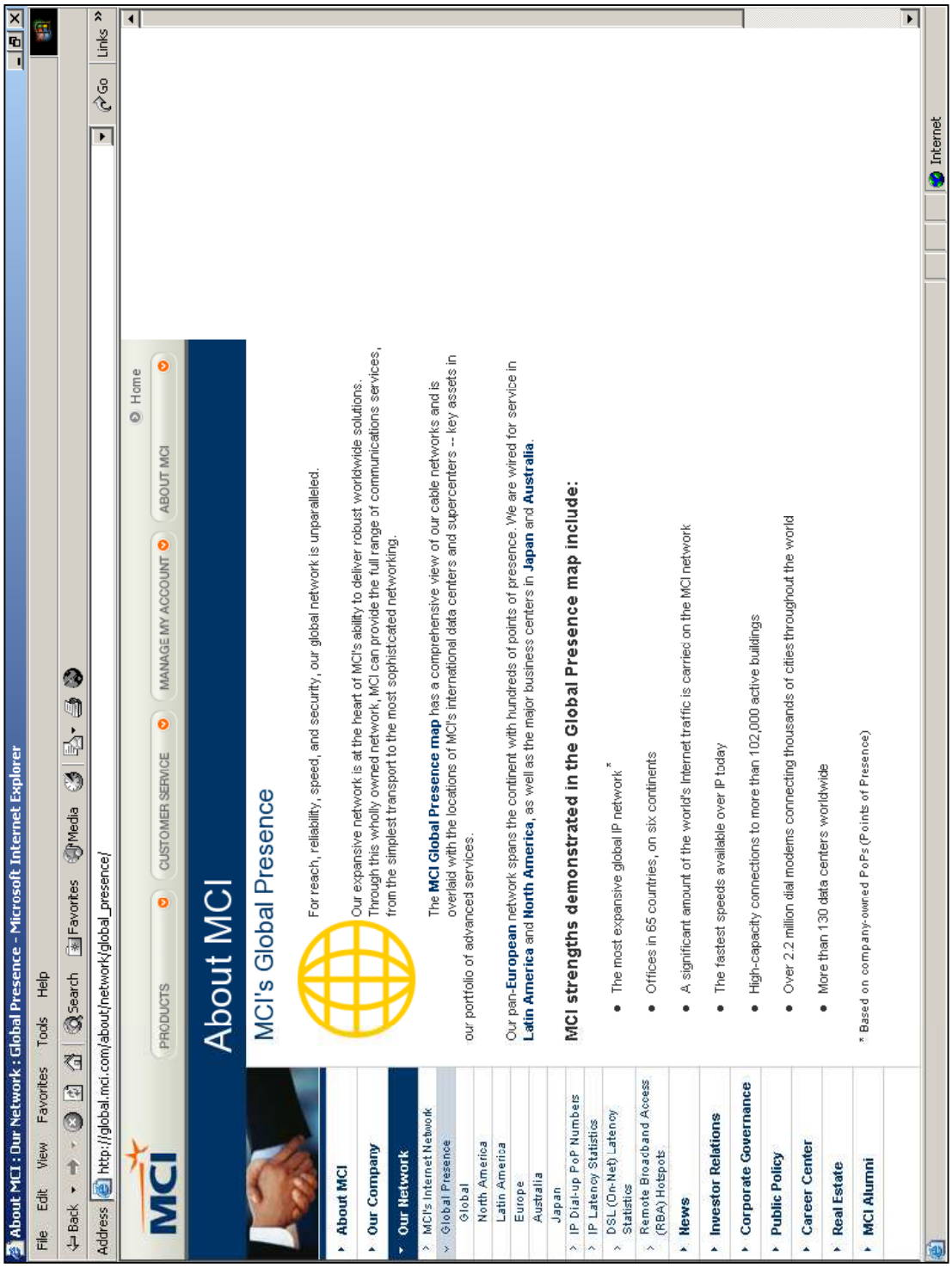


Figure 6.31: The promotional context in which network marketing maps are embedded on the MCI corporate website. (Source: author screenshot of MCI website, March 2005.)

6.5.3.2 WorldCom's network marketing maps

The map artefacts are produced 'by hand' in Adobe Illustrator using spreadsheets of data of network connections provided by the engineering department; "this takes several days per map" (Ritson interview 2000). A quarterly update cycle is used as "an appropriate cost/benefit balance between keeping the maps up-to-date and the resource implications of getting maps drawn to print quality" (Ritson interview 2000).

A critical point to note is that the maps show inter-city routes and installed capacity only. They do not show how much of the capacity is active, or how much data traffic is actually flowing across the network routes. The routes between hubs are represented as logical links and not geographic cable pathways. Given the speed of change in 'Internet time', the temporal accuracy with static maps is always problematic, as Mike O'Dell then Chief Scientist at UUNET notes: "the engineering data change constantly, so there is a challenge to 'smooth' some of detail so the [maps] stay relatively accurate while at the same time don't violate external statements of 'over <mumble> locations' where people literally count dots on drawings to check-up on such statements" (pers. communications, March 2000). A balance must also be struck between accuracy and artistic licence. The maps are published on the corporate website and identified by text and logos as officially sanctioned public statements of the corporation. Therefore, they have to tread a fine line between portraying the infrastructure in the most favourable way and wilful deception. Outright lying on the map could too easily be exposed and open the corporation to adverse publicity, potential accusation of deliberately fraudulent statements and criminal deception of investors/customers.

The first map in the sample is the "UUNET Global Network", dated first quarter 1997 (Figure 6.32). Although clearly identified through the UUNET logo, the network was a subsidiary of the WorldCom corporation by this point (see Table 6.4 above). In graphic design terms this is the simplest marketing map of the WorldCom set, being a muted black and white line art composition. It has a distinct engineering feeling about it and has many stylistic commonalties with ARPANET network maps (see Figure 6.3 above).

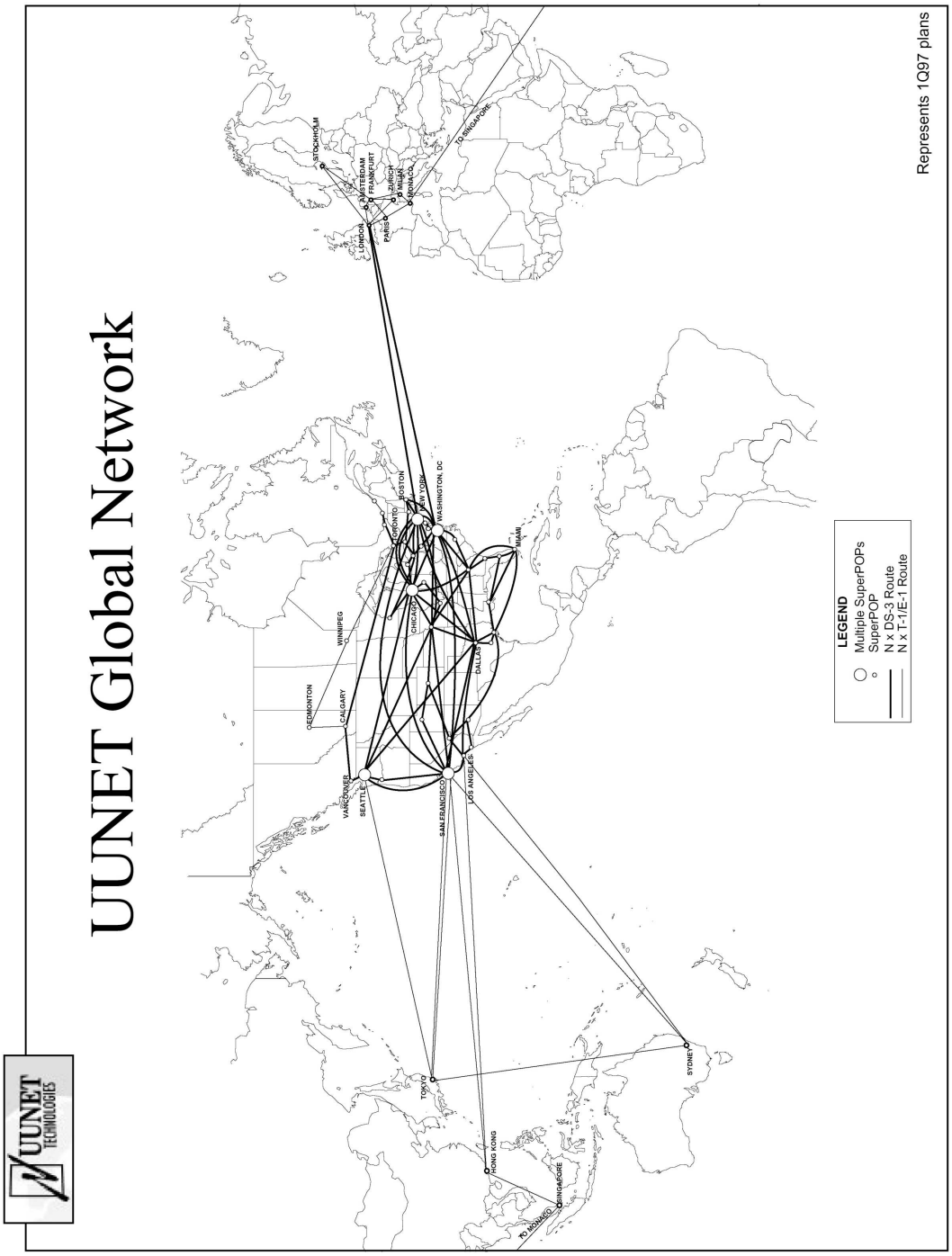


Figure 6.32: A WorldCom global scale marketing map showing the newly acquired UUNET backbone from spring 1997. (Source: Originally published on corporate website. No longer available.)

The title clearly proclaims this to be a *global* network, but in terms of the range of infrastructure mapped this is clearly a problematic claim to sustain. While the U.S. territory is well covered, everywhere else looks sparsely connected. There is a rather tenuous feel to the links to Europe: just two thin lines terminating in London. Asia-Pacific looks better in some regards, with several long network lines carving straight across the Pacific ocean, but there is no actual mesh of networking within the region. The map is thus somewhat unhelpful because it shows too well that vast swathes of the world are far outside the range of WorldCom's networking. To try to counter this and to increase the perception of network range, the cartographer has shrunk the extents of the map - cropping off the top and bottom of the world and removing a large slice through the middle of the Eurasian continent, including the whole of India.

However, the reach of the network looks rather more positive than the range, with many of the major hubs (Tokyo, Los Angeles, Chicago, New York and London) of globalisation interconnected by UUNET / WorldCom. The map focuses effectively on identifying the cities connected, rather than the countries. Other well known 'important' places for global business activities are also connected and consciously identified - Singapore, Hong Kong, Paris, Frankfurt and Zurich.

WorldCom's global network is projected consciously to create an image of corporate centrality. The hub of operations in the Northeast of America is visually privileged by its positioning in the middle of the map view. The map is a textbook example of ethnocentricism, with North orientated at the top, and the U.S. centred and complete. Centrality for the U.S. and for WorldCom is doubly reinforced because there are no links out to the periphery of globalisation (South America and Africa are wholly bypassed) and all links lead back to the North American heartland[19]. However, other core regions of the world economy are not connected by WorldCom's infrastructure.

[19] Except for a somewhat curious link between Monaco and Singapore, that does the uncomfortable cartographic trick of disappearing at one edge and then reappearing on the opposite side of the world.

In terms of the next two cartographic design strategies for promotional cartography, abundance and capacity, the performance of the 1997 map is mixed. The North American heartland appears at first glance to have an abundance of network routes criss-crossing it. However, on closer inspection it is apparent that many U.S. states do not have a hub and the lines cross over them without connecting. Outside North America, the network fares even worse - just four hubs in Asia-Pacific and only eight to cover Europe. The impression is not one of an abundant network throughout the world from this map, but one of a largely unconnected globe. The capacity of the network again looks relatively healthy for North America, with some well proportioned black lines representing what were at the time high-bandwidth DS-3 routes (45 Mbps) and fairly large circular hubs, but the international routes run at a much lower capacity (1 Mbps) and are mapped by rather spindly looking lines and dot-sized hub symbols that connotes a rather frail network overall.

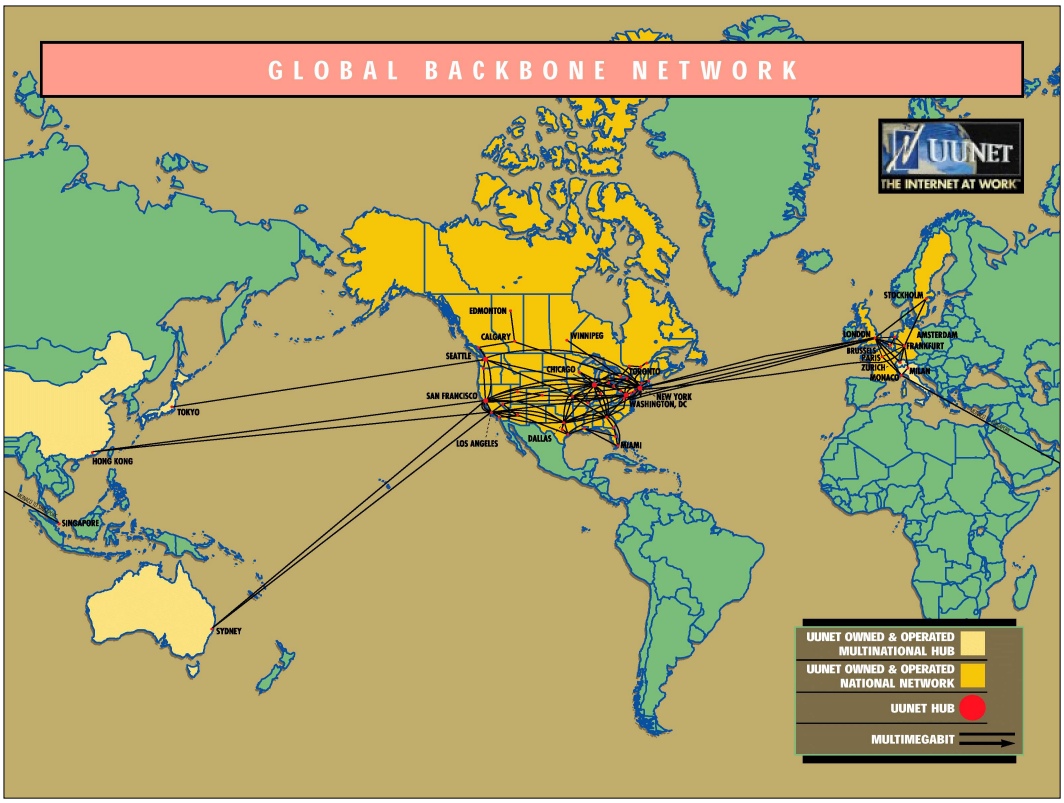


Figure 6.33: Global scale backbone marketing maps produced by WorldCom's UUNET backbone, May 1998. (Source: Originally published on corporate websites. No longer available.)

The next map in the sequence moves forward about a year, showing UUNET's 'Global Backbone Network' in May 1998 (Figure 6.33). This map is clearly the product of the same design approach as the 1997, however, the coloured version is arguably actually less effective than the black and white version it updates. The legend is somewhat simplified and the technical language is toned-down compared to the 1997 map.

Little has changed in terms of range of the network in that year. If anything, there actually seem to be fewer long links, particularly in Asia-Pacific (the dropping of links between Tokyo-San Francisco and Tokyo-Sydney being obvious). There are several more links across the North Atlantic but they are tightly clustered together. The lack of network range in the northern latitudes now also seems problematic, with the empty extents of Greenland and the Canadian Northern Territories drawn large (and exaggerated by the map projection). The corporate centrality of WorldCom in this Mercator view of the world remains potent and if anything is somewhat enhanced by the imposition of the three-class colour-coding of nations. The golden-coloured corporate heartland of North America and parts of Northern Europe comes to the fore on the map, followed by a select few beige nations deemed privileged enough to have a UUNET hub. The rest of the world literally shrinks into the background of the map by the application of the light 'natural' green wash. This signifies unidentified, unimportant, unprofitable territory outside the sphere of WorldCom's corporate concerns. Yet, as a network marketing map, the presentation remains quite ineffectual in terms of denoting abundance and especially capacity.

The next map shows a dramatic shift in design, presenting 'UUNET's Global Internet Backbone' draped over a stylised 'marshmallow' world, from the summer of 1999 (Figure 6.34). The map has lost all its clunky engineering legacies, likely a function of 'proper' marketing people taking over the design of the network maps, under the direction of Henry Ritson, at UUNET's office in Cambridge, UK (interview 2000). The design styling would develop over the next three years, but remain quite consistent in terms of colours, key symbology and fonts (see Figures 6.35 and 6.36 below).

In terms of demonstrating network range, the 1999 map is quite an improvement over the previous two examples. The somewhat unusual choice of projection means that many long orange-coloured route lines sweep from the west coast of the U.S. across the entire width of the map to reach the Asia-Pacific cities. These routes are represented by smooth curves which draw the eye along their full length from U.S. origin points to distant destination in the Orient. The lines are also spread apart, aiding range identification and increasing the perception of an abundance of routes. However, one must question the validity of this presentation of routes. Obviously, all route lines are generalised to some degree on marketing maps but they should probably be shown actually going in the right direction around the world! Additionally, showing routes in this way also unintentionally punctures further the globalist claims of the corporation, as the lines can be seen to pass *over* all of South America, Africa and India.

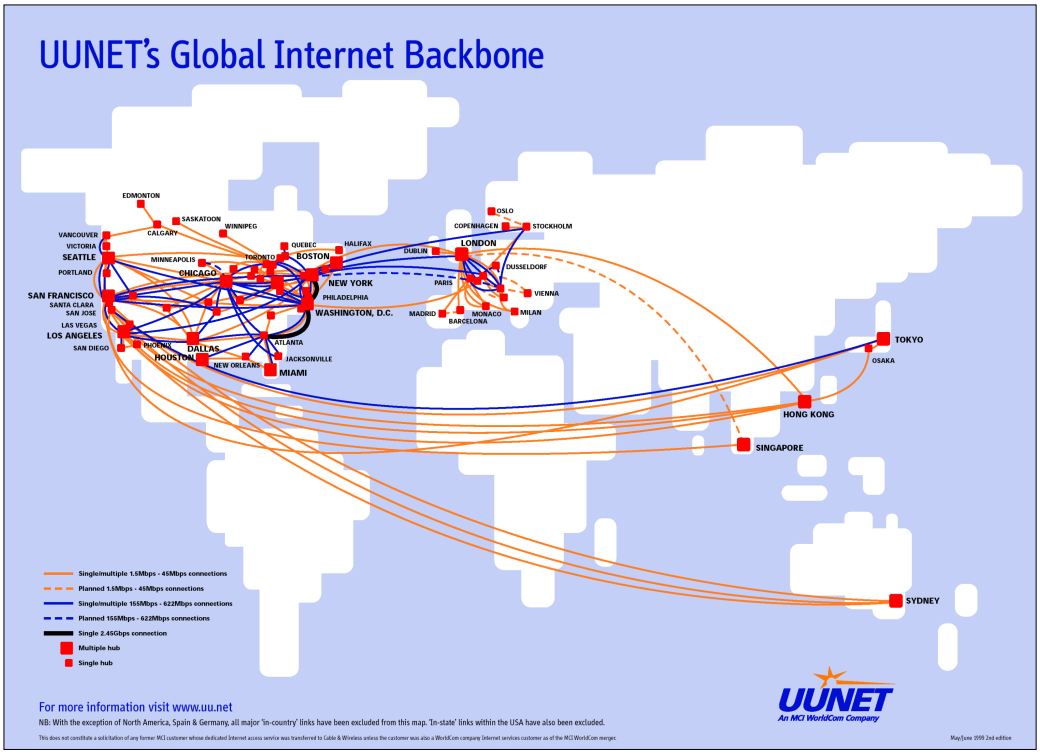


Figure 6.34: Global scale backbone marketing maps produced by WorldCom's UUNET backbone, June 1999. (Source: Originally published on corporate websites. No longer available.)

Unlike the two previous examples, the 1999 map shows the whole extent of the world (the dissected Indian landmass is restored). The projection is a 'one-ocean' viewpoint focused on the Atlantic, with the Pacific Ocean effectively disappearing at the margins of the map. This, in combination with the unification of the Eurasian landmass, creates clear problems for the persuasive presentation of a supposedly global network. The whole left-hand side of the map, stretching east from Stockholm to the Bering Straits, becomes an eye-catching vast white void, entirely un-penetrated by WorldCom.

These problems with map extents and the display of route range also impact on the sense of centrality in the overall presentation. The graphic centre of the map is now occupied by Western Europe. In a design sense, the overall map looks unbalanced - the dense left side appears to outweigh the empty void on the right. This 'off-centred' presentation in relation of corporate power was quickly corrected in the next version of the network map (see Figure 6.35).

The reach of the network is still well-defined with the maps focusing on cities that are connected. Unlike the previous map, two different sizes of hubs are distinguished by the size of the symbol and label font. Indeed, the strength of the clusters of hub symbols tends to dominate the map, rather than the route lines between them. The primacy of cities is further enhanced by the greater degree of exclusivity on this map compared to the previous ones. The background is represented by expansive empty continents. This is a conscious de-politicised rendering of the globe, a neoliberal *terra nullius* for globalising capital.

The density of city hubs and interlinks in the two core regions of North America and Western Europe scores well in terms of the cartographic design strategy for abundance. Yet, the super-abundance in these parts of the map also makes the rest of the world look more starkly empty. Pragmatically coping with such a large contrast is difficult; "You try and show a map of the world's Internet and you can't ever find a scale or legend which will cope with the differences in line density between Northeast of the USA and more 'Internet remote' areas" (Ritson interview 2000). The capacity of the network is better demonstrated in this map, with the use of thicker lines and inclusion of colour coding of routes by

bandwidth. One can speculate as to whether the ambiguity in the representation of capacity has positive connotative impacts. Of course, the use of data classification to group diverse features together into a small number of categories is a common approach in statistical cartography (as noted in chapter five with regard to choropleth maps in particular). While classification is useful for simplification it also works to mask variability in the data. This masking could have useful benefits in marketing by maximising the impression of capacity because, without knowledge of the underlying data distribution, the map reader cannot tell how many of those bright orange-coloured lines are 45Mbps bandwidth and how many are really at 1.5Mbps - this is a not an insignificant difference in capacity, after all.

Moving forward in time by another year, we come to the marketing map of 'UUNET's Global Internet network' for June 2000 (Figure 6.35). The corporate fortunes of WorldCom were beginning to slide by this point, as the growth in capitalisation through the second half of the 1990s began to slow (see Figure 6.29 above). In overall design style, there is clearly a lot of common heritage with the previous map. However, some of the more radical elements in the 1999 design have been toned down. Most obviously, the centring of the map is changed to give North America back its 'rightful' (in terms of corporate power) privileged position. Also, the unusual bubble shaped rendering of the continental outlines in the 1999 map has been dropped in favour of more conventional geographic shapes.

In the same fashion as the 1997 and 1998 maps, the unified world is split and the 'Indian cut' is again made to shrink the extents of the Eurasian continent. There are a whole lot of long route lines, rendered in bright colours, across the pale blue North Atlantic and Pacific oceans. Most run arrow-straight and have been consciously spread apart to improve their legibility and also their potency in connoting range. The parallel track-like routes to Europe in particular seem to cover the whole ocean. The extra long route line from Seattle across the Pacific and down through the whole of China to reach Singapore is also demonstrative of extreme range. Linked to the overall impression of network range, UUNET's infrastructure now also appears to offer many more *direct* routes than in previous

maps, especially connecting into European cities. All the improvements in the presentation of the range of the network in the June 2000 map are, however, more than offset by the complete failure to demonstrate the reach of UUNET's network.

The slightly larger scale of mapping employed and the growing density of network route lines and hubs means that the cartographer chose not to identify the cities. The simple removal of labels to improve legibility is actually problematic for persuasive communication, as readers cannot tell which 'right places' the network reaches. If one knows something of the geography of world cities, it is possible to make plausible guesses, but prospective customers and investors can not tell for certain which cities are connected. To the untrained eye, the scattering of red squares of the UUNET hub on the map now appear to be a random collection of points. Additionally, I would argue that without citing cities by name (and country borders as well) the visual-cognitive link between infrastructure and territory is broken on this map; the result seems like a disengaged network floating *above* the world, the network is rendered so exclusively that it does not actually connect with the world. This impacts directly and significantly on the power of map to conjure up the required sense of tangibility in reader's minds. The logical network in this map looks too virtual to be really real.

In terms of demonstrating abundance and capacity, this map also achieves mixed results. The underlying network has expanded greatly over the 1999 extents and there is an appearance of a denser meshing of links in the North American heartland and also in Europe. Indeed, the overwhelming abundance of mapped infrastructure, at this scale, completely smothers the Northeast U.S. and the San Francisco Bay area; as such it is counterproductive to cartographic legibility. The broader based growth of the route links in Japan, across Australia and branching down to Puerto Rico in the Caribbean are, however, useful additions for evoking an abundant, successful network. There are now so many links on most routes that the cartographer has chosen not to try to show them all, instead the overlapping presence of multiple links is indicated by placing small numbers ('x2', 'x3') embedded in the middle of the line. Whilst an acceptable pragmatic technical solution to convey information factually, it does nothing in terms of design strategies for marketing maps to evoke in readers the power of network

infrastructure being built by UUNET. The result is that while the number of routes is many times greater than the year before, it does not look like it from the map.

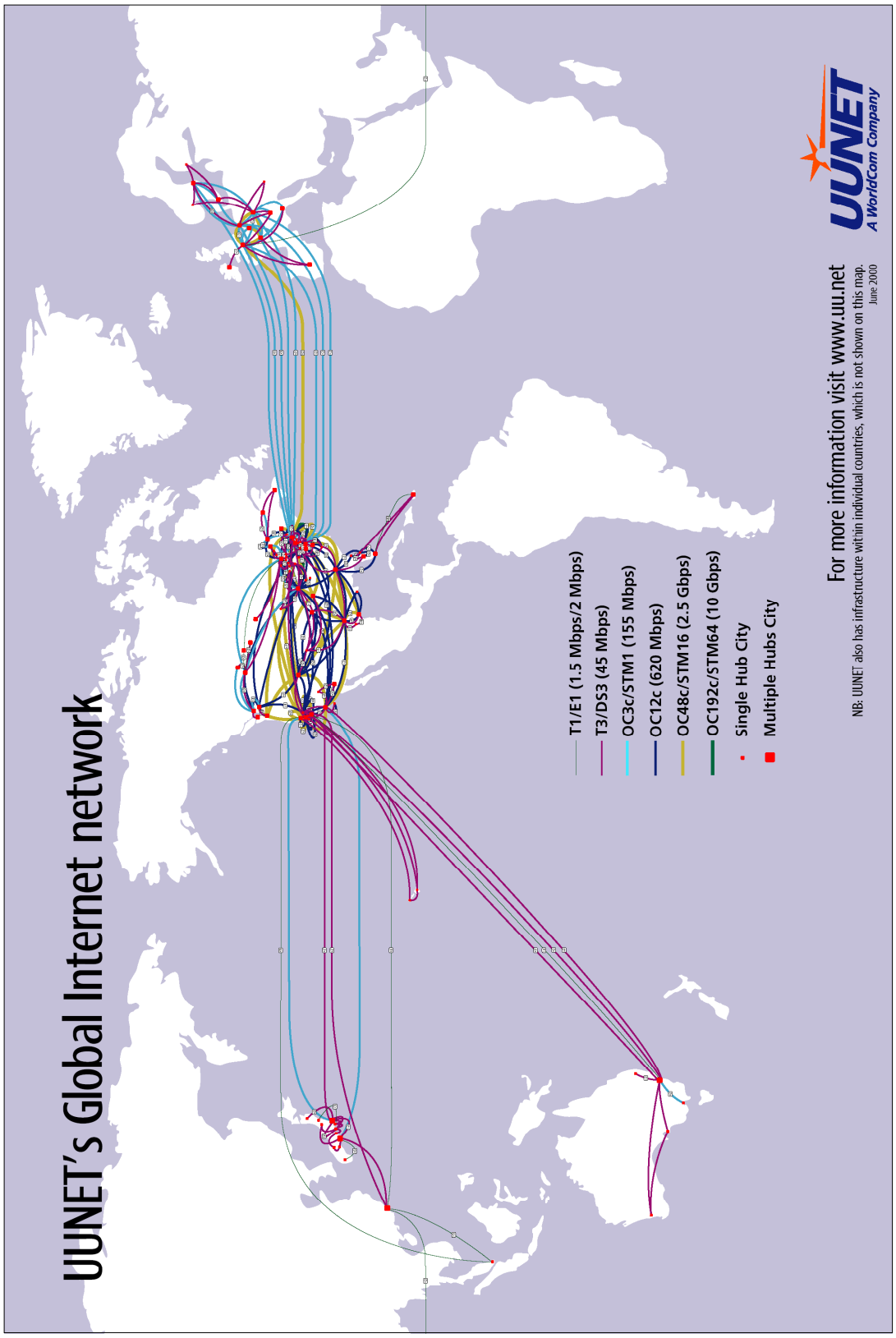


Figure 6.35: Global scale backbone marketing map of WorldCom's UUNET network, June 2000. (Source: Originally published on corporate website. No longer available.)

The display of route capacity is partially improved by using six different coloured-coded line categories instead of the three classes in the 1999 map. However, the choice of colours seems rather random and does not suggest a building intensity through hue; although line weight is sensibly employed to suggest increasing capacity and the overly thick style of the 1999 is avoided. Looking at the key, it is also worth noting how much the topmost network capacity has increased. In the one year between, the highest bandwidth links (shown by dark green route lines on Figure 6.35 above) have grown fourfold from 2.45Gbps to 10.0Gbps. However, these routes in the Northeast U.S. (in a ring linking NYC-DC-Chicago) are, however, hard to spot being heavily over-plotted with other lines.

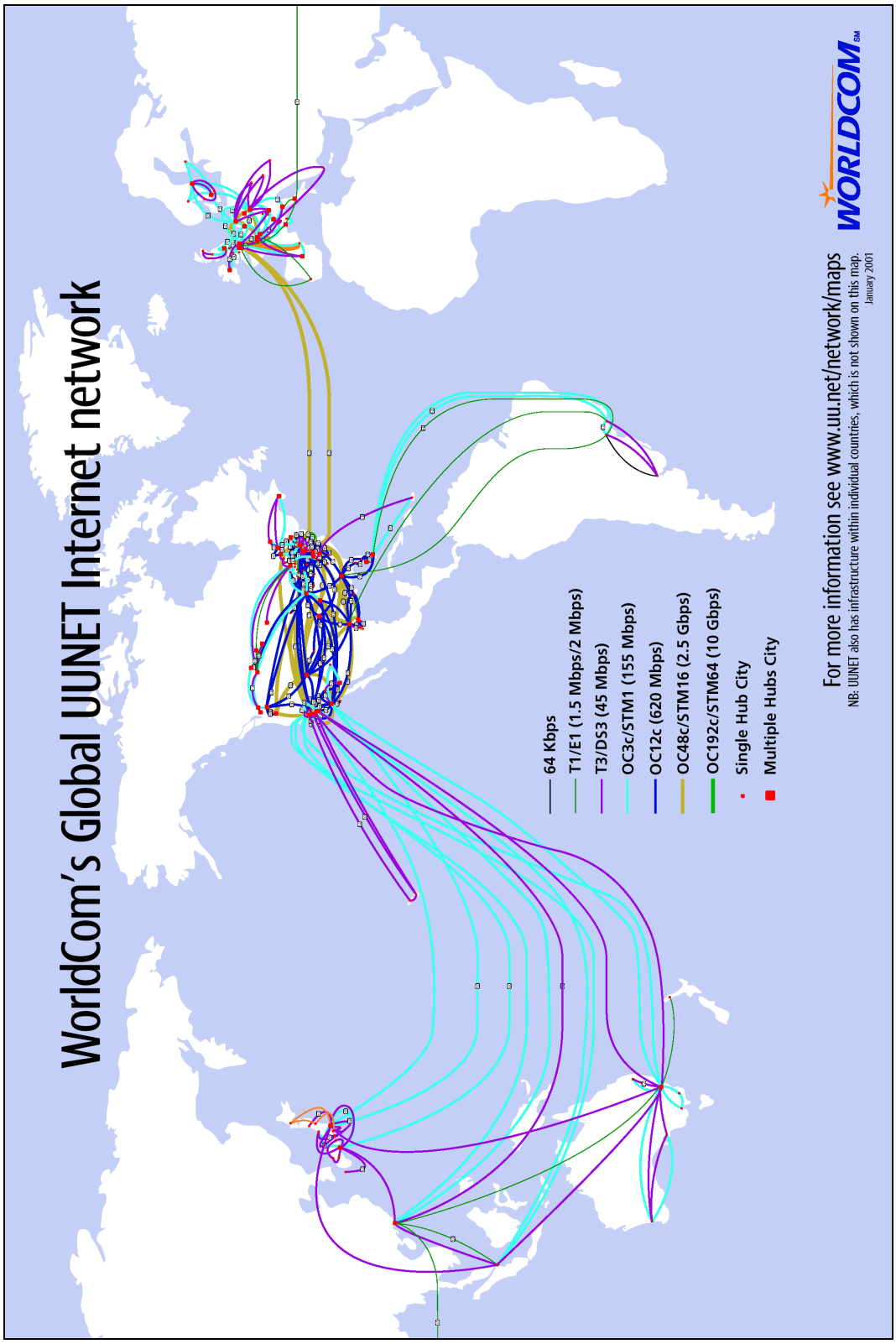


Figure 6.36: Global scale backbone marketing maps of WorldCom's UUNET network, January 2001. (Source: Originally published on corporate websites. 2001 map is no longer available.)

The last map available from this era of WorldCom's dominance of Internet backbone infrastructure comes from January 2001 (Figure 6.36). The company was experiencing business difficulties at this point with falling revenues, large debts and a steeply declining stock price (Figure 6.29). The projection and extents of the underlying base map remain unchanged, along with the problematic lack of city label needed to identify the network hubs. The demonstration of network range has been improved on trans-Pacific routes with the links being stretched into long swooping curves that seem to be pulling Asia towards the North American heartland. The network infrastructure has also expanded, finally, into the 'global south' with a notable series of route lines dangling down from U.S. to Brazil. This positive display of range is somewhat undone, however, by the removal of lines across the Atlantic, with the tremendous track-lines of the 2000 map replaced by two rather understated gold-coloured routes into London. The demonstration of abundance has intensified in this map, with even more over-plotting of link lines to create an impossible tangle in the core networked regions. The capacity encoding remains unchanged, apart from the somewhat strange addition of one new category at the bottom. This new low bandwidth level of just 64 Kbps looks embarrassingly small compared to the rest and has been seemingly added to accommodate a single new route in Latin America, likely to be between Sao Paulo and Buenos Aires (although one cannot be sure of this reach, due to the lack of city labels).

The discussion of WorldCom's global marketing maps is concluded by examining the last version presented on the MCI[20] corporate website, as of March 2005 (Figure 6.37). The map was a very different design origin to the Ritson produced ones. It was delivered as an interactive Flash application and served partially as an index map to access more detailed regional scale maps. The overall projection used is a 'standard' geographic world map centred interestingly on Europe, rather than the U.S. Harking back to the map from 1997, country boundaries are added back in. Indeed, of all the cartographic attempts to justify the claims of offer a *global* network, this map presents some of the most plausible evidence, with the

[20] This was the name WorldCom's post-bankruptcy corporate entity. The company disappeared as an independent entity having been purchased by Verizon in January 2006.

links into several countries in South America, to India and into Africa (admittedly only to two cities in South Africa).

Figure 6.37: Global scale backbone marketing maps of the MCI network in March 2005. (Source: Originally published on corporate websites. 2001 map is no longer available.)

The map has a very much simplified symbology compared to earlier examples and there is no legend, logo, date, contact information or other corporate identification. In terms of identifying network reach, no effort is made at all, as no hub locations are indicated. Only two classes of network links are distinguished (green ones and orange-coloured ones), but it is not clear what their capacity is. Only in terms of demonstrating network range does the 2005 map score reasonably well; the links running down through the South Atlantic to South Africa are especially effective. The impression of range, however, is diminished because the Atlantic-centred projection necessarily splits the Pacific, so breaking the routes here in half. In this case utilising a world map with an equal area projection to denote their network would serve the company's marketing better.

6.6 The map and the myth

In conclusion, I want to consider the relationship between cartographic imagination displayed in the network marketing maps and the hype of Internet

growth, particularly the 1990s myth that it was doubling in size every 100 days in terms of traffic flows. Cartography has long been created and consciously deployed to serve the exclusive and exclusionary interests of private capital. The emergence of the marketing map genre over the last century has been one of the most conspicuous developments in cartography (although surprisingly little analysed, in comparison to scholarly preoccupations with territorial and thematic mapping of nation-states). Maps are deployed to differentiate one network from another. As Henry Ritson, UUNET global marketing manager put it:

> "What we have to illustrate is that, since the Internet is 'many networks connected' you get better, faster, more reliable service if the network you connect into first is able to take you most of the way to your destination 'on an uncongested motorway' rather than hitch-hiking across a variety of crowded lanes. Our network maps basically show the area of the Internet that we have the ability to manage directly - and if we are managing it we can maintain high quality of service ..." (interview, 2000).

Internet infrastructure marketing maps are also as much about impressing investors as luring customers from competing networks. By analysing network maps, such as sequence published online by WorldCom, it was demonstrated that marketing maps attempt to denote the strengths of a infrastructure to investors and differentiating it from competitors through eight distinct cartographic design strategies: range, reach, directness, centrality, abundance, capacity, silencing and exclusivity. However, it was also apparent that they had mixed success in tapping into these eight strategies in a connotative sense. As such, the analysis present here demonstrates the real difficulties in effectively mapping Internet infrastructure even when the interest being served is dedicated exclusively to commercial persuasion without the need for objectivity. The most significant failing in the maps overall was the all too obvious mismatch between the claims of corporations to offer a global network service and the mapped reality of their infrastructure that barely covers a third of the world in terms of area (although they do probably connect the majority of the significant population from the business perspective). The overall connotation is that much of the world remains out of their reach.

Despite the design failings in the maps, they are produced frequently by corporations and often prominently displayed on the website, and are obviously an integral part of the company's marketing message (as shown by the analysis of fifty corporate websites; see Table 6.1). The maps' primary goal is to justify bold marketing claims by providing attractive and authoritative visual proof of the extent of the company's network. The maps draw on the reserves of cartographic *gravitas* - people tend to believe what they see on the map as real, particularly when it is shown using familiar framework of a Euro- centric world projection. At least three distinct truth claims can be discerned from the use of cartography in service of Internet infrastructure marketing:

(1) 'Biggest is best': The maps can prove, better than other rhetoric devices, that the network is as large as is claimed. One can see it really does connected continents, link all those important cities, span oceans. The expansive scale of the network as demonstrated beyond doubt on the map implies a successful company.

(2) The network is made tangible through the map. The rendering of invisible, unknowable, virtual network links into real lines inscribed onto a familiar landscape connects customers instinctively to the infrastructure (as discussed in chapter four). As Ritson commented: "The Internet is such an intangible concept for people that it is easy for them to assume that whichever Internet provider they choose, they will still connect to the 'same Internet'.... The network maps show what the infrastructure really is" (interview 2000). Of course, the map can show this with particular emphasis to make it look rather more than it is.

(3) The third and most important truth claim is that of *trust*. The network, when mapped must look permanent, safe and trustworthy. The backbone marketing map connotes: 'we are here to stay. Look at all the infrastructure we've built. You can trust us with your precious data.'

In relation to WorldCom case study it is now apparent that faith in this corporation generated by cartographic trust was misplaced. Events happening *off* the map fatally damaged the truth claims made on the maps. Despite having the biggest Internet backbone, WorldCom went bankrupt in July 2002. More widely,

the crash of the telecoms sector in 2002 exposed the hollowness of the hype that underlay all those marketing maps. The maps were born out of the myth of internet 'traffic doubling every 100 days' and they were also an element in promulgating this mythical narrative. They were visual, irrefutable, cartographic prove of the growth happening and the need for more and more bandwidth. Ritson himself repeated this mantra in relation to WorldCom:

> "the network has been growing at 1000% per year for several years now. The map can go significantly out of date in a week. It is a terrifying moving target. I'm not even sure if anyone has ever had to map anything that grows this fast before." (interview 2000).

Of course, the maps in the late 1990s may have been connoting great traffic growth but they were not actually denoting that. They were showing the speculative building of infrastructure. They denoted more and more bandwidth, but investors could not see (and some probably did not want to see) that all those thick gigabit route lines were only half full, a quarter full, had only a trickle of data on them or were actually empty. It was easy to believe that maps were showing growth in demand - after all, why would a commercial company be building links between cities if they did not have the traffic to fill it? Airlines do not fly with empty planes, why would backbones networks be running empty pipes - and then spending billions building yet more pipes?

Basically, WorldCom were claiming to be installing much more infrastructure than they actually needed to hide losses and artificially boost revenues. They gave the impression of carrying much more traffic than they actually were. "[WorldCom] routinely counted fiber-optic capacity as traffic, rendering the statistic essentially worthless as a barometer of the Internet's growth" (Dreazen 2002, no pagination). WorldCom's backbone maps were complicit in this deception, they were compliant in mis-selling the nature of the demand.

Although, accusing the maps per se of misleading is disingenuous at another level. The maps were doing what they were supposed to be doing. They *were* marketing maps, not independently-produced, informational maps, and made no pretence at denoting traffic. Indeed, within their own parameters and agenda of marketing

they were accurate and in some senses honest. It was just that there was no other source of information - so people believed the claims of doubling growth every three months and took the maps that were available (and pushed out by companies) as credible and cartographically trustworthy evidence[21].

What of the Internet infrastructure business now the dust from the 2002 crash has settled? Well it is still there - the Internet as a whole did not miss a beat and still continues to grow at a healthy rate. WorldCom, however, has vanished as rapidly as it appeared. The tainted name itself was erased when the corporation emerged from bankruptcy in April 2004 as MCI. At the start of 2006, MCI was to be acquired by Verizon, a major U.S. telephone company, for a mere $5.3 billion. Meanwhile, Bernie Ebbers, the former chief executive of WorldCom was found guilty in federal court of orchestrating the fraud and in July 2005 received as 25 year jail sentence.

[21] Indeed, the marketing maps from ISPs in this period have been exploited as credible evidence in a good number of academic studies on Internet topology and growth (e.g., Malecki 2002, 2004; Townsend 2001) and for policy analysis (e.g., OECD 2002).