

NYTE

visualizations

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NYTE

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Published on the occasion of the exhibition *Design and the Elastic Mind*, which ran from February 24 to May 12, 2008 at MoMA The Museum of Modern Art in New York City. The exhibit was organized by Paola Antonelli, Curator and Patricia Juncosa Vecchierini, Curatorial Assistant, of MoMA's Department of Architecture and Design.

Project sponsor
AT&T

Technical partners
Yahoo! Design
Innovation Team
British Telecom

Under the patronage of
The Italian Cultural Institute of New York

Produced by
The Massachusetts Institute of Technology

Edited by
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Book concept and design by
Clelia Caldesi Valeri

Published by
SAP Press

ISBN 978 0 9794774 1 6

Printed by
Aktiva in Turin, Italy

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within a framework of vigilant, carefully debated, vigorously formulated and executed public policy – with careful attention to issues of data aggregation and individual privacy – we will soon find that we have unwittingly allowed the stealthy, piecemeal emergence of an irreversible condition of electronic hyper-visibility. We will have allowed individuals, and all that they do, to register on Noll's map. And we will regret it.

NEW YORK: THE CITY OF THE TELEPHONE

Voice communications have been critical to the development of New York City as a center for ideas, information, and culture. Just as the city's ice-free natural harbor led to the rise of trade and commerce, the telephone has shaped New York City's emergence as a global hub for the flow of information in, through and out of the city.

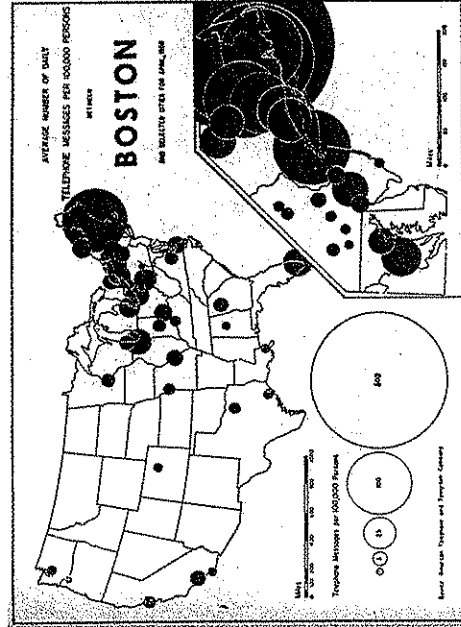
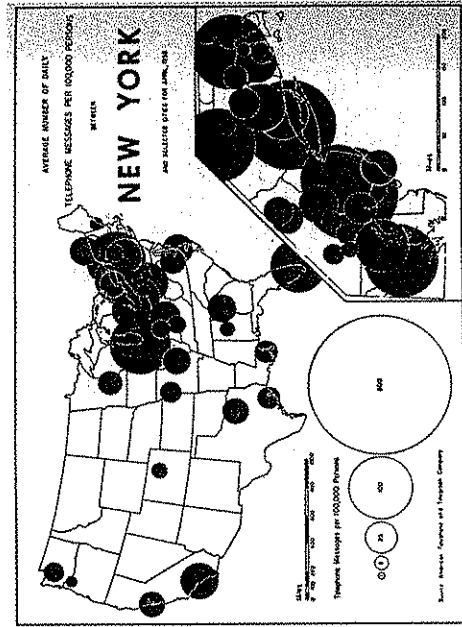
Urban planners often point to Los Angeles as the archetypically automobile city. But New York is the world city most thoroughly organized around the telephone. As economist Robert Lucas has written, "a city, economically, is like the nucleus of an atom."¹ New Yorkers depend on telephones to support the constant flow of data, gossip, and ideas that maintain these bonds.

As long as tools for talking over long distances have existed, New York has been at the forefront of technological adoption. Just as it had played a key role in the early history of the telegraph, what Tom Standage called "the Victorian Internet,"² New York was a critical early hub for the emerging telephone infrastructure in the United States in the early

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¹ Lucas R. E. 2002. *Lectures on Economic Growth* (Harvard University Press: Cambridge, Massachusetts).

² Standage T. 1998. *The Victorian Internet: The Remarkable Story of the Telegraph and the Nineteenth Century's Online Pioneers* (Walker & Co.: New York).



Maps of AT&T phone calls, *New York and Boston*, April 1958 credit images by Neil C. Gustafson, © 1961 The Twentieth Century Fund, Inc., reprinted in Gottmann J. 1964. *Megalopolis* (The MIT Press: Cambridge, Massachusetts)

twentieth-century. As Herbert Casson wrote in an early history of the telephone system:

Already, by cable, telegraph, and telephone, no two towns in the civilized world are more than one hour apart. We have even gridled the earth with a cablegram in twelve minutes. We have made it possible for any man in New York City to enter into conversation with any other New Yorker in twenty-one seconds.³

New York's national and global role would be magnified over the next century as it became connected through the telephone network. The first long-distance telephone link between two cities connected New York and Boston in 1883, and by 1915 transcontinental lines linked the coasts. The telephone became an instrument of cultural and economic domination that continues to this day. As Jean Gottman described in his 1962 studies of "megalopolis" (the urbanized corridor running from Boston to Washington, with New York at its geographic and economic center), New York was a net exporter of information.⁴ It is no accident that the original site of Bell Labs, the nation's leading corporate laboratory for telecommunications, was in Manhattan's Greenwich Village.

Today's global telecommunications networks were created in large part because New York's firms were willing to pay for them. The city's knowledge industries – from media firms to investment banks – are powerful drivers of technological innovation. Today, mobile phones are critical to the city's unique role as a vibrant place for face-to-face contact that occurs on the city's sidewalks, in hotel lobbies, office buildings, and restaurants. But it is the complexity of the city's built environment and the density of subscribers that keeps wireless engineers

³ Casson H. 1910. *The History of the Telephone* (Project Gutenberg E-Text: www.gutenberg.org).

⁴ Gottman J. 1962. "Megalopolis: The urbanized northeastern seaboard of the United States". *American Political Science Review*.

awake at night, searching for new ways to squeeze more calls into the finite amount of spectrum in midtown Manhattan.

New York was also built on the in-person exchange of information, yet rather than displacing that function, the telephone has enhanced it. The New York Stock Exchange (NYSE) was originally established on a street corner, under a buttonwood tree, where buyers and sellers of stock would meet to conduct business. Today, billions of shares are traded each day on the New York Stock Exchange, through networks that link the NYSE around the world. The telephone has also allowed the rich web of face-to-face transactions that take place in New York to be connected across the globe. Today, the world's major publishing empires are produced by people working in Manhattan but are then distributed electronically to all points of the globe. In a sense, New York imports raw information and exports ideas, decisions and new services.

Surprisingly, despite the importance of the telephone to New York, urban planners know remarkably little about what actually flows across this vital infrastructure. And that's why this exhibition is so timely, because it marks a turning point in our understanding of the city akin to the first aerial photographs.⁵ While numerous studies show historical snapshots of telecommunications flows between cities, we are entering an era in which it will become routine to see this data in real time. Measuring information-based activity will be as central to our understanding of cities as the census is today.

We can already see how New Yorkers are using telecommunications to shape globalization. Comparing data provided by AT&T for earlier studies,⁶ we see clearly that New York's connections to the world are rapidly diversifying. While the overall

⁵ For a discussion of the impact of aerial photography on twentieth-century city planning see Campanella T. 2001. *Cities from the Sky* (Princeton Architectural Press: Princeton, New Jersey).

⁶ Moss M. L. 1984. "New York Isn't Just New York Anymore." *Intermedia*. 1996 data from unpublished studies of the Taub Urban Research Center, New York University.

Going Global
Percentage of New York City's international telephone traffic (in minutes)

Origin and destination	1982	1996
United Kingdom	23.8	12.1
France	7.5	3.3
Germany	5.9	2.4
Israel	4.2	2.7
Japan	3.3	3.3
Korea	1.4	1.7
China	n/a	1.9
Pakistan	n/a	0.9
Rest of world	53.9	71.7

Source: AT&T

volume of telephone traffic expanded several-fold from 1982 to 1996, the share to the city's traditional trading partners in the Western hemisphere declined rapidly. Instead, most of the talk is with new centers of global commerce in Asia and the homelands of the city's exploding immigrant population.

As the twenty-first-century unfolds, New York remains one of the most innovative laboratories for creating new ways of organizing culture and commerce across great distances. The great challenge is to recognize the complex and unpredictable ways in which telecommunications can be used to reinforce the cities of the twenty-first-century. As Casson wrote in 1910:

No invention has been more timely than the telephone. It arrived at the exact period when it was needed for the organization of great cities and the unification of nations.

Today, the telephone and its many descendants are enabling the organization of new kinds of global structures. The images

in this exhibition reveal that our conceptual frameworks have yet to catch up with the reality of information flows. We must be prepared to consider new forms of urbanism, in which communications create communities that transcend spatial boundaries.⁷ What we're seeing with these images created by MIT's *senseable* city lab is something much more complex. A city with a center, but few borders. A city with a hinterland inscribed in cyberspace.

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⁷ Sassen S. 1992. *The Global City*. New York, London, Tokyo (Princeton University Press: Princeton, New Jersey).

REPRESENTING AT&T'S NETWORK DATA IN REAL TIME

The New York Talk Exchange exhibit is a representation of the actual communications traffic flowing to and from New York City via the AT&T network. Data for the project includes the volume of Internet Protocol (IP) traffic flowing through the city from both Internet users and business networks, as well as the number of phone calls occurring in the city at a given time. This data is presented in 10-minute snapshots throughout each day.

The AT&T network today carries 13.4 petabytes of IP traffic on an average business day. That's the equivalent of more than forty-seven megabytes of information for every man, woman and child in the United States. Additionally, its voice network carries 127 billion long-distance voice calls over the course of a year. As the visualizations show, New York City is a center for a large portion of this IP and voice traffic.

For the purposes of this project, both wired and wireless calls are examined. A call is considered to terminate in the city if the telephone switch that serves the dialed number is located within one of the five boroughs of New York. Likewise, a call from a wired phone originates from the city if its phone number is served by one of these switches. Wireless calls are factored in when the cellular tower that serves a phone is located in one of the five boroughs. Thus, calls from New Yorkers who are traveling outside of the city are not counted, because the cellular tower currently serving their phone is outside of the five boroughs. Likewise, wireless calls from visitors to New York City are counted because the cellular tower currently serving them is in one of the five boroughs.