

NET Institute

Conference on

Network Economics

December 12, 2003



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NET Institute

The **Networks, Electronic Commerce and Telecommunications (“NET”) Institute** <http://www.NETinst.org> is a non-profit institution devoted to research on network industries, electronic commerce, telecommunications, the Internet, cable television, “virtual networks” comprised of computers that share the same technical standard or operating system, financial networks including credit card and ATM networks, and on network issues in general. Of particular interest is research on innovation and introduction of new technology in network industries. The NET Institute functions as a world-wide focal point for research and open exchange and dissemination of ideas in these areas. The NET Institute competitively funds cutting edge research projects in these areas of research. It organizes conferences and seminars on these issues.

The following distinguished academics sit on the NET Institute’s board of directors:

1. Professor Kenneth Arrow, Economics Department, Stanford University
2. Dr. Vinton G. Cerf, Senior Vice President, MCI
3. Professor Nicholas Economides, Stern School of Business, New York University (Executive Director)
4. Professor Ariel Pakes, Economics Department, Harvard University

The NET Institute very gratefully acknowledges the generous financial support of the AT&T Foundation and Microsoft.

The NET Institute expects to continue its summer grants program during the year 2004, and expand its support of research activities, conferences, and scientific meetings.

Activities

During 2003, its first year of operation, the NET Institute has funded through its “summer grant” program a number of research proposals in a number of network industries. The successful projects (in alphabetical order of the researchers) are listed below. The full papers are downloadable at <http://www.NETinst.org> as part of the working papers series of the NET Institute. A number of these papers are featured in this first NET Institute conference.

1. Fernando Beltran, “[Effects of ISP Interconnection Agreements on Internet Competition: The Case of the Network Access Point as a Cooperative Agreement for Internet Traffic Exchange.](#)”
2. Jay Pil Choi, “[Antitrust Analysis of Mergers with Bundling in Complementary Markets: Implications for Pricing, Innovation, and Compatibility Choice.](#)”

3. Chris Forman & Pei-yu Chen, "[Network Effects and Switching Costs In the Market for Routers and Switches.](#)"
4. Martha Garcia-Murillo, "[Assessing The Impact Of Internet Telephony On The Deployment Of Telecommunications Infrastructure.](#)"
5. David Gilo and Yossi Spiegel, "[Network Interconnection with Competitive Transit.](#)"
6. Dan Akerberg and Gautam Gowrisankaran, "[Quantifying Equilibrium Network Externalities in the ACH Banking Industry.](#)"
7. Christiaan Hogendorn, "[Excessive\(?\) Entry of National Telecom Networks.](#)"
8. Jay P. Kesan and Andres A. Gallo, "[Internet Regulation: The Political Economy of ICANN and the Shaping of New Regulatory Regimes for the Internet.](#)"
9. Carleen Maitland, "[The Delft UMTS Testbed and End-user Security features](#)" and "[End-user Security in Mobile Telecommunications: Policy Perspectives and a Research Agenda.](#)"
10. Marc Rysman, "[Adoption Delay in a Standards War,](#)" and "[Differentiation Across Standards and Adoption Failure in 56K Modems.](#)"
11. Katja Seim and V. Brian Viard, "[The Effect Of Entry And Market Structure On Cellular Pricing Tactics.](#)"
12. Ananth Srinivasan and David Sundaram, "[Orchestrating Web Services For Networked Enterprise Collaboration.](#)"

NET Institute Conference at NYU/Stern on NETWORK ECONOMICS

Co-sponsored by the NET Institute, www.NETinst.org

and the [NYU Center for Law and Business](#)

Friday, December 12, 2003, Room 4-90,
Stern School of Business, NYU, 44 West 4th Street, New York City

Program

- | | |
|-------------|---|
| 8:30-9:00 | Continental Breakfast |
| 9:00-9:15 | Introduction.
Nicholas Economides , Exec. Director, NET Institute and Stern School of Business, NYU
William Allen , Director, NYU Center for Law and Business |
| 9:15-9:45 | Jay Pil Choi , Michigan State University
“ Antitrust Analysis of Mergers with Bundling in Complementary Markets: Implications for Pricing, Innovation, and Compatibility Choice. ” |
| 9:45-10:15 | Marc Rysman , Boston University
“ Adoption Delay in a Standards War ” and
“ Differentiation Across Standards and Adoption Failure in 56K Modems. ” |
| 10:15-10:45 | Dan Akerberg and Gautam Gowrisankaran, University of Arizona and Washington University in St. Louis
“ Quantifying Equilibrium Network Externalities in the ACH Banking Industry. ” |
| 10:45-11:00 | Break |
| 11:00-11:30 | Christiaan Hogendorn , Wesleyan University
“ Excessive (?) Entry of National Telecom Networks. ” |
| 11:30-12:00 | Fernando Beltran , Universidad de Los Andes, Bogotá, Colombia
“ Effects of ISP Interconnection Agreements on Internet Competition: The Case of the Network Access Point as a Cooperative Agreement for Internet Traffic Exchange. ” |

- 12:00-1:00 Lunch; **Nicholas Economides**, Exec. Director, NET Institute and Stern School of Business, NYU
“[Competition Policy in Network Industries: An Introduction](#)”
- 1:00-1:30 David Gilo and **Yossi Spiegel**, Buchman Faculty of Law and Recanati Graduate School of Business Administration
“[Network Interconnection with Competitive Transit](#).”
- 1:30-2:00 **Martha Garcia-Murillo**, Syracuse University
“[Assessing The Impact Of Internet Telephony On The Deployment Of Telecommunications Infrastructure](#).”
- 2:00-2:30 **Ananth Srinivasan** and David Sundaram, University of Auckland Business School, Auckland, New Zealand
“[Orchestrating Web Services For Networked Enterprise Collaboration](#).”
- 2:30-3:00 Katja Seim and **V. Brian Viard**, Stanford Business School
“[The Effect Of Entry And Market Structure On Cellular Pricing Tactics](#).”
- 3:00-3:15 Break
- 3:15-4:45 Synthesis; Discussion of key topics for further research

Antitrust Analysis of Mergers with Bundling in Complementary Markets: Implications for Pricing, Innovation, and Compatibility Choice

*Jay Pil Choi**

September 2003

Abstract

This paper develops a simple model to analyze the effects of mergers in complementary system markets when the merged firm is able to engage in bundling. In the short-run analysis, I analyze the impact of (mixed) bundling on pricing decisions for existing generations of products. The basic model is then extended to analyze industry dynamics where the implications of mergers for innovation incentives and technical tying/compatibility decisions are explored. Welfare implications of mergers in the short and long-run will be also analyzed.

Keywords: merger, mixed bundling, complementary markets, compatibility, innovation, and Cournot effect.

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Adoption Delay in a Standards War

Marc Rysman
Boston University

October 10, 2003

Abstract

We analyze a dynamic model in which firms and consumers choose to adopt one of two technologies or delay their adoption. Adoption allows agents to trade with other adopters of the same technology. We show that there is an inefficient equilibrium in which firms differentiate across standards and consumers delay their adoption. With one standard, there is immediate adoption, which matches the experience of the 56K modem market.

JEL: L15, L10

I thank Martino De Stefano for helpful comments on this work, as well as excellent research assistance. Support was provided by NSF Grant SES-0112527 and a grant from the NET Institute.

Quantifying Equilibrium Network Externalities in the ACH Banking Industry 1

*Daniel A. Akerberg
Department of Economics
University of Arizona
and NBER*

and

*Gautam Gowrisankaran
John M. Olin School of Business
Washington University in St. Louis
and NBER*

October 1, 2003

Abstract

We seek to estimate the causes and magnitudes of network externalities for the automated clearinghouse (ACH) electronic payments system, using a panel data set on individual bank usage of ACH. We construct an equilibrium model of consumer and bank adoption of ACH in the presence of a network. The model identifies network externalities from correlations of changes in usage levels for banks within a network, from changes in usage following changes in market concentration or sizes of competitors and from adoption decisions of banks outside the network with small branches in the network, and can separately identify consumer and bank network effects. We structurally estimate the parameters of the model by matching equilibrium behavior to the data, using simulated maximum likelihood and a data set of localized networks, and use a bootstrap to recover confidence intervals. The parameters are estimated with high precision and fit various moments of the data reasonably well. We find that most of the impediment to ACH adoption is due to large consumer fixed costs of adoption. The deadweight loss from the network externality is moderate: the optimal number of ACH transactions is about 16% higher than the equilibrium level.

¹ We acknowledge funding from the NET Institute, and thank Steve Berry, Jinyong Hahn, Andrea Moro, Klaas van't Veld and seminar participants at numerous institutions for helpful comments.

Excessive (?) Entry of National Telecom Networks, 1990-2001

*Christiaan Hogendorn**

September 26, 2003

Abstract

From 1990-2001 there was tremendous capacity expansion and entry of new firms in the North American long-haul telecommunications industry. This was followed by an equally unprecedented downturn. We document these trends by improving and continuing FCC fiber-optic route-mile data that ended in 1998. We disentangle the many swaps and leases between networks in order to measure owned route miles versus route miles shared with other carriers. We find that the amount of sunk investment was not as great as some reports suggest because so much network investment was actually nonsunk swaps and leases. We then analyze the pattern of investment to test for preemption using a method developed by Gilbert and Lieberman (1987). Our tests generally indicate a symmetric buildout rather than preemptive behavior, although there is some evidence that small firms preempted new owned-route-mile investment by large firms.

JEL classification: L11, L13, L96; keywords: telecommunications, investment, preemption

* Economics Department, Wesleyan University. e-mail: chogendorn@wesleyan.edu. I thank Shane Greenstein, Joyce Jacobsen, Jonathan Kraushaar, Steven Lanning, and Andrew Odlyzko for helpful comments. All errors are of course my own. The NET Institute of New York University has provided funding for this research. Adelina Halim and Jayson Whitehorn provided research assistance.

Effects of ISP Interconnection Agreements on Internet Competition: The Case of the Network Access Point as a Cooperative Agreement for Internet Traffic Exchange

*Fernando Beltrán**

Center for Studies on Management of Network Services

Universidad de Los Andes

Bogotá, Colombia

This paper presents and analyzes the main aspects of the historical development and the current issues at stake in the South American Internet access market. We have contacted representatives of the cooperative exchange points (also called Network Access Points or NAPs) at Latin American NAPs Second Meeting in Buenos Aires, Argentina¹.

We have studied the interconnection schemes for the exchange of local and regional traffic in the South American region, trying to identify the main incentives large ISPs have for improving the financial conditions under which interconnection agreements occur, at the expense of smaller ISPs. In fact, the model of cooperative agreement for the exchange of domestic (national) traffic has been adopted all thorough the region; the Internet access market has benefited in each country from the cost reduction and the improvement in quality that the operation of a NAP has meant in each country.

The most important achievement of this work is the understanding of the basics upon which the stability of the exchange points is founded. This is especially critical for the growth of Internet in South America. We have identified come crucial aspects such as the characteristics of the interconnection agreements and the payments ISPs make to the NAP administration.

We have developed a sufficiently detailed understanding of important issues such as the impact of new forms of interconnection such as secondary peering agreements and multi-homing on the stability of Internet growth in the context of the fast developing and ever more complex South American Internet access markets. We have collected information on the structure of exchange points in different countries in the region to study the ISPs patterns of behavior arising from the new interconnection agreements, in particular, and the changes in the traditional hierarchy induced by new contract forms, in general. Such agreements include transit services and bilateral agreements at the exchanges, in existence for a long time in North America and Europe but a relatively new feature in South and Central America. For that purpose we have developed theoretical models using bargaining theory and have also made some insights on the cost allocation methods at cooperative exchange points.

*In collaboration with Milena Galvis, Lina Gómez, Marcela González, Felipe Carrillo September 3rd, 2003

Competition Policy In Network Industries: An Introduction*

*Nicholas Economides***

June 2003

Abstract

We discuss issues of the application of antitrust law and regulatory rules to network industries. In assessing the application of antitrust in network industries, we analyze a number of relevant features of network industries and the way in which antitrust law and regulatory rules can affect them. These relevant features include (among others) network effects, market structure, market share and profits inequality, choice of technical standards, relationship between the number of active firms and social benefits, existence of market power, leveraging of market power in complementary markets, and innovation races. We find that there are often significant differences on the effects of application of antitrust law in network and non-network industries.

Key words: networks, network effects, public policy, antitrust, telecommunications, technical standards

JEL Classification: L4. L5

* I thank Brian Viard, Larry White and the participants at the conference “The New Economy: Just How New is It?” at Texas A&M for their helpful comments and suggestions.

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Network interconnection with competitive transit

David Gilo¹ and Yossi Spiegel²

September 30, 2003

Abstract

We examine the interaction between two interconnected networks (e.g., two LECs) and a third network (e.g., an IXC) seeking access to their customer base. The IXC could either interconnect directly with both LECs or interconnect with only one LEC and transit calls to the other LEC via the first LEC's network. We show that such competitive transit may induce the LECs to negotiate a reciprocal access fee for the traffic that flows between their networks (including transited traffic) so as to raise the access prices that each will eventually receive from the IXC. When the volumes of inbound and outbound long-distance calls are equal, the LECs will voluntarily interconnect with the IXC at below-cost rates without a need for regulatory intervention. However, if the volume of inbound calls exceeds the volume of outbound calls and the IXC offers interconnection prices to the two LECs, the small LEC would like to raise the reciprocal access fee as much as possible, while the large LEC would like to raise it only up to some critical level.

For helpful comments we thank seminar participants at Tel Aviv University and 2003 SAET conference on current trends in Economics in Rodos. The financial assistance of the NET Institute is gratefully acknowledged.

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Assessing the Impact Of Internet Telephony On the Deployment of the Telecommunications Infrastructure

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Abstract

Internet telephony is a service that poses direct and unregulated competition to traditional voice service providers. Because of this governments and carriers are concerned about the potential negative effects that it can have on the revenues and consequently expansion of a country's telecommunications infrastructure. This paper's aim is to determine whether this service has had such a negative impact that it is justified for regulators to prohibit its use. Through a longitudinal investigation of four years of data and 180 countries this study finds no evidence to support the claim that there have been either negative effects on the revenues of carriers or a reduced rate of expansion of telecommunications infrastructure. This paper further argues that prohibition of new technology based services could result in negative long term effects for both operators and consumers.

Orchestrating Web Services For Networked Enterprise Collaboration

Ananth Srinivasan and David Sundaram

*Center of Digital Enterprise, University of Auckland Business School
Auckland, New Zealand*

Abstract

Internet technologies are widely recognized for their promise as enablers of collaborative computing both within and among organizations. The presence of heterogeneous systems based on different technological platforms in organizations makes the implementation of network collaboration very complex. The approach taken for the most part to deal with this issue has been based on Enterprise Application Integration. The major drawback of this approach is the dependence on proprietary solutions that are not based on open standards. When the need for inter-organizational collaboration arises, such solutions hinder the smooth exchange among the participating organizations due to their complexity and lack of interoperability.

“Web Services” is a new class of internet based, open standards technology that offers the promise of resolving these problems. Web services technologies are offered as the new generation of electronic commerce enablers. What is currently missing is a compelling implementation framework for the deployment of this technology in organizations. A lack of clear understanding about how to deploy Web Services to enable inter-organizational collaboration will impede the uptake of this promising new technology. In this project, our aim is to construct and test a valid implementation framework for Web Services. Such a framework will enable effective inter-organizational network based computing which will have a positive effect on organizational productivity. The emphasis of our work will be to support decision oriented, collaborative business processes.

We propose a conceptual framework for building systems that utilize Web Services technologies to enable networked organizations to automate collaborative processes. We take the view that it is useful to conceptualize organizational service chains in terms of workflows and build a framework for orchestrating such services. We articulate a conceptual framework along these lines and present specific ways by which the implementation of the framework using Web

Services technologies could benefit inter-organizational collaboration. Our primary objective of building prototypes that demonstrate the validity of such a framework was successful. Two prototypical systems that demonstrate the validity of such a framework were built. They now offer a platform for ongoing testing and refinement. We believe that such prototypes will serve as useful tools for organizations that are investigating the use of this emerging technology to facilitate networked collaboration to improve productivity.

Key Words: Web Services Orchestration; Inter-organizational systems; Enterprise collaboration

The Effect of Entry and Market Structure On Cellular Pricing Tactics*

*Katja Seim***

*V. Brian Viard****

This Draft: 10/2/2003

Abstract

We test the effect of entry on the tariff choices of incumbent cellular firms. We relate the change in the breadth of calling plans between 1996, when incumbents enjoyed a duopoly market, and 1998, when incumbents faced increased competition from personal communications services (PCS) firms. Entry by PCS competitors differed across geographic markets due to the number of licenses left undeveloped as a result of the bankruptcy of some of the auctions' winning bidders and due to variation across markets in the time required to build a sufficiently large network of wireless infrastructure. We find that incumbents increased the number of calling plans more in markets with more entrants and that this effect is not explained by demographic characteristics of these markets or the geographic scope of the incumbents' services.

Keywords: entry, market structure, cellular, price discrimination, nonlinear pricing, telecommunications

JEL Codes: L11, L13, L25, L96

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