MTI Report 01-16

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Using Fiber Networks to Stimulate Transit Oriented Development: Prospects, Barrier and Best Practices

Mineta Transportation Institute
San José State University
San Jose, CA 95192-0219

MTI Report O1-16

Using Fiber Networks to Stimulate Transit Oriented Development: Prospects, Barriers and Best Practices

October 2001

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a publication of the
Mineta Transportation Institute
College of Business
San José State University
San Jose, CA 95192-0219
Created by Congress in 1991

Technical Report Documentation Page

1. Report No. FHWA/CA/OR-2001/34	2. Government Accession No.	3. Recipients Catalog No.
4. Title and Subtitle Using Fiber Networks to Stimulate Transit Oriented Development: Prospects, Barriers, and Best Practices		5. Report Date October 2001
6. Authors Walter Siembab, Stephen Graham, Malu Roldan		7. Performing Organization Code
		8. Performing Organization Report No. 01-16
9. Performing Organization Name and Address Mineta Transportation Institute College of Business—BT550 San José State University San Jose, CA 95192-0219		10. Work Unit No.
		11. Contract or Grant No. 65W136
12. Sponsoring Agency Name and Address California Department of Transportation Office of Research—MS42 P.O Box 942873 Sacramento, CA 94273-0001 U.S. Department of Transportation Research & Special Programs Administration 400 7th Street, SW Washington, D.C. 20590-0001		13. Type of Report and Period Covered Final Report
		14. Sponsoring Agency Code

15. Supplementary Notes

This research project was financially sponsored by the U.S. Department of Transportation's Research and Special Programs Administration and by the California Department of Transportation (Caltrans).

16. Abstract

This study empirically examines a practical aspect of a relationship that is only now being conceptualized—the relationship between rail transit, land development, and telecommunications. It pushes the envelope of knowledge in so far as the interaction between just two of the factors, public transportation and land use (urban form), has been a focus of policy research for only about 30 years, especially the last 10 years.

This study is concerned with the feasibility of introducing three telecommunications-based incentives for transit-oriented development. The market for these hypothetical incentives is the developers of transit-oriented projects. California's Bay Area/Santa Clara Valley and Los Angeles/Southern California regions are the study's geographical focus. The question is the extent to which members of the development community believe that the incentives would affect the viability of their transit-oriented projects.

17. Key Words Fiber Optics, Transit Oriented Development, Rail Transit, Land Development, Telecommunications	18. Distribution Statement No restrictions. This document is available to the public through The National Technical Information Service, Springfield, VA 22161		
19. Security Classif. (of this report) Unclassified	20. Security Classifi. (of this page) Unclassified	21. No. of Pages 110	22. Price $15.00

Form DOT F 1700.7 (8-72)

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Library of Congress Catalog Card Number: 2001096738

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ACKNOWLEDGEMENTS

The authors of this study wish to thank the staff of the Mineta Transportation Institute for their assistance in bringing this report to print. In particular, they wish to thank Research Director Trixie Johnson, Research and Publications Assistant Sonya Cardenas, Graphic Artist Ben Corrales and Editorial Associates Robyn Whitlock and Jimmy Young.

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EXECUTIVE SUMMARY

In the last 30 years, while integrated land use transportation concepts and practices have been gestating, the nature of telecommunications technologies and markets has changed dramatically. This study empirically examines a practical aspect of a relationship that is only now being conceptualized–the relationship between rail transit, land development and telecommunications.

Although this research is intended to inform policy, it has implications for a new conceptual paradigm of integrated thinking about public transit, land development and digital networks. The goal is the articulation of concepts, policies and practices that use digital networks as a complement to bricks and mortar construction in order to quickly and affordably reshape urban form around public transportation systems.

It is clear that overcoming the barriers to transit-oriented development requires a strategy of public-private partnerships. These partnerships involve local governments, metropolitan planning organizations, transit authorities and sometimes state and federal agencies making collateral investments in infrastructure, joint developing public land or providing an array of incentives to attract the necessary private capital and expertise.

The recent changes in telecommunications markets are particularly relevant to public rail authorities. Since construction of wireline networks requires access to rights-of-way, and competitive markets have lead to dramatic expansion of private network infrastructure, rail authorities are well positioned to offer rights-of-way in joint development agreements as a way of acquiring extensive network resources.

Businesses, hospitals, governments, colleges, secondary schools and other private organizations and public institutions are only now beginning to factor these new technologies and services into their business plans and practices. As these institutions gain access to digital networks and acquire the skills to use them, they can be guided toward policies for providing remote access to work for their employees and to services for their customers.

ISTEA and its successor TEA-21 have given regions more flexibility in spending federal transportation funds. Many of the livable communities programs have become feasible due to this flexibility.

The primary purpose of this study is to determine the interest level of the development community in three specific network-based incentives that could be offered by transportation agencies and rail authorities through telecommunications network policies. In order to provide a context of meaning for the responses of the development community, two other research questions were asked:

- What are the current and best practices using telecommunications networks as development incentives elsewhere in the nation and in Western Europe?
- Based on the current telecommunications network policies in Southern California and the Bay Area, what are prospects for, and barriers to, offering network incentives to TOD?

Taken together, these questions will shed light on the potential for public transit authorities and MPOs to collaborate on developing a network strategy to support transit-oriented development.

Conclusions of this study include the following concepts:

- Common and best practices in the United States and Europe suggest that regardless of the relative degree of telecommunications market liberalization, rail transit authorities are looking to joint development arrangements with private telecommunications companies for network infrastructure to support internal operations of to generate revenue.The cost and availability of digital network resources are unlikely barriers to developing and deploying network strategies, and the potential for synergy between public transit and public telecommunications may become an idea in good currency.
- The development community wants the incentives.
- Network strategy is close to adoption somewhere. The prospects for offering the network incentives in either the northern or southern metropolitan regions in California may be good.
- The challenge is to overcome the barriers to innovation.

The capabilities of digital networks allow partial reallocation of many functions. This insight suggests the possibility of analyzing existing TODs in terms of the bundle of the functions unique to each. This data base could help gain insights in the mix of functions that most effectively realize the goals of a transit village. Because the combination of bricks and mortar and telepresence can now create a wide variety of functions in a compact space, it is worth researching the characteristics of an optimal mix under various circumstances.

INTEGRATING RAIL TRANSIT, LAND DEVELOPMENT AND TELECOMMUNICATIONS

INTRODUCTION

This study empirically examines a practical aspect of a relationship that is only now being conceptualized—the relationship between rail transit, land development, and telecommunications. It pushes the envelope of knowledge in so far as the interaction between just two of the factors, public transportation and land use in terms of urban form, has been an intense focus of policy research for only about 30 years, especially the last 10 years. (See TCRP Report 16, *Transit and Urban Form, Volumes 1 and 2,* Transportation Research Board, 1996.)

In this same 30-year period during which integrated land use-transportation concepts and practices have been gestating, the nature of telecommunications technologies and markets has changed dramatically. A watershed event was the 1984 court-ordered break-up of the ATT telephone monopoly that introduced market competition and unleashed a torrent of new telecommunications technologies and services. The evolution of the commercial Internet out of the non-commercial, research-oriented ARPANET is one of the more significant manifestations of this phenomenon. It is the urban space-shaping capabilities of these new technologies and services that have yet to be absorbed into the transportation institution's network policies.

Although this research is intended to inform policy, it has implications for a new conceptual paradigm of integrated thinking about public transit, land development, and digital networks. The goal is the articulation of concepts, policies, and practices that use digital networks as a complement to bricks and mortar construction in order to quickly and affordably reshape urban form around public transportation systems.

This study is concerned with the feasibility of introducing three telecommunications-based incentives for transit-oriented development. The market for these hypothetical incentives is the developers of transit-oriented projects. California's Bay Area/Santa Clara Valley and Los Angeles/Southern California regions are the study's geographical focus. The question is the extent to which members of the development community believe that the incentives would affect the viability of their transit-oriented projects.

The first section of this report establishes that TOD is a reasonable social goal, particularly important to rail authorities because it is linked to long-term ridership growth, and to transportation policy agencies because it is included in their regional plans. TOD also represents an urban form approach to transportation solutions for regions with polluted air and where the highway infrastructure is overwhelmed with congestion—and significant expansion of that infrastructure is not affordable.

But TOD has not happened in needed quantities through purely market forces. This is due to a combination of financial, political, and physical factors. Also, the public transit institution itself has been slow to adopt the culture and the tools to cause appropriate projects to develop at rail stations.

It has become clear that overcoming the barriers to TOD requires a strategy of public-private partnerships. These partnerships involve local governments, metropolitan planning organizations, transit authorities, and sometimes state and federal agencies making collateral investments in infrastructure, joint-developing public land, or providing an array of incentives to attract the necessary private capital and expertise.

The recent changes in telecommunications markets are particularly relevant to public rail authorities. Since construction of wireline networks requires access to rights-of-way, and competitive markets have led to dramatic expansion of private network infrastructure, rail authorities are well positioned to offer rights-of-way in joint development agreements as a way of acquiring extensive network resources.

The transition from regulated utility to competitive marketplace has resulted in consumer benefits such as vastly expanded service options and, in some cases, lower prices. But the nature of markets means that devices and services are distributed unevenly between neighborhoods and houses, according to the consumer's ability to pay. Competition also means uneven infrastructure development within metropolitan regions. While thriving central business districts typically have a glut of fiber optics, many low income districts have been skipped over. The telecommunications network policies of transportation agencies can address both the household/neighborhood and the district inequities as part of a strategy for improving access to work and to services.

Businesses, hospitals, governments, colleges, secondary schools, and other private organizations and public institutions are only now beginning to factor these new technologies and services into their business plans and practices. As

these institutions gain access to digital networks and acquire the skills to use them, they can be guided toward policies for providing remote access to work for their employees and to services for their customers.

Finally, ISTEA and its successor TEA-21 have given regions more flexibility in spending federal transportation funds. Many of the livable communities programs have become feasible through this flexibility.

All of these factors have created an array of opportunities for rail authorities to use their rights-of-way and for metropolitan planning organizations to deploy their local and federal funds in order to provide network resources as incentives for transit-oriented development.

RESEARCH QUESTIONS

The primary purpose of this study is to determine the interest level of the development community in three specific network-based incentives that could be offered by transportation agencies and rail authorities through telecommunications network policies.

In order to provide a context of meaning for the responses of the development community, two other research questions were asked:

- What are the current and best practices using telecommunications networks as development incentives elsewhere in the nation and in Western Europe?
- Based on the current telecommunications network policies in Southern California and the Bay Area, what are prospects for, and barriers to, offering network incentives to TOD?

Taken together, these questions will shed light on the potential for public transit authorities and MPOs to collaborate on developing a network strategy to support transit-oriented development.

TRANSIT-ORIENTED DEVELOPMENT DEFINED

Transit-oriented development (TOD) is the development of transit supportive functions adjacent to urban rail stops. A TOD project can be a single family, multi-family or mixed residential cluster; an employment center such as an office complex; an employment-service center combination such as a retail mall or medical facility; or a mix of residential, employment, and service functions.

The idea behind TOD is to direct land development to public transit, particularly rail systems. Locating key functions in a compact development within 1/3 mile of a transit station theoretically should result in greater use of the transit system. Trip origins for many people would be connected to many of their trip destinations. The convenience of rail transit would lead to rail becoming the mode choice of residents, employees, and shoppers. Land use would support transit use.

The traditional central city in a metropolitan region, or a small town in a rural area is an ideal model for integrating housing, retail, jobs, and services in a compact area so that functions are within walking distance or a short transit ride. The central city is traditionally the place where the greatest variety of goods and services could be found. The promise of TOD is that, collectively, the station developments can add up to a single central city with the rail system providing public transit access between functions, like a horizontal elevator.

The *ideal* TOD model is the *transit village*. At its core, the transit village is a compact, mixed-use community, centered around the transit station that, by design, invites residents, workers, and shoppers to drive their cars less and ride mass transit more (Bernick and Cervero, *Transit Villages in the 21st Century*, McGraw-Hill, 1997, page 5). The Transit Village includes six elements or characteristics:

- Enhanced mobility and environment;
- Pedestrian friendliness;
- Alternative suburban living and working environments;
- Neighborhood revitalization;
- Public safety; and
- Public celebration (civic and other public places such as a plaza).

(ibid, page 7)

There is also the hope that transit villages and other TODs can revitalize the neighborhoods around stations, often small business districts which have declined because of competition from auto-oriented retail malls and office centers.

Transit villages and other transit oriented developments are considered by their advocates to be the antidote to the sprawl model of urban form where large scale, low density, single function tracts are integrated over relatively long

distances by the single occupant vehicle. Smart growth, livable communities, traditional neighborhoods, and new urbanist developments are different terms for comparable concepts.

REASONS TOD IS IMPORTANT

Without engaging directly in the debate over empirical validation of the underlying TOD concepts—whether the built environment, land use policy or urban design can influence travel behavior—there are several reasons why TOD is important. For a discussion of the debate, see "The Impacts of Urban Form on Travel: A Critical Review," Randall Crane, Lincoln Land Institute Working Paper WP99RC1, 1999.

To Meet Long Term Goals of Rail Systems

Planning for urban rail systems involves forecasts of ridership growth that are in part based on assumptions about transit-oriented development. A recent study commissioned by the Bay Area Rapid Transit District (BART) concluded in part that there has been a "frequent failure of major transit investments in the United States to generate the amount of transit-related development anticipated and needed (emphasis in the original) to generate the long term ridership essential to justify the capital investment in transit" ("Joint Development Entrepreneurial Study" Sedway, Kotin, Mouchly Group, May, 1996, page 2).

As a specific case, TOD has lagged in the BART system.

> All along, system planners expected that suburban BART stations would naturally become magnets for new development centers. Disappointment set in when over time most station areas either remained unchanged or took on the low density settlement patterns that characterize much of the East Bay. It became apparent that BART, in and of itself, was unable to incite new growth or turn around flat or declining local real estate markets (Bernick and Cervero, 1996, page 188).

The UC Berkeley Transportation Department conducted a study of TOD implementation at the stations in San Diego's MTDB system in 1996. One of the themes upon which their analysis was focused was that TOD policy may be a regional strategy but TOD implementation is not.

> If one restricts attention to projects that were specifically designed to leverage rail transit, there are relatively few TODs either existing or being planned near San Diego Trolley stations. In other words, the San Diego experience is consistent with the experience elsewhere; TOD projects are built in some places, but they appear to fill a market niche rather than becoming a major trend" (Boarnet and Compin, "Transit Oriented Development in San Diego County: Incrementally Implementing a Comprehensive Idea," University of California Transportation Center, Working Paper # 343, June, 1996, Pages 10-11).

In addition to the ridership issues that existing rail transit authorities may face, there are also potential long term national policy issues at stake. The report to BART observed that without institutional policy changes

> ...it is very likely that many of the major investments in new and expanding light and heavy rail systems that are currently under way will, looking back 10 to 20 years from now, be considered poor transportation investments because the transit-supportive land uses needed to generate adequate ridership did not materialize. If this happens, funding for further rail transit investments could be in serious jeopardy (Sedway, Kotin, Mouchly Group, May, 1996, page 2).

It should be noted that real estate market conditions generally improved after these studies were published. And the Metropolitan Planning Organizations (MPOs) and rail authorities in California arguably became more effective catalysts. As a result there has been more TOD planning and building activities in recent years, particularly in the Bay Area and San Diego. However, the economy has slowed again in spring, 2001 and this may slow construction of new projects other than housing.

To Satisfy Regional Transportation Plans and Livable Communities Policies

In order to coordinate transportation planning across metropolitan areas or urban regions, the USDOT designates metropolitan planning organizations (MPOs) to represent each region.

The transportation policy for the region can be found in two essential documents. MPOs are required to produce a Regional Transportation Plan (RTP) with a 20 year planning horizon—with updates every 3 years. MPOs are

also required to produce a Regional Transportation Improvement Program (RTIP) every two years. The RTIP provides a 6-year snapshot of transportation projects in the region for which funding is committed. The RTIPs establish the short-term funding decisions that help implement the RTP. The RTIP directs the expenditure of federal transportation funds which have been allocated to each region.

The RTP and RTIP must provide for air quality improvements sufficient for the state/region to meet state and federal air quality standards, and must conform to the State Implementation Plan (SIP). The SIP documents regional and local efforts to meet federal ambient air quality standards.

Bay Area

The Metropolitan Transportation Commission is the MPO for nine counties in the greater Bay Area.

In 1998, MTC launched the Transportation for Livable Communities program. It has provided planning grants, technical assistance, and capital grants to help cities and non-profit organizations develop transportation-related projects. The TOD-related projects that TLC funds are those that:

- Enable residents to use a range of travel modes, including transit, walking and biking, to access jobs shopping, recreation and other daily needs.
- Provide for development of housing and regional activity centers that are accessible to the regional transit network.
- Provide for a diversity of development and other community-oriented transportation strategies designed to limit the extent to which it is necessary to travel from one community to another to access basic necessities of living.

MTC's TLC program has recently been expanded to include a Housing Incentive Program (HIP). This program was based on the San Mateo County TOD Incentive Program launched in January, 1999. It seeks to encourage density around transit stations by providing local jurisdictions with $2,000 per bedroom for new housing development within 1/3 mile of a transit station with a minimum 40 units per net acre. The funds can be used for any transportation project within the jurisdiction's limits.

The TLC program has been budgeted for $100 million over the next 20 years.

Southern California

The Southern California Association of Governments (SCAG) is the MPO for six counties in Southern California. Unlike MTC, SCAG does not program the federal TEA21 funds that are allocated to the region. That responsibility is handled by the Los Angeles County Metropolitan Transportation Authority (MTA) which issues a "call for projects" every two years. That "call" does not include special funds for livable communities so there is no financial commitment in the south comparable to the program in the north.

MTA allocates funds according to modal application such as freeways (HOV lanes), signal synchronization and bus speed improvement, and transportation demand management. One of the model applications is "regional bikeways and pedestrian improvements" which includes design and construction of bicycle lanes and paths and related amenities such as landscaping and signage.

SCAG supports livable communities through advocacy and education. Its Web page contains case studies and profiles of successful projects.

Its current emphasis, budgeted through 2002, is for "growth visioning for sustaining a livable region." "SCAG has created the Growth Visioning Committee to inform, engage and facilitate consensus on a Vision—a strategy for addressing the challenging consequences of anticipated growth in the region" (www.scag.ca.gov/livable).

> "Visioning is a tool that has gained widespread attention as a method of stimulating rethinking about how the future might be shaped in neighborhoods, communities and regions. It involves identifying desirable—as opposed to merely projected—future conditions and stimulating change to realize that future image, typically drawing upon "smart growth" strategies and techniques to the extent that they can be applied" ("Growth Visioning for Sustaining a Livable Region: Visioning Case Studies, 10 Regions in the US," Summary Report, The Planning Center and Southern California Transportation and Land Use Coalition, May 24, 2001).

The regional visioning process is being designed in 2001. The process will be conducted in 2001/2002.

SCAG's transit oriented development policy is to locate a significant share of new housing and jobs within .25 mile of transit stations or major bus corridors.

It advocates linking communities and neighborhoods with viable pedestrian and bicycle facilities. It promotes in-fill development to revitalize under utilized and vacant sites.

To be Consistent with California's Smart Investment Initiative

California State Treasurer, Philip Angelides, published a report in 1999 describing the State's Smart Investment Policy. The policy addresses the need to make strategic use of limited state funds in the face of growth anticipated to equal that experienced in the state's boom years of the 1950s through the 1970s. "Growth will increase the need for all forms of public and private sector goods and services—needs that will overwhelm public resources if investment policies are not conceived with wisdom and vision" (Angelides, 1999, page 1).

The report recognizes that it is not possible to fight growth, but it is essential to make growth *smart*. Smart growth generally means locating development away from the urban periphery into the existing urban fabric near public transit services in order to be "more economical, more efficient, and less harmful to the natural environment."

> [Smart] development means land uses that support transportation options beyond more freeways and roads; a better mix of housing in communities and neighborhoods; locating jobs near housing, and balancing job growth with new housing; land use designs that bring homes, schools, workplaces, services, and retail shops closer together; communities centered around civic places; more efficient, well planned higher density of land use, and protection of environmental resources (Angelides, 1999, page 9).

This specifically suggests compact, mixed use developments adjacent to rail and bus transit stops.

The state-wide initiative has spawned regional smart growth alliances with their own initiatives. For example, MTC recently joined with the Association of Bay Area Governments, the Bay Area Air Quality Management District, the Bay Conservation and Development Commission, and the Regional Water Quality Control Board, and the Bay Area Alliance for Sustainable Development to develop a set of "best practices" and possible financial incentives for "smart growth." MTC's definition of smart growth includes development that supports and enhances public transit, among other characteristics.

Status Quo isn't Working

In the big picture, if regional mobility worked well without TOD, then incentives for TOD would be less imperative. Unfortunately, things are not working well.

In general, the private automobile is used for around 90% of all trips in California's metropolitan areas. Public transit carries only about 6% of all trips. The regional transportation plans forecast congestion and air quality crises as unmitigated effects of growth, which will worsen an already bad situation. The commitment to transit service and road maintenance limits the amount of funds available for other options. Of those, the expansion of the road system and extension of the rail system require the most capital.

According to the MTC, 25 million daily person-trips are being forecast in the Bay Area for the year 2020. The transportation budget for accommodating this volume of traffic is $90 billion. Of that amount, $73 billion—81% of the total available—is committed to maintaining and operating public transit systems and the road system (from streets to freeways). Despite this substantial investment to improve transportation in the region, the mode share of automobile trips will remain at about 90%. There will be about 365 vehicle-hours of delay per day due to congestion.

Despite $82.5 billion expenditures over the next 25 years in Southern California, commute times will not decrease and evening peak speeds will decrease by 10%.

There is also an immediate problem in Southern California. The proposed solutions contained in SCAG's Regional Transportation Plan will not bring the region into conformance with federal air quality standards. The shortfall occurs specifically in unrealistic assumptions about the number of vehicle trips that will be converted from automobiles to high speed rapid transit. "For every motorist planners can show they are putting on the train—even if only on paper—the planning agency gets credit for meeting clean air laws" (Shuit, "Flaws in Region's Transit Plan May Jeopardize Funds," *Los Angeles Times*, Page B-1, April 22, 2001).

If the regional plan fails to meet its requirements, $1.9 billion in highway funds scheduled to flow into the region to relieve congested highways and freeways would be halted.

IMPEDIMENTS TO TOD

Growth and development have been for many years highly controversial throughout much of California. Today, development in general is as much political as it is economic. However, there are a number of impediments specific to transit-oriented development: financial, political, physical, and institutional factors.

Financial Factors

The market viability of the housing product is questionable. The market for high density housing is thought to be soft due to consumer preference for low-density living. (Bernick and Cervero, pages 139-140)

There is often a lack of conventional financing. Transit-based housing is a largely untested market. (Bernick and Cervero, pages 139-140)

Markets fluctuate and the market demand for each element of a mix of uses seldom follows the same cycles (Bernick and Cervero, pages 139-140). For example the recession of the late 80s to early 90s hurt the office market.

Political Factors

Local governments that control land development at the stations often oppose TOD for the following reasons:

- Local governments prefer retail developments at stations because of the sales tax revenue. Ironically, some governments oppose retail development at stations in order to protect other commercial areas in town such as the traditional central business district (Bernick and Cervero, page 195).
- High-density housing usually increases demand for schools, city services, and public streets (Bernick and Cervero, page 140).
- TOD is not a priority in jurisdictions with other pressing problems such as crime and poverty (Bernick and Cervero, page 285).
- There is often NIMBY political opposition. Ironically, this phenomenon can take the form of resistance to high density housing in more affluent communities where the concern is to protect against decline caused by those of a different race and class; and in less affluent communities where the concern is to protect against gentrification by those of a different race and class (Anastasia Loukaitou-Sideris, “Transit-Oriented Development in

the Inner City: A Delphi Survey," *Journal of Public Transportation*, Volume 3, Number 2, 2000).

Physical Factors

Some stations are sited in freeway medians (Bernik and Cervero, page 165).

Many systems are built along existing rights-of-way and are surrounded by existing development. There is no vacant land upon which to build (Boarnet and Compin, Page 12).

Institutional Factors

The public transportation institution itself is part of the problem. The culture inside many transportation authorities is focused on operations—keeping the wheels rolling. Land development in those cases is not considered to be part of the core business. The skills required to be effective are outside of traditional transit planning expertise.

> …the goal of using land use policies to boost ridership represents a major shift in American transportation planning. Prior to the mid-1980s, transportation planners rarely sought to influence travel behavior by manipulating land use patterns. Furthermore, rail systems by their nature involve several stations, often in multiple jurisdictions and land use authorities. This level in inter-governmental land use policy coordination, while found in other nations, is not typical of American planning. Thus both in intellectual disposition and in the required amount of coordination, TOD is a departure for transportation planning in the United States (Boarnet and Compin, page 1).
>
> The progress toward TOD has been incremental, measured one or two projects at a time. While for any station or even city, each project is a significant effort, the character of station-proximate land throughout the system is, at best, adapting slowly. Hence the revolutionary prospect that land use can boost rail transit ridership faces a long, incremental implementation process (Boarnet and Compin, page 22).

The public transit institution has been slow to adopt new policies, play new roles, and use new tools. The need for reform of transportation agencies and

authorities is part of the today's TOD challenge, and certainly part of developing network policies to support TOD.

HOW GOVERNMENTS CAN STIMULATE TOD

Because of the various factors which impede market development of TOD, it is clear that each level of government will need to play some leadership role if it expects to capture the potential public benefits of TOD. This is especially true if the transit village ideal is to be realized.

> The need for the transit agency and local government to assume a proactive role, is perhaps most crucial. Without government leadership, nothing will happen….To move a transit village proposal forward from theory to implementation, some form of public-sector financial participation—in the form of infrastructure investment, land assembly, or direct participation—is absolutely essential (Bernick and Cervero, Page 352).

Local governments regulate development activity around rail stations through zoning and other land use controls. This policy framework must accommodate high density projects, including those with a housing component. In addition to providing a TOD-friendly regulatory environment, government can also adopt policies and programs that will actively stimulate TOD. These include:

- Assemble multiple parcels into single ownership;
- Accept reduced land costs in return for project participation;
- Accept reduced rent payments in return for project participation;
- Serve as a guarantor on project loans;
- Issue tax-exempt bonds to reduce financing costs;
- Provide below market rate loans;
- Improve infrastructure through tax increment financing;
- Enhance transportation-area plaza through site improvements;
- Reduce parking costs through shared parking; and
- Expedite local permits and reviews.

Beyond those local initiatives, regional, state, and federal agencies can provide funds as investments in services or support infrastructure. It is not unusual for

the total government investment supporting a TOD project to run into the millions of dollars. The Richmond Redevelopment Agency, for example, applied $25 million in various government funds to support its transit village.

The MPO establishes the priorities and plans for the region and, based on those plans, can provide federal and state transportation funds.

Investments tangentially related to livable communities/TOD include transit, bicycle and pedestrian facilities, which will receive $400 million—.4% of the total 20 year budget. As mentioned above, the Transportation for Livable Communities program will receive $100 million.

Some of the recent TOD oriented investments made by MTC's TLC planning grant program include:

- $100,000 for design concept and phase 2 design for a mixed use development at the BART Ashby Street station in Berkeley.
- $35,000 for a 24th Street BART station community plan in San Francisco.

Some of the recent TOD oriented investments made by the TLC capital program include:

- $435,000 to enhance walkability with improved signage to BART from new library and mixed-use office/retail development and renovated community center in City of Orinda.
- $750,000 to construct a new pedestrian plaza on the west side of the BART/Amtrak Station at the site of the planned Richmond Transit Village.
- $2 million for median and streetscape improvements in support of the Fruitvale Transit Village at the BART Fruitvale Station in Oakland in fiscal year 2000.

In addition, $9 million has been set aside through 2002/2003 for the Housing Incentive Program as an incentive for 4,500 new housing units within walking distance of rail transit (this program is described in Section 1.2.2.1 on page 5).

The rail authority itself is constrained in terms of the incentives that it can bring to the table. It can offer only its own assets. Typically, this involves land adjacent to some stations, often in use as a surface parking lot. This land can be used as the basis for joint development with a private partner.

TELECOMMUNICATIONS NETWORKS—RESOURCES FOR URBAN DEVELOPMENT

While the relationship between land use and transportation has been evolving within the transportation planning profession, so also has the relationship between telecommunications and cities been evolving. For an excellent review of the emerging concepts and empirical research, see Stephen Graham and Simon Marvin, *Telecommunications and the City: Electronic Spaces and Urban Places*, Routledge, 1996.

Several factors have converged to make this evolution possible—technological advances, competitive markets, and rights-of-way needed for wireline networks owned by rail authorities.

Technological Advances Bring New Capabilities

It is, in part, the quantum leap in technological capabilities that has excited the imagination about the potential for networks to be used to reorganize urban space. "If improvements in fiber optics continue, the carrying capacity of a single fiber may reach hundreds of trillions of bits per second just a decade or so from now" (Gary Stix, "The Triumph of the Light," *Scientific American*, October, 2000). For perspective, an ISDN connection runs at 128 kilobits per second over twisted pair copper wire.

William Mitchell, Dean of Urban Planning at MIT, provides the following description of the implications of the extraordinary capabilities of digital networks.

> When piped systems replace wells you get a greater flow of water and you can take long hot showers. When freeways supplant dirt tracks you can live in the suburbs and drive every day to work. And when high-speed, digital telecommunications system succeed the telegraph and the telephone, you get socially significant changes in everyday interactions. It turns out that the more bits per second that you can push through a communications channel, the more complex and sophisticated the interchanges and transactions that can take place over it (Mitchell, e-topia, MIT Press, 1999, page 16-17).
>
> At megabit and gigabit rates, expressive subtleties—tones of voice, body language, and so on—need not be filtered out, as they are in lower-bandwidth telecommunications...This telepresence can begin

> to compete effectively with bodily presence in situations—such as negotiating a contract, discussing a design proposal, or conducting a medical examination—where nuance and context are critical (ibid, page 18).

As simply put by Nicholas Negroponte:

> Digital living will include less and less dependence upon being in a specific place at a specific time, and the transmission of place itself will start to become possible (Negroponte, *Being Digital*, Random House, 1995, page 165).

Technology available today supports applications that can be used to transmit place and reorganize urban form. The applications include telework, distance education, e-government, telemedicine, and e-commerce.

Competitive Markets bring New Needs and New Opportunities

ATT's divestiture of its Regional Bell Operating Companies (RBOCs) in 1984 formalized the technology-driven trend toward competitive markets. In the 1950s, the telecommunications markets consisted of the regulated telephone utility and broadcast television over VHF frequencies. Today, there are many more markets and each generally has several competing firms, and sometimes even competing industries. For example, broadcast television, direct broadcast satellites, cable television, video tapes, and DVDs are five industries, each with competing firms within them, that vie for a share of the home entertainment market.

However, the local exchange market through which households and businesses purchase dial tone, local switching, and distribution remains a monopoly in most places. Competition has begun to emerge in a few, mostly large metropolitan areas such as Los Angeles. But even in those cases, the former RBOC remains the dominant carrier.

The salient characteristic of new markets and new competitors is that new infrastructure has been, and continues to be developed by private firms, particularly in the intra-regional domain where competition is just now growing. Firms characterized as alternate local transport networks, competitive local exchange carriers, cellular telephone networks, and digital cable companies have developed either new or modernized wire-line backbone networks in most metropolitan regions in California.

The significance of these networks to regional economic growth is summarized by William Mitchell:

> The global digital network…will increasingly become the key to opportunity and development, and the enabler of new social construction and urban patterns. Investment, jobs, and economic power seem certain to migrate to those neighborhoods, cities, regions, and nations that can quickly put the infrastructure in place and effectively exploit it (Mitchell, page 14-15).

However, effective exploitation will require universally distributed opportunities to use the network. Markets imply that the quality and quantity of goods consumed are functions of the consumer's ability to pay a higher price. Many "worthy" uses may not be able to afford commercial prices. Virtual access to work and to services by large segments of the traveling public may be infeasible at commercial prices.

Rapid technological innovation causes the high end of all those newly formed markets to constantly rise, thereby rendering the technological infrastructure of most households, small businesses, and non-profit corporations as perpetually in some degree of obsolescence. CDs replace vinyl recordings and DVDs replace CDs. Digital high definition television monitors replace lower definition analogue sets. The Intel Pentium chip replaces the 486 chip and today the newest computers run on the Pentium 4. Digital photographs require much more network bandwidth than text e-mail.

In most cases, a high degree of technical literacy is required in order to become an effective consumer of most any technology product or service. Knowledge, like money, is not evenly distributed.

In other words, new private investment in fiber optics and new social needs in the information technology marketplace combine to create new opportunities for the agile transportation authority wishing to leverage its rights-of-way.

Rail Rights-of-Way

The resource absolutely essential to wire-line networks is right-of-way. Gaining access to public rights-of-way is more cost-effective for network developers than assembling them a parcel at a time from private owners. Public rights-of-way can be assembled a segment at a time from local governments. However, transportation authorities and electric utilities own, in most cases, up

to several hundred miles of continuous rights-of-way. These rights-of-way have unique value in an era of network expansion and modernization.

Every rail authority needs a telecommunications system to support its operations. Operations include a number of activities that range from train control to platform security via video monitoring. These networks, initially developed by the rail authority itself, often have excess capacity, empty conduit, or at least spare space in the underground vault. This is significant since burying the cable is the largest cost in building wired networks. As a result, rail authorities are well positioned to enter into joint development agreements with private network firms, usually at relatively modest costs to the authorities.

New rail systems, or the segments built in the last ten years or so, have typically used optical fibers as the medium for their operations network. Older segments were built using copper wires, either twisted pair or coaxial cable. Authorities have been modernizing these copper-based systems over the past 20 years. Private partners have sometimes been involved.

In other words, telecommunications market competition has led to private investment in new network infrastructure, thereby creating joint development opportunities for rail authorities wishing to leverage their rights-of-way. Whether through private or rail authority investments, rail corridors either contain or can potentially contain vast amounts of network capacity.

Competitive markets have also produced an ever-rising high end of technology, allocation of quality and quantity by price, and increasing requirements for technical sophistication among consumers. These new needs have created new opportunities for rail authorities. For example, rail authorities with little investment of their own can leverage their rights of way in order to obtain modern networks to support operations, *and* to create high-end, expertly staffed, non-commercial public access to broadband digital networks at rail stations.

TELECOMMUNICATIONS NETWORKS—A NEW FAMILY OF INCENTIVES FOR TOD

The incentives that were tested in this study were derived from a network deployment model for rail authorities, funded by the MTA.

Network Deployment Model for Rail Authorities

Bernick and Cervero, writing from a land use perspective, anticipated that telecommunications could support transit village development, or other forms of live-work communities.

> Advances in telecommunications and changes in the way people live and work could very well give rise to the kinds of self-sufficient villages that Ebenezer Howard and his contemporaries dreamed of…Distributed workplaces of the future will take the form of neighborhood telecenters, equipped with videoconferencing, on-line data-search capabilities, and facsimile transmission and voice mail (Bernick and Cervero, Page 368).

Writing from a telecommunications perspective, integration of digital networks and bricks and mortar buildings at transit stops is what Mitchell refers to as *smart places*:

> All networks produced privileged places at their junctions and access points—for example, access to irrigation systems, highway off-ramps, air transportation hubs, seaports, and railway junctions. Today, there are *smart places*, where the bits flow abundantly and the physical and digital worlds overlap, at points where we plug into the digital telecommunications infrastructure (Mitchell, Page 31).

Whether as electronic Garden Cities or *smart places*, the question is one of how a synthesis of land, rail and telecommunications can be conceptualized and translated into policy. The answer has been evolving since the early 1990s.

In 1991, the Joint Development Department of the Los Angeles County Transportation Commission (LACTC) had been receiving inquiries into the possible use of its rights-of-way for commercial development of fiber networks. Before proceeding, management sought technical assistance in identifying the various network utilization strategies available should the LACTC enter into a joint-development agreement. The resulting policy report, "MetroNet: Strategies for Fiber Optic Deployment" (Siembab, 1992) presented a model of how broadband networks could be combined with rail transit to affect transit-oriented developments.

The model consisted of two new infrastructure elements. First, a metropolitan area network (MAN) referred to as the MetroNet (to be consistent with MTA's

Metro Rail and SCRRA's Metrolink terminology). Second, a series of non-commercial, shared-use, multiple-function facilities that would provide access to the MAN, and therefore access to markets, work, and services.

According to this network deployment model, the metropolitan area network (MAN) would include government and public-non-profit components. The MAN could be developed through a public-private partnership, through a public-public partnership with other agencies, or by the rail authority acting alone. The MAN would initially be built on the rights of way owned by the rail authority. It would subsequently extend off those rights of ways to designated activity centers well-served by bus transit. This would mean that the main government buildings, public schools, and colleges and universities, and public health/hospital facilities in a region would all be connected to the MAN. The public non-profit network would be available at below market prices to private schools and colleges, community non-profits, private hospitals and so forth.

A *network access center* is a public facility that provides non-commercial access to devices that attach to digital networks in an array of settings. These settings include office, meeting space, medical clinic, classroom, training center, video production studio, and so forth. If one understands the travel demand of the adjacent community, it is possible to program the technology platform to provide access to some sub-set of the functions for which the community normally travels or would like to travel if convenient. Distance education, telemedicine, e-government, e-commerce, e-banking, and e-retail are some of the network applications that could appear at each network access center. The MAN would connect the NACs.

The 1992 riots resulted in interest throughout the region to "rebuild LA." A project to demonstrate the principles of the MetroNet model, sponsored by the MTA and funded by ISTEA, was one of the initiatives. This became the Blue Line TeleVillage Demonstration Project (BLTV), located along the Metro Blue Line light rail in Compton, about midpoint between the Los Angeles and Long Beach central business districts. Planning began in the fall of 1994, the facility opened in March, 1996, and continues in operation today. See Section 5.5.2.1 below for a description of the BLTV. The MetroNet model was subsequently absorbed into the core of a regional strategy referred to by Siembab as Network Oriented Development (NOD).

Incentives

The MetroNet deployment model, demonstrated through the BLTV, suggested that digital networks could be used to offer three types of incentives for TOD.

The three—direct access to fiber, network services, and network access centers—were presented to the participating members of the development community as part of this research study. The incentives are realistic in that they can be realized with off-the-shelf technologies at costs far less than the costs of other TOD incentives.

Direct Access to Fiber

Incentive: Exclusive long term use of one or more fiber strands. If there is no MAN, one could be developed with a private partner at little or no cost to the rail authority. In the worst case, the authority could offer excess capacity from its operations network.

Beneficiaries: Office or industrial tenants with very high volumes of data communications—among multiple sites of the same organization (especially if the sites are also rail adjacent), with trading partners in the region, or for access to the Internet.

Benefits: Free or very low cost high volume digital communications from a station location to any other point on the MAN, or access to points-of-presence of other network vendors or Internet service providers. This incentive would be passed on by the developer to an anchor tenant with network management capabilities.

Examples: Government data processing center, medical center, stock broker, information technology design and manufacture operations, or research and development firms.

Network Services: Digital Subscriber Line Service (DSL) bundled with Internet Service (ISP)

Incentive: Free high-speed access to Internet as well as free Internet service. Security alarm service could also be provided, but this option was not presented. These services can be acquired from a third party at little or no cost to the rail authority in exchange for exclusive use by the third party of some bandwidth on the MAN.

Benefits: Lowers costs to residents for services that are increasingly considered valuable, or even essential.

Examples: Residential (or mixed-use) developments. Households for whom Internet service is essential, some small businesses and merchants in mixed use buildings.

Network Access Centers

Incentive: This would take the form of a core facility modeled on the prototype NAC (the BLTV) that will, by itself, substantially increase the mix of activities located at a rail transit station. This would potentially involve a public, non-commercial facility of between 2,000 and 10,000 square feet that would combine furniture, technology, and staffing in order to create electronic access to:

- Medical diagnostic and treatment services;
- Business meeting services;
- Shared work stations;
- Computer and Internet access;
- Community college and university extension classes;
- A variety of transactive kiosks for banking, retail shopping, and paying traffic tickets; and
- E-government services and information for county, state and federal agencies.

NACs can be funded using federal transportation funds if included in the RTP and RTIP, or could qualify as part of a special program in the regional "call for projects" like MTC's TLC program. The BLTV was funded by ISTEA through the 1994 call for projects.

Benefits: This facility would provide an extremely compact mix of uses that would make the station area a significant activity center for a cross section of community members. It has the potential to make the station a destination rather than a just a portal to transit.

From the economic perspective, it:

- Provides access to broadband networks (addressing the "digital divide");
- Functions as an economic engine for the adjacent community;

- Should stimulate development near the station; and
- Supports the diffusion of technological and programmatic innovations.

It is, in other words, a system of public transit on the information highway, which is co-located with a system of public rail transit.

Beneficiaries: Since a NAC should be designed to address community needs, it could conceivably benefit any kind of development—low, middle, and high income residences, small to medium office businesses, and small retail businesses.

For small businesses and non-profit corporations, it can provide resources for various types of electronic meetings including audio or video conferencing, training in various computer programs, and small business technical assistance.

For residents, it can provide post-secondary educational opportunities from local community colleges, well equipped work stations that can be used by entrepreneurs or contract employees, and other similar services.

For employees of large corporations working in TOD office buildings, it can provide access to credit unions, continuing education classes and professional conferences, certain medical exams, and so forth.

Relationship of Network Incentives to Barriers

The three network incentives can potentially address some of the barriers identified above. The incentives could affect some of those barriers in the following ways.

Financial Factors

Network services can add amenities worth about $60 per month to each housing unit (the approximate market value of Internet service with DSL or cable modem access). These amenities could help overcome consumer resistance to the rail-adjacent location and might distinguish the project from competitors. Regarding financing, as mentioned during the interviews, the market value of the incentives could lead to a larger loan (10% larger in the hypothetical example—see Chapter 4).

Network access centers can create a presence for functions that are not subject to normal service delivery economics. Just as an ATM machine drastically

reduced the cost of a withdrawal transaction compared with using a teller in a bricks and mortar bank, so can distance education classes, e-government services, and e-retailing opportunities lower the cost of service delivery. This means a much smaller market size can support such activities. A commitment from the MPO to provide funds to lease 5–15,000 square feet of store front or office space would help counter a down-market. And the resulting income to the developer could also be used to increase the size of the bank loan.

Political Factors

Network access centers would increase the draw of TOD activity centers without threatening the sales tax revenue of off-track retail centers. By making some public services such as government, education, and health care more compact and transit convenient, the stress on the equivalent bricks and mortar facilities could be mitigated. Streets should be no more congested despite the addition of new functions.

NIMBY resistance in both affluent and less affluent communities might be mitigated by network access centers programmed to satisfy local needs and interests, from job training programs to high-end executive work stations.

Physical Factors

Network access centers do not require new construction on vacant land. NACs can be developed in vacancies in existing buildings. Platforms located in freeway medians make TOD difficult, but modest sized network access centers or full service kiosks can be accommodated on some of those platforms.

Institutional Factors

Network incentives complicate the challenges to the public transportation institutional culture already grappling with effective ways to integrate land development with rail transportation. The policies and practices of MPOs and rail authorities form a barrier to network incentives just as with TOD in general. The promise for overcoming these barriers is that they leverage the assets of the transit authority in a way that provides incentives that cost the authority less to produce than the real estate market values them.

METHODOLOGY AND PARTICIPANTS FROM THE DEVELOPMENT COMMUNITY

OVERVIEW

This project collected four types of data:

- TOD policies;
- Good practices;
- TOD community interviews; and
- Field observation.

TOD policies were assembled primarily from official publications available on the Internet. In a few cases, a knowledgeable individual was contacted by phone or e-mail to provide guidance or interpretation.

Good practices were collected in both Western Europe and the United States. Professor Stephen Graham, University of Newcastle on Tyne, conducted the following tasks relative to Western Europe:

- A major search of literature, gray material, and conference proceedings.
- A major Internet search.
- E-mail contact with 50 leading European transportation and telecommunications specialists.
- Telephone interviews with leading policy makers in leading edge transit operators.

Professor Malu Roldan, San José State University, conducted the following tasks relative to the United States:

- A search of online and offline transportation data bases, including TRIS, PATH, APTA, and ABI.
- A major Internet search, specifically websites linked through UC Berkeley's Davis Transportation Library website.
- Telephone interviews with key contacts.

Field observation involved visits by the Principal Investigator to many of the stops along the BART, MTA, and VTA rail systems to observe existing TOD projects and potential TOD sites.

The most complex data collection effort involved the interviews with the TOD community. The interview format included description of the need for TOD, explanation of the possible incentives, open discussion, and, finally, scale-assignment.

The interview was completed in 15 minutes in a few instances. Because of respondent interest in discussing options, issues and opportunities, 45 minutes to an hour was the norm. This process is discussed in greater detail below.

SELECTION OF INTERVIEW CANDIDATES

The project used broad strokes to identify members of the TOD community. Names of interview candidates were solicited from several sources:

The Local Government Commission maintains a list of "infill" developers. The list is annotated with a brief description of the developers recent projects. This list was screened to eliminate those that appeared to lack transit oriented experience.

The Los Angeles County Metropolitan Transportation Authority maintains a mailing list of people with a variety of interests in RFPs regarding joint development of MTA property at Metro stations. This list was screened to eliminate property managers, construction companies, project managers, and others with a peripheral interest in TOD.

The Valley Transportation Authority has a staff member assigned to provide support for TOD. VTA hosted in the summer of 2000 a "livable communities summit." VTA made available the list of attendees at that summit and identified developers with interest in specific VTA station developments.

The Transportation Department in the City of Oakland provided a few names of developers currently interested in BART stations located in Oakland.

The Southern California Regional Rail Authority maintains a list of contacts representing the cities along the rights of way. These contact persons were generally in public information or city management and were seldom directly involved in land use planning for the jurisdiction. Nevertheless, an e-mail was

sent to each person asking them to forward the request for information to the appropriate person. TOD development policies and names of transit oriented developers locally active were requested. There were only two responses to this e-mail request and the information received was limited to TOD policies.

The Metropolitan Transportation Development Board provided a list of developers having made recent inquiries into development opportunities adjacent to the San Diego trolley system.

The project's limited budget impacted the time for and cost of travel to conduct the interviews. The location of the Principal Investigator in Los Angeles resulted in a bias toward Los Angeles based developers as interview candidates. However, developer interest in TOD sites was not limited to the location of the developer's home office so there was not a bias toward sites adjacent to MTA stations. For example, Creative Housing in Los Angeles is planning to develop the MacArthur transit village in Oakland.

The procedure followed was to obtain the telephone number from an information operator, call and either speak to the target or leave a message. About 90% of calls required a call back. In all, over 75 firms were called to obtain the 22 interviews.

DESCRIPTION OF INCENTIVES

The MetroNet deployment model, as discussed in Section 1.6, was not presented in the interviews. Each interviewee was presented with the three discrete incentives and the responses reflected the relevance of the incentives to specific current or recently completed projects.

STANDARD SCALE FOR COMPARISON

A standard scale was needed in order to compare responses. This scale was developed through informal conversations with various people familiar with the TOD community, but not directly involved with it. These included a planner from the City of Los Angeles formerly assigned to livable communities unit (since disbanded by the City), a low cost housing developer familiar with technology applications but with no experience with TOD, and a senior transportation planner with the City of Oakland. The 4-point scale that was adopted appears to reflect a rational or common sense way of relating to the incentives.

CAVEATS

The interviews introduced new ideas. The questions posed had never previously been asked. None of the respondents could provide answers based on facts or experience. What has been gathered are impressions and attitudes. Underlying some of the attitudes are beliefs about the appropriate role of government and the personal experience of the respondent in relation to specific government agencies that included local governments, transportation authorities, and metropolitan planning organizations.

Responses reflect a set of assumptions about their tenants that may ultimately be incorrect. The survey did not include tenants or tenant organizations.

Respondents generally thought specifically in terms of their own developments, particularly current projects. This fails to appreciate the strategic benefits of region-wide deployment.

The quality of the interviews varied in terms of the interviewee's available time, and his/her comfort with the seemingly technical topic.

There is some self-selection among the respondents. Those that agreed to the interview might well have a bias toward network technology. Those who did not make the time to return the phone calls or would not make time for the appointment could well have been people who would have had a negative reaction to the incentives.

There may be a "why not?" phenomenon present. Respondents were basically asked whether contributions by a third party would provide an incentive to their developments. While every respondent seriously reflected on the impact of these contributions, there is the possibility that there was a touch of "why not, it's not my money" in their response.

With only a couple of exceptions, most interviewees were unfamiliar with the telecommunications concepts being advanced. And those exceptions were minimally knowledgeable and certainly not experts in the area.

It is a challenge to explain that which doesn't exist to people with little available time. This is one reason why in-person meetings were preferred to telephone interviews.

The scale has limitations. Like other attempts to reduce responses to numbers for the sake of comparability, richness is lost. In many cases, the reasoning behind the assessment provides more information than the number assigned. For this reason, qualitative data in the form of respondent comments has been included.

DEVELOPMENT COMMUNINITY PARTICIPANTS

The interviews conducted with the 22 members of the development community essentially constitute a preliminary market assessment for a new family of telecommunications incentives. These incentives are not now offered but are relatively low cost and do not require technological innovation.

Twenty-two individuals can provide only an initial impression of interest. For perspective, there are over 120 names on the mailing list of just the MTA.

However, a number of very significant organizations participated. Five of the planned transit villages, those with the most advanced plans, were represented. Some of the most important TOD housing developers in the state participated. They include Eden Housing (Ohlone Chynoweth), Bridge Housing (Ohlone Court, Coggins Square), and The Lee Group (Village Green).

For analysis, the 22 have been broken into 3 groups, Transit Oriented Developers, Transit Village Developers, and Other. The five organizations planning transit villages have been separated because they are a planning a version of the ideal, mixed-use TOD. This allows the analysis to determine whether there are differences in preferences between transit village developers and developers specializing in single uses. The "Other" category contains respondents who are associated with development, but who are not actually developers.

TRANSIT-ORIENTED DEVELOPERS

Bridge Housing

Bridge Housing is among the leading developers of affordable housing in California. The company advocates "smart growth" concepts, and builds on infill sites in existing communities, often at or near rail stations. Mixed-use projects either incorporate new retail and commercial activity (Marin City USA) or are located near job centers (West Oakland). Recent projects include Strobridge Court in Castro Valley (built on BART station property), Montevista in Milpitas (walking distance to VTA light rail station), and Coggins Square (walking distance to Pleasant Hill BART station). Bridge also developed the 135 unit Ohlone Court, the project on the outer edge at VTA's Ohlone Chynoweth station in San Jose.

The Castle Group

The Castle Group is a privately held residential real estate organization headquartered in San Mateo, California. The firm's businesses include development, land investment, construction, and ownership-affiliated entities. Castle projects consist of both rental and for-sale housing, with product types including stacked flats, townhomes, lofts, high-rise, detached single-family, and mixed-use developments. The firm's specialty is high density, in-fill environments. It recently completed the Whisman Station housing development in Mountain View and the adaptive re-use of Del Monte Plant #51 in San Jose, providing 450 housing units within walking distance from the Diridon Station.

Eden Housing

Eden is a nonprofit corporation dedicated to providing housing and associated services to people without adequate financial means. It has developed 3,300 units of affordable housing throughout Northern California for seniors, families, and people with special housing needs. Eden was the developer of 195 rental units at the Ohlone Chynoweth VTA light rail station.

Inland Cities Corporation

ICC acquires land, obtains construction loans and selects a merchant builder for a variety of project types. This includes office projects and mixed residential and retail. It has not done a TOD yet, but was a bidder on one of the Metro Red Line RFPs.

Simon Lee & Associates

Develops residential projects as well as retail projects, from mini-malls to a 200,000 square foot shopping center (in Orange County). It has 2,000 tenants in various developments, but none are currently at rail stations. He was interested in one of the MTA's RFPs for the Metro Red Line.

The Lee Group

The Lee Group specializes in public/private ventures with redevelopment agencies and community development departments. Their focus is on housing—from entry level single family for low and moderate income families to luxury estates. They were responsible for the Village Green, 186 single

family detached homes adjacent to the Sylmar/San Fernando Metrolink Station with childcare center. It is the largest transit-based affordable housing development in the County of Los Angeles. The firm also develops some mixed-use projects. Venice Renaissance mixed affordable senior and handicapped rental housing with for-sale ocean view condominiums and ground floor retail. The principals of the firm have been involved in Southern California real estate development for over 40 years.

Madison Park Real Estate Investment Trust

The firm's slogan is "the live-work REIT." They make adaptive reuse of classic buildings abandoned or under-utilized. It is currently working on converting an old Sears store at 27th and Telegraph in Oakland to mixed use—live-work units with ground floor retail. Another project is the old bakery in Emeryville, where there will be 57 live/work units. Typical size of such units is 700 to 1,800 square feet. The firm looks for transit adjacent locations but basically redevelops wherever they find suitable properties.

Mozart Development

The firm builds commercial and residential projects. Residential is usually in-fill, zero lot line, detached, at medium to high density. The firm has an office building under construction near downtown Sunnyvale with 460,000 square feet and 10,000 square feet of retail.

Olson Company

The Olson company is one of the 15 largest home builders in Orange County. It specializes in in-fill and builds near transit when possible. It recently developed Renaissance Walk, 40 units of affordable housing one block from the Metro Blue Line in Long Beach. It also built Heritage Walk, 38 units one block from the Pasadena Blue Line, and a 200 unit complex is being built near a BART station in Pittsburg in the Bay Area. It also has several developments in San Diego.

Barry Swenson Builders

Swenson Builders are committed to in-fill development and TOD. The firm prefers very high density in the form of 10 story buildings or more. For example, it has proposed to build two 15-story towers at the Tamien station on the VTA light rail system. The firm is planning to build a headquarters

building for a technology company on the Vasona Line, and 140 senior housing units and 61 townhouses.

Urban Partners LLC

Urban Partners acquires and develops real properties in high population growth and urban core areas of California, particularly in metropolitan Los Angeles. It specializes in mixed-use projects that require complex land use planning, financial structuring, and entitlement expertise. It is currently developing a housing project at the Del Mar Station on the Pasadena Blue Line.

TRANSIT VILLAGE DEVELOPERS

Alameda County Community Development Agency

The County of Alameda owns a site in the City of Dublin adjacent to the East Dublin stop on the BART line (the end of the eastern extension). The CDA intends to develop the land into a mixed-use project that was referred to as a Transit Village. It will include retail, hotel, multi-family dwellings and office commercial. No developers have been retained but Sun and Oracle Corporations each have options on large parcels.

Creative Housing

Currently involved in two mixed-use projects, one on the Pasadena Blue Line which is predominantly housing, and the other which is at the MacArthur BART Station in Oakland. The MacArthur project is planned to be a transit village. The firm is committed to the goals of the transit village—reduced auto dependence and a higher quality of life through a dense village environment with transit access.

Economic Development Division
City of Mountain View

The City of Mountain View downtown area is adjacent to a multi-modal transit stop, with VTA bus and light rail services as well as CalTrain available. (CalTrain is a commuter rail train serving the Bay Area and San Jose.) The City has adopted policies and made investments consistent with the evolution of a transit village. For example, the City created a transit overlay zone that provides a density bonus in order to attract development to the downtown. The

Crossings housing development is one of those developments. The City also narrowed San Carlos Street, west of the transit stop, in order to provide parking, street landscaping, and enhance the pedestrian experience. The City also built a new civic center, including a performing arts center on San Carlos Street, 5 blocks west of the transit stop.

The Fruitvale Development Corporation

The FDC is the developer of the Fruitvale Transit Village, perhaps the currently planned transit village with the highest public profile. Office space for several community organizations, 47 housing units, a medical clinic and 38,000 square feet of retail are planned. The Fruitvale Transit Village will be developed at the BART Fruitvale Station in Oakland.

Richmond Redevelopment Agency
City of Richmond

The City of Richmond Redevelopment Agency has planned and will begin construction on a transit village at its intermodal station on 16 acres of land, much of it an existing BART surface parking lot. BART and Amtrak (including the Capital Corridor from San Jose to Sacramento) rail services and multiple Alameda County Transit bus lines are available. The project will cost almost $60 million and it will include at build-out 231 affordable townhouses and live-work units, 20,000 square feet of retail, and a 30,000 square foot cultural center. There are also related improvements including a police substation, Amtrak platform and canopy, a four-story 680-space garage for replacement parking, and an elevated adjacent street. Almost $21 million in public funds (about 35% of the total cost) have been committed to the project.

OTHERS

ACG Environments

Provides architecture and engineering, program management, and facilities design services to commercial, institutional and industrial developers. It has been in business since 1983. The firm’s principal is committed to transit oriented development and believes that rail transit will change the urban dynamics of Los Angeles. A 350 unit housing development at the Pasadena Blue Line Del Mar station is a current project.

Bank of America

Bank of America does not discriminate between TOD and other projects. The same investment criteria must be met in either case. The interview was conducted with a Senior Vice President in the Home Builder Division. Her most direct involvement in TOD was as a member of an Urban Land Institute "Advisory Panel" in Charlotte North Carolina.

CB Richard Ellis

Leases retail shopping centers in the Los Angeles area. The person interviewed had no previous experience with TOD.

Pat Figueroa

Mountain View Council member for 18 years, two years as Vice Chair of VTA Board.

She has been out of office for 2 years.

Orange County Transportation Authority

The OCTA is the lead agency developing the Center Line, Orange County's first rail transit system. The first phase is being planned for 30 miles with a projected cost of $2.3 billion.

The system will have TOD elements. The corridor cities will adopt policy guidelines for TOD and commit to station area planning. OCTA funded the cities to study TOD options. These studies were intended to augment OCTA traffic analyses. The amount of those funds varied between $100,000 and $350,000. OCTA was selecting the locally preferred alternative, but the project was put on hold in the spring of 2001.

Langdon Wilson Architects

Langdon Wilson offers architectural and planning services to diverse projects including mixed use housing and retail.

RESPONSES OF DEVELOPMENT COMMUNITY

Table 3.1: Participant Study

Developer	*Project Types/Position*	*Category*	*Projects*
Bridge Housing	Affordable Housing	TOD	Strobridge Court (Castro Valley), Montevista (Milpitas), Coggins Square (Pleasant Hill)
The Castle Group	Rental and For-Sale Housing	TOD	Whisman Station Housing (Mountain View), Del Monte Plant #51 (San Jose)
Eden Housing	Affordable Housing	TOD	195 rental units at the Ohlone Chynoweth VTA light rail station
Inland Cities Corp.	Office, Mixed Residential & Retail	TOD	Bidder on one of the Metro Red Line RFPs
Simon Lee & Associates	Residential & Retail	TOD	Interested in one of the MTA's RFPs for the Metro Red Line
The Lee Group	Transit-based affordable housing and mixed-use projects	TOD	Village Green (Sylmar/San Fernando), Venice Renaissance
Madison Park Real Estate Investment Trust	Adaptive Re-Use of Classic Buildings	TOD	Sears Store (Oakland), Bakery (Emeryville)
Mozart Development	Commercial & Residential	TOD	Office Building in downtown Sunnyvale
Olson Company	In-fill TOD	TOD	Renaissance Walk (Long Beach), Heritage Walk (Pasadena)
Barry Swenson Builders	Very High density TOD	TOD	Proposed two 15 story towers for Tamien station (San Jose)
Urban Partners LLC	Complex mixed-use	TOD	Del Mar Station Housing Project (Pasadena)
Alameda County Community Development Agency	Transit Village	TVD	East Dublin stop of BART line
Creative Housing	Transit Village	TVD	Pasadena Blue Line, MacArthur BART station

(continued)

Table 3.1: Participant Summary *(Continued)*

Developer	*Project Types/Position*	*Category*	*Projects*
City of Mountain View, Economic Development Division	Transit Village	TVD	Transit Overlay Zone, Civic Center, Narrowing of San Carlos Street
Fruitvale Development Corporation	Transit Village	TVD	Fruitvale Transit Village
City of Richmond, Richmond Redevelopment Agency	Transit Village	TVD	Richmond Inter-modal Station
ACG Environments	Provides architecture, engineering, program management, & facilities design services to developers	Other	350 unit housing development at the Pasadena Blue Line Del Mar station
Bank of America	Senior Vice President Home Builder Division	Other	NA
CB Richard Ellis	Retail shopping center leases	Other	Los Angeles Area Shopping Center
Pat Figueroa	Mountain View Council Member	Other	NA
Orange County Transportation Authority	Rail Lines with TOD	Other	Center Line (Orange County)
Langdon Wilson Architects	Architectural & planning services to mixed use housing & retail	Other	

Interviews were conducted primarily in February and March, 2001. The effects of the electric power crisis in California were only beginning to be felt, and suburban real estate markets were hot due to a sustained period of economic growth. Affordable housing was badly needed throughout the regions polled—Santa Clara County, Los Angeles and Orange Counties, San Francisco and the East Bay. Indeed, it is these very economies that are generating the demand for affordable housing that is being built as sprawl at the suburban periphery. At least three of the transit villages are planned for areas needing economic revitalization—Fruitvale, MacArthur, and Richmond.

In most cases, the responses reflected the extent to which the respondent has one or more specific projects for which the incentives appeared to be a good fit. The responses should not be interpreted in terms of whether offering the incentives would make good public policy, but rather the degree to which the incentives would benefit a current or planned project.

QUANTITATIVE DATA: GRADE SCALE

Respondents were asked to rate each incentive in terms of a 4-point scale:

A “1” means no interest in the incentive.

A “2” means interest, but doubt that the incentive would have a significant impact.

A “3” means that the incentive would be significant, contingent upon certain conditions, such as particular demographic characteristics or project location.

A “4” means that the incentive would unconditionally have a significant impact.

However, the number of interviews was small so that the apparent precision possible with numerical data can be misleading. The average values should be interpreted as tendencies, not exact ratings.

The expertise of each participant was generally limited to a specific development type or combination of types. As a result, the following tables record responses in 3 categories—retail developments, office developments, and mixed developments. Mixed developments include housing-retail combinations or transit villages, which promise to integrate housing, retail, office, and cultural or community buildings.

The three incentives do not apply equally to each development type. For example, direct access to strands of fiber does not currently make sense to a residential development, but might be attractive to an office complex with sophisticated high volume consumers of network services. DSL/ISP for office developments was similarly not asked. These variations in participant expertise and relevance to development type account for the uneven number of responses to each incentive.

Table 3.1.1: Summary of Responses

	Fiber			DSL/ISP			NAC		
Developer Type	***Retail***	***Office***	***Mix***	***Retail***	***Office***	***Mix***	***Retail***	***Office***	***Mix***
TOD	2.0	3.1	-	2.0	N/A	2.9	-	-	3.3
Transit Villages	-	-	3.1	-	N/A	2.7	-	-	3.2
Other	1.0	3.7	-	1.0	N/A	3.0	2.0	-	2.8
N	2	7	4	2		19	1		21
Total Average	1.5	3.4	3.1	1.5	N/A	2.9	2.0	-	3.1

Each of the incentives averaged around a 3 rating. This means each was perceived as being potentially significant, contingent upon certain conditions being met, such as a specific location or the development catering to a specific market niche.

The retail experts were pessimistic about the utility of any of the incentives to a purely retail development. However, there were only two retail experts in the study so this is not a particularly reliable conclusion.

The TOD/Transit Village participants were slightly less optimistic about the utility of fiber access and DSL/ISP network services than those in the “Other” category, and slightly more positive about the value of a network access center than those in the “Other” category.

Transit-Oriented Developers

Each of the 11 TOD participants believed that the NAC incentive was either absolutely significant (grade 4) or would be significant under certain conditions (grade 3). As a group, they felt only slightly less optimistic about fiber access and DSL/ISP network services.

Table 3.1.2: Transit-Oriented Developers

	Fiber			DSL/ISP			Network Access Center		
Developer	***Retail***	***Office***	***Mix***	***Retail***	***Office***	***Mix***	***Retail***	***Office***	***Mix***
Bridge Hsng	-	-	-	-	N/A	2	-	-	3
Castle Group	-	-	-	-	N/A	3	-	-	3
Eden Housing	-	-	-	-	N/A	3	-	-	4
Inland Cities	-	-	-	-	N/A	2	-	-	4
S. Lee & Ass.	2	-	-	2	N/A		-	-	4
Lee Group	-	2	-	-	N/A	2	-	-	3
Madison Park	-	-	-	-	N/A	4	-	-	3
Mozart	-	4	-	-	N/A	3	-	-	3
Olson Co.	-	-	-	-	N/A	3	-	-	3
Swenson Bldr.	-	3	-	-	N/A	3	-	-	3
Urban Partnrs	-	3.5	-	-	N/A	4	-	-	3
N	1	4		1		10	0		11
Average	2.0	3.1		2.0	N/A	2.9			3.3

Transit Village Developers

The sub-set of transit oriented developers planning some version of a Transit Village responded on average almost identically to the TOD respondents.

Table 3.1.3: Transit Village Developers

	Fiber	DSL/ISP	NAC
Developer	***Mixed Use***	***Mixed Use***	***Mixed Use***
Alameda County CDA	2.5	2.5	2
Creative Housing	4	-	4
Mountain View	2	2	3
Fruitvale Development	4	4	4
Richmond Redevelopment	-	2.5	3
N	4	4	5
Average	3.1	2.7	3.2

Other

Within the "Other" category, those most directly associated with the development process, the two architects, tended to value the incentives more highly than the banker, transportation planner, and former elected official.

Table 3.1.4: Other

		Fiber	DSL/ISP		NAC	
Developer	***Role***	***Office***	***Retail***	***Housing w/ Retail Mix***	***Retail***	***Housing w/ Retail Mix***
ACG	Architect	4	-	4	-	4
CB Richard Ellis	Commercial Broker – Retail Malls	-	1	-	2	
Bank of America	Residential Lending	-	-	3	-	2
Pat Figueroa	Former Elected Official	-	-	2	-	3
OCTA	Rail Transit Planner	3	-	3	-	3
Langdon Wilson Architects	Architect	4	-	3	-	2
N		3	1	5	1	5
Average		3.7	1.0	3.0	2	2.8

QUALITATIVE DATA: COMMENTS

The comments collected during the interviews provide, in some cases, the reasoning behind the numerical grades. In other cases, specific examples of the relevance of each incentive were identified. In those cases, the references may be geographically unfamiliar to some readers. These comments are as close as possible to exact quotes from the participants.

The comments have been organized first according to the category of role (e.g., TOD, Transit Village, Other), and second by the type of incentive. The comments begin with the lowest grade category first.

Transit Oriented Developers

Fiber Incentive

Grade 2 (Interest, but doubt that the incentive would have a significant impact).

Currently developing an 80,000 square office building with ground floor retail near a Pasadena Blue Line station. For this size building, fiber access would not be a big ticket item. It takes about $40,000 to wire the building for a T-1 circuit. It would be low on the list of incentives. Not that many companies would have that much need for that kind of bandwidth (Lee Group).

Grade 3 (Incentive would be significant, contingent upon certain conditions).

Commercial development: Fiber would draw businesses to the rail line, subject to other locational constraints. For example, it would not overcome resistance of locating in East San Jose. It would be very helpful in a current "build-to-suit" project (Swenson Builders).

The possibility of adding to the mix of uses is very interesting. The County is interested in innovation and high technology (OCTA).

Grade 4 (Incentive would unconditionally have a significant impact).

Fiber might be perceived as a benefit by the Los Angeles Unified School district which is interested in one of the MTA sites. And it would be an incentive for light industrial along the Red Line extension to the east of downtown where it would also connect with the City's empowerment zones (ACG Environments).

Fiber would be an incentive to commercial projects, it must be there. (Mozart Development).

DSL/ISP Incentive

Grade 2—Interest, but doubt that the incentive would have a significant impact.

Retail: ISP and DSL would have minimal impact. Less than 100 of my tenants currently have Internet access through their stores. However, the incentive is

too far ahead of its time. It will make a difference in this market, maybe in 5 years (Simon Lee and Associates).

Housing: This would be low on a list of incentives. The costs will go down in the near future as those services will be bundled with telephone service (Lee Group).

Housing: A nice amenity but it wouldn't make an infeasible project feasible. There are different barriers to production but this isn't one of them (Bridge).

Mix of housing/retail: Might have some impact, but it would not be a major incentive (Inland Cities).

Grade 3—Incentive would be significant, contingent upon certain conditions.

Housing: A marvelous idea. The income limit of our market is $60,000 at the high end and many tenants are computer users. Although the market is so tight that there has been little problem leasing units. Low rents with amenities of transit access and day care attract more than enough demand. The incentive would be more appropriate in some developments than others (Eden).

Housing: This would impact the consumer's decision-making process, but don't know how significant it would be. In a transit village market, if you deliver great technology it will definitely give you a competitive advantage. However, in another development, Castle installed Cat 5 wiring and it did not give a competitive advantage. Second, would it be better to put up a satellite dish or is there some other technology that will surpass fiber? (Castle Group)

Housing: Would be a big benefit but it also wouldn't convince tenants to accept a particular location that wasn't otherwise attractive. Families probably wouldn't live in a high rise because of it (Swenson Builders).

Housing: Even though firm doesn't get involved with tenant improvements, it would be valuable in a multi-tenant building (Mozart Development).

Housing: Could be very valuable depending on the demographics (Olson Company).

Grade 4—Incentive would unconditionally have a significant impact.

Could be a strong element in marketing the units in the residential project. That case involves a middle to high-end rental market with live/work units aimed at 1 or 2 person professional service firms. High-speed Internet access and service would clearly be incentives for those target tenants (ACG Environments).

Would certainly be interested. Currently trying to do something like this commercially (Madison Park).

This is a world in which developers struggle to differentiate their products. Of course, no hesitancy (Urban Partners).

Network Access Center Incentive

Grade 3 (Incentive would be significant, contingent upon certain conditions).

Housing: The impact would not be immediate, but it might well increase over time. Parking is an immediate issue—replacement parking and parking for your own development. It would not support a go/no go decision. It could be very valuable, however, if it helped the project qualify for extra points from the lending agencies that specialize in affordable housing loans. These agencies give extra points for proximity to services (Bridge).

Housing: Would be perfect, quite effective at build-out. Ultimately, success would depend on speedy and reliable transit service to the station from the surrounding neighborhoods (Swenson Builders).

Housing: Would make sense in either a downtown or suburban location. (Mozart Development)

Housing: Would be more valuable than a child care center depending on the demographics. (Olson Company)

The concept is a good one. But I have a few concerns. What is the institutional home for these facilities? Maybe they should be put in libraries, and libraries should be included in TOD. Residents like their privacy so maybe this facility would attract too many outsiders to the development. Also, the facility might attract a lot of kids and that would be bad for the development. On the other hand, ground floor retail is often difficult to lease. If this would work in a ground floor storefront, then why not? (Urban Partners)

The significance will depend on the specifics of the particular development and the intended market niche. The Whisman project is high end and pricey, and a NAC might not be helpful there. But it could have a huge value for the right location and development type. (Castle Group)

Grade 4 (Incentive would unconditionally have a significant impact).

Brilliant idea, love that idea. I am proposing senior housing and day care, and will donate a 5,000 square foot community center at a Red Line station. I was thinking of creating public Internet access but can see the NAC idea is more sophisticated and I would rather do that. (Lee and Associates)

This would be very attractive, superb. It should serve the residents and add traffic to support the retail. (Inland Cities)

It would definitely help. It might affect the rents that could be charged for the units. (Madison Park)

The firm is redeveloping Aliso Village in East LA, a 35 acre site at the location of the former Aliso Village public housing complex. It is being redeveloped as a mixed-income community of approximately 400 multi-family units and 97 single-family homes. There will be a large commercial pad that is expected to contain community oriented commercial services. A network access center could make a significant contribution to that space. (Lee Group)

It could also make a significant contribution to their development in the Pomona central business district, about 1 block from the Metrolink train station. The Western University is participating in a university sponsored village core that includes a book store and university-related functions. A network access center could complement the university oriented activities. (Lee Group)

Mix Housing/Retail: Incredible idea. Would have been great to include in the design of Ohlone Chynoweth. That development has 1,500 square feet of retail adjacent to the station designed for a convenience store and perhaps a café or dry cleaners. Would like to include a NAC in the commercial part of a development. (Eden)

It absolutely has value. The plan includes a community center in or adjacent to a park and this community center could house the NAC and become a gathering area for youth. (ACG Environments)

It would carry out the theme of urban enhancement by enhancing access to jobs, education and health on the light rail extension to East Los Angeles. The ability to enhance community is absolutely important. It would help create community fabric. There is a small industrial area with sewing machine repair businesses into which the job element and job training could be introduced. The NAC would provide nice incentives for job creation, a commercial center and light manufacturing. (ACG Environments)

At 4th and Rowan in East Los Angeles there is a large church, Roybal Health Center and a junior high school within which the NAC could reinforce the health element of the community fabric. Because so many of the households in this area lack the capital for home-based technology infrastructure, such a facility in the public realm would be a benefit. (ACG Environments)

Transit Village Developers

Fiber Incentive

Grade 2 (Interest, but doubt that the incentive would have a significant impact).

Fiber would not be a deciding factor, but master developer will definitely want this infrastructure. Reliability would be an issue. (Alameda County)

Grade 4 (Incentive would unconditionally have a significant impact).

This would have a huge impact on the development. Access to fiber might help attract an equity partner, and an anchor tenant. Sun Microsystems or another firm from the Santa Clara Valley might be attracted if fiber to the home office were available as an incentive. Currently interested in negotiating access to the BART network. (Creative Housing)

DSL/ISP Incentive

Grade 2 (Interest, but doubt that the incentive would have a significant impact).

It could create an advantage. May create a buzz that works for the project. It may be a good amenity for the area if the operator is reliable and there are tie-ins. (Alameda County)

Won't have much impact in the current economy. Demand is so high today that the significant issues for development are the availability and cost of land. If the economy cools down, then maybe these incentives might become important. (Mountain View)

Could increase demand for the housing, but demand for housing is currently high. (Richmond)

Grade 4 (Incentive would unconditionally have a significant impact).

This would be wonderful for residential, potentially a strong marketing feature. It's too early to say with regard to retail. The expected retail tenants will be mom and pop businesses and they won't get interested until they can see the space take shape. It would become an exceptional marketing tool once ground is broken for construction. (Fruitvale)

Network Access Center Incentive

Grade 2 (Interest, but doubt that the incentive would have a significant impact).

This type of facility might fit best in a low income area. Fruitvale might be a good location due to the network of social delivery systems. (Alameda County)

Grade 3 (Incentive would be significant, contingent upon certain conditions).

Would not play much of a role in the current economy. However, there has been preliminary discussion about extending the central business district east of the rail tracks. If that were to happen, the City would be very interested in a network access center as a novel facility that would attract visits to that redeveloping area. (Mountain View)

Would help the development, could have a big impact on the last piece, the cultural center which is unspecified beyond the general concept in the current plan. May be advisable to apply to the MTC-TLC program for funding to plan something of this nature in an unspecified 3,400 square foot space located in the transit station itself. (Richmond)

Grade 4 (Incentive would unconditionally have a significant impact).

Would have a tremendous impact. There is a community center element in transit village and mixed retail-housing plans that could be more effective as a network access center. Let's get funding to do this in the current plan. (Creative Housing)

We are already doing something quite like this. If these incentives could have been discussed before the final plan was established, the NAC could have been positioned as the anchor tenant for the commercial portion of the development. (Fruitvale)

It would help the development. It would have a big impact on the last phase of development. Let's apply to the MTC right now since there is a 3,400 square foot space in the first phase in the transit station itself which has not yet been determined. (Richmond)

Other

Fiber Incentive

Grade 3 (Incentive would be significant, contingent upon certain conditions)

From Rail Planning Perspective: It is an intriguing idea but may not be enough to create an incentive. On the other hand, it could provide a competitive advantage for the rail locations over other locations. (OCTA)

Grade 4 (Incentive would unconditionally have a significant impact)

This adds another advantage to locating near rail. This type of incentive could be offered to projects between as well as at stations. Depending on the ultimate tenant, this could have a significant impact. In speculative buildings, this type of amenity could attract large tenants or specialized consumers of broadband services such as medical firms. (Langdon Wilson)

DSL/ISP Incentive

Grade 1 (No interest in the incentive)

Retail: Success in retail depends on proximity to the market. Amenities that don't directly affect the potential customer won't have much value. (CB Richard Ellis)

Grade 2 (Interest, but doubt that the incentive would have a significant impact)

Housing: From City Council perspective, it would be nice to see but the incentives would not affect the community design features that the Council would be concerned about. Developers should decide. To be supportive irrespective of developer interest, would need to see evidence of travel impacts—such as the potential to encourage telecommuting. (Figueroa)

Grade 3 (Incentive would be significant, contingent upon certain conditions)

Mixed Housing & Retail: Would be a very strong incentive for residents—a big amenity. This would not be true of retail tenants since their location decision depends 100% on the size and characteristics of the local market place. The developer always wants to differentiate the product and make it more marketable. These incentives would be of value to some products and not others. (Langdon Wilson)

From a banker's perspective, these services would be characterized as income to the property. Assume the project is a 200 unit apartment building and that the value of the incentive totaled $60 per month or $720 per year per unit. This is equivalent to $144,000 income to the property per year. Assuming that about 70% of that can be captured through increased rent (about $100,000 per year) and an 8% interest rate, then the incentives would add about $1 million of borrowing power. To put that in perspective, the 200 unit building would hypothetically cost $10 million dollars, assuming $40 per square foot construction costs and 1,250 square foot units ($50,000 per unit). The maximum impact of these incentives could be achieved by working out a package that included other incentives such as low income loans. (Bank of America)

It could have value. For example, Santa Ana Community College might be interested. (OCTA)

<u>Network Access Center Incentive</u>

Grade 2 (Interest, but doubt that the incentive would have a significant impact)

Retail: Sounds like a great amenity if the retail center is otherwise viable. While it may attract some people to the center, it should also try to keep them in the center longer. To be very valuable, it would need to provide the turn-over volumes and rates of a movie complex. (CB Richard Ellis)

Retail: Could see it as helping the welfare to work programs. I don't think it could help other retailers unless it could generate the volume of a cineplex—2,000 to 5,000 people with a turnover every two hours. Rents for retailers reflect the people who pass your door. (Langdon Wilson)

From a banker's perspective, there is no way to assign monetary value of the incentive and so the incentive would not affect a financing decision. The value could increase if empirical evidence were available that allowed quantification in terms of the market value from proximity to a network access center. The value could decrease if the facility is poorly managed, and/or becomes an eyesore or detriment to the community. (Bank of America)

Grade 3 (Incentive would be significant, contingent upon certain conditions.)

From City Council perspective, the idea is interesting, but the issue is funding. In Santa Clara Valley, the idea should be commercially viable. Although this may not be so in Southern California. The city would not pay for it. The city seldom makes direct investment in any real estate development. It is willing to invest in the required infrastructure and to provide a density bonus or zoning variance depending on the impact on traffic generation. If MTC wanted to pay for it, the city would cooperate but not take the initiative. If it were funded by the MTC, the issue would be the impact on other funding categories, particularly rail and road expenditures. However, it would be a good idea to bring the telecommunications incentives forward for consideration. Innovation may not fly right away but it gives the decision makers a chance to get educated on new subjects. How the innovation is presented is probably the key to getting support.

The possibility of adding to the mix of uses if very interesting. The County is interested in innovation and high technology. (OCTA)

INTERPRETATION OF SCORES AND COMMENTS

On average, the numerical scores suggested that the sample of development community surveyed believed that, under the right circumstances, the network incentives could make a significant contribution to transit-oriented development. This Section interprets the subjective comments in terms of the numerical grades in order to gain insights into the reasoning behind the grades.

Explanation for Grade 2 Responses (analysis of negative comments across all grades)

Fiber

Analysis of the grade 2 responses shows that although the grades were relatively low, the respondents didn't dismiss the incentives as having no value. Essentially, the comments said that for the incentives to become more valuable:

- The project would have to be of a large scale such as a transit village, and include large tenants.
- The fiber incentive, because of its relatively low cost compared to other elements of the development, would not succeed on its own but would need to be included in package of incentives.

Network Services

Two respondents gave grade 2 responses to the network services incentives on the basis that there is no previous empirical evidence upon which to judge their potential performance. However, innovations, by definition, are untried. If trials yield successful experience, this rating should increase.

Network Access Centers

It makes sense that the impact of any addition to a shopping mall would be a function of the visitors it attracted and the time it extended the visit. The standard of cineplex volume of 2-5,000 people every two hours would be impossible to meet. One reason is the density of seating in a cineplex is relatively high since customers sit passively, often with friends or relatives. Realistically, even a cineplex provides those visitation numbers only after 6PM and during the day on some weekends. This raises the possibility that a portion of NAC facilities could also be used to offer entertainment services in the evening such as video games or small video theatres in what are spaces used for meeting rooms during the day.

Value of property could decrease if the facility were improperly managed

Retail

This development category is being specifically addressed because only two responses were received.

One of the promises of the MetroNet deployment model is that a network access center could help revitalize declining commercial centers. The two respondents with retail expertise did not see that prospect. Their comments had three ideas:

- Network service incentives may be ahead of their time, and may look more reasonable in a few years as retail businesses become more dependent on the Internet. Experience certainly supports the idea that Internet penetration will be higher in the future than it is today. Specifically, e-business applications such as online ordering and e-commerce innovations such as in-store online shopping can be expected to develop in a five year period.
- As above, the network incentive by itself does not provide great value, but it could contribute as part of a larger package of incentives.
- Volumes of visitors associated with entertainment centers would help revitalize the mall—suggesting an interesting NAC design innovation.

One participant commented that current Internet penetration in retail stores is less than 10%, but that because penetration in retail stores might increase in 5 years, the incentive may be ahead of its time. That assessment may be correct.

Comments Explaining Grade 3 Responses

While many of the grade 3 comments included positive terms such as "marvelous idea" or "would be quite effective," the most interesting in terms of policy are those that expressed the concerns or limitations perceived by the respondents. These are the qualifications that kept the respondent from assigning the incentive a higher grade.

Fiber

As with comments on the lower grades, there is a consensus that the fiber incentive (actually, each incentive) would be most effective as part of a package. And that it would not, by itself, be able to overcome unattractive qualities of a particular site.

One respondent correctly observed that the availability of fiber connections would enhance the value of sites all along the rail line, not just at the rail stations.

Network Services

As with fiber, network services would not, by themselves, overcome an unattractive neighborhood or induce a large family to live in a high raise apartment.

Another concern was whether a wireless technology might become more attractive to consumers than fiber-based. This is unlikely in the TOD context since the competitive advantage of wireless technologies is service while in-motion. Other than that characteristic, few people think about the medium over which a service is delivered. Wireline services are more likely to be more competitive in the long run in price and service quality.

Network Access Center

One of the questions about a Network Access Center was its institutional home. There are, of course, a number of possibilities including an existing non-profit, a new non-profit, and a government agency such as the public library. The decision regarding institutional home would be determined during the planning process for the facility.

Locating an innovative activity center at a rail stop raises physical access questions similar to those associated with rail service. Beyond the population within walking distance, success depends on either adequate parking near the facility or speedy and reliable transit access to the facility. These issues are outside of the scope of the MetroNet deployment model but are included in the Network Oriented Development Strategy. The answer is that with full scale network deployment, it is possible to create “neighborhood transportation zones” that authorize an array of new public and private non-automotive, short range transportation options.

One respondent was concerned that a Network Access Center would attract children and perhaps outsiders that would make the tenants uncomfortable. Yet another respondent (who gave the incentive a grade 4) wanted the facility precisely because it might appeal to children, at least at certain times. Both comments were in relation to a housing development where, in reality, a Network Access Center would probably be located adjacent-to rather in the

midst-of the development. Although the substitution of the somewhat obligatory "community facility" by a neighborhood scale Network Access Center is an option that received some developer support.

Comments Explaining Grade 4 Responses

The ability of a developer to identify a particular context in which an incentive would have value is significant. The Ladder of Participation developed by the Blue Line TeleVillage found that the ability of an organization to visualize an application was the key step in implementing that application. That is, almost everyone who visualized an application went on to implement it.

The comments associated with the highest grade on the scale provide examples that might be useful should a region design a pilot program for offering one or more of these telecommunications-based incentives. There was a high proportion of the comments that did identify a specific context as opposed to just offering praise such as "marvelous idea." It may be that a high rating was the result of the developer's ability to see exactly how the incentive might be used in his/her context or specific project.

Among the Transit Oriented Developers, 3 out of 4 comments on the fiber incentive mentioned a specific application; 3 out of 5 on the network services incentive, and 4 out of 6 for the Network Access Center incentive.

Among the Transit Village Developers, 1 out of 1 comment on the fiber incentive mentioned a specific application; 1 out of 1 on the network services incentive, and 3 out of 3 for the Network Access Center incentive.

Among the "Other" participants, 1 out of 1 comment on the fiber incentive mentioned a specific application; and 3 out of 3 for the Network Access Center incentive.

The specific contexts identified by the developers are described in Chapter 7.

BEST PRACTICES: WESTERN EUROPE AND THE UNITED STATES

As discussed in Chapter 1, involvement with land use and development is a relatively new practice for transportation planning agencies and transit authorities. It seems likely that examples of telecommunications integrated with land development and rail systems would be quite rare.

A review of literature for evidence of innovative practices was conducted for the United States and Western Europe. Professor Malu Roldan of the Mineta Institute at San José State University was responsible for research in the United States, and Professor Stephen Graham of the Center for Urban Technology, University of Newcastle on Tyne was responsible for Western Europe.

In each setting, there were two types of relevant cases. One is the development of fiber networks by rail transit authorities for goals that include stimulating TOD. The other is development of any type of public network access facility at a rail or other transit station that attempts to use digital networks to relocate functions to a rail station.

These examples are the ones that were found via review of print publications, Web sites and interviews. While no one can say conclusively, it appears from our research that, as expected, transportation agencies and transit authorities in the United States and Western Europe have very little experience linking telecommunications to land development.

USING FIBER TO SUPPORT TRANSIT-ORIENTED DEVELOPMENT: KEY POLICY ISSUES AND EXPERIENCE FROM A WESTERN PERSPECTIVE

Written by Stephen Graham

It is increasingly clear that “what makes a great railway franchise is what makes a great telecom franchise” (Tanner, 2000, B3). A decisive convergence is developing between metropolitan and inter-urban rail and the key conduits of the information age: optic fiber networks (Graham and Marvin, 1994). The enormous recent investment in optic fibers within and between cities, which carry the bulk of the exploding range of electronic communications, is being laid along rights of way and conduits that tend to closely parallel infrastructural systems for physical movement. This is not surprising when one

considers that, typically, 80% of the costs of starting or 'rolling out' a telecom business come with the traditional, messy process of getting cables in the ground to link up dispersed customers within highly competitive and liberalized markets.

This convergence and cross-fertilization of interests between previously wholly separate industries entails new institutional innovations for maximizing commercial and developmental synergies. It also involves the widespread opening up of the conduit and rights-of-way assets of rail, subway, highway, power, and water to support the fiber roll-out process. For the first time since the close co-evolution of initial rail and telegraph networks in the 19th century, a wide range of institutional arrangements are emerging through which major subway, suburban rail, and interurban rail operators are, in a sense, starting to consider "wheels and wires" in parallel (Hepworth and Ducatel, 1991, Horan and Jordan, 1998).

The growth of integrated thinking of the linkages between systems of physical and electronic mobility promises major progress in the struggle to develop more sustainable and transit-oriented models of development (TOD). The early development of highly capable and cost-effective (or freely provided) fiber networks parallel to the high-accessibility corridors of rail routes can only add to the economic and social development potential of the nodes along such corridors. But to make the most of the potential contribution of fiber to TOD, new and innovative ways of thinking are necessary that integrate consideration of transport, telecommunications, and land use/urban design domains. New institutional arrangements and linkages between the largely separate policy worlds of transport and telecommunications will be necessary which deliver long-term developmental and commercial benefits to both sides, beyond the immediate commercial benefits of revenue raising for transport operators and reduced network development costs for telecom operators. Finally, new concepts of transit and broadband oriented development will need to be developed and translated into commercial and public policy development strategies.

In this section of the report we provide the context for the rest of our analysis of Western Europe. We do this in four parts. First, we explore the financial imper-atives that are driving the use of rail corridors to support telecommunications rights of way and development in more detail. Second, we look in detail at the barriers that tend to inhibit the development of cross-sectoral institutional innovation that integrate fiber in to TOD and rail corridor development strategies. Third, we look at the various institutional innovations

that have so far emerged that attempt to overcome these. Finally, we look at two examples from Western Europe of leading-edge strategies to integrate telecommun-ications fully into the commercial and development strategies of rail operations and rail corridors.

THE FINANCIAL IMPERATIVE OF USING FIBER AND RIGHTS OF WAY WITHIN LIBERALIZING TELECOMMUNICATIONS REGIMES

Since the parallel construction of telegraph and rail networks in the nineteenth century, railways and telecommunications have always closely co-evolved. The parallel liberalization and marketization of telecommunications and the increasing commercialization of rail means that this co-evolution is reaching a new and extremely intense phase. Since the early 1990s there has been a massive growth in the opening of rail rights of way (ROWs) and rail-owned fiber networks to the proliferating blizzard of telecom operators searching for cheap, maintainable solutions to the imperative of laying networks to meet high-demand markets.

In Europe, for example, virtually every subway, suburban rail, and interurban rail operator (and, for that matter, many electricity, gas, water, highways and waterways operators) has realized that potential exists to generate lucrative new revenue streams through negotiating with competing telecom operators, either to lease duct space or to lease dark fiber.

This is a symbiotic match: leeways for cheap market access for ambitious and ultra competitive telecom operators generating revenue streams from the existing assets for increasingly commercially astute rail operators (who are also increasingly getting involved in the commercial development of their property assets for retail, leisure and office use) (Bertolini, 2000). As rail companies strive to sweat their assets within increasingly tight commercial contexts, the telecom gold mine is a godsend. It is also a connection that has been broadly encouraged by both rail and telecom regulators. In France, for example, all infrastructure operators have been directly encouraged by the national telecom regulator, ART, to open their ducts to new telecom competitors, as a way of encouraging the quick and relatively low-cost roll out of competition to undermine the monopoly power of France Telecom.

The increasingly close commercial connection between rail and telecom franchises will continue with the exploding demand for wireless antennae and base stations (especially for the roll-out of third generation wireless). In the

U.S., for example, 100,000 wireless antennae will be in place by 2002, offering a $3 billion bonanza to those owning the sites and real estate on which they are placed (around $15,000 to $70,000 per site). Rail companies are especially well placed to profit from these new wireless infrastructures as environmental protests are making siting them outside of major transport corridors an increasingly conflictual, lengthy, and costly process.

THE BARRIERS INHIBITING CROSS-SECTORAL THINKING

It is relatively simple to develop commercial relationships to simply support the development of fiber by telecom operators within rail rights of way or conduits. It is a much greater challenge, however, to develop institutional innovations to ensure that the fiber contributes towards wider TOD and urban development or design objectives. In order to integrate fiber and telecoms into TOD strategies there will clearly be a need to overcome major barriers. These are of three kinds: paradigmatic/perceptual; institutional; and commercial.

Paradigmatic and Perceptual Barriers

First, major paradigmatic/perceptual barriers continue to exist between the policy worlds of telecom operators and those of transport operators. The language, cultures and professional contexts of the two are extremely different. Few people have an understanding of both worlds. These problems were at the heart of the failures of joint venture companies, set up between European rail and telecom operators in the mid to late 1990s that will be discussed below. Many rail companies are in such regulatory turmoil, facing the pressures that come from privatization and/or becoming more commercial in their operations, that they are struggling even to maintain their core functions. This can reduce their desire to launch apparently exotic non-core activities like telecom joint ventures and holistic TOD strategies, even if it is clear that such strategies will bring long term ridership and development benefits to the rail operator.

Institutional Barriers

The second type of barrier, those which are institutional, are equally problematic. Beyond the technical and financial imperatives of gaining leeways and ROWs for installing network capacity (often in secretive competition with other operators), telecom operators have little institutional involvement in debates about urban, community, and physical development in and around station corridors. As the French network urbanist Gabriel Dupuy argues “telecom operators do not want to share the [telecom]cake and they are

often strong enough to impose their common point of view to the transport infrastructure owners" [about the development of their networks on a secretive, commercial basis] (personal interview, 11/11/00).

Conversely, transport policy makers and wider urban professionals and politicians still often have little understanding of the esoteric worlds of telecommunications development and regulation (Horan and Jordan, 1998). Successfully bringing the two worlds together in the form of integrated and holistic strategies to develop fiber and TOD together therefore requires substantial institutional innovation.

Commercial Barriers

Such institutional barriers lead, in turn, to commercial barriers, which also work to inhibit the kinds of holistic thinking and strategy making that will be necessary to realize the benefits of synergistic development between fiber and TOD corridors. Telecom operators tend to incorporate rail-based fiber into their wider networks with little interest beyond the need to get drops to the buildings of IT-Intensive organizations. It is often hard to convince them of the tight business case for concentrating their minds on the economic and social development of station areas and rail corridors, rather than elsewhere within the areas served by their fiber networks. Operations tend to dominate the culture of rail companies, and quickly justify control over new network resources.

A Ladder or Partnership: Institutional Solutions to Managing Rail-Telecom Synergies

So how, in practice, are the above paradigmatic, institutional and commercial barriers being overcome? Four emerging attempted solutions can be identified. In what follows we discuss these along a ladder of growing partnership. We discuss the least innovative and more traditional solutions first, followed by more holistic and imaginative solutions based on deeper partnership between rail and telecom operators.

<u>Leasing of Existing Ductspace, Leeway Rights, and Station Space</u>

The first and most simple solution has been the leasing of existing ductspace, leeways rights, and station space by telecom operators. This is also the most common solution and is practiced all over North America, Asia and Europe. This approach is especially common in the UK (e.g. London transport),

France, Netherlands, Germany, and Eastern Europe. Increasingly, station and platform space is also being leased to telecom operators to offer commercial Internet terminals (as is the case in Amsterdam and across the UK, where Railtrack now supports the roll-out of hundreds of BT street Internet terminals to main business stations).

Leasing of Installed or New Fiber Which is Still Owned by the Rail Company

The second approach is the leasing of installed or new fiber that is still owned by the rail company. Examples of this practice come from Swedish railways, the Paris Metro (RATP), Hungarian rail, and Japan rail. In this approach, 'dark'fiber laid within and between main business corridors by rail companies in their own ducts to meet their own operational needs, provides a highly salable asset to commercial telecom providers. This is especially attractive to so-called 'resale' telecom operators, who offer services by leasing capacity on fiber networks owned by third parties, rather than installing their own.

Establishing Joint Venture Companies (JVCs) Between Rail Operators and Telecom Providers

The third solution has been in establishing Joint Venture Companies (JVCs) between rail operators and telecom providers. This was a common development in the late 1980s and 1990s, especially in Europe. For example, Deutsch Bahn (German National Railways) set up a joint venture with the telecom company Mannesman ACOR called DBCom. In exchange for shares in Mannesman, Deutsch Bahn opened up leeways and fiber to DBCom right across Germany. In the Netherlands a joint venture was created between BT and the national railways in 1997. Known as Telfort, this used existing optic fiber and ROWs to support the development of a national competitor to the Dutch PTT. Space near stations was used to install exchanges.

Major joint ventures were also constructed at the trans-European scale. In 1997 a consortium of European rail companies created the HERMES joint venture with GTI to establish a 17,000 km fiber trunk network linking all the major cities in Europe. This is now in place.

However, it is now apparent that such rail-led joint ventures have rarely been commercially successful. The paradigmatic, institutional and commercial barriers discussed above have often not been successfully resolved in practice. Experience suggests, in particular, that Rail companies proved ill-suited to the cut and thrust of the fast moving and esoteric world of telecoms operations.

Telecom operators failed completely to get involved in the commercial and urban development strategies for the spaces around stations and rail corridors, and so missed major commercial opportunities for building up synergistic links with the rail corridors in which they placed their fiber.

As a result of this commercial failure, most joint ventures have now been converted into pure telecommunications companies, under the total control of the original telecom partners. DBCom is now entirely controlled by Mannesman (who are, in turn, mostly owned by Vodafone). Telfort is now a 100% subsidiary of BT. And Hermes is now absorbed totally into GTI's extending European operation. The result is that prospects for using rail-based fiber for holistic development strategies for stations and rail corridors have actually diminished in these cases because the institutional distance between rail and telecom operators has increased. The telecom operators in these cases are purely concerned with mobilizing networks for competitive market share within extremely dynamic and ultra-competitive market places. This apparent setback does not invalidate the idea of integrating fiber into TOD and rail corridor development strategies. Rather it stresses the need for new and innovative thinking to make sure that potential commercial and developmental synergies are realized in practice.

One area where new JVCs are still emerging is in third generation mobile. In the UK, for example, Railtrack (the track-holding company for national rail) has established a major JVC with Marconi known as Euromast (of which they own 15%). Euromast is planning to install 5000 shared radio masts on and around the track system, which will be linked by Marconi's own 6,500 km fiber network, Ipsaris. Base stations will then be rented out competitively to a range of service suppliers. In the context of increasing locational battles over mast construction (and wider environmental concerns and health-risk protests), this venture is seen as a mutually beneficial way to offer new and existing 3-G mobile companies easy, cheap, and quick access to major metropolitan areas and corridors.

Establishing Dedicated Subsidiary Organizations to Manage Liaisons With Telecom Companies

The final and most recent innovation is for rail companies to establish dedicated subsidiary organizations to manage liaisons with telecom companies. Much less common than the above three options, this approach is relevant only for the more complex networks in the most demand-rich areas. The only example so far discovered is Telcite, a subsidiary of the Paris metro

operator RATP. Telcite has been one of the most innovative examples of integrated fiber and transport planning; it is an example that we explore in more detail below.

BEST PRACTICES IN WESTERN EUROPE

Clearly, attempts to integrate fiber into TOD strategies face problematic barriers; there are major factors inhibiting imaginative and innovative strategies which begin to realize the clear potential benefits and synergies in practice. However, two cases have emerged of more imaginative practice. Here the scope for greater developmental synergies between rail and telecommunications, to boost the development of spaces and station areas, has started to be explored. As a final part of this context-setting review, it is therefore worth exploring these cases in more detail.

Fiber: The Paris Subway-Telcite and NAXOS

The Paris Subway presents Europe's best case study of a sophisticated approach to managing liaisons with telecom companies by a municipal subway operator (RATP). Set up in 1998, Telcite is a wholly owned subsidiary of RATP charged with exploiting the subways extensive fiber and duct assets within the context of liberalizing and booming telecommunications demands in the Paris region.

Initially Telcite themselves gained a license from the French telecom regulator, ART, to lease their fiber network to telecom companies within the Paris region. Given France's relatively late liberalization, ART were keen to use all infrastructure providers as means of rolling out competitive networks to France Telecom, the PTT, with speed and ease. In 1999, Telcite was forced to set up another subsidiary, NAXOS, in order to actually operate a separate fiber network commercially. NAXOS now have in place a comprehensive set of ductways housing world-class dark fiber which can be commercially opened to a huge range of telecom suppliers through mutual contracts. This network is now a major basis for the competitive telecoms market in Paris. Most major competitors, including COLT, Belgacom, Cegetel, BT, Cable and Wireless, Eurotunnel Telecom, GTS, Global Crossing, Kaptech, Qwest, and Level 3 have contracts with Naxos to use their fiber.

However, these relationships have not gone beyond basic contracts. NAXOS and Telcite currently do not have plans to try to influence what these suppliers do with their fiber. Nor do they want to enroll these operators in wider

strategies to develop station areas and RATP corridors for economic, community, social, or physical development purposes. They basically do not see the need. They are aware that the existence of such a huge range of world-class telecom competitors along their corridors is enhancing the development prospects of their station areas. But, as they see it, they "are not estate agents. We are asked by real estate agents when they plan to build or renew a building 'can you service it?' and we reply" (Mse. Lenoir, commercial manager). In other words, the dynamics are completely left to the synergistic interplay of the network connections and their impact on development processes through real estate and development markets.

Telcite and NAXOS are, however, much more active in using their network to enhance the RATP system and the experience of travelers. They have now set up a system for the use of GSM mobile phones across the RATP network. They have also set up an alliance with a manufacturer of public Internet terminals (Cyberdeck) to roll out free Internet terminals (paid for by advertising) to line B of the suburban RER rail network. And they are exploring with Cyberdeck the extension of these into e-commerce platforms for travelers. Again, however, none of these things are being done explicitly to boost the development of stations and rail corridors. If this occurs, this is seen as a welcome by-product of a purely commercial strategy aimed at cashing in on the fiber assets established by RATP.

Station Facilities: The European Electronic Railway

An imaginative attempt to develop and exploit synergies between rail corridors and broadband telecommunications networks, the European Electronic Railway is an EU-supported project incorporating experimental initiatives in the Netherlands, Austria, and Germany. Commencing in the year 2000, for an initial period of 3 years, each program site is organized around a public private partnership developed to link rail operators, local-regional authorities, telecom companies, and end-users (small companies, tourism firms, governmental & non governmental organizations, and target users). These partnerships are tasked with developing projects which harness and develop synergistic linkages between exploiting broadband telecom and IT systems, supporting the economic and social development of station areas and rail corridors (particularly those with poor existing access to broadband), and improving the ridership, viability, and image of the (largely rural) rail networks involved in the process. Particular efforts are being made to support the innovative use of IT by companies and users that tend to be under-represented in using new technologies.

The only EER project to be implemented so far is the 'Telechance' initiative in Jennersdorf, Austria. This involves a partnership between the Austrian Bundesbahn rail network, local authorities, and the Vodafone/Mannesmann telecoms group, which offers broadband ADSL services to station areas, Telechance includes the development of managed workspaces for small e-commerce companies, training and support services for women e-commerce entrepreneurs, and training in advanced IT use to a wide variety of local users and organizations, linked with local technical colleges. While initially Telechance projects have benefited from EU subsidies, the project has already successfully spawned a range of commercially successful small e-commerce and teleservice companies. E-commerce and Web-site support is also provided to a wide range of local firms, who are encouraged to market their services collectively over the Web. The local station also houses an Internet café with broadband connectivity and high quality video-conferencing facilities, the first in the region.

A key to the early success of Telechance has been a highly motivated project entrepreneur, who has been critical in convincing the various partners of the merits of thinking holistically about how fiber and transport corridors can together be harnessed for both social and economic development and commercially rewarding applications of both sets of networks. Once the initial success had been made in convincing the local authority, telecom operator, and rail operators, however, the more significant step has been in convincing local firms and community groups to get involved in taking advantage of the networks and services that become available. As René Van Veen, President of the EU organization developing the Electronic Railway argues:

> "Convincing the rail operators, local governments, and telecom firm to become involved was only the first step. It was not the most difficult one. The real challenge was to mobilize the local community. This was done through a series of workshops allowing them to start to formulate their own expectations and applications. This created a commitment. Part of the challenge is opening eyes for opportunities of synergy" (personal interview, February 2001).

The German and Dutch EER projects have yet to be significantly developed. In the German case, at Losheim, the initial telecom operator was the local energy company. Due to financial problems, however, a new telecom operator is being sought. In Eest Groningen in the Netherlands, Telfort, the joint venture between BT and Dutch railways, now a full commercial subsidiary of BT, is the telecom partner. Neither the German nor the Dutch case have progressed

beyond the early project planning stages because of the changing involvement of telecom partners. As René Van Veen suggests, the shift from Joint Venture companies linking rail and telecom operators, to fully commercial telecom firms, has made the establishment of cross-cutting partnerships at the local level more complicated: "These loose relations [between telecom operators and] Railway companies make cooperation between the Railway Companies and local partnership initiatives less visible or even more complicated."

UNITED STATES: FIBER AND STATION FACILITIES

Fiber Networks

The search for evidence of connections between rail systems, land development and fiber networks reinforced a general theme of this research study—that the nexus is still quite primitive. A search of the online document data base of the American Public Transportation Association (www.apta.com) found only 13 references to titles including fiber optics or fiber networks. As of November, 2000, the most recent paper was from 1998 and the topics in every case were technical in nature. None dealt with policy issues or applications outside of rail operations. The APTA librarian confirmed that, despite collecting a variety of information about each public rail system in the United States, the organization does not track issues relating to right-of-way development and fiber networks.

The Web page of leading industry consultant Kingston Cole and Associates (www.kingstoncole.com) is a more effective source of information for rail transit-fiber network connections. KC&A clients along with a brief description of the policy include:

Bay Area Rapid Transit District (BART)

BART entered a joint development agreement with Metropolitan Fiber Systems Network Technologies (MFSNT) in 1996 to construct a multi-duct fiber optic system in BART's right-of-way. The agreement provides revenue to BART, new products and services for BART riders (a form of ITS), and an operational internal telecommunications system, including large amounts of fiber for BART's own use.

Peninsula Joint Powers Board Transit District (JPB)

Operates Caltrain which connects Santa Clara Valley with the Bay Area in northern California. As of 1999, JPB was negotiating with Metromedia Fiber Networks to joint develop its rights-of-ways for terms and conditions that included:

- Revenue of $.875 million per year.
- One innerduct reserved for JPBs exclusive use.
- 24 strands of dark fiber reserved for JPBs exclusive use
- 50% of the revenues from rental fees from 3 other innerducts in an 8 innerduct system owned by MFN

Washington D.C. Metropolitan Transportation Authority (WMATA)

As of 1999, WMATA was evaluating its options regarding a business plan for development of fiber optic and wireless systems for internal use and revenue production.

Tri-County Metropolitan Transportation Authority of Southern Oregon (Tri-Met)

As of 2000, Tri-Met had completed negotiations with Metromedia Fiber Networks to share revenue from the commercial development of its rights-of-way for fiber networks, and to receive other unspecified amenities from MFN.

Santa Clara Valley Transportation Authority (VTA)

As of 2000, VTA had commissioned KC&A to negotiate on its behalf with fiber network developers to occupy existing vacant conduit space and possibly lease existing VTA dark fiber that has been declared surplus.

Los Angeles County Metropolitan Transportation Authority

KC&A developed the policy described in Section 5 for revenue pricing license agreements with commercial carriers interested in using its rights-of-way.

In addition to this variety of rail authorities, state transportation agencies have also been active in joint developments of fiber networks in their rights-of-way. They include New Jersey, California, Montana, and Oklahoma. Cities as well

have pursued similar relationships. They include the California cities of Anaheim, Glendale, Pasadena, Milpitas, and Palo Alto.

In general, the joint development arrangements provide the right-of-way owner with revenue and some kind of capacity to use for its own purposes.

The national survey of rail authorities published in the MetroNet Report (Siembab, 1992) included the Southeastern Pennsylvania Transportation Authority, Chicago Transit Authority, Metropolitan Atlanta Rapid Transit Authority, and the Massachusetts Bay Transportation Authority, as well as several of the cases discussed above. The findings of this older survey were consistent with the arrangements that have been made in the late 1990s and early 2000s.

No cases were found in the literature where a joint development deal included any relationship to land development, either directly or indirectly through secondary deals with Internet Service Providers. No cases were found where transportation authority capacity, developed independently or acquired as part of a fiber joint development arrangement, was used to support TOD.

Station Facilities

Blue Line TeleVillage

The Blue Line TeleVillage (BLTV) was designed and developed as the prototype network access center. That is, the facility was intended to demonstrate the viability of a non-commercial, multi-user technology platform that would improve access to network technologies as well as access to services and work. It introduces functions to a rail stop, analogous to the mix of uses in a transit village.

It was sponsored by the MTA using ISTEA Congestion Management Air Quality (CMAQ) funds. Opened in April 1996, operational responsibility was transferred to the City of Compton in April 1997 and the facility continues in operation today.

The Blue Line TeleVillage used about 2,500 square feet of space in the Martin Luther King, Jr. Transit Center (owned by the City of Compton), adjacent to the Compton Station of the Metro Blue Line. The site was chosen because it was adjacent to a multi-modal rail station at about the mid-point on the Metro Blue Line. The Transit Center was adjacent to the Compton Civic Center,

which included a County Court Building as well as municipal facilities, a U.S. Post Office, and a large retail facility. In other words, the result was a prototype Transit e-Village.

Just under 10,000 people lived within 1/2 mile of the facility—the outer limit of walking distance. There are 41,600 people that lived within 1 mile and 133,700 within 2 miles of the facility. There were 121 business establishments with about 4,000 employees within 1/2 mile.

The service area was in a transition from African-American to Hispanic origin with the population at the time at about 50% each. Compton is a suburban community with housing throughout the service area less dense than in the County as a whole. In general, economic conditions in the service area were worse than in the County as a whole: household income about 2/3 of the County average, high school graduation rate relatively low, about double the County-wide unemployment rate, low vehicle ownership, and a much higher percentage of blue collar workers.

The BLTV had six elements:

Computer Center—in an 800 square foot room equipped with 12 pentium computers, local area network, and Internet access using 4 integrated services digital network (ISDN) lines.

Video Conference Center—in a 1200 square foot room equipped with a dual monitor group-scale video conference system, seating for up to 20 people, and 3 ISDN lines with an option for 6.

Telework Center—two semi-private work stations equipped with computers, telephones and printer, connected to the Internet through the local area network in the Computer Center. The Telework Center was located in the City of Compton's Business Assistance Center (BAC) and provided teleworkers with access to the BAC's meeting room and library. The library was also equipped with a VCR and a desk-top video conferencing unit using a single ISDN line.

Kiosks—City of Los Angeles Housing Authority, AIDS Information Center of the County Museum of Science and Industry, an ATM from Wells Fargo Bank, and an ATM from the Bank of America.

Community Meeting Room—a large space that could seat up to several hundred.

Circuit Rider Work Station—set aside so that representatives of various government agencies could appear for scheduled visits at the BLTV to provide information or directly deliver services to constituents. A benefits counselor from the Social Security Administration is an example.

These facilities were used in the following manner:

Computer Center—provided public-access computing, classes ranging from an introduction to computers to intermediate level in several applications programs, Internet access, contract training for local organizations such as day care providers, and facility rental to large organizations interested in conducting their own computer training programs for employees.

Video Conference Center—24 interactive video conferences were held in addition to 50 meetings that did not use technology. The video conferences included a contract distance education class originating at California State University at Dominguez Hills; library services such as story telling for pre-school children and a book tour lecture by African-American author Walter Mosley originating in the Pasadena Public Library; several small business assistance seminars sponsored by the Small Business Development Center also originating in the Pasadena Public Library; a meeting demonstrating the technology for local artists, and another with an FTA official demonstrating possible programs with state and federal agencies.

Telework Center—provided a professional work space for residents who were home-based or for small and under-capitalized organizations; and provided a remote work station for employees telecommuting from a regular job. The desk-top video conferencing unit was intended for local business people to obtain one-on-one training from mentors in Small Business Development Centers located elsewhere in the County.

Community Meeting Room—Several large gatherings sponsored by the MTA or the BLTV were held there, including the community leaders planning meeting, Advisory Board meetings and a “Women’s Day” Conference. In addition, other organizations held meetings there in order to tour or to use some other element of the BLTV—including the Inner City Computer Society, the Compton Chamber of Commerce, and the Regional Business Assistance Network of the Los Angeles Economic Development Corporation.

Circuit Rider Work Station—only the federal Office of Personnel Management and the MTA provided a circuit rider, although there was community interest

in other government agencies. The work station was primarily used for BLTV administration.

There were over 6,000 visits to the BLTV. The kiosks and the Computer Center were the most popular, in part because they were the easiest to use. Almost 2,000 people received training in computer skills.

The Small Business Development Centers were among the most effective users of the BLTV.

The BLTV started the process of becoming a community meeting place—the Compton Chamber of Commerce held a mixer at the BLTV, the Inner City Computer Society regularly held meetings and training sessions there, children's services organizations used the Computer Center, and kids gathered there after school and over holidays.

The following table summarizes the apparent mode shift away from automobile use associated with the facility.

Table 4.1:
Mode Choice for Journey to Work and Journey to the BLTV

	To Work		To BLTV	
	County	**Service Area** 2 mi rad	**Member Data Base** N=620	**User Survey** N=34
Auto	85.6%	88.3%	70.8%	45.4%
Transit	6.5	6.2	20.2	44.1
Walk	3.3	2.4	9.0	10.3

VIA Metropolitan Transit, San Antonio, Texas, 2025 System Plan

In May, 2000, the voters in greater San Antonio failed to approve building the key piece of the 2025 System Plan—a light rail transit system with 12 stations. Televillage centers, based on the model developed at Compton as the Blue Line TeleVillage (and influenced by the community technology center located at a rail stop at the University of Missouri at Saint Louis) were planned for five of those stations.

VIA lists five goals for that system of televillages:

- increase the use of transit;
- provide more passenger amenities;
- promote community revitalization and local entrepreneurship;
- contribute to compact housing, commercial and related activity, i.e. transit oriented development at rail stations; and
- provide another educational resource for the community.

Each of the five facilities was planned to offer:

- instruction in basic computer literacy and software applications;
- resources for individuals and small businesses who cannot justify or afford the purchase of a personal computer, software, peripherals or Internet/e-mail access;
- space for home-based business entrepreneurs and for "telecommuters" who do not need to travel to a workplace;
- distance learning opportunities in lieu of travel to an educational campus; and
- teleconferencing activities of general and specific interest to neighborhood groups.

Adjacent or nearby early child development facilities were envisioned as part of a parallel initiative.

The prospectus developed by VIA Metropolitan Transit entitled "TELEVILLAGES: Providing a Basic Resource for the 21st Century" closed with the following:

> A televillage facility is a resource with many advantages. It provides community access to technology; supports neighborhood activity centers; and reinforces the use of transit service. Televillages promote the advantages of modern communications and information technology while at the same time maintaining a sense of community at the neighborhood and individual level. A televillage initiative in and for San Antonio is recommended.

> '[In the 21st Century] physical settings and virtual venues will function interdependently and will mostly complement each other within transformed patterns of urban life rather than substitute within existing ones. Sometimes we will use networks to avoid going places. But sometimes, still, we will go places to network' (William Mitchell, 1999, Page 155).

e-Station in Philadelphia

Although neither rail oriented nor multi-functional, the e-station as computer enhanced bus facility is a step in that direction. Its origins are in Intelligent Transportation Systems where the question was, what information should be provided to transit consumers at bus stops? The first e-station is being designed by faculty and students with the Urban Lab at the New Jersey Institute of Technology. The research and design phase is being funded by the New Jersey Department of Transportation. The following description is quoted from the project's Executive Summary provided by Professor Karen Franck, Director of the Urban Lab and Darius Sollohub, Principal Investigator.

The e-station is a new type of building conceived by faculty and students in the New Jersey School of Architecture to address two kinds of problems faced by Newark residents. The first problem is reliance on bus service to meet many daily needs. Residents must wait by the side of the road, unprotected from cold or inclement weather, possibly in unsafe locations, with little certainty of when the bus will arrive. The second problem is residents lack of access to the Internet. This robs many residents of the chance to take advantage of all kinds of resources from e-mail to job information to purchasing goods through e-commerce.

As a series of enclosed, computer-equipped and staffed bus stations, e-stations address both of these problems. As presently envisioned, each e-station consists of: (1) an enhanced transportation system to inform people of exactly when buses are to arrive; (2) a portal to the Internet giving users e-mail service and access to myriad resources including the states One Stop program for employment information; (3) a full-time concierge or facilitator; and (4) card access to the building. As e-stations evolve, they can also offer access to e-commerce with purchases delivered to the station.

Approximately 2,000 square feet in size, each station would have a storefront facade, adequate seating, storage or other flexible space, banks of computers, a concierge desk, pay telephones, and an ATM machine. E-stations will be sponsored and maintained by local community organizations in partnership with private entrepreneurs.

The research and design phase is being funded by the New Jersey Department of Transportation and the National Center of Transportation and Industrial Productivity. The target date for opening the prototype is fall 2002.

CURRENT TELECOMMUNICATIONS POLICIES BAY AREA AND SOUTHERN CALIFORNIA

With the national and European experience as context, the next question is the status of integrated telecommunications in the Bay Area and Southern California.

BAY AREA

The research centered on the policies and activities of the region's MPO—the Metropolitan Transportation Commission, and its two rail systems—BART and VTA (light rail). The commuter rail systems, Caltrain and Altamont Commuter Express, were not addressed.

Metropolitan Transportation Commission

According to staff, MTC does not have specific regional policies or guidelines on any telecommunications issues. MTC supports telecommuting in principle as one alternative for reducing work trips. Past participation in telecommuting demonstration projects did not indicate that it could be a significant part of the transportation solutions for the Bay Area. MTC will soon begin its regional architecture development for Intelligent Transportation Systems (ITS), which will likely have a component dealing with telecommuncations alternatives for linking together ITS projects throughout the Bay Area (wireline and wireless).

BART

BART originally explored the possibility of developing its own fiber system, but found that ownership of fiber or conduit might trigger its regulation as a public utility. To avoid this possibility, it searched for a joint development partner and completed a three-way agreement in 1995 involving MFS Network Technologies and California DOT (Caltrans).

Under the agreement, MFS technologies installed approximately $45 million worth of capital improvements procured by BART for a new fiber optic system for use in operating its rail transit facilities. MFS also invested $3 million to install additional conduit throughout BART's system. This conduit will be rented to any carrier that wants to pull its fiber through. Ninety-one percent of the rents will go to BART while the remaining 9% will go to MFS. BART expects these revenues to cover all but $2 million of the cost for its train

control system—including operations, maintenance, and interest on debt over a 15-year period. BART's license to MFS does not provide exclusivity, however MFS has exclusive rights as long as there remains unoccupied capacity in the conduit system. After system capacity has been reached, BART will give MFS right of first refusal if BART wants to increase conduit capacity.

Twenty-five miles of ROW, out of the 100 included in BART's current and planned extensions, are owned by Caltrans. Caltrans gave BART control of those 25 miles but retained ownership. In exchange, Caltrans will receive 25% of the revenues that BART receives from conduit leases on the 25 miles owned by Caltrans—but only after BART has fully paid for the telecommunications system. Caltrans also receives in-kind compensation in the form of access to BART's 48 strands of fiber optic cable along the full 100 miles of the BART system. Caltrain's lease to BART appears to be exclusive.

Beginning in the spring of 1997, BART began discussions with new strategic partners including University of California, Berkeley, Lawrence Livermore Laboratories, and others in order to achieve maximum utilization of the fiber network. This effort also involved discussions with private companies interested in using the BART network to conduct BETA tests of innovative products and services.

In June, 1999, BART entered into an agreement with Lawrence Livermore Laboratories, Nortel, and the Department of Defense Applied Research Agency to engage in experimental development of the "Next Generation Internet" (NGI). BART is the only transit agency in the country involved in such an effort. The experiments will include evaluating BART-specific applications such as anti-collision systems (see www.kingstoncole.com).

VTA

VTA has been systematically replacing twisted pair copper wire with optical fibers throughout its network backbone. Rather than seek a private joint venture partner, management applied for and received a federal grant to pay for the modernization process.

Management's desire to protect the network and the rail service from disruptions or inconveniences related to the needs and practices of outside vendors was the primary reason for not seeking a private partner. In some areas, the network is physically between the tracks. In other cases, the network is beneath the landscaping or in the middle of the street.

The backbone network carries a wide area network (WAN) that connects the switching sites and is used for train control, alarm monitoring, and video security at platforms.

The fiber network has substantial excess capacity. There are 24 fiber stands in most places with only 4 of the 24 currently lighted. There is also a 4-inch pipe with 3 inner ducts, 1 in use and 2 vacant. A short segment of the backbone has 48 fiber strands with the second 24 added as part of a joint development agreement with the County of Santa Clara. The County uses its capacity for traffic signal control.

The bureaucratic organization of the fiber network is with the "maintenance" function under rail operations.

SOUTHERN CALIFORNIA

The research centered on the policies and activities of the region's MPO—the Southern California Association of Governments, the Los Angeles County Metropolitan Transportation Authority (operates Metrorail) and the Southern California Regional Rail Authority (operates Metrolink, the commuter rail system).

SCAG

SCAG developed a telecommunications policy in 1996 published under the name "Telecommunications Deployment Strategy." The Strategy did not offer a new vision of the region, nor mandate innovative programs or demonstration projects, nor regulate behavior. It proposed to a) monitor network applications in the region that had transportation impacts that could be replicated by others; and b) to disseminate information about those network applications. The Strategy was never funded and it remains unimplemented and essentially forgotten. The problem, according to SCAG staff interviewed, has been the lack of regional leadership for telecommunications programs. It is not part of anyone's agenda.

The SCAG region is one of the participants in the National Telecommuting Program. This is a test program that provides employers with incentives for offering the telecommuting work option. It offers air quality credits to firms authorizing telecommuting and allows the credits to be sold to firms who need credits to satisfy air quality standards.

SCAG includes telecommuting in its RTP.

SCAG is planning to fund a study sometime in the next 6 months that will improve on the telecommuting data now collected and published as part of the State of the Commute Annual Report.

Los Angeles County Metropolitan Transportation Authority

The MTA owns or controls substantial real estate assets and telecommunications facilities. These assets include rail right-of-way, fiber optic cable, conduit, duct bank, antenna towers, and communications buildings and sites. These assets have increasingly become attractive to third parties for telecommunications uses.

In 1998, the MTA retained a consultant to develop a strategy and business model for developing those MTA assets. Following that strategy, the MTA executed three agreements with fiber optic companies for use of the rights-of-way generating over $2 million in revenue for the Authority.

This strategy also resulted in the MTA Board adopting in March, 2000 the "Telecommunications and Related Facility Assets Management Program and Third Party Use Guidelines." The MTA staff report conveying this policy to its Executive Management Committee states that "the use of MTA's assets by third parties is a source of revenue for MTA. Future revenue from use of these assets is dependent upon the demand for use of the facilities by telecommunications providers and will vary from year to year."

The policy will provide guidance for proceedings with a number of different proposals. These include:

- owners who have buildings wired for broadband who are interested in using MTA's excess dark fiber,
- cellular telephone firms interested in space inside the Metro Red Line tunnels, and
- telecommunications firms interested in using existing dark fiber or installing new fiber in the Metro Red Line tunnels.

The policy guidelines also apply to transactions with governmental agencies. MTA intends to work cooperatively with other agencies with their own internal communications systems by sharing, swapping, and other joint use arrange-ments which facilitate cost savings and inter-governmental cooperation.

It is interesting that these new policy guidelines are officially considered to incorporate the previous MTA Fiber Optics Policies adopted by the Board in May, 1996. The 1996 policies were inspired by the MetroNet deployment model and developed in the "Rebuild LA" environment that also led to the Blue Line TeleVillage Demonstration Project. However, the new guidelines conflict with the 1996 policies in several significant areas. This suggests that the former policy is more ignored than incorporated.

For example, the 1996 Mission Statement states that the MTA was seeking interested parties to joint develop a backbone fiber optic system throughout its 300 miles of rights-of-way to meet several goals in addition to generating revenue and coordinating with other public agencies for sharing telecommunications assets. These additional goals for developing the backbone network include benefiting Los Angeles County residents, businesses and institutions by:

- Improving mobility by encouraging the use of telecommunications as an alternative to travel.
- Using access to the fiber optics system as a tool to encourage high technology development in proximity to rail systems and stations or other activity centers that promote bus and rail use.
- Promoting economic development and job creation in Los Angeles County through the availability of new telecommunications facilities and services for Los Angeles businesses and residents.

This policy statement continues with specific examples regarding TOD, one of which involves replicating the Blue Line TeleVillage prototype. These passages are quoted in their entirety below:

> "**Opportunities for Development Around Rail Stations and Activity Centers**. MTA sees opportunities for encouraging new high technology development around rail stations and other planned activity centers along rail corridors by providing access to the fiber optics system. MTA currently has an active joint development

program, which encourages the development of MTA-owned properties adjacent to rail stations. Such properties can be developed for a range of purposes, and encourage use of rail station locations not only as transfer points, but as final destinations for work, commerce, and homes. Such activity in proximity to the MTA transit system is a strong incentive that encourages the use of the transit system as an alternate to the single occupant automobile. By providing fiber optics access at rail stations and for nearby development, stations become important centers that can serve as a crossroads between bus and rail services and the information superhighway."

"**Opportunities for the Development of TeleVillage System**. MTA's vision for a fiber optics system includes a system of three or four publicly sponsored TeleVillages that are connected to the fiber optics network in proximity to rail stations. MTA's Metro Blue Line TeleVillage, which opened at the Martin Luther King Jr. Transit Center in Compton in April, 1996 is a working example of a TeleVillage. TeleVillages are "high tech village centers" that provide a flexible range of teleservices uniquely tailored to meet individual community needs or market niches. Such services include but are not limited to:

- Public information access;
- Telework applications;
- Distance learning programs;
- Telehealth systems;
- Telecommerce opportunities;
- On-line services; and
- Applications that accommodate mobility demand via the information super-highway

MTA encourages project proponents to identify opportunities for the creation of TeleVillages that could be implemented by local agencies and would complement the fiber optics proposal being submitted by private vendors.

There is no evidence that these policies were implemented. As the 2000 Guidelines suggest, revenue is currently the only operative goal regarding rights-of-way and fiber network development.

According to MTA staff responsible for implementing these policies, the MTA Board did not seek to remove the 1996 policies. That seemingly contradictory policies are coexisting on the books is not an issue since, according to staff, no one knows how to go about implementing the 1996 policies. The new policies lead to a relatively simple process for generating revenue.

Southern California Regional Rail Authority (operates Metrolink)

The rights-of-way that the Metrolink system operates over are owned by its member agencies which comprise the transportation commissions of the various counties (i.e., Los Angeles County Metropolitan Transportation Authority, Orange County Transportation Authority, Ventura County Transportation Commission, San Bernardino Association of Governments, and Riverside County Transportation Commission. Those member agencies issue the real estate agreements (licenses, easements, leases, etc.) on their respective rights-of-way. Some of the Metrolink lines are shared with the Union Pacific Railroad and no licenses can be issued on the Union Pacific portion of the property. The Southern California Regional Rail Authority handles the review and approvals of any encroachments within the member agency rights-of-way. Metrolink is simply charged with the management of the public transportation needs over those properties. There are no network developers nor composite application-specific designs. There appears to be little or no interest in those concepts with-in the Metrolink organization. (E-mail from Metrolink Network Administrator, 2/3/01)

The current status is as follows:

The SCRRA currently has its fiber optic equipment turned off. It will soon be reactivated and 45 Mb/s will be available from Pomona to LA. There are excess conduits and fiber, but decisions regarding their potential are not a priority of the SCRRA management.

- The properties over which Metrolink operates are owned by various public and private authorities.

- Several independent ROW leases have been given to various developers. These have apparently been negotiated strictly between the property owners and the fiber optic companies. Metrolink's participation has been peripheral. The majority of leases have been for commercial development.

CONCLUSIONS, RECOMMENDATIONS, AND FUTURE RESEARCH

CONCLUSIONS

The three research questions will now be addressed in terms of the data collected. The following is a summary of the conclusions which are then detailed later in this chapter.

The study's context—the common and best practices in the United States and Europe—suggests that:

Regardless of the relative degree of telecommunications market liberalization, rail transit authorities in both the U.S. and Europe are looking to joint development arrangements with private telecommunications companies for network infrastructure to support internal operations or to generate revenue. That digital network applications may be a mission-critical strategic resource has not occurred to them. This lack of awareness may be the product of one or more of Graham's barriers to integrated thinking—paradigmatic-perceptual, institutional, or commercial (see pages 47-48).

The cost and availability of digital network resources are unlikely barriers to developing and deploying digital network strategies. The marginal cost of adding capacity to an existing fiber network is relatively low, whether funded by the rail authority or a private partner. The development costs of a robust network access center is somewhere in the general area of $300,000 to $400,000 with operating costs of about $200,000 to $300,000 annually. These are relatively small costs to a transportation enterprise that will spend $90 billion on regional mobility in the next 20 years; or for transit village developments that will receive $20 to $25 million dollars each in varied public investment packages.

The potential for synergy between public transit and public telecommunications may become an idea in good currency. From relatively simple Internet access through e-stations in New Jersey, Railtrack in the UK and Cyberdeck in France; to more complex social institutions such as the European Electronic Railway; to very complex multi-user, multi-functional facilities that provide access to work and services like the Blue Line TeleVillage in Compton, public access to digital networks is beginning to co-

locate with public access to rail networks. These can be the emerging "smart places" in William Mitchell's *City of Bits*.

The development community wants the incentives.

The 22 members of the development community surveyed by this project believed, on average, that network resources could, under the right market conditions, make a significant contribution to the success of a transit oriented development or transit village. That many of their comments suggested specific development contexts adds credibility to their assessment of the value of the incentives.

Network strategy is close to adoption somewhere. The prospects for offering the network incentives in either the northern or southern metropolitan regions in California may be good.

The VIA Metropolitan Transit System 2025 Plan in San Antonio, although defeated by voters, suggests that a similar proposal for strategically integrating digital networks with rail networks will occur again somewhere in the United States. Both the Bay Area and Southern California regions may be good candidates to conduct trial programs offering network incentives as part of a package of incentives for transit oriented developments. The situations are promising in opposite ways. The transportation organizations of the Bay Area aggressively support transit oriented development with a wide variety of incentives. Both BART and VTA could provide network capacity at relatively low cost. While not as aggressive with TOD support, the transportation organizations in Southern California were, in the middle 1990s, on the cutting edge of network policy and strategic use of network resources. In the case of the MTA, the policies are still on the books. Only enforcement is necessary.

The challenge is to overcome the barriers to innovation.

Overcoming barriers so that an initiative can be adopted, whether a small policy or a conceptual paradigm, requires a champion community. TOD has champions who are represented by a variety of organizations. By and large, those organizations are unaware of the potentials of digital networks. The study found no champions for network incentives. Telecommunications vendors, focused on market share, are among the least likely to advocate providing subsidies to network services and access technologies in exchange for certain types of land development.

Interest of the Development Community in Network Incentives

The numerical results indicate that developers believe the incentives would help their TOD projects, especially under certain market circumstances. Excluding the results that relate only to retail developments, overall the responses were as follows:

	Average Rating	Responses
Fiber for a commercial office development	3.4	7
Fiber for a mixed-use development	3.1	4
Network services for mixed-use dvlpmt	2.9	19
Network Access Center for mixed-use	3.1	21

There was no "test" group with which to compare the pattern of responses. However, the distribution of responses within each of the three groups in the survey also provides insight into the preferences.

Transit Oriented Developers responded in the following pattern:

	Rating					
	1	2	2.5	3	3.5	4
Fiber for commercial office development	0	1	0	1	1	1
Network services for mixed-use development	0	3	0	5	0	2
Network Access Center for mixed-use	0	0	0	8	0	3

Transit Village Developers responded in the following pattern:

	Rating					
	1	2	2.5	3	3.5	4
Fiber for commercial office development	0	1	1	0	0	2
Network services for mixed-use development	0	1	2	0	0	1
Network Access Center for mixed-use	0	1	0	2	0	2

The “Other” category responded in the following pattern:

	Rating					
	1	2	2.5	3	3.5	4
Fiber for commercial office development	0	0	0	1	0	2
Network services for mixed-use development	0	1	0	3	0	1
Network Access Center for mixed-use	0	2	0	3	0	1

The composite distribution is as follows:

	Rating					
	1	2	2.5	3	3.5	4
Fiber for commercial office development	0	2	1	2	1	5
Network services for mixed-use development	0	5	2	8	0	4
Network Access Center for mixed-use	0	3	0	13	0	6

In other words, 8 of 11 (73%) of the reactions to the fiber incentive were at rating 3 or above, with 5 of the 11 (45%) at the maximum.

For the network services incentive, 12 of 19 (63%) were rated 3 or above and 4 of 19 (21%) received the maximum rating

For the Network Access Center incentive, 19 of 22 (86%) were rated 3 or above and 6 of 22 (27%) received the maximum rating.

Fiber and Network Access Centers appeared to have more support than the network services incentives, but the reactions to all three could easily be considered positive. None of the respondents dismissed the incentives as having no value. In response to many of the qualitative statements about enhancing the value of the individual incentives by including them in a package, one option would be to test the value of all three incentives combined through a regional pilot program.

The qualitative comments also provide insights into interpretation. Some of the explanations for a 2 rating were actually either neutral or positive:

- Network service incentives are probably ahead of their time, and may become expected by tenants within 5 years.
- There is as yet no empirical evidence upon which to base an opinion.

- The value of the surrounding property could decrease if the Network Access Center fell into disrepair or was not properly managed. The implied converse is that the value of the surrounding property could actually increase if the facility were well run and generated substantial visitation.

Others addressed the limits of the incentive's value. Many of the comments associated with 3 ratings also help define limits:

- Fiber needs to be offered in large projects, especially commercial office projects.
- Each incentive would have greater impact in a larger package of incentives.
- A Network Access Center will need to be managed by an appropriate institution.
- Physical access and/or parking will need to be provided.
- An off-site but adjacent location might be the most appropriate for a Network Access Center in relation to a housing development.
- The social context of a Network Access Center should determine the extent to which it caters to children or adults.

The ability of a developer to identify a particular context in which an incentive would have value is significant. The analysis of data collected by the BLTV Demonstration Project found that the ability of a person to visualize an innovative application of network technology was the threshold at which implementation of that application had a high likelihood of occurring. Developers who can visualize the application can probably make use of the incentive in the way visualized.

The comments associated with the highest grade on the scale provide examples that might be useful should a region seek to design a pilot program for offering one or more of these telecommunications-based incentives. There was a high proportion of the comments that did identify a specific context as opposed to just offering praise such as "marvelous idea." It may be that a high rating was the result of the developer's ability to see exactly how the incentive might be used in his/her context or specific project.

The following are the specifics mentioned:

Fiber could:

- Attract an anchor tenant—a large multi-site firm, such as a large technology firm in the Santa Clara Valley, a large public institution like the Los Angeles Unified School District, or other specialized high bandwidth consumer like a medical institution.
- Create an incentive for light industrial development—for example, in East Los Angeles where it could reach empowerment zones.
- Help attract an equity partner.
- Be helpful in certain build-to-suit situations where the client consumes large quantities of bandwidth.
- Provide a competitive advantage to projects at rail-adjacent locations, not just at stations.

Network services such as DSL and ISP could:

- Be a strong element in marketing residential units or small retail units to mom and pop operators.
- Appeal to a middle to high-end rental market with live/work units aimed at 1 or 2 person professional service firms.
- Have more value in a less tight housing market than today
- Add 10% to the borrowing power of a developer with a 200 unit apartment building.

Network Access Center could:

- Be an alternative to the 5,000 square foot community center, which the developer intends to donate to the project anyway.
- Qualify for extra points from the lending agencies that specialize in affordable housing loans and give extra points for proximity to services.
- Occupy one component of a large commercial pad that is expected to contain community oriented commercial services in a mixed-income development of approximately 400 multi-family units and 97 single-family homes.

- Help the project by going into a ground floor storefront which can be difficult to lease.
- Be more valuable than a childcare center.
- Add foot traffic to support the retail or keep the same people around longer.
- Raise the rents in adjacent space.
- Work as an addition to a university sponsored village core that includes a book store and university-related functions being developed in a traditional central business district—example Pomona about 1 block from the Metrolink train station.
- Be included in the convenience retail portion along with a convenience store, café and dry cleaners of what is predominantly a housing development—example; Ohlone Chynoweth.
- Carry out the theme of "urban enhancement" by providing access to jobs, education and health on the light rail extension to East Los Angeles. It would help create community fabric. There is a small industrial area with sewing machine repair businesses into which the job element and job training could be introduced. The NAC would provide nice incentives for job creation, a commercial center and light manufacturing.
- Between the large church, Roybal Health Center and a junior high school at 4th and Rowan, a NAC could reinforce the health element of the community fabric.
- Capitalize low-income households which lack capital for home technology infrastructure.
- Become a novel facility that would attract visits to redevelop a part of the downtown area.
- Fit into otherwise unspecified elements of transit village plans.
- Keep people in the retail center for a longer period of time.

Current and Best Practices Using Network Incentives for TOD Elsewhere in Europe and the United States

Europe (This Sub-Section has been written by Stephen Graham)

Four conclusions need to be stressed here in relation to the European experience.

First, it is clear that there exists a ladder of potential partnerships in Europe between rail operators and telecom operators. Only the higher stages of this ladder really begin to explore possible developmental synergies to support TOD and rail corridor development. The lower levels merely stress the commercial exchange of leeway and conduit rights for revenue streams, without regard to the possibilities of strategically using the interplay of both networks for wider development purposes.

Second, it is obvious that major paradigmatic, institutional, and commercial barriers exist which make the development of integrated fiber and TOD strategies challenging and complex.

Thirdly it is clear that more imaginative and integrated strategies, which attempt to harness fiber to the development of rail corridors are now starting to emerge. Even here, however, experience is so far limited and, as in Paris, immediate commercial benefits can still dominate over the wider development of TOD-like concepts.

Finally, it is important to stress that care needs to be taken in drawing direct conclusions from the above, largely European experience, for the particular case of integrating fiber into TOD in California. In Europe cities remain much less geographically spaced out and car-dependent than metropolitan areas in the U.S. The imperatives of TOD are different as widely available subway and suburban rail networks tend to already exist which channel relatively high proportions of daily commutes and trip flows. Finally, the above examples have emerged within the context of relatively centralized policy regimes where nation states, the EU and municipalities or nationally owned rail operators get together to forge alliances, often with the benefit of major public subsidies to support project start-up. In Europe, too, the telecommunications context is particular. Competition is still in the initial stages of rolling-out and municipalities have relatively little power to control telecom licensing and leeways of the type available in the U.S. since the 1996 Telecommunications Act. The situation in California is considerably different to that in Europe on all counts, and we need to be conscious of the limits that this places on the degree to which we can directly transmit lessons across the Atlantic in a simple fashion.

United States

The literature found no examples of a rail authority in the United States or Western Europe using its telecommunications resources to encourage land development at its station stops. Indeed, the literature suggested that the notion of land development as a strategic concern of rail authorities is new and not universally embraced. That network resources have a strategic role in transportation is even more remote. As in Europe, networks or the underlying ROW have been seen as a source of revenue. Fiber networks are deployed in operations. Excess capacity is seen as a revenue source and not as TOD incentive.

With the exception of the European Electronic Railway, the examples of innovative telecommunications facilities at stations were more advanced in the United States than in Europe. The VIA Metropolitan Transit plan for a system of TeleVillages is the most ambitious strategic use of telecommunications found in the research.

However, none of the advanced examples in either Europe or the U.S. appeared to consciously link to station-adjacent land development concepts. For the most part, it appears that the facilities are being located at a rail station to improve access to them by customers. However, the VIA plan was not sufficiently developed to evaluate this observation.

Graham's three barriers appear also to be a factor in the U.S. rail transit authorities. It also appears that the paradigmatic/perceptual and the institutional barriers are present in the American metropolitan planning organizations responsible for developing short and long range plans for each region. The research into the U.S. context did not specifically poll MPOs around the nation, but the research was unable to identify projects that would have been the result of integrative thinking.

Prospects For/Barriers to Offering Network Incentives for TOD in Southern California and the Bay Area

Political Support for TOD

There is a broad consensus among MPOs, rail authorities, the State Treasurer's Office and a variety of environmental organizations that TOD is a significant societal goal. A variety of transportation policies and programs support TOD, although the degree of commitment to TOD varies between agencies.

Financial Feasibility of Network Incentives for TOD

There is no direct way to verify the financial feasibility of network incentives since transportation decision makers were not polled by this study. We know that there have been no manifestations of the phenomenon in California nor elsewhere in the U.S. or Europe. However, financial considerations are a matter of political priorities. Polling would have only verified the obvious—network incentives are not now a political priority.

For the purpose of this study, the question of financial feasibility is related to the approximate cost of network incentives being generally within the order of magnitude of what is currently spent on competing incentives.

Given the willingness of MPOs to invest millions in streetscape and other capital investments to support a range of TOD projects, network access centers appear to be financially feasible.

For example, the Richmond Transit Village Fact Sheet lists estimated project cost at between $55 and $59 million, with over $20 million coming from various local, state, and federal investments, grants, and loans. Correspondence from the City of Oakland lists estimated total cost of $100 million for the MacArthur Station transit village project, with the developer requesting $25 million from government sources.

Conceptual Link of Network Incentives to TOD

It is becoming clear that technological advances can be captured by the urban development process in new and powerful ways. The ability to shift time and transmit place, in particular, can be used to reinforce the mix of functions and the hours of operation in any TOD.

The potential to use digital networks to spatially reorganize many urban functions implies that the urban form may be more flexible than is currently assumed under a bricks and mortar development paradigm.

Southern California

The region generally lags behind the Bay area in actual programs that support TOD, transit villages, livable communities and/or smart growth. Although it has recently reformed the unit, the MTA actually dissolved its joint development real estate division in 1998. It is not surprising that most of California's current transit village activity is focused in the north.

It appears that in 1996, the Southern California transportation institutions were international leaders in the integration of the concepts, policies, and practices of integrating telecommunications with land use and transportation. At that time:

- SCAG adopted a unique program called the "Telecommunications Deployment Monitoring Strategy."
- MTA adopted the fiber network policies derived from the MetroNet deployment model involving fiber for TOD and fiber for NACs (referred to as TeleVillages in the policy).
- MTA was in the process of demonstrating the effectiveness of the prototype NAC in the Blue Line TeleVillage Demonstration Project.

Southern California would appear to be a place already positioned to conduct a significant trial of network incentives.

However, these policies and experiences have been all but renounced at the level of staff rather than by the governing board. This may add a new political dimension to the Cognitive/Perceptual barrier discussed by Graham.

Bay Area

The Bay area has made a significant commitment to TOD in the form of MTC's Transportation for Livable Communities grant program, VTA's staff and outreach programs, and BART's aggressive real estate department.

Although, beyond funding various mostly failed attempts to facilitate telecommuting, MTC has no telecommunications policies and no examples of integrated thinking. It has the funds to provide $2,000 per bedroom as an incentive to cities to encourage housing developments at rail stations.

BART also has one of the most sophisticated fiber network joint venture agreements in the world, and has fiber resources available. VTA also owns excess capacity on its fiber network. For different reasons than in Southern California, the Bay Area appears to be poised to conduct a trial of network incentives for TOD.

RECOMMENDATIONS

These recommendations are directed to four main audiences. The first includes the MPOs and the rail transit authorities that own the problem to which TOD is an answer. Realistically, those institutions are culture bound, political and are not usually open to unsolicited advice.

The second audience is the developers themselves. The relatively enthusiastic response of those participating in the study suggests that this community is ready for new ideas. And the development community, although small, could become a political force for encouraging innovative practices.

The third audience is the array of advocate organizations that are active in the local, regional, state and national political processes. There are local and regional smart growth advocates, alternative transportation advocates (from bicycle to car-sharing organizations), regional organizations concerned with transportation and the environment, state-level organizations of government officials such as the Local Government Commission, and others such as the Congress for New Urbanism and the Surface Transportation Policy Program at the national scale.

The fourth audience consists of the various local governments (cities and counties) that ultimately control land use and physical development around rail stations. Network Access Centers, in particular, specifically address the needs of the local community and could therefore be seen as a type of quid pro quo for the local jurisdiction's authorization of development.

The survey responses support a recommendation for MPOs and rail transit authorities to conduct pilot programs in which network incentives would be offered to transit village or other transit-oriented developers. However, this is naïve given the barriers to innovation identified by Graham as evidenced by the selective policy enforcement at the MTA.

An alternative that might be more feasible would be to enhance an existing transit village or recent transit-oriented development as a limited demonstration. Fiber access, network services or a network access center could be offered at strategic locations in order to better understand the value of each resource to the success of the TOD.

Specifically include a clause about network incentives in the reauthorization of TEA-21. Absent a national champion, this is another naïve recommendation.

Perhaps the most realistic recommendation would be for a livable communities advocate organization to acquire funding to mount an education program that would introduce the network models, international experience, and incentive options to elected officials, transportation agency managers and staff, developers, and consumers. The research has shown that developers highly value the incentives when they can visualize potential applications to their own projects. In other words, perhaps the best that can be done is to inform the political process and let politics run their course. In the words of ex-council member and ex-VTA Board member Pat Figueroa, "it would be a good idea to bring the telecommunications incentives forward for consideration. Innovation may not fly right away but it gives the decision makers a chance to get educated on new subjects."

FUTURE RESEARCH

One of the key assumptions about this research was that the development community had a good feel for the reaction of end-consumers of their building products for the network incentives. One direction for future research would be to poll a sample of these end-consumers, both current and prospective TOD occupants, to verify the expectations of the developers.

Local and regional decision makers, especially elected officials, were not represented in the survey. Since it is that community which ultimately makes decisions about incentives, it would be useful to study their perspective on the network incentives. This research could help develop Graham's concept of barriers (pages 47-48) to integrated thinking.

One of the potential benefits of the network incentives, particularly the Network Access Center, is that it can contribute in a package with other programs to economic revitalization of slumping retail malls. The two retail experts in the developer-survey did not believe that the network incentives could by themselves play a role in mall revitalization, and were not specific about a role in a larger package. Further research could focus on a variety of retail experts to more effectively evaluate this potential.

The capabilities of digital networks allow spatial reallocation of many functions. This insight suggests the possibility of analyzing existing TODs in terms of the bundle of the functions unique to each. This data base could help gain insights in the mix of functions that most effectively realize the goals of a transit village. That is, what are the characteristics of the mix that attracts more trips or that best serves the residents and businesses in the market area, or in the immediately adjacent pedestrian zone? Because the combination of bricks and mortar and telepresence can now create a wide variety of functions in a compact space, it is worth researching the characteristics of an optimal mix under various circumstances.

APPENDIX: PARTICIPANTS

ACG Environments
Tony Gonzalez, President

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Bridge Housing
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Eden Housing
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City of Mountain View
Pat Figueroa, Ex-Council Person

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Evelyn Johnson, CEO

Inland Cities Corp.
Jim Ahmad, Civil Engineering and Construction Management

Langdon Wilson
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Lee Group
Jay Stark, Director of Development

Madison Park Real Estate Development Trust
Karen Stefonek, Director of Real Estate Development

Mozart Development Company
James Freitas

Olson Company
Alex Hernandez

Orange County Transportation Authority
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