U.S. Department
of Transportation

SHARED RESOURCES: SHARING RIGHT-OF-WAY FOR TELECOMMUNICATIONS

Identification, Review and Analysis of Legal and Institutional Issues

FINAL REPORT

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16. Abstract

This report presents the results of research on the institutional and non-technical issues related to shared resource projects.

Shared resource projects are a particular form of public-private partnering that may help public agencies underwrite their telecommunications infrastructure for ITS. The partnership involves sharing the public resource of roadway right-of-way and the private resource of telecommunications expertise and capacity to the advantage of both parties. Most commonly, private telecommunications providers are granted access to roadway rights-of-way for their own telecommunications infrastructure (principally fiber optics conduits and cable) in exchange for providing telecommunications infrastructure to the public sector. In some cases, the arrangement provides private telecommunications firms with access to roadway right-of-way in exchange for cash compensation to the public sector, which can then be directed to public sector transportation, ITS, or other needs.

This report identifies and explores 20 issues associated with implementation of shared resource projects and describes various options for dealing with these issues. The report also presents five case studies to illustrate the types of arrangements that have been implemented to date.

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EXECUTIVE SUMMARY

BACKGROUND

The advent of fiber-optic communications technology coupled with continued rapid growth in demand for communications capacity have led private communications companies to seek to build new and extend existing fiber-optics networks. Coincident with this, government agencies at all levels are seeking to establish communications networks for intelligent transportation systems (ITS) and other governmental functions. It is in this context that there is increased incentive and opportunity for sharing the public resource of highway *right-of-way* in exchange for private telecommunications expertise and capacity to further both public sector and private corporate objectives.

In light of these developments and a growing body of applied experience, the Federal Highway Administration (FHWA) authorized this study to explore nontechnical issues related to such projects, generally referred to as "shared resource" projects, and to develop and present guidance for those considering this approach in highway rights-of-way.

Traditionally, longitudinal access to the right-of-way for non-transportation communication networks has been carefully controlled, especially in freeways and limited access highways. In early 1988, the US Department of Transportation revised its policy on utility accommodation, allowing states with FHWA-approved utility accommodation plans to permit installation of fiber-optic cables and other utility infrastructure along interstate rights-of-way, thus setting the stage for shared resource projects. More recently (October 1995), the AASHTO Board of Directors directed AASHTO committees to formulate guidelines for accommodation of fiber optic cable in roadway rights-of-way.

A shared resource project in this context has four specific features:

- Public-private partnering;
- Private longitudinal access to public roadway right-of-way;
- Installation of telecommunications hardware (principally fiber-optic lines, but also cellular towers/antennae);
- Compensation granted to the right-of-way owner over and above administrative costs.

Compensation options include barter and cash. In barter or in-kind arrangements, private parties install the system, receiving access to the right-of-way for their own capacity in return for providing telecommunications capacity to the public agency. In cash arrangements, private parties install the telecommunications system, receiving access to the right-of-way in return for monetary compensation to the public agency. Hybrids of the barter and cash alternatives can also be created in which in-kind compensation (communications capacity) and monetary

compensation are combined as consideration for private access to right-of-way for private sector objectives.

Shared resource projects are an innovative approach but only one of several ways to provide for public sector needs and, by no means, a universal solution. Before embarking on shared resource arrangement, public agencies must evaluate their telecommunications needs, the several options available to meet those needs (including private sector-supplied services), and then the appropriateness of each option in light of specified needs. This study on shared resource projects was intended to support those agencies that, after this initial screening process, have determined that shared resource projects do indeed offer the best solution.

ISSUES

The research team identified 20 issues in four categories that figure prominently in shared resource arrangements; these are detailed in the table below. Threshold Legal and Political Issues are those that must be addressed at the outset; if left unresolved, they can thwart further progress. Financial Issues involve valuation and taxation. Project Structure Issues deal with how the project will be implemented and Contract Issues focus on more detailed aspects of each partnering agreement, particularly the allocation of responsibilities between public and private partners. This report defines these issues, lists options for addressing each, and describes the advantages and disadvantages of available options.

Issues Associated with Shared Resource Project Development

Threshold Legal and Political Issues	
Public sector authority to receive and/or earmark compensation: *	The public sector may be precluded from receiving cash payments, but may still be free to engage in barter arrangements, particularly if they are structured as procurements. In general, state departments of transportation (DOTs) have less flexibility; municipalities and authorities such as turnpike and transit agencies have greater flexibility in dealing with cash flows.
Authority to use public right-of-way for telecommunications	Shared resource arrangements may be precluded if state law mandates free access for utilities or if public agencies are not allowed to discriminate among utilities (e.g., permit access for telecommunications but disallow access for gas and sewerage).
Authority to participate in public-private partnerships	Because shared resource arrangements are a form of public-private partnering, legal authority to enter into such agreements is a basic requirement. In some cases, "implied authority" is not considered sufficient and specific legislation or "express authority" must be passed.
Political opposition from private sector competitors	Shared resource arrangements may trigger political opposition, though not necessarily prohibition, from private sector companies resisting the establishment of bypass networks that they perceive as competing with the services they offer. Opposition may be slight when the bypass system is limited to transportation needs, but it is likely to be stronger if the system supplies a greater range of public sector communications needs.
Inter-agency and political coordination	In addition to investing effort in coordination among agencies in the same political jurisdiction, the lead public agency may also have to orchestrate agreements between geographically proximate political jurisdictions to ensure continuity of fiber for their private partner(s).
Lack of private sector interest in shared resources	At its core, shared resource arrangements depend on private sector interest in expanding telecommunications infrastructure. Reluctance to enter into partnerships with public agencies for access to right-of-way may stem from insufficient market demand for increased communications capacity, cost factors such as more stringent installation specifications along roadway right-of-way, and administration or managerial burden of compliance.

Financial Issues	
*Valuation of public resources**	Before entering into shared resource agreements, the public sector needs to have some idea of the value of the assets it brings to the partnership; that is, continuous or sporadic access to its right-of-way for placement of private (communications) infrastructure.
*Tax implications of shared resource projects**	Partnerships between public and private entities may pose unique tax issues, particularly bond eligibility for tax-exempt status when proceeds may benefit profit-making private organizations.
Valuation of private resources	Valuation of the private resources provided in barter arrangements helps the public sector determine whether it is receiving a fair market "price" for its resource.
Public sector support costs	Although shared resource arrangements provide cash revenue or telecommunications infrastructure without public sector cash outlays, such compensation is not without cost since the public sector must use agency labor hours for administration, coordination, and oversight.
Project Structure Issues	
*Exclusivity**	Shared resource arrangements may limit access to public right-of-way to a single private sector partner in any specific segment, that is, grant exclusivity. From the public sector point of view, exclusive arrangements have both advantages (administrative ease) and disadvantages (potential constraints on competition among service providers, lower total compensation received by public sector).
Form of real property right	Shared resource arrangements can be structured in any of several legal formats (easement, lease, franchise, license) with variations in the property rights conveyed. Moreover, the property right may involve access to the right-of-way itself for privately owned infrastructure, or be limited to access to (or use of) publicly owned infrastructure.
Type of consideration	Compensation to the public sector may in the form of goods (in-kind), cash, or combinations of both. Moreover, in-kind compensation can include not only basic fiber-optic cable but also equipment to "light"[1] the fiber, maintenance, and even operation and upgrading.
Geographic scope	Projects can be extensive in scope, covering long segments of roadway, or more focused on specific areas. The option that is best in any individual context depends on other factors, such as considerations of administrative burden, service interests of potential bidders, and private sector willingness to install infrastructure in an area larger than their primary area of interest.
Contract Issues	
*Relocation**	Allocation of responsibility for infrastructure relocation in case of roadway improvements affects private partner willingness to pay for right-of-way insofar as it carries a financial responsibility as well.
*Liability**	Similarly, allocation of legal liability among partners affects the financial risks assumed by each one. Liability includes responsibility for system repair, consequential damages (economic repercussions), and tort actions.
Procurement issues	Shared resource arrangements face many of the same issues as other procurements regarding selection and screening of private vendors or partners.
System modification	Shared resource arrangements may or may not include explicit provisions for system modification; that is, technological upgrading to keep abreast of technical improvements and expansion of capacity to meet subsequent needs.
Intellectual property	Intellectual property involves intangible components (e.g., software programs) of the operating system that might not be available to the public sector partner when the partnership is dissolved after the lease period unless specifically addressed in the contract.
Social-political issues	Social-political issues involve equity among political jurisdictions or population segments within the right-of-way owner's domain. More specifically, two issues may affect how shared resource arrangements are structured: most-favored community issues—comparable compensation for all communities engaging in shared resource arrangements, and geographic and social equity—equitable access to and benefit from shared resource arrangements.

Note: * Designates issues that were selected by the project's January 1995 focus group for further study.

[1] "Light" fiber refers to fiber optics supported by equipment for transmission and receipt of communications signals; "dark" fiber refers to physical fibers devoid of supporting telecommunications equipment.

CASE STUDIES

In addition to addressing individual issues, this report describes five case studies, which exemplify the broad range of ways in which shared resource projects can be implemented:

- *State of Maryland:* Maryland has entered into a shared resource agreement with MCI and Teleport Communications Group (TCG) to install 75 miles of fiber optics along I-95; Maryland will receive 48 fibers, equipment to "light" 24 fibers, and maintenance services. Each of the three partners will own its own fiber, but only MCI will physically access the system.

- *Ohio Turnpike Commission:* The Ohio Turnpike Commission is involved in several non-exclusive licensing agreements with private telecommunications providers for installation of infrastructure along the right-of-way. The projects vary in mileage and location along the turnpike; the Commission is compensated with a fixed per-mile annual license fee of $1,600 and rights to use the fiber optics for Turnpike purposes at low or no cost, if desired.

- *State of Missouri:* Using standard procurement procedures, the State of Missouri contracted with Digital Teleport, Inc. (DTI) for installation of more than 1,300 miles of a backbone system of six fiber-optic cables, associated telecommunications equipment, and maintenance dedicated to Missouri Highway Administration use in exchange for DTI's exclusive access to the same right-of-way for its own fiber-optic system.

- *Bay Area Rapid Transit:* San Francisco Bay Area Rapid Transit (BART) concluded a three-party agreement in which BART procures a new fiber-optics system supporting its rail operations from MFS Network Technologies; MFS invests its own funds to install additional conduit throughout the system, which it will rent to carriers willing to pull their own fiber; and Caltrans is included as a silent partner because some of BART's right-of-way used in this project is leased from the State. In return for access, BART receives 91 percent of lease revenues from MFS-owned conduit, MFS retains 9 percent, and Caltrans receives a portion of BART's revenues plus 4 fiber strands.

- *City of Leesburg, Florida:* The City of Leesburg, Florida, established a communications utility with two private partners, Knight Enterprises and Alternative Communications Networks (ACN), which will design and construct the network. The City funds and owns the dark fiber on its right-of-way, a portion of which will be used for public sector needs. ACN has exclusive rights to lease the remaining capacity in this system to private and public customers, who will own their site-to-backbone fiber link. The City will receive the lease revenues until its capital investment has been repaid; thereafter it will split the revenues with its partners. Leesburg reserves the right to enter into agreements with other partners for additional infrastructure.

CONCLUSIONS

Shared resource projects offer a new opportunity for public-private partnering for transportation agencies and are particularly relevant to ITS projects. Although a number of issues must be addressed, there are options for each so that individual projects can be structured to suit particular circumstances. Shared resource partnering, however, is market-driven and the window of opportunity for individual projects is limited, with the specific time frame depending on local circumstances.

From FHWA's perspective, it is important to plan for effective outreach on shared resource projects in the very near term in order to acquaint public agencies with the issues and possibilities before the opportunity for such projects is past. To this end, this study also included the preparation of guidance for public (and private) agencies interested in entering into shared resource projects. This guidance, published as a stand-alone document and available from FHWA, identifies issues associated with shared resource projects, catalogs the options available to address each issue, summarizes advantages and disadvantages of some of the most salient issues, and succinctly describes the stages in development of a shared resource project.

1.0 INTRODUCTION

1.1 BACKGROUND

The advent of fiber-optic communications technology coupled with continued rapid growth in demand for communications capacity have led private communications companies to seek to build new and extend existing fiber-optics networks. Coincident with this, government agencies at all levels are seeking to establish communications networks for intelligent transportation systems (ITS) and other governmental functions. It is in this context that there is increased incentive and opportunity for sharing the public resource of highway *right-of-way* in exchange for private telecommunications expertise and capacity to further both public sector and private corporate objectives.

In light of these developments and a growing body of applied experience, the Federal Highway Administration (FHWA) authorized this study to explore nontechnical issues related to such projects, generally referred to as "shared resource" projects, and to develop and present guidance for those considering this approach in highway rights-of-way.

Although shared resource projects are rightly heralded as an innovative approach to satisfying public sector needs, they are only one of several ways to provide for these needs and, by no means, a universal solution. Before embarking on shared resource project approach, public sector agencies must evaluate their telecommunications needs, identify and evaluate the several options available to them to meet those needs (including private sector-supplied services), and then evaluate the appropriateness of each alternative in light of specified needs. This study on shared resource projects was intended to support those agencies that, after this initial screening process, have determined that shared resource projects do indeed offer the best solution.

The study was conducted by a research team led by Apogee Research, Inc., and including Nossaman, Guthner, Knox & Elliott, and Dr. Thomas Horan. Apogee Research, based in Bethesda, Maryland, is a transportation consulting firm recognized for its work in infrastructure finance, market analysis, and economics. Nossaman, Guthner, Knox & Elliott, a California law firm, is a leader in legal and institutional issues involving communications systems, toll roads, mass transit, and ITS. Dr. Horan is a nationally recognized expert in institutional issues and ITS.

The Shared Resource Study had four major objectives:

1. Identify where shared resource approaches have been used or are being considered for installation of communication systems in highway rights-of-way, and identify the public agencies and private sector organizations involved.

2. Identify and analyze legal and institutional issues that have arisen or are likely to arise in using a shared resource approach, and develop recommendations and alternatives for addressing them.

3. Report on findings.

4. Prepare guidance for public and private officials considering a shared resource approach.

This study does not focus on technical issues of design, installation, or maintenance of communications technologies in highway rights-of-way.

1.1.1 Shared Resource Project Characteristics

For the purposes of this report, "shared resource project" refers to those projects that share public highway rights-of-way, previously viewed as entirely within the public domain, for the installation of telecommunications hardware (principally fiber-optic lines but also including cellular towers). Compensation to the public sector may or may not be involved, though in the strictest sense "shared resource" implies some form of consideration granted to the public agency partner by the private sector participant that is permitted access to the right-of-way or other public resource. A shared resource project in this context has four specific features:

1. Public-private partnering;

2. Private longitudinal access to public roadway rights-of-way;

3. Installation of telecommunications hardware (principally fiber-optic lines) in the right-of-way by private companies and/or public sector agencies; and

4. Compensation over and above administrative costs granted by the private sector partner to the public sector right-of-way owner.

Compensation options include barter and cash. In barter or in-kind arrangements, private parties install the system, receiving access to the right-of-way for their own capacity in return for providing telecommunications capacity telecommunications services to the public agency. In cash arrangements, private parties install the telecommunications system, receiving access to the right-of-way in return for monetary compensation to the public agency. Hybrids of the barter and cash alternatives can also be created in which in-kind compensation (communications capacity) and monetary compensation are combined as consideration for private access to right-of-way for private sector objectives

Of course, it is possible for a public agency to allow private access to highway right-of-way without direct compensation of any kind, simply for the benefit to the community of having telecommunications infrastructure located in the highway, where it is most advantageous to development of ITS services or other communications needs.

Shared resource projects are particularly relevant to the development of ITS products and services, which use fiber-optic and wireless communications systems. FHWA's ITS architecture provides for flexibility in selecting wireless or wireline communications; nonetheless, it is generally recognized that some longitudinal wireline applications will be required in all systems. Although such systems can be can be leased from private telecommunications providers or installed, owned, and operated entirely within the public sector, shared resource projects may offer the public sector a way to implement ITS (wireline and wireless) with a lower financial burden.

Beyond these direct transportation system benefits, a shared resource approach can

- Promote economic development,
- Support development of a region-wide communications network infrastructure,
- Reduce transportation infrastructure costs for state and other transportation agencies,
- Support new ITS services and products,
- Facilitate educational networks and distance learning,
- Support traffic management, congestion mitigation, and transportation efficiency, and
- Promote development of ancillary products and services.

In places where longitudinal utilities may be accommodated within highway rights-of-way without compromising the integrity of the highway system, state and local political subdivisions may identify a number of advantages in extending access privileges to other private organizations. Allowing telecommunications companies to install fiber-optic lines in public rights-of-way may provide an opportunity to accelerate certain ITS services and to lower the cost of such services by requiring shared resource partners to (1) pay for the right to use the right-of-way, (2) provide in-kind services to the public sector, or (3) contribute a combination of barter and monetary compensation.

Of course, in several states, particularly those that are less populous, interest in these types of projects is not yet sufficient to support ITS implementation. For example, Alaska is not interested in ITS. The state has not yet completed its federally aided highway system, and existing capacity will be sufficient for at least the next 20 years. Hawaii, too, cites low population density and geographic constraints as limiting factors. The City of La Mesa, in San Diego County, California, has expressed interest in shared resource projects but perceives a lack of private sector interest because of its areas of low population density.

Low population density or "rurality" can also be an incentive. The City of Leesburg in Central Florida entered into a public-private partnership to attach all city-owned and -occupied office buildings to a network of computer systems using fiber-optic cable and to develop an information highway in the Leesburg Utility territory. Leesburg officials cite rurality as a compelling incentive for developing a fiber-optics network:

> ... while there are not a large number of users..., there may be compelling needs for modern communications due to the

> rurality itself. A modern communications highway in a rural area can enable that area to compete on the same playing field as large metropolitan communities.[2]

1.1.2 Utility Accommodation Policies

Traditionally, access for non-transportation communication networks in highway rights-of-way has been carefully controlled, particularly with respect to freeways and limited access highways. The intent has been to minimize the negative impact of utility maintenance vehicles on traffic flow and traffic safety, minimize obstructions in the right-of-way and avoid open cuts into roads and rights-of-way that utility lines typically require, and minimize the costs and complexities of future roadway expansion or modification.[3]

The American Association of State Highway and Transportation Officials (AASHTO) accommodation policy reflected these concerns.[4] Traditionally, AASHTO policy precluded accommodation unless the utility could show that

1. The accommodation will not adversely affect the safety, design, construction, operation, maintenance, or stability of the freeway;

2. The accommodation will not be constructed or serviced by direct access from the through-traffic roadways or connecting ramps;

3. The accommodation will not interfere with or impair the present use or future expansion of the freeway; and

4. Any alternative location would be contrary to the public interest. This determination includes an evaluation of the direct and indirect environmental and economic effects that might militate against selection of the alternative non-highway right-of-way.

The intent was to minimize the number of utilities that were allowed longitudinally in the freeway right-of-way.

The U.S. Department of Transportation (USDOT) and most state highway agencies adopted the AASHTO policy. But on February 2, 1988, USDOT published a new policy in which states would have the power to approve the installation of fiber-optic cables and other utility lines along interstate highway rights-of-way. More recently, on October 29, 1995, the AASHTO Board of Directors sanctioned placement of fiber optic cables in highway and roadway rights-of-way, subject to new guidelines to be established by AASHTO.[5]

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[2]Leesburg Communications Utility Historical Background, p. 3.
[3]"Further Hearings Likely; Use of Highway Rights-of-Way by Fiber Optic Networks Cautiously Backed," *Communications Daily*, April 17, 1986, Vol. 6, No. 74, p. 2.
[4]AASHTO, "A Policy on the Accommodation of Utilities Within Freeway Right-of-Way," section 2, 1982.
[5] AASHTO Policy Resolution PR-21-95 "Installation of Fiber Optic Facilities on Highway and Freeway Rights-of-Way," October 29, 1995 in which the Board directed relevant AASHTO committees and

Prior to its policy revision in February 1988, FHWA approved requests for cable laying on a case-by-case basis. Although the old policy did not ban fiber-optic installations on interstate highways, it strongly discouraged them. Only 250 state requests for utility installations were approved between 1960 and 1988.[6] The USDOT policy change requires states to file a plan with FHWA describing policies on utility installation. If a state chooses to allow utilities along interstates, it must ensure that safety is not affected. States must also examine what effect turning down an application would have on farmland productivity and look at any impairment or interference with the use of the highway.

With this authority to make state-level determinations regarding the accommodation of utilities in state highways *and* interstates, some states have revised their policies to permit the installation of longitudinal utilities in the public right-of-way. However, the inventory undertaken for this study indicated that many states had not yet (October 1994) revised provisions for longitudinal encroachment.

States considering revision of utility accommodation policies have not lost sight of their basic interest in the public right-of-way—to provide safe and efficient transportation access—and have been careful to maintain control over access to the right-of-way. Louisiana, for example, rejected a private shared resource proposal for cellular phone towers in the right-of-way because of safety concerns. And in its 1992 Feasibility Study of Using Highway Right-of-Way for Telecommunications Networks, the Washington State DOT (WSDOT) cautioned against permitting too many users access to the right-of-way. WSDOT cited the following liabilities:

> (1) increased safety risks to network maintenance staff and to the traveling public, (2) a potential for negative impacts on traffic flow, (3) additional costs and considerations during the design and construction of roadway modifications and (4) increased complexity in the management and design of WSDOT's SC&DI communication networks.[7]

Delays related to efforts to change the policy are an additional factor. Although the WSDOT study recommended revision of the state's policy, it acknowledged that revisions could take as long as 24 months. The state's policy has not changed.

Other states simply do not favor longitudinal encroachments. For example, in Florida, notwithstanding any statutory limitations, it has been the Florida DOT's (FDOT) policy not to allow private installations. In a recent project to share segments of the microwave backbone and tower space for the Motorist Aid system, FDOT specifically chose microwave technology over fiber optics to avoid the need for permitting maintenance crew access to the right-of-way. The state has also expressed concern that if it allowed one private installation, it would

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subcommittees to prepare appropriate guidelines for eventual publication by AASHTO on technical, operation, economic and financial aspect of placement of FO cables in highway and freeway rights-of-way.

[6]Hoffman, "States Can Approve Fiber Optics Along Interstate Rights-of-Way," *Engineering News-Record*, February 4, 1988, p. 7.

[7]Washington State Department of Transportation, "Feasibility Study of Using Highway Right-of-Way for Telecommunication Networks," July 29, 1992, p. 2.

have to permit others, leading to over-utilization. In Rhode Island, the accommodation policy was revised after the change in USDOT regulation but still allows longitudinal utility encroachments of only 1,000 feet—and only where needed to cross major physical features.[8] In Georgia, public utilities and telephone companies had been permitted to use public rights-of-way but no longer can do so, and private use is forbidden by state law. In Indiana, longitudinal installations on highways with limited access control are generally discouraged, and longitudinal installations on highways with full access control are permitted only if justified by extreme hardship or unusual conditions and only if there is no impairment of safety or future highway expansion.

Even where states have revised the AASHTO policy, accommodation policies and shared resource projects have continued to focus on the safe and efficient operation, maintenance, and control of the highway system. For example, the RFP recently issued by Maryland for "Fiber Optics along the Baltimore to Washington Corridor" requires that proposers have a 24-hour highway emergency response capability and lists several access restrictions to protect highway use and safety. Although not yet involved in a shared resource project, Cellular One has approached the Illinois DOT with a plan for attaching microantennae to bridges in the Chicago area; safety is viewed as the main concern.

The Iowa DOT Highway Division Policy for Accommodating Utilities on the Primary Road System (revised and implemented in May 1992), established a permit process for the purposes of ensuring the safety of motorists, pedestrians, construction workers. and other highway users; ensuring the integrity of the highway; documenting the location of utility facilities; and managing the highway right-of-way.[9] Except for emergencies, access must be obtained from a point other than freeways or ramps.

1.2 STUDY APPROACH

The research team's approach to the study involved five tasks:

- Task A: Literature review and issue identification
- Task B: Focus group review of Task A findings and selection of issues for further research
- Task C: Analysis of issues selected in Task B
- Task D: Focus group review of Task C findings
- Task E: Final report and guidance

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[8]Rhode Island, "Regulations for Accommodating Utility Facilities within Public Freeway Rights-of-Way," 1990. Interestingly, the state's parallel policy on accommodation in railroad rights-of-way does not contain a similar limitation. (Rhode Island, "Rules and Regulations For Accommodating Utility Facilities Within Railroad Rights-of-Way," 1993.)

[9]Iowa Accommodation Policy, §§ 761-115.4 (306A).

Task A consisted of a comprehensive literature search and review to identify projects that use or will use a shared resource approach for telecommunications projects along highway rights-of-way as well as current and planned policies regarding utility accommodation. The literature review, supplemented with telephone follow-up of selected cases, also identified other projects (not necessarily involving telecommunications or highway rights-of-way) in which similar nontechnical issues have been raised or examined in detail and which offer instructive experience addressing these issues. The results provided a common data source for identifying key issues and potential resolutions by the experts participating in the Task B focus group.

Because FHWA's revision of policy to allow state highway agencies to expand the degree of utility encroachment in highway rights-of-way occurred at the beginning of 1988, statewide shared resource efforts relying on full or partial use of interstate rights-of-way have been possible only in the last few years. Both the scope and the methodology of Task A reflected the relatively recent availability of longitudinal access to the interstate system.

In Task B, a focus group of public and private sector experts in transportation and/or communications was convened to discuss nontechnical issues arising in shared resource projects, using the Task A report as the basis for discussion. Nontechnical issues included institutional impediments; procurement limitations; regulatory and legal issues; issues related to costs, funding, and financing; and concerns with respect to effects on privacy and the environment. Proponents face four types of issues in developing effective projects:

- Threshold legal and political issues;
- Financial issues;
- Project structure issues; and
- Other (contract) issues.

Of the issues inventoried and described in Task A, the focus group identified the following specific issues as appropriate for further research in Task C:

- Public sector authority to receive and earmark compensation;
- Evaluation of public resources/right-of-way;
- Tax implications of shared resource projects; and
- Contract terms (exclusivity, relocation, and liability).

These choices reflected the concerns of the focus group with practical implementation. Socio-political issues and other non-business issues were discussed, but the group directed Task C research toward "business" issues which directly affect the economic viability of shared resource projects.

Task C considered five specific case studies selected from shared resource projects that have reached the implementation stage and that provide as broad a range of such projects as feasible. For each case study, the team interviewed public and private officials and reviewed contract documents, RFPs, and other materials.

In addition to analyzing data from the case studies, Task C involved additional independent legal and economic research on two selected issues:

- Evaluation of public resources/right-of-way: Investigation of the bases for valuation of public right-of-way, including evaluation of payments for railroad and other utility right-of-way and identification of the objective factors that influence right-of-way value; and
- Tax implications of shared resource projects: Legal analysis of the effect on tax-free debt status of different forms of public-private partnerships in shared resource projects.

Under Task D, the study team convened a second focus group to review the nontechnical issues selected by the earlier focus group (and evaluated in the Task C report) and to discuss pending legislation on telecommunications. Attendees included many of the same experts who had participated in the first focus group plus other public and private sector officials invited to broaden the group's expertise and range of experience.

Based on the findings of this study, FHWA also undertook a series of briefings and workshops across the country to discuss the features of shared resource projects and the issues that need to be addressed in their implementation.

2.0 CASE STUDIES

This chapter briefly summarizes basic characteristics of the shared resource arrangements in each case study. The remaining chapters of the report draw on information from the case studies, as appropriate, to illustrate the variety of approaches used to address the shared resource issues identified by the focus group.

2.1 STATE OF MARYLAND

Maryland is engaged in a shared resource project to install 75 miles of fiber optics in its right-of-way. The agreement involves MCI and Teleport Communications Group (TCG). Operation began on September 4, 1995 on a portion of the project (College Park to downtown Baltimore segment).

Maryland is allowing MCI access to 75 miles of right-of-way for 40 years (with options for renewal), in which MCI may lay as many conduits as feasible and desired and pull fiber as needed afterward. In return, MCI is giving Maryland 24 "dark fibers"[10] for state use and acting as the lead contractor in building the system and providing routine maintenance. MCI has installed two conduits in the Baltimore–Washington Corridor segment of I-95, one for itself and one for Maryland, with no excess capacity. TCG, which entered the arrangement as a subcontractor to MCI, will pay MCI to install and maintain fiber for TCG's use in the privately held conduits. In return for access, TCG is providing the state with equipment necessary to light the original 24 dark fibers plus an additional 24 unlit fibers for public sector use. Each of the three partners retains ownership of the fiber dedicated to its use. As the party responsible for construction and maintenance, however, only MCI will physically access the system.

Maryland set up this shared resource project strictly as a procurement, purchasing telecommunications capacity with right-of-way access. The state also disaggregated its fiber-optics backbone geographically. Bidders could invest only in right-of-way routes of specific interest to them. The right-of-way for this agreement is part of the I-95 corridor that runs between Washington, D.C., and New York City, an area in which telecommunications redundancy can be valuable. Railroad and other utility rights-of-way are competitive options in the corridor.

The telecommunications capacity gained by the public sector as part of this shared resource arrangement will be used for a broad array of public agency needs; that is, it is not restricted to transportation needs. Coordination of public agency communications needs, under the auspices of the Department of General Services (DGS), preceded this shared resource project. The DGS began coordinating and purchasing telecommunications state-wide in the mid-

[10] "Dark fibers" are fiber-optics cables that are not attached to the electronics equipment necessary for transmission and distribution of telecommunications signals; fibers are "lighted" when the necessary electronics equipment is added and activated.

1980s, when each agency was found to be contracting separately for inter-LATA services. At the time that the shared resource approach was introduced, self-supply through a statewide network was already under consideration.

The RFP published by the DGS listed a number of technical requirements in exchange for private sector access to the right-of-way, including fiber, manhole access, and equipment. The bid received was less than fully compliant with these requests. For example, the state had requested equipment to light the fiber and local communications switching connections as well as free maintenance; the bidder offered dark fiber and maintenance. The DGS, however, has the ability to negotiate post-bid revisions and was able to conclude a more favorable arrangement with MCI. TCG did not respond to the initial RFP but was incorporated later in the arrangement.

Although the rights granted to MCI and TCG are technically not exclusive, the private partners have "practical exclusivity" because the state does not want repeated construction projects in the right-of-way. Maryland will probably allow only one company to put in fiber and oversee maintenance. Additional partners would have been accepted if they had responded to the RFP with an acceptable bid. This limited window of opportunity was defined by Maryland for both practical and safety reasons. The state does not want to create problems with traffic congestion and accidents from additional construction.

The shared resource arrangement provides for relocation cost sharing. That is, the state will pay for the necessary duct for the fiber-optics cables if and when relocation of the duct is required by construction or reconstruction of the roadway. MCI will relocate and provide ancillary equipment to reestablish the network connectivity to operate at "pre-move" performance levels. Potential contractors had requested that the state commit not to require relocation for at least five years from the contract date. Although the state did not expect to move facilities within that term, it would not commit contractually to refrain from doing so. It is unclear MCI will be responsible for relocation if the state installs an ITS application.

The state's liability is limited to repair of any facilities that it damages; it is not liable for consequential damages. MCI has indemnified the state for any dissemination of information pertaining to the contract and for any negligent performance of its services under the contract. According to the interviewees, this was a significant issue in the negotiation of the contract. Because MCI is a major long-distance contractor, potential liability costs for "consequential" damages could run into millions of dollars.

2.2 OHIO TURNPIKE COMMISSION

During the 1980s the Ohio Turnpike Commission entered into a number of licensing agreements for installation of telecommunications facilities in the Turnpike right-of-way, the most recent in the late 1980s. These agreements use a standard license form and are expressly non-exclusive; licenses extend for a 25-year period. Most of the current applications are for cellular uses; of the four or five licensing agreements for fiber optics, two covered the entire

length of the Turnpike. Litel has 200 miles of fiber and MCI less than 75 miles of fiber along the Turnpike; other firms have also been granted licenses.

Of the five cases studied, only the Ohio Turnpike Commission receives a fixed per-mile fee for the use of its right-of-way. In return for allowing access, the Commission receives a license fee of $1,600 per mile of installed fiber, as well as rights to use the fiber optics for Turnpike purposes at low or no cost. At present, the Commission uses relatively little of the capacity available. Valuation of the right-of-way was determined with information from market studies conducted prior to the 1980s.

The Ohio Turnpike agreement requires relocation, alteration, or protection of the telecommunications facility, at the licensees' sole expense, in order to avoid interference with the operation, reconstruction, improvement, or widening of the Turnpike. From a strictly legal drafting perspective, the agreement contains excellent, broadly drafted indemnities. The licensees are required to maintain specified levels of insurance and to hold the Turnpike Commission harmless from losses, costs, claims, damages, and expenses arising out of or related to any claims as a result of the agreement. The Commission has the right to defense by its own counsel and to control any claims made against it. The agreement also requires licensees to indemnify the Commission for bodily injury and property damage, to the extent of the licensees' negligence. The Commission is only liable to the extent that damage to its system is caused by its own "gross" negligence.

2.3 STATE OF MISSOURI

In 1994, Missouri entered into a contract with Digital Teleport, Inc. (DTI) for the installation of a statewide backbone system of more than 1,300 miles of fiber optics. More than 300 miles have been installed and activated, and an additional 100 miles of conduit have been installed. The principal areas already constructed are within the City of St. Louis and between St. Louis, Columbia, and Jefferson City. In return for allowing access to the right-of-way, Missouri receives six lighted fibers for state highway use as well as DTI maintenance of the system.

Missouri's arrangement offers two strong advantages. It gives exclusivity to one telecommunications firm, although that firm can lease access to other telecommunications firms on its lines, and is doing so. And there is limited or no serious competition from alternative right-of-way locations, such as railroads, in the areas of greatest interest to the bidders; i.e., within the St. Louis Standard Metropolitan Area (SMA). [11]

Missouri law allows utilities to exist in highway rights-of-way so long as they do not interfere with the roadway; however, the state has historically restricted utility access on the freeways to outer roadways or limited utility corridors, where access is contingent on meeting state permit requirements. Missouri's agreement with DTI grants an exclusive easement for 40 years within highway air space outside the standard utility corridor. The DTI facility was defined by the state as a "state highway facility," so it is permitted under the contract to be

[11] A Standard Metropolitan Area (SMA) is a U.S. Census-defined region including a city and its surrounding jurisdictions or other grouping of political jurisdictions that effectively function as a single economic center.

located in places other utilities are not located. "Exclusive" in this context applies only to other fiber-optics cable systems or communications systems.

Missouri, like Maryland, set up its shared resource project strictly as a procurement, purchasing telecommunications capacity with right-of-way access. DTI's exclusive access is considered a procurement contract awarded to a single contractor in a competitive process, rather than a special privilege, which might be subject to legal challenge. Missouri's RFP specified requirements for a basic statewide fiber-optics system, with the winner to be that bidder offering the most attractive package for transportation telecommunications infrastructure and service over and above the minimum requirements. Compensation was specified as access to highway right-of-way for the winner's own telecommunications system in the same corridors as the state system.

Although DTI can also locate within the standard utility corridor, the exclusivity provision does not apply to that portion of the right-of-way. The provision permits other firm's fiber-optics cables to cross DTI's easement at an approximate right angle, but only upon mutual agreement of the Missouri Highway and Transportation Commission (MHTC) and DTI regarding the location. Nothing in the agreement limits the Commission's authority to install its own fiber-optics cable for highway purposes within MHTC air space.

The state is to bear the cost of relocating. MHTC may either acquire additional right-of-way for the fiber-optics cable corridor in some fashion acceptable to DTI or remove and relocate other utilities at its own expense, so that DTI may place its system in the utility corridor if necessary.

DTI assumes responsibility for all warranties and liabilities for service and performance, and maintains insurance for bodily injury and property damage, product, and completed operation (with underground property damage endorsement, commercial automobile insurance, and worker's compensation insurance). Holders of sub-easements from DTI must maintain the same level of insurance.

MHTC is not responsible for any liability incurred by DTI. DTI is responsible for all injury or damage for its negligent acts or omissions and "saves harmless" MHTC for any expense or liability deriving from such acts or omissions, whether on its part or on the part of its subcontractors or agents. MHTC is liable for actual repair costs if its personnel, contractors, or subcontractors damage or destroy any part of the fiber system or equipment installed by DTI, but it is not liable for lost revenues or other incidental or consequential damages sustained by DTI.

2.4 BAY AREA RAPID TRANSIT

In this three-party agreement concluded in 1995, San Francisco Bay Area Rapid Transit (BART) procured a new fiber-optics system for use in operating its rail transit facilities. In addition to installing approximately $45 million worth of capital improvements procured by BART for its own system, MFS Network Technologies (MFS) will invest $3 million to install

additional conduit throughout the BART system. MFS will then rent that conduit space to any carrier that wishes to pull its own fiber. BART will receive 91 percent of the rental returns, and MFS will receive the remaining 9 percent. BART anticipates that these revenues will cover all but $2 million of the cost—including operations, maintenance, and interest on debt—for its train control and communication system over the 15-year period; they may cover even more.

BART had investigated developing its own fiber system but determined that ownership of fiber or conduit might trigger its regulation as a public utility, which it preferred to avoid. This prompted BART to search for a joint development partner.

BART's right-of-way gains value from the fact that it is a closed system and generally well protected from intrusion. Railroads are the main competition for right-of-way lessees; Southern Pacific, for example, owns substantial right-of-way leased to telecommunications carriers.

A particularly valuable portion of BART right-of-way runs through the BART tunnel under San Francisco Bay. Although there are two other ways for telecommunications firms to cross the Bay, they pose greater risk: running cable across the Bay floor runs the risk of disruption from shipping or natural events, and capacity for stringing fiber along the Bay Bridge is limited due to weight considerations.

The BART agreement also involves the California DOT (Caltrans) as a "silent" partner. Of the 100 miles of right-of-way included in BART's current and planned extensions, 25 miles are actually owned by Caltrans, which conceded control but not ownership to BART. Thus, Caltrans is also a lessor and, for the airspace lease it negotiated with BART, will receive a portion of the revenues generated from MFS conduit leases after BART has fully paid for its telecommunications system. BART divides its revenues by facility segment and will pay Caltrans 25 percent of the revenues it receives from conduit leases on those segments of right-of-way shared with Caltrans (which are considered relatively lower value for telecommunications use). This cash compensation goes into the state highway account to be used for highway improvements throughout the state as allocated by the California Transportation Commission; this format has already been established by Caltrans, which raises about $12 million per year from other airspace leasing.

Caltrans also receives in-kind compensation—4 of BART's 48 strands of fiber-optics along the full 100 miles of the BART system, with access at 15 strategic locations. In fact, this in-kind compensation was the dominant attraction for Caltrans. Caltrans has estimated that this in-kind benefit is equivalent to $8–12 million in avoided costs for independent construction of Caltrans infrastructure or $960,000 per year in lease costs for comparable fiber.

Caltrans' lease of air space to BART appears to be exclusive for the conduit system. BART's license to MFS does not provide exclusivity; however, as long as the conduit system between two adjacent BART stations has unoccupied capacity and MFS is not in default under the agreement, BART has agreed that it will not grant any other provider a license to install a communications system between such points. After system capacity has been reached this

exception will cease, even if space later becomes vacant; however, BART must give MFS right of first refusal if BART wants to add conduit capacity.

BART is obligated to designate a new route for the conduit if it must be relocated, and all relocation costs not paid for by a third party are to be paid by BART. MFS indemnifies BART for everything resulting from MFS's performance under the Agreement, regardless of the negligence of BART or whether liability without fault is sought to be imposed on BART, except where the damage results from negligent or willful misconduct by a "BART Indemnitee" and was not contributed to by any omission of MFS. MFS is not obligated to indemnify BART for BART's own negligence or willful misconduct.

Both BART and MFS waived consequential, incidental, speculative, and indirect damages, lost profits, and the like. The agreement includes the form of license to be used by MFS in marketing excess capacity to third-party customers, the "User Agreement." Interestingly, it requires the user to insure MFS, exculpate MFS from liability for service interruptions, and indemnify MFS.

2.5 CITY OF LEESBURG, FLORIDA

The City of Leesburg's Communications Utility and its private partners, Knight Enterprises and Alternative Communications Networks (ACN), developed a new fiber-optics system within the City. Leesburg is providing funding for construction and right-of-way access on above-ground utility poles; ACN is designing and constructing the network and leasing the capacity to private or public customers under a five-year contract with the City.

The City owns only the dark fiber on its right-of-way, which it can also use for communications among its own buildings. Customers own the fiber from the right-of-way line to their own facilities, pay ACN a fee for access to the City-owned backbone, and can either use their own equipment or pay ACN for use of ACN equipment to light the fiber. Approximately 10 miles of fiber have been installed, and plans are under way for an additional 30 miles of fiber.

Leesburg is investing its own capital in the project and will receive cash compensation based on lease payments (i.e., revenue sharing) in addition to fiber-optics capacity. The initial cash revenues will be used to repay capital and, thereafter, revenues will be split evenly between the City and its telecommunications partner. Funds will be deposited into a separate utility fund for communications to pay maintenance and miscellaneous costs. At the end of the year, any funds remaining in the account will be transferred to the general account. Leesburg will also use revenues from its telecommunications system to obtain fiber-optics interconnections for government services.

The City's agreement with ACN requires that if other entities express interest in the City's cables, ACN must coordinate the connection and the equipment used for those connections. ACN can bill those other entities for time and materials spent in the evaluation. Further, since

the City is sharing revenues from ACN's marketing of the network, it prohibited ACN from competing with the City's cables.

Essentially, there are two levels of private sector exclusivity in the Leesburg arrangement: (1) the number of private sector partners involved in the shared resource agreement, and (2) the number of telecommunications service providers gaining access to the fiber-optics infrastructure. ACN is the exclusive marketing partner for City-owned cable built under the ACN-Leesburg arrangement. The City can allow additional vendors to operate within the service area under other agreements, and the "Leesburg Telecommunications Systems Permit Ordinance" appears to contemplate open access to multiple vendors. Exclusive access to the City-owned telecommunications capacity is not granted to telecommunications service providers. The Leesburg-ACN agreement also has a unique reverse-exclusivity provision. Within the service area, ACN may not offer certain services on cables other than those provided by the City without permission from the City. Relocation is not explicitly addressed in the agreement, probably because of the short (five-year) duration of the contract.

3.0 THRESHOLD LEGAL AND POLITICAL ISSUES

Threshold issues are those that determine whether shared resource projects are viable options for state and local highway agencies; these are the issues that must be addressed at the outset of a program for shared resource projects. Primarily legal and political, issues range from statutory or regulatory constraints on access to public rights-of-way for communications purposes, to political opposition to competition between public and private communications systems.

Shared resource projects are developing in an atmosphere of significant political and legislative activity. Several important telecommunications bills have come up before the United States Congress which, if enacted, would significantly affect the telecommunications industry and have associated ramifications for shared resource projects. These bills would measurably alter the market structure for telecommunications services and thus the relationship among service providers. Provisions in such bills may also affect the ability of local governments to negotiate specific public benefits in return for allowing access to a given telecommunications provider or offer exclusive right-of-way access to one vendor, or the telecommunications carriers that use public rights-of-way to offer preferential rates to public institutions.

3.1 PUBLIC SECTOR AUTHORITY TO RECEIVE AND EARMARK COMPENSATION RECEIVED

One of the essential threshold questions in determining whether a public agency will pursue shared resource projects, and which type of shared resource projects will be most attractive, is the ability of the highway to receive compensation for allowing private use of its right-of-way. The related factor of the ability of the agency to control the compensation it receives is also critical in its effect on the willingness of the agency to expend its resources in developing shared resource projects. This issue cuts two ways. Clearly, it is a disincentive to the highway agency to have compensation received in return for right-of-way access directed into a general fund. Although a benefit to the public as a whole, such a transaction looks unimpressive on the highway agency's balance sheet. In many cases, the type of compensation received by the public agency—in-kind telecommunications capacity or cash—is governed by its ability to receive and earmark compensation for access to its rights-of-way.

In states where the primary benefit of a shared resource project is viewed as accelerating implementation of ITS, concern with inability to earmark the funds specifically for that use may render the DOT unwilling to accept the additional responsibilities and risks associated with permitting access to the public right-of-way. In states where non-transportation-related public use of the installed fiber-optic network is the primary attraction of a shared resource project, the state may be concerned that it is not able to use revenues generated from the public right-of-way for non-transportation-related uses.

3.1.1 Barriers to Compensation

Historically, one barrier to receiving compensation has been the obligation of highway agencies in some states, such as California, to allow public utilities in the right-of-way at no charge, other than fees for the cost of administering the franchise. It is worth noting that in those states, the transportation authority may take the position that since it cannot charge for access, it will not provide access. For example, in California, public utility telecommunication companies are permitted access to public streets and highways to construct and install telecommunication facilities without obtaining local franchises or paying for the use of such streets and highways (Cal. Pub. Util. Code § 7901).[12] However, Caltrans has historically interpreted the law to be permissive rather than mandatory in regard to state highways and has generally refused to permit such access because it cannot charge for it.

A second barrier has been the traditional policy regarding federal-aid highways that limits longitudinal utility encroachments. This barrier was reduced, to some extent, by the 1988 revision of the USDOT policy on longitudinal encroachment. The new rule requires state accommodation plans to evaluate the desirability of utility installation and ensure that safety is not affected in the event that longitudinal encroachments are permitted. Since many states have not revised their accommodation policies, however, a highway agency's ability to receive compensation may remain limited by its inability to allow access to right-of-way.

In spite of more liberal federal guidelines, accommodations policies in some states restrict transportation departments from charging for longitudinal use of the right-of-way. South Carolina officials, for example, indicated that a shared resource plan was "more trouble than it was worth," in part because state law does not allow the assessment of fees. Unless state laws and accommodations policies are revised to permit receipt of compensation for longitudinal access to the right-of-way, the departments charged with maintaining the public rights-of-way are logically less motivated to absorb the additional costs and risks associated with permitting such access.

A further limitation on compensation derives from regulations governing federal-aid highway financing. Where highway right-of-way is acquired with federal-aid money, the federal regulations require compensation to repay federal funds if the right-of-way is disposed of for non-public purposes.[13] This provision limits the range of shared resource projects available to state highway agencies. The limitation may not be significant, however, since credit must be returned to the federal government only when right-of-way is transferred, not when joint use is permitted. The case studies indicate that most shared resource transactions involve granting a lease or license, rather than transferring property interests which might trigger credit to federal funds.

Federal regulations also provide an alternative means of pursuing shared resource transactions without requiring credit to federal funds. The state highway department may permit the use of

[12]In contrast, Michigan does not give utilities rights to right-of-way without local agreement. (Mich. Const. Art. VII, 29.) (See Libonati, The Law of Intergovernmental Relations: IVHS Opportunities and Constraints, 22 Transp. L.J. 225.)

[13]23 C.F.R. § 713.307(b).

highway airspace for non-highway purposes, so long as the airspace is not required for highway uses within the foreseeable future. Although use of airspace by private parties is subject to FHWA approval, revenues generated by airspace leasing are expressly exempt from federal funds credit requirements.[14] Caltrans used this provision in granting BART the right to develop its contract with MFS.

3.1.2 Agency Type

In essence, the extent to which public agencies can receive and earmark compensation depends on whether their authorizing legislation defines them as

- Highway service providers, or
- Revenue generators.

The case studies suggest that public agencies can be divided into three groups, based on their characteristic statutory authorities to receive and control compensation. Special purpose transportation agencies such as turnpike authorities and transit agencies (for example, the Ohio Turnpike Commission and BART) have the broadest organic legislation, which allows considerable latitude in accepting any type of compensation available and using such compensation for the agency's transportation purposes.

State DOTs are highway service providers, generally more limited in their authority to receive compensation. In some case studies, states elected to avoid negotiating for cash compensation rather than debate their authority to receive such revenues. Even where compensation can be received for private access to the right-of-way, the compensation received may enter state accounts unrelated to the project producing the revenue. Finally, municipal utilities such as those in Leesburg, Florida, and Palo Alto, California, can generally receive revenue from right-of-way access, since utilities have undisputed authority to collect and earmark compensation. However, such utilities are subject to oversight by state utility regulators.

Greater flexibility may come only through legislative change. Some states have begun to move toward liberalizing agencies' authority. California has initiated four public-private tollroad projects, and similar efforts are under way in Washington and Minnesota, among other states. But these efforts are generally considered demonstration projects, and they do not allow agencies additional authority or flexibility with respect to existing state highways. To provide maximum flexibility for agencies to enter into shared resource arrangements which produce cash compensation, most states will need to revise statutory authority for highway agencies along the lines of the authority granted to the Ohio Turnpike Commission.

Although expanded authority for highway agencies may be the most comprehensive approach to establishing the ability to receive and earmark compensation, public policy and political concerns may limit the willingness of state legislators to modify the authority of tax-supported agencies comprehensively. An alternative may be to establish state-level ITS agencies

[14] 23 C.F.R. § 713.204(b).

authorized to lease state highway rights-of-way at a nominal fee and given broad authority to contract for ITS services or enter into public-private partnerships, using access to state highways as capital. Creating such agencies would, of course, also require new state legislation, but resistance to such a broad grant may be reduced if the grant is directed at a special purpose such as development of ITS services.

3.1.3 Project Form

Another distinction among the case studies is the extent to which projects take the form of a procurement of goods or services, rather than a lease or license to use right-of-way. If an agency can allow the use of its right-of-way by private parties but is uncertain about its authority to receive in-kind or cash compensation, it may choose to pursue a procurement approach. The procurement approach is limited since it precludes either cash compensation or the kind of public-private partnership exemplified by the BART transaction. "Purchasing" telecommunications facilities or services with right-of-way access may also raise issues under individual state's procurement requirements, since there may be some obligation to monetize the value of the right-of-way in order to establish the cost of the procurement.

Nonetheless, the procurement approach may both save time and avoid political opposition for shared resource projects. Missouri intentionally avoided cash compensation from the private sector and operated its shared resource project strictly as a procurement, purchasing telecommunications capacity with right-of-way access. Maryland used the same approach. The City of Leesburg, like BART, will use the revenues from its telecommunications system to recoup construction costs and gain fiber-optics interconnections for government services. Of the five cases studied, only the Ohio Turnpike Commission receives a per-mile fee for the use of its right-of-way.

3.2 OTHER THRESHOLD ISSUES

In addition to authority to receive and earmark compensation, selected by the focus group for in-depth analysis, the research team identified and reviewed a number of other threshold legal and political issues in Task A. These are described and evaluated briefly in this section of the report.

3.2.1 Authority to Use Public Right-of-Way for Telecommunications

One of the most significant current obstacles to shared resource projects is legal and institutional limitation on authority to use public rights-of-way for telecommunications. Although a number of states authorize the use of local streets for utility purposes, and some, such as California, mandate free access for utilities, right-of-way on state and interstate highways has traditionally been considered inviolate. The issue here is whether the public sector has the authority to allow other uses and users into the right-of-way. The other side of the same issue is whether the state has the right to preclude other uses or users from its rights-of-way.

The WSDOT Feasibility Study in 1992 surveyed 51 jurisdictions on their accommodation policies and obtained 34 responses. The study concluded that states have varying policies and summarized those policies (in order of increasing restriction) as follows:

- Only one state, Kansas, allowed all utilities on freeways and limited access highways; six states permitted communication networks (only) in the freeway right-of-way; 18 states based their policies on a 1982 or 1989 AASHTO guideline for accommodation in the freeway right-of-way; 10 states permitted no utilities on freeways.

- Iowa and Georgia were the only states that charge for longitudinal use of their right-of-way. Minnesota was planning to charge for use of its freeway right-of-way once current laws changed.

- Only 14 states had some form of surveillance, control, and driver information (SC&DI) network and most are very rudimentary; Washington and California appeared to have the most progressive planning efforts to address SC&DI applications.

- Iowa, Oklahoma, and Wisconsin were the only states indicating that they had or planned to have state-owned telecommunication networks principally in the highway right-of-way that are or will be shared with other state agencies for non-transportation-related applications. New York indicated that its SC&DI network is shared with the State Patrol.[15]

In addition to the obvious restrictions that a state's accommodation policy may place on whether the public right-of-way may be used for a shared resource project, as well as whether state or local agencies may exact a price for access to the right-of-way, the manner in which the public right-of-way was acquired for its transportation use may be a limiting factor. In many states much of the public right-of-way has been acquired by donation or dedication from the owners of property adjacent to the right-of-way. Landowners dedicate right-of-way either because they viewed it as advantageous to have the public highway adjoining their property, or because such dedication was required as a condition to development approvals for the adjoining property.

The documentation for acquisition of public right-of-way by state or local transportation agencies may effectively limit the ability to use all or portions of a highway for a "non-transportation" purpose. Traditionally, a dedication for street purposes has been construed to provide only an easement to the public unless the conveyancing document specifically indicates that it intends to transfer fee title to the public.[16] In such cases, unless the transfer to the public agency was made sufficiently broad or specific, the landowner who made the dedication or donation arguably transferred only an easement and reserved any benefits flowing from leasing the air space. California enacted legislation specifically addressing this

[15]WSDOT Feasibility Study, at pp. 22-23.
[16]Miller & Starr, *California Real Estate, 2d*, 1990, § 21:29, p. 506.

issue for new acquisitions. California Senate Bill 714 added section 104.2 to the California Streets and Highways Code in 1989, which states

> If property is provided through donation or at less than fair market value to the Department for state highway purposes, or purchased with funds provided by a local agency, the donor or seller may reserve the right to develop the property but any development of the property shall be subject to the approval of the Department and any reservations, restrictions or conditions that it determines necessary for highway safety.

In addition, Senate Bill 714 amended section 104.12, subdivision (a), of the Streets and Highways Code to read in part:

> The Department may lease to public agencies or private entities for any term not to exceed 99 years the use of areas above or below state highways, subject to any reservations, restrictions, and conditions that it deems necessary to ensure adequate protection to the safety and the adequacy of highway facilities and to abutting or adjacent land uses . . .. *If leased property was provided to the Department for state highway purposes through donation or at less than fair market value, the lease revenue shall be shared with the donor or seller if so provided by contract when the property was acquired.* [emphasis added]

Thus, the status of the public agency's title to the public right-of-way and other state laws governing development may constrain the public sector's ability to reserve the benefits of shared resource projects entirely to the public.

3.2.2 Authority to Participate in Public-Private Partnerships

A significant barrier is posed by legal restrictions or institutional reluctance related to public-private partnership agreements. Although legislation has been enacted in some states and is under investigation in others to allow highway agencies to develop extensive partnerships, most such authorizations are limited to demonstration projects, where they exist at all. Moreover, safety in highway rights-of-way remains a significant concern of state highway agencies.

Generally, state agencies cannot act unless authority is specifically granted by statute ("express authority"), or unless such acts are necessary to achieve the express purpose or object of a statute ("implied authority"). State DOTs generally have broad *express* authority to contract for construction and maintenance of state highways and to plan, develop, and

improve the state highway system. (*See*, e.g., Title 43, C.R.S., §§ 4-1-100 et seq.) Implied authority may exist to the extent *necessary* to carry out express purposes. But how far does that implied authority extend? Does it encompass non-transportation-related business activities for the purpose of raising transportation revenues? Does it permit participation in separate legal entities such as Help, Inc. (Heavy Vehicle License Plate program for monitoring interstate commercial vehicles using ITS technologies)? A number of states that are already involved in these projects, or are seriously considering them, have passed express legislative authority (e.g., *see*, California's AB 680 and Washington's recent privatization demonstration projects legislation).

In 1993, the Minnesota state legislature provided the state highway agency with unique capabilities to develop partnership agreements. Among other things, the legislation permits agreements with governmental or nongovernmental entities for sharing facilities, equipment, staff, data, or other means of providing transportation-related services. In California, the Caltrans is investigating the development of legislation authorizing shared resources on state highways. Michigan is seeking to modify state law to permit shared resources on an experimental basis. Massachusetts has adopted a formal policy statement regarding its desire to share resources, and the state believes that authority exists under federal and state accommodation policies.[17]

3.2.3 Political Opposition from Private Sector Competitors

Political concerns may also deter agencies from entering into shared resource agreements. For example, the possibility of using shared resources to allow public agencies to compete with private agencies in providing telecommunication services may generate opposition from the telecommunications industry and raise concerns that public agencies are stepping away from traditional "governmental" services. Agencies may also be faced with inter-agency and inter-jurisdiction political barriers.

Typically, networks that are privately owned (so-called "bypass networks") are installed to avoid telephone companies' circuit costs and long-distance telephone costs. While a bypass network installed by a single organization would have a minimal impact on telephone company revenue, if enough organizations were to put their telecommunications on bypass networks it could decrease telephone company traffic significantly enough to result in local telephone company rate increases to the general public.[18] So to the extent that a state would like to finance its own network by leasing out excess capacity, or obtain a telecommunications facility by permitting a company to install its own network and provide extra capacity for the public agency, it may expect private sector lobbying against any large network effort.

As a case in point, when the State of Iowa proposed a fiber network to accommodate all state and educational telecommunication traffic, it commissioned Ernst & Young to study the

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[17]"Wiring Massachusetts. An Agenda for Public/Private Cooperation to Facilitate Telecommunications Systems Along Massachusetts Highways Policy Guidelines," Commonwealth of Massachusetts Highway Department, 1994.
[18]*Ibid.*

impact of the proposed network on the telecommunications industry in Iowa. Only when Ernst & Young determined that the state network posed no significant threat to the telecommunication industry did the state decide to move ahead with its procurement.

The perceived threat of state-owned "bypass networks" is just one component of broad political concern associated with the type of shared resource project to be undertaken by a state, and the appropriateness of public-private projects generally. A public agency's determination to install a telecommunications system in a public right-of-way for ITS purposes seems beyond political reproach. However, when opportunities are entertained to finance that purely transportation need by selling excess capacity in the network, or permitting private entities access to the right-of-way for privatized purposes in return for the provision of certain public services, the government may be perceived as entering into competition with the private sector.

A public agency's installation and operation of its own telecommunications network in the state right-of-way may be viewed as directly in competition with private telecommunications companies within the state. Financing the governmental purposes through a commercial sale of excess capacity may exacerbate perceived anti-competitive effects. Governmental activities may be viewed as even more anti-competitive by entering into a "partnership" with a private entity and not providing equal access to all parties desiring use of the public right-of-way.

Partnerships for shared networks may be viewed as creating a hybrid entity, not public and not private, and U.S. laws have little experience with this type of hybrid organization. To whom is the organization accountable? Voters or shareholders? As opportunities for entering into these types of arrangements increase, and the arrangements themselves become increasingly complex and sophisticated, the lines between appropriate governmental activity and private activity may blur.

Organizations which have entered into shared resource projects appear to have attempted to draw a bright line between governmental and non-governmental functions. Most of the projects studied involve a public agency's request for services in return for access to the right-of-way. Few, if any, have considered sharing excess capacity in competition with the private sector. For example, in response to concerns expressed by the State Public Service Commission, Missouri's agreement with DTI provides that Missouri's dedicated fiber can be used only for state purposes, not for revenue-generating purposes. This is also the case with the Ohio Turnpike agreement which provides use of the dedicated capacity only for Turnpike purposes that do not include sale to or use by any other person, or even any other public agency. The WSDOT Feasibility Study, however, does contemplate the possibility of recovering construction costs by renting available network facilities.

3.2.4 Inter-agency and Political Coordination

Another threshold political issue is faced when the proposed shared resource project will involve more than one public authority. To make the project attractive to the private sector, the public agency may need to be able to ensure the ability to continue cable into geographically contiguous areas. Cities within a large urban area may be unable to develop

ITS projects or large shared resource efforts on their own, when the private partners need projects that cover the entire metropolis. Palo Alto cites this obstacle as the major reason its shared resource effort focuses on city services and not ITS.

Additional problems may arise when it is necessary to coordinate efforts among different agencies within the same political jurisdiction. Multi-agency relationships are obviously fertile ground for political conflict, as well as project delays, inconsistent regulations, and burdensome administrative requirements.[19] Of course, multi-agency projects may also provide opportunities for overcoming barriers faced by one or more of the parties, as in the BART/Caltrans transaction with MFS.

3.2.5 Lack of Private Sector Interest in Shared Resource Projects

Finally, even assuming all legal and political issues have been resolved on the public partner's side of the arrangement, shared resource projects may falter because of private sector reluctance to participate. The benefits accruing to the public sector from participation in shared resource projects have been described. The obvious benefit to the private sector partner is access to a continuous right-of-way that can be negotiated with a single or only a few contractual arrangements rather than a laborious assembly of smaller parcels, perhaps even at a lower "cost" than access to comparable private rights-of-way. Nonetheless, potential private partners may not be eager to enter into such arrangements.

Several factors contribute to private sector reluctance or lack of interest:

- Limited demand for additional rights-of-way access, since many communications firms installed their backbone systems a number of years ago;
- Additional costs for infrastructure in public rights-of-way due to more stringent installation specifications (e.g., deeper trenches);
- Administrative/managerial burden of compliance with public sector contractual requirements and in-kind provision of compensation.

At base, private sector interest in shared resource projects is market driven. Regardless of administrative ease or public sector conditions on rights-of-way access, telecommunications service providers have no reason to negotiate for additional rights-of-way—whether highway or other—if their current capacity is sufficient to satisfy existing and anticipated demand or if they feel that there is insufficient market for their services in the areas accessed by those rights-of-way. For example, the City of La Mesa, California, would like to use shared resources to expand a system of fiber optics to operate traffic signals and to develop other

[19]Maine indicates that a potential shared resource project with AT&T proved infeasible largely due to the inability of the public sector to meet the private entities aggressive timing requirements.

ITS uses but faces a "geographic barrier": the suburban jurisdiction lacks the density to attract private partners interested in serving its population.

4.0 FINANCIAL ISSUES

Financial issues include public and private resource valuation, support costs, and tax implications of private sector participation in typically tax-exempt projects. To date, compensation to the public agency in shared resource projects appears to have been based on estimates of public sector needs or private partner willingness to contribute rather than on a systematic evaluation of the worth of the shared public resources. As these projects become more common, systematic valuation of the public resources involved will become more important. In determining costs and benefits of different forms of compensation, public agencies must also address out-of-pocket costs that are incurred when a public agency forms a partnership; that is, the costs of soliciting bids, screening, and monitoring joint ventures. Federal tax policy creates an additional disincentive: potential income tax liability and potential loss of tax-exempt status for bonds issued to finance a project.

4.1 VALUATION OF PUBLIC RESOURCES

Before embarking on an ambitious procurement for a shared resource project, the public agency must determine what it considers a fair trade for the resources it brings to the partnership. Realistic estimates of the value of public right-of-way are important because they help the public sector identify an appropriate range of compensation in negotiations with potential private sector lessees.

Although access to rights-of-way is leased and prices are recorded in various contracts, these values may not be generally available because they are considered proprietary. In the absence of an organized market that monetizes public rights-of-way, one of the issues likely to become important is more systematic and objective valuation of the non-traded public resources. In the cases reviewed to date, there was limited systematic and explicit evaluation of the primary resource (access to the public right-of-way). Rather, it appears that barter and even cash arrangements are based on what public officials estimate to be public sector communications needs and what they perceive private partners are willing to provide.

Defining the value of access means taking into account the costs of installing the infrastructure, particularly differences among alternative rights-of-way, and variations in context and the monetized value of any perceived advantages or disadvantages of highway right-of-way over the next best alternative.

4.1.1 Factors Affecting Value

Telecommunications growth and competition among telecommunications providers generate demand for new infrastructure in a given location. Ultimately, it is this force that determines the general value of right-of-way for telecommunications in a given locale. At any level of demand for right-of-way access in general, the competitive value of highway access depends on (1) the costs of supplying telecommunications using alternative (competitive) approaches

and (2) factors that cause variations in the costs and benefits of installing infrastructure along highway right-of-way.

Factors responsible for value and variations in value along any particular highway or roadway include the following:

- *Location* (urban, suburban, rural) and *section of the country* influence real estate values and thus the costs of alternatives, such as assembling individual parcels or leasing access rights from railroads. *Type of terrain* affects installation costs; if highway right-of-way offers easier terrain than the next best alternative, it is cost-saving and thus the right-of-way is "worth" more.

- Similarly, *location within the highway right-of-way* affects installation costs and thus value of right-of-way access from the lessee's point of view.[20] That is, installation in the median is generally the least-cost highway option for the telecommunications company because fewer or no problems are posed by highway entry points and intersections.[21] Because of greater traffic safety concerns, however, the median is the least desirable location for telecommunications or other utility infrastructure from the viewpoint of a public sector transportation agency.

- *Infrastructure security* is related to the type of right-of-way and to location within that right-of-way. For example, security may be better just inside the fence line than along the median, and this can mitigate the installation cost advantages of location in the median.[22] Moreover, in general, telecommunications security from damage is perceived as greater on interstate/freeway right-of-way—median or fence line—than along railroad right-of-way, private land, or other roadways.[23] Najafi et al. (1990) evaluated the relative value of different right-of-way locations based on a survey of 78 public and private officials. Respondents rated public safety, aesthetics, preservation of environment, and security of system on a scale of 1 to 4 for five right-of-way corridor options: non-interstate highway, private land, railroad, interstate/freeway median, and interstate/freeway fence line.

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[20]Using representative data from Hess et al. (1988), plowed-in cable located along an interstate right-of-way fence line cost $6,000 more per mile than it would in the interstate median. Installation along railroad right-of-way was estimated as equal in cost (*excluding* access costs) to installation along an interstate median, and installation along non-interstate highway was estimated as $17,000 more per mile. (Hess, Ronald W., Bridger M. Mitchell, Eleanor C. River, Don H. Jones, Barry M. Wolf. "Feasibility of Using Interstate Highway Right-of-Way to Obtain a More Survivable Fiber-Optics Network," The RAND Corporation, Santa Monica California, January 1988.)

[21]This is the "conventional wisdom." The situation is reversed if plans call for frequent connections to off-highway facilities, which would require running conduits under the pavement from a median placement but not from a fence-line or shoulder location.

[22]A physical fence is advantageous since it provides clear demarcation to avoid damage from accidental encroachment on the right-of-way by utility or other excavations; this applies to both limited access highway and rail rights-of-way (such as BART's). Location in the median may also pose unexpected risks such as that brought out by a Virginia DOT official who noted that, on some highways, large road kill is buried in the median, which is often the only on-site option along some rights-of-way.

[23]This was brought out in the Task B focus group and further documented by the Najafi et al. (1990) study discussed later in this report. (Najafi, Fazil T., Abdenour Nazef, Paul Kaczorowski. "Location Alternatives for Fiber Optic Cable Installation," *The Logistics and Transportation Review,* June 1990.)

Interstate/freeway median was rated lowest for traffic safety (average 1.5 rating)—clearly a legitimate concern for transportation agencies. Regarding system security, however, interstate/freeway fence line and median locations rated 3.5 and 3.1, compared with 2.2 for non-interstates and 2.7–2.8 for private land and railroads, indicating a clear comparative advantage for roadway locations. (Average scores were similar for all locations on aesthetics and preservation.)

- *Allocation of financial responsibility* for unplanned events and the *risk of damage and relocation*—the chance that such events will actually occur—figure significantly in financial risk. The greater the risk assumed by the private telecommunications company, the greater the potential costs associated with using a particular right-of-way and thus the lesser the value of access vis à vis other options.

- *Term of contract* and *length of right-of-way* also affect costs. The longer the contract, the greater the guaranteed use of the infrastructure installed. Although shorter contracts may be renewed and ultimately extend into long-term contracts, the risk of non-renewal increases financial risk. Similarly, the greater the length of the right-of-way accessed under one contract, the less expensive the transactions and negotiation costs per mile. This holds true for highway, railway/transit, and utility right-of-way, although certainly not for parcels assembled from individual landowners plot by plot. The longer the right-of-way accessed from a single agency, therefore, the greater the value per mile to the lessee in light of costs of multiple negotiations avoided. This rule of thumb may also distinguish between long-distance carriers, which have greater revenues and can afford greater compensation, and local carriers, which have shallower pockets and less revenue-generating telecommunications traffic over the infrastructure installed. Used this way, distance can be a criterion that allows lessors to vary prices systematically among lessees according to their willingness to pay (a function of the value they place on right-of-way access as well as their ability to pay).

- *Connectivity* includes both proximity to a viable distribution network (retail) and long-distance continuity, that is, connections to other right-of-way required for system completion. For example, in a study for the Massachusetts Turnpike Authority (MTA), Little (1990)[24] noted that "potential demand for Turnpike right-of-way would be enhanced if interstate and state highways that interconnect with the MTA become available for fiber-optics occupancy."

- *Type of infrastructure* can figure in valuation in two ways: as an indication of (1) maintenance needs and thus the chance of safety problems or traffic disruption due to infrastructure maintenance; and (2) telecommunications volume and profitability of the infrastructure installed. In a number of cases, DOTs have denied longitudinal access to traditional utilities believed to pose safety problems but are considering or have granted access to fiber-optics providers because maintenance is limited and danger of combustion or similar hazards nonexistent. Infrastructure type can also be a proxy for revenue

[24] Arthur D. Little, Inc. "Final Report: Massachusetts Turnpike Authority, Appraisal of ROW for Fiber Optic Occupation," Cambridge Massachusetts (Reference 64775, March 1990).

> potential, probably the single most important determinant of right-of-way value. For example, access to right-of-way is assumed to be of greater value when used for fiber optics than for conventional copper cable because fiber optics have greater communications capacity and therefore greater revenue potential. Railroads often distinguish among infrastructure types in levying lease fees. In two cases reviewed for this study (BART and Leesburg), revenue was an explicit factor in compensation received by the public sector. The primary public participants are investors in these cases; revenue-sharing provides them with the means to pay off their capital outlays.[25]

In addition, timing is an implicit yet important factor because demand for right-of-way of any kind strengthens or weakens as market situations shift, competition changes, and technology advances. In the shorter run, the speed with which a right-of-way lease can be negotiated and construction completed can be an overriding factor.

In 1988 the Rand Corporation conducted a study of fees charged for use of highway right-of-way. The results of that study were summarized in the WSDOT Feasibility Study and are presented in the table below. Based on the Rand study, WSDOT determined that charging for highway right-of-way in Washington would generate revenue on the order of $50,000 to $300,000 per year. This sum was not viewed as having a significant impact on transportation programs in general.[26] WSDOT went on to conclude that

> in summary, there appears to be minimal justification in charging for use of our right-of-way purely for the sake of increasing revenue to the Department. However, changing RCW § 7.44 to allow WSDOT to receive compensation in exchange for use of the highway will potentially allow WSDOT to reduce construction costs and construction time frames for its SC&DI communication network.[27]

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[25]The third public agency involved in revenue-sharing, Caltrans, is not an active investor; its participation is limited to giving BART permission to engage in shared resource agreements on the Caltrans right-of-way allocated to BART for its rail lines. Caltrans views its revenue receipts from the BART deal as "icing" on the fiber-optics capacity "cake" it will receive.

[26]WSDOT Feasibility Study.

[27]WSDOT Feasibility Study, p. 10.

Fees Charged for Highway Rights-of-Way (1988)

STATE	FACILITY TYPE	LOCATION IN RIGHT-OF-WAY	ENVIRONMENT	ANNUAL OR ANNUALIZED FEE (per mile)
California	Aqueduct	N/A	Rural	$2850
Florida	Turnpike	Median	Rural	$ 736
Georgia	Highways	Edge	Rural Urban	$1000 - $2000 $5000
Illinois	Tollroad	Edge	Suburban	$1500
Iowa	Highways		Urban Rural	$4500[28] $1500
Indiana	Tollroad	Median	Rural	$1800
Massachusetts	Turnpike	Median	Urban	$5000 - $7500[29]
New York	Throughway	Fence	Suburban	$5280
Ohio	Turnpike	Median	Rural	$1600-$1850

Source: Rand Corporation

Since the Washington study was conducted, the growth in opportunities associated with the "information highway" has been explosive, and the value of access to public sector right-of-way for installation of fiber-optic networks has appreciated significantly. Indeed, many agencies are concerned that without a standard for valuation they could be "giving away the store" if they pursue the opportunity early, before much is known about the market for shared resource projects.

Massachusetts has framed the counter-argument in its policy statement, "Wiring Massachusetts." The State says that time is a critical variable and that it cannot afford to wait if it wants to remain economically viable, projecting that in the near future transportation of goods and services will rely heavily on telecommunications and that therefore the State *must* provide a friendly environment.

4.1.2 Valuation Methods

At least two parties are involved in determining compensation: the "buyer" (lessee) and the "seller" (right-of-way owner or lessor). The compensation finally agreed upon will be at or below the maximum value of the right-of-way to the lessee. To drive the best bargain for the

[28]The Iowa DOT reserves the right to negotiate the fee charged for occupancy dedicated solely to state governmental use. Iowa Accommodation Policy, § 115.24(12)c.

[29]It should be noted that Massachusetts' new policy for "Wiring Massachusetts" will charge the "Lead Agency" an annual $500 permit fee in addition to the in-kind services required.

public sector, the right-of-way owner must have a clear idea of the lessee's upper bound before negotiations conclude.

Public sector agencies have expressed an interest in methods that will help them estimate what lessees might be willing to pay for longitudinal access to highway right-of-way. In the absence of an established market, in which frequent trading establishes values that are openly reported, there are several viable approaches to valuation:

- Competitive auction;
- Valuation of adjacent land;
- Cost of next best alternative;
- Needs-based compensation;
- Historical experience; and
- Market research.

Aside from competitive auction, which may or may not elicit bids at "full market value," no single approach will yield a completely accurate right-of-way value. Several approaches used simultaneously will better pinpoint the range within which market value falls.

Competitive Auction

If the number of potential buyers/lessees exceeds the number of contracts to be awarded, bidding in a competitive auction can be used to make a selection and to establish compensation levels. This is analogous to recent FCC auctions for available bandwidth. In its mirror image (that is, solicitation of low bids rather than high bids), public agencies practice auction-type bidding in selecting low-bid contractors for specified projects.

There are differences, however, between the rights auctioned by the FCC and the access to public right-of-way associated with a shared resource project—primarily safety considerations. Any auction for shared resources must be contingent upon meeting other specified conditions such as construction and maintenance practices to ensure safe highway operations. Further, a shared resource project will probably involve a long-term working partnership. Therefore, it will be more important to the awarding agency that it have control over the selection of vendors.

Shared resource projects also differ significantly from other auction situations because more than one lessee can be accommodated in the same right-of-way. In all cases documented to date in this study, the highway right-of-way can physically accommodate *all* lessees interested in longitudinal access. Thus, competitive auction may be a practical option only if access will be granted exclusively to a single lessee.

An auction approach is not without drawbacks. Of course, competitive auction generally assumes more than one potential bidder. The Little study (1990) concluded that the market for Massachusetts Turnpike right-of-way in 1990 was too weak to support an auction approach. And, like other high-bid awards, competitive auctions for highway right-of-way could act to exclude smaller, less well-capitalized firms if the access will be exclusive to the high bidder or compensation will not vary with firm revenues.

Missouri provides an example of auction-based valuation. The DOT, having already determined its fiber-optics needs, invited bidders to submit their best offer for a DOT-specified fiber-optics backbone geared to the needs of an advanced traffic management system. The opening bid had to provide at least six dark fibers along stated routes (bidders could not "cherry-pick" specific segments but had to install fiber for DOT along all selected routes). The winning contractor was to be that firm offering the best terms over and above this threshold requirement. In return for providing the state with telecommunications capacity, the winning bidder was granted exclusive longitudinal access for its telecommunications infrastructure alongside DOT's fiber-optics backbone system.[30]

Valuation of Adjacent Land

Highway right-of-way derives part of its value from the same factors that determine the value of adjacent property, so it is only logical to use proximate real estate values as a guide to highway right-of-way values. In fact, Union Pacific Railroad, a potential competitive right-of-way supplier, has developed an extensive database of real estate values that it uses (along with other factors) to determine compensation for access to its right-of-way.

In a 1988 study, Hess et al. estimated that one-time payments for rural private land easements typically equal 50 to 70 percent of land value. Using a percentage factor of 70 percent and assuming a 20-foot construction corridor (that is, 2.4 acres per linear mile of right-of-way), the study's estimate of average one-time right-of-way costs for rural private land ranged from a high of $5,160 per mile in New Jersey to a low of $240 per mile in New Mexico.

It is misleading, however, simply to equate the real estate cost of easements on adjacent land with highway right-of-way value since this ignores cost differentials in installing telecommunications infrastructure in alternative locations. Using adjacent real estate values directly also overlooks the degree of uninterrupted access afforded by public right-of-way as well as the very real financial and administrative advantages of dealing with one agent rather than a number of individual landowners. Santa Fe Railroad explicitly incorporates this element in its computation of lease rates, which are based on the value of (adjacent) real estate.

More specifically, annual lease rate per right-of-way mile is computed as follows:

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[30]Based on a conversation with an official from Missouri Department of Highways and Transportation, April 9, 1995.

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*[fair market value of land required] * [target rate of return * tax* continuity factor]*

Target rate of return is increased by tax liability on the income and a "continuity factor," which is the added premium for the railroad's ability to provide a continuous corridor for telecommunications infrastructure; these two factors together total about 20 percent (on average).

The premium paid for the advantages of right-of-way already under a single "landlord" may be significantly greater than 20 percent in some cases. In an article on valuing railroad right-of-way for abandoned systems, Miltenberger[31] gives several examples in which a significant premium was paid for an established right-of-way corridor. For example, Penn Central sold 21.85 miles of right-of-way (average width of 100 feet) to a pipeline company in 1989 at approximately 1.9 times the at-the-fence (ATF) value for the land. This was the lowest enhancement factor of the several cases Miltenberger describes. The savings from dealing with one landowner are substantiated by Miltenberger's data from authors such as Harris, who estimated that land costs per se were 55 percent and acquisition costs 45 percent of the total costs of acquiring 241 parcels for electrical transmission line easements in Mississippi and Tennessee.[32]

The Little study for the MTA recommended four right-of-way fee strata based on its land value analysis. Using real estate values per square foot for sampled (representative) properties proximate to the Turnpike, assuming 2 square feet of property are equivalent to 1 linear foot of right-of-way, and annualizing value by assuming a 12 percent annual return, the consultants recommended the land zones and annual rents shown in the following table as the logical base for negotiating with prospective lessees.

Zone	Recommended Rent $/linear foot/year
Inside Route 128 (Kneeland Street to Exit 16)	3.25
Route 128 to Route 495 (Exit 16 to Exit 11A)	2.75
Route 495 to Chicopee (Exit 11A to Exit 6)	1.75
Chicopee to NY State Line (Exit 6 to Exit 1)	1.00

Of course, rates negotiated in specific contracts may vary, depending on other factors such as access/egress, timing, and market conditions. The consultants also identified a fifth category: the tunnels under Boston Harbor, for which they used different methods of valuation (discussed later). In general, the consultants noted that their interviews and analyses indicated

[31]Frederick D. Miltenberger, "Rail Right-of-Way Valuation," *The Appraisal Journal for 1992,* Vol. 60, No. 1 (Chicago IL).
[32]David Harris, unpublished working paper, 1989, cited in Miltenberger (1992).

that $1 per linear foot per year is a lower bound value for Turnpike right-of-way and that, "whether rational or not," they perceived a psychological barrier to going over $5 per foot per year except in special circumstances.

Cost of the Next Best Alternative

Alternative right-of-way locations compete with highway right-of-way and, in so doing, set the upper boundary on highway right-of-way values. Cost of access to the next best location provides a benchmark for evaluating highway right-of-way access. It is not sufficient as a guide to highway right-of-way values, however, because other factors intervene, such as (1) costs of installation, which will differ among alternatives and within the highway right-of-way itself, and (2) timing or immediate availability, which can supersede other factors. Timing and ease of negotiation aside, the total cost of infrastructure installed in highway right-of-way generally cannot exceed the cost of the same infrastructure installed in the next best alternative location when all costs—including access payments and the value placed on less tangible factors such as security—are taken into account.

Thus, as a rule of thumb, the maximum value for highway right-of-way is equal to

(1) *total cost of infrastructure located along the next best right-of-way—including* payment for access as well as installation and equipment costs, transaction fees for land purchases, and discounted maintenance costs
minus
(2) *total cost of installing that same infrastructure along highway right-of-way—excluding* access payments but *including* transactions fees and discounted maintenance costs
plus
(3) *value of (non-monetized) advantages of highway location* (for example, those related to security, ease of negotiation, and so forth).

The next best alternative can be assembly of right-of-way from privately held parcels, installation along right-of-way owned by local public utilities (e.g., gas, electric) or in a DOT-defined utility corridor, installation along railroad right-of-way, or a combination of several of these options. Railroad right-of-way is a highly competitive alternative for highway right-of-way on routes between SMAs, for example, as an alternative to I-95 through Maryland. This is supported by telecommunications company use of such access.

In intra-SMA markets, however, railroad right-of-way is generally less competitive, particularly where it flows to older industrial areas and telecommunications expansion needs to flow to newer commercial business areas. For example, in the St. Louis SMA discussions focused on Missouri's upcoming shared resource project revealed telecommunications companies' interest in an SMA quadrant not accessed by railroad lines and hence their interest in roadway right-of-way access. In this case, the next best alternative might be assembly of easements from privately held parcels or access to already-crowded utility corridors.

Whatever alternative is "next best," cost group (1) minus cost group (2) equals the potential *out-of-pocket* savings from locating in a highway or interstate right-of-way. In addition to

directly quantified out-of-pocket savings, valuation should take into account other less easily monetized factors that differentiate types of right-of-way; for example, probability and cost of accidental damage to telecommunications infrastructure from derailment, flooding, and other construction; differences in ease of access for repair and maintenance; likelihood of expansion that would require relocation of telecommunications infrastructure. These factors are incorporated in cost group (3), which is added to out-of-pocket savings to yield an estimated upper bound value for highway right-of-way. Hess et al. (1988) used this approach to estimate the value of several types of highway right-of-way compared with railroad right-of-way. Results of this study are summarized in the discussion of empirical evidence.

The Little study used several approaches to estimate fair market rental for the Boston Harbor tunnels, considered a unique resource not amenable to fees based on local land values. The consultants likened the tunnels to two routes each served by a pair of transmission towers. They estimated fair market value from three angles: comparable tower rental (a straightforward next best alternative), revenue generation, and comparable Massachusetts Bay Transportation Authority (MBTA) right-of-way (a historical precedent approach, discussed below).

At $12,000 per tower per year, which the study estimated to be a fair tower rental rate, the rental for transmission service comparable with that offered by the pair of tunnels would be $48,000—approximately $4.80 per foot per year. The consultants confirmed the approximate magnitude of this rate by estimating another next best alternative scenario. Making assumptions about average daily vehicle traffic through the tunnels, the number of vehicles that were cellular-equipped, and the minutes of use per day in the tunnel, they estimated cellular revenues of $600 per day or $219,000 per year. Based on their estimate that a licensed carrier would charge 25 percent of revenues to carry another company's signal, that cellular traffic would generate $54,750 per year for the carrier (that is, a telecommunications service choosing to use the tower-based option rather than fiber-optics installation in the tunnels would have paid close to $55,000 per year for this next best alternative).

Needs-Based Compensation

Some right-of-way owners set target levels of compensation based on estimated needs rather than independent estimates of private partner willingness to pay, particularly in barter arrangements. They will know if they target too high if no potential lessees express an interest or if potential lessees come back with lower offers; they will not know if they target too low.

Estimated needs can include telecommunications infrastructure to support public agencies in addition to the right-of-way owner, and they can include equipment as well as fiber-optics cable, thus boosting the needs-based target level of compensation. Maryland DOT's shared resource arrangements, for example, focused on statewide telecommunications needs rather than being limited to DOT needs alone.

If needs are underestimated or right-of-way owners are reluctant to bargain for all their telecommunications needs, lessors using needs-based compensation may receive less than if they had used another approach to valuation. However, it may be useless to bargain for

compensation beyond public sector capacity needs in many shared resource arrangements. If regulatory restrictions prohibit state agencies from receiving cash payments and, as well, from leasing telecommunications services or even excess conduit or fiber-optics capacity, there is no incentive to push in-kind compensation beyond public sector telecommunications needs. By default, therefore, compensation is based on public sector needs rather than estimates of market value.[33]

Historical Experience

Historical precedent, where data are available, may provide a much easier approach to valuation than comparative bottom-up cost comparisons such as those described by Hess et al. (1988); however, data from completed shared resource arrangements may understate the lessees' willingness to pay. That is, the terms of completed agreements indicate only that private lessees were willing to pay a given level, but the compensation paid may be less than they were prepared to pay. Nonetheless, historical experience is a better guide than none at all and certainly provides a starting point for negotiations.

Since documented compensation rates vary according to objective factors and according to needs and expectations of the parties involved, historical analysis should include information on right-of-way and lessee characteristics as well. Conrail developed a systematic approach to valuation based on historical data, drawn from its own right-of-way leases.[34] The company assembled information from past contracts on lease payment and six associated factors:

- Right-of-way location (rural/urban, whether it connects two major centers, whether it is vital to the lessee's system),
- Lessee's business (wholesale, retail, or non-communications business),
- Purpose of telecommunications line (inter-LATA[35] or intra-LATA),
- Number of miles leased,
- Competing right-of-way options,
- Number of fibers to be installed.

Conrail evaluated the characteristics associated with past agreements using a scale of +1 to +10 for the first four factors (+10 indicating high lease value), a scale of -10 to +10 for competing right-of-way options, and a scale of +1 to beyond +10 for number of fibers. Based

[33]Although several states have explored or are exploring the possibility of leasing state-owned telecommunications capacity, we have no examples to date of such arrangements involving non-toll roadways and highways. Public corporations such as toll-road authorities may have greater flexibility in leasing such capacity and, in fact, the New Jersey Turnpike is planning to allow private sector access for a fee to the publicly financed and owned fiber-optic cables that the Turnpike will install during Phase II of the Turnpike Widening Project.

[34]Based on a telephone conversation with Conrail, April 1995.

[35]Local Access Transfer Area.

on the observed relationships between negotiated lease rates and the point value of the factors associated with each lease, the company worked backward to an estimated dollar value for each factor-point. Conrail uses this historically based matrix of values, which is pegged to the Consumer Price Index to keep pace with inflation, to set annual lease rates for new contracts.

Little (1990) used historical precedent to support its other two estimates of the value of the Boston Harbor tunnels. Referring to the fee of $5.50 per foot per year charged by the MBTA for comparable right-of-way along its rail routes, Little noted its comparability to the other estimates and recommended that the MTA charge the same rate as the MBTA for tunnel right-of-way. If they were priced at this rate, the 10,722-foot-long tunnels would garner more than $58,000 per year in rental fees.

Market Research

Ultimately, right-of-way value is based on lessees' willingness to pay for longitudinal access. The approaches to valuation described here are attempts to (1) infer lessee willingness to pay by analyzing the same factors they use in evaluating right-of-way (for example, costs of next best alternative) or using information that reveals their willingness to pay in other circumstances (historical evidence), or (2) force prospective lessees to reveal their current willingness to pay through competitive bids. Direct contact with potential lessees—that is, market research—may also provide information on willingness to pay as well as identify contract conditions and other factors that shape potential demand for right-of-way.

Palmer Bellevue (1994)[36] used market research as a significant portion of its market feasibility study for the New York Thruway Authority. The consultants surveyed 24 private sector telecommunications and cable companies; they also contacted 12 non-telecommunications entities, including various public sector agencies that use telecommunications services.

Respondents were queried about the level and type of interest in Authority-provided facilities, and the type of facilities desired. The consultants explored several possible approaches to leveraging the Authority's right-of-way:

- Direct lease of right-of-way access to private telecommunications firms;
- Authority installation of ducts and lease of duct capacity; or
- Authority installation and lease of dark or light fiber.

The initial survey was followed by a request for information (RFI) from potential "customers" to determine more precisely specific characteristics of demand such as routes, special requirements, time frame, and willingness to pay.

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[36]Palmer Bellevue/Coopers & Lybrand (Mark C. Ciolek, J. Cale Case, and Michael R. Press), "Analysis of the Market Potential of the Thruway/Canal Rights-of-Way for Use as Fiber Optic Cable Electronic Highways," Chicago, Illinois, August 1994.

Such market research, although certainly useful, can also be incomplete or misleading for two reasons:

- Respondents are asked about *anticipated* behavior, rather than historical behavior, and their reactions may change when the proposed situation actually comes into being.

- Because respondents may eventually become lessees, there is a strong incentive for them to understate their willingness to pay. Considered strategically, a savvy potential lessee would indicate an amount just high enough to ensure the Authority's continued pursuit of right-of-way partnerships but not as high as the maximum it is actually willing to pay.

Thus, in most instances, market research alone is unlikely to provide sufficient information on right-of-way value. Palmer Bellevue acknowledged these shortcomings and, in fact, pursued other approaches such as case studies of other highway and railroad lease arrangements (that is, historical evidence).

4.1.3 Empirical Evidence

Empirical evidence to establish benchmarks for right-of-way valuation derives from several sources:

- Highway right-of-way values inferred by Hess et al. (1988), using a next best alternative approach,

- Lease rates charged by independent authorities (toll and turnpike), and

- Shared resource agreements recently negotiated by state and local agencies.

Next Best Alternative

Hess et al. (1988) inferred the value of highway right-of-way by comparing fiber-optics installation costs in roadways and on railroad right-of-way and private land. The authors collected information on installation costs from six telecommunications companies as well as engineering firms and cable manufacturers. They documented costs in five categories—engineering, right-of-way acquisition, cable procurement, cable installation (placement, splicing, etc.), and regenerator procurement—and took into account differences in cost according to location in interstate freeways, non-interstate highways, railroads, and private land. Cost data, even within a type of right-of-way, showed wide variation; thus the results are very dependent on the specific values selected by the authors from the ranges of values.

The table below indicates possible values for roadway right-of-way based on comparisons among locations. Caution is advised in using these values, not only because they are based on 1988 data and exclude installation of conduits now more commonly used but also because they are based on representative values, which may or may not be valid in individual cases.

Costs of Installed Fiber-optics Infrastructure by Location					
	Interstate Highway[a]		Non-Interstate Highway[a]	Private Land[b]	Railroad[c]
	Median	*Fence Line*			
Total Installed Cost (one-time, $000 per mile)	$44.8	$50.8	$61.8	$57.8	$56.8
Compared with Interstate Median	—	+6.0	+17.0	+13.0	+12.0
Compared with Interstate Fence Line	-6.0	—	+11.0	+7.0	+6.0

Notes:

[a] *excludes* land acquisition costs.

[b] *includes* land acquisition costs of $1,000 per linear mile of right-of-way.

[c] *includes* one-time acquisition costs of $12,000 per mile.

According to this set of computations, longitudinal access to interstate highway right-of-way median could be worth a $12,000 one-time payment if the next best alternative were a railroad right-of-way.[37] On the other hand, location in a non-interstate right-of-way may present no advantages over the next best alternative unless that alternative is private land and transactions costs (not considered here) amount to more than $4,000 per linear mile (that is, the difference between installed costs of $61,800 on a non-interstate exclusive of lease costs and $57,800 on private land including purchase or easement costs).

Rates Charged for Longitudinal Access to Right-of-way

Although most shared resource agreements negotiated by state DOTs involve in-kind compensation, independent tollroad and thruway authorities and at least one state DOT have histories of cash compensation that provide empirical data on right-of-way values. The following table presents an updated and somewhat expanded version of the data presented by Hess et al. (1988) on costs of accessing highway and aqueduct rights-of-way. It is clear that there is a significant variation in fees that cannot be explained solely in terms of location within the right-of-way or urban/rural context. These differences are (presumably) attributable to region of the country (and associated variations in land values), competitive conditions such as the proximity and characteristics of the next best alternative, and bargaining strength of the contractual parties involved, as well as market needs of the lessees involved.

[37]Hess et al. (1988) estimate that a $10,000 one-time payment is equivalent to a $1,600 annual payment for a 20-year period if discounted at 15 percent.

Fees Charged for Roadway and Aqueduct Rights-of-Way, $ per mile per year									
STATE	FACILITY TYPE	ROADWAY						AQUEDUCT	
		Rural		Suburban		Urban		Rural	Urban
		Median	*Edge*	*Median*	*Edge*	*Median*	*Edge*		
California	Aqueduct							$2,850	
Florida	Turnpike	$736[a]							
Georgia	Non-Interstate Highways		$1,000-2,000[b]				$5,000[b]		
Illinois	Tollroad				$1,500				
Iowa	Highways	$1,500[c]				$4,500[c]			
Indiana	Tollroad	$1,800 + capacity[d]							
Massachusetts	Turnpike					$5,000-7,500			
New York	Thruway				$5,280				
Ohio	Turnpike	$1,600-1,850 + capacity[d]							

Notes:

[a] Fees no longer apply because DOT has taken over this roadway and cannot charge fees.

[b] Actual rate in rural areas depends on average daily traffic; fees are considered reimbursement for administrative costs, including permitting and insurance factor.

[c] The Iowa DOT reserves the right to negotiate the fee charged for occupancy dedicated solely to state governmental use (Iowa Accommodation Policy, §115.24(12)c).

[d] These are the rates negotiated in 1985 with Litel; contract gives the Turnpike the option of free utilization of a stated amount of capacity at any time in the future.

Lease fees are also clearly related to the year in which contracts were negotiated. For example, Ohio Turnpike's reported fee of $1,600 is part of a 25-year contract negotiated in 1985 with Litel; new negotiations are under way that will presumably involve higher lease rates. Indiana Toll Road's rate of $1,800 is similarly from its 1985 contract with Litel, a rate set by simply adding $200 to the rate Ohio negotiated in the same year. Officials indicated that any lease negotiated now would be at a higher rate.

Railroad lease rates, which often determine the cost of the next best alternative, are generally considered proprietary; however, Little (1990) reported rates for several lines contacted in the course of its study. For example, D&H Railroad charges $1 per foot per year on average. Occupancy is permanent but payment is for up to 25 years. In contrast, Central Vermont Railroad charges $2–4 per foot per year, depending on the area and time of installation.

As of 1990, the MBTA defined five fee zones with charges ranging from $1.50 to $5.50 per foot per year for access to its transit right-of-way. Zone 5, from South Station to the Rhode Island state line, is negotiated case by case. The other four zones are defined according to location in the rail system. The highest rate is for right-of-way in the urban core (Boston–

Cambridge, including the airport); the lowest for commuter rail lines outside the I-495 beltway (the outer beltway).[38]

The New Jersey Turnpike considered a policy based on a standard price for access to its right-of-way regardless of surrounding land density (rural, suburban, urban).[39] The rate would have depended only on whether the lessee were a "lead" investor or not. The first lessee or lead investor would build four single ducts or a single duct with four inner ducts. This carrier could occupy two ducts for its own use, paying the Turnpike a lease fee of $1 per foot per year. The third and fourth ducts would be reserved for subsequent carriers, which could access each duct for a lease fee of $2 per foot per year paid to the Turnpike. If a fourth carrier were interested in right-of-way access, it would become the lead investor for a new set of four inner ducts (or four single ducts) and the process would repeat itself. The Turnpike Authority did not plan to receive in-kind fiber-optics capacity in consideration for right-of-way access.

Recent Shared Resource Agreements

Recent shared resource agreements involve in-kind compensation; some also include cash compensation. In some cases, longitudinal access to highway or roadway right-of-way is limited to one lessee; in others, all qualified parties are permitted access. The level of compensation varies significantly from case to case.

For example, in leasing access to 75 miles of a major inter-SMA highway to two private companies, Maryland DOT gained 48 fibers, of which 24 are dark and 24 lighted. Missouri granted exclusive access to one firm over a longer distance (although this was a state requirement rather than the telecommunications partner's preference), and gained six lighted fibers including maintenance and technological upgrading over a 40-year period. Missouri's system involves at least some median placement; Maryland's is entirely in the median.

Significant differences between these two arrangements that might boost the per-mile value of Maryland right-of-way include the following:

- Maryland disaggregated its fiber-optics backbone geographically, allowing bidders to limit their investment to right-of-way routes that interested them; Missouri required all bidders to lay fiber for the full system as designed.

- Maryland's right-of-way for this agreement runs between two major urban SMAs (Washington, D.C., and New York City), where telecommunications redundancy has positive value, although railroad and other utility rights-of-way are competitive options.

Value-enhancing aspects of Missouri's arrangement include the following:

- Exclusivity to one telecommunications firm, although this firm is leasing access to other telecommunications firms on its lines.

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[38]Little (1990).
[39]This policy was described in Little (1990).

- Limited or no serious competition from alternative right-of-way locations such as railroads in the areas of greatest interest to the bidders; i.e., within the St. Louis SMA.

In contrast, the arrangements concluded by BART and by the City of Leesburg, Florida, include cash compensation in addition to fiber-optics capacity; however, both public agencies are investing their own capital in their projects. Leesburg is providing all capital investment for the project; the initial cash revenues will be used to repay capital and, thereafter, revenues will be split evenly between the City and its telecommunications partner.

BART and its telecommunications partner are each investors in the project, but their capital investments are segregated into two separate activities. MFS Network Technologies is investing $3 million to construct conduit that it will lease to private carriers who will pull their own fiber. BART obtains $45 million in capital improvements including an integrated fiber network (48 fiber-optics strands including electronics and software) from MFS. In consideration for MFS access, BART receives 91 percent of the rental income from the MFS-managed conduits. BART anticipates that these revenues will cover all but $2 million of the cost—including operations, maintenance, and interest on debt—for its train control and communication system over the 15-year period; they may cover even more.

The BART agreement also involves Caltrans as a "silent" partner. Of the 100 miles of right-of-way included in BART's current and planned extensions, 25 miles are actually owned by Caltrans, which conceded control but not ownership to BART. Thus, Caltrans is also a lessor and, in consideration of the airspace lease it negotiated with BART, will receive a portion of the revenues generated from MFS conduit leases after BART has fully paid for its telecommunications system.[40]

Caltrans also receives in-kind compensation—4 of BART's 48 strands of fiber-optics along the full 100 miles of the BART system, with access at 15 strategic locations. In fact, this in-kind compensation was the dominant attraction for Caltrans (which Caltrans has estimated as equivalent to $8–12 million in avoided costs for independent construction of a Caltrans infrastructure or $960,000 per year in lease costs for comparable fiber-optics capacity).[41]

4.2 TAX IMPLICATIONS OF SHARED RESOURCE PROJECTS

Federal tax considerations may effectively preclude a public agency from receiving compensation for access to the public right-of-way. Federal tax law may dissuade such use in at least two ways: (1) the threat of income tax liability and (2) the threat of losing tax-exempt status for bonds issued to finance the project.

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[40]More specifically, BART divides its revenues by facility segment and will pay Caltrans 25 percent of the revenues BART receives from conduit leases on those segments of right-of-way shared with Caltrans.
[41]Based on a memorandum to James Van Loben Sels from California Department of Transportation, Division of State and Local Project Development, November 18, 1994.

Section 115 of the U.S. Internal Revenue Code excludes "income derived from any public utility or the exercise of any essential governmental function" from the definition of gross income. Generally speaking, states and municipalities are not subject to federal income taxation; however, the U.S. Supreme Court has held that revenue from businesses that constitute a departure from usual "governmental functions" is not exempt from the imposition of income tax.[42] In *Iowa State University of Science and Technology v. United States*, 500 F.2d 508, 523 (Ct. Cl. 1974), the court held that the operation of a commercial television station by a state university was not an "essential governmental function," and consequently that revenues derived from the venture were subject to federal tax. The same conclusion might be reached under various states' income tax laws. Consequently, a DOT may face federal income tax liability on revenues earned from a shared resource project, depending on how the project is structured and how these revenues are ultimately classified.

Federal tax laws relating to the issuance of tax-exempt municipal obligations may also discourage joint ventures between public and private entities. If private involvement in a project exceeds the levels established by federal law, the project will not be eligible for tax-exempt financing. Similarly, adding a private component to an existing project may jeopardize the tax-exempt status of the bonds[43] issued to finance the existing public project.[44]

In projects in which infrastructure facilities are funded with the proceeds of tax-exempt bonds, not only is the income potentially subject to taxation, the bonds may also lose their tax-exempt status. Federal tax laws state that if it is expected that a private entity will benefit from more than a minimal amount of the proceeds of a municipal financing, and that the private entity will provide security or payments exceeding more than a minimal amount of the debt service on that financing, then that financing may not be issued on a tax-exempt basis:

> Generally speaking, if a facility built with tax exempt bond funding is later used for a purpose not qualified for tax exempt financing, the person using the property for the non-qualified use will lose the right to deduct rent, interest or equivalent amounts with respect to that proportion of the property that has been converted to a non-qualifying use. Amounts received by a municipality resulting from such a use of a facility might be held to fall outside the exemption of 26 U.S.C. § 115 discussed above, and would therefore be subject to tax.... Furthermore, the bonds would lose their tax exempt status and the bondholders would be required to pay tax on any interest they received. Bond indentures typically guard against this sort of

[42] *Helvering v. Powers*, 293 U.S. 214 (1934).

[43] As used herein, the term "bond" is intended to refer to any municipal obligation, including, but not limited to, bonds, notes, leases and certificates of participation.

[44] Although participants in the Task B focus group viewed risk to the tax-exempt status of bonds as a significant potential issue, it was not a prominent issue in the case studies. In part, of course, this is due to the nature of the public projects involved. Historically, state highways, including those in Missouri and California, have been funded directly from available state funds, or state and federal funds, with no bond financing.

> eventuality by making loss of tax exempt status an event of default.[45]

In one of the ITS projects examined for this study, the San Joaquin Hills Transportation Corridor in Orange County, California, the need to comply with tax-exempt financing strictures was cited as a significant issue to be considered before the tollroad agency enters into any shared resource arrangement. The project was financed principally by more than $1.1 billion in revenue bonds secured only by tolls from the Corridor. As part of the first tollroad system in southern California, with more than 17 miles of uninterrupted fiber-optic cable stretching through premium Orange County real estate near business centers, the Corridor is a prime candidate for a shared resource project. However, the potential effect on the tax status of construction bonds was one of the factors deterring the public agency from pursuing a shared resource approach. Before any such arrangement is considered, the agency will have to carefully examine the impact on the tax-exempt status of its bond financing. Income from a shared resource project could exceed the thresholds discussed in the following section and therefore jeopardize the tax-free status of the bonds.

The federal tax analysis will be greatly affected by the structure of the shared resource project, and case-by-case analysis will be necessary. The following discussion sets out the general provisions of the tax law in this area.

4.2.1 Current Law[46]

The restrictions on the use of tax-exempt obligations to finance various activities depend on whether such obligations are "governmental bonds" or "private activity bonds." Governmental bonds are obligations of a state, or political subdivision thereof, which are used for governmental purposes *or* which are secured by the credit of the governmental issuer. Private activity bonds are obligations of a state, or political subdivision thereof, which are used for private purposes *and* are secured by an interest related to such private purposes.[47]

Governmental bonds are tax-exempt and may be used for any valid purpose of the issuer, including the construction and operation of a freeway or tollroad. Interest on private activity bonds is *not* exempt from federal income taxation.[48] Therefore, the factors leading to classification of the obligations as private activity bonds must be reviewed carefully in any shared resource project, and any tax-exempt financing of a project must be structured so that the obligations are governmental bonds.

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[45]"Building the Information Highway: Legal and Policy Issues Facing Public Power" (February 1994).
[46]This discussion applies to bonds issued after August 15, 1986.
[47]The term "governmental bond" is not defined under current law. Rather, current law provides guidance for determining when obligations are "private activity bonds." By default, municipal obligations which are not private activity bonds are deemed to be governmental bonds.
[48]In some limited circumstances private activity bonds may be exempt from taxes. Private activity bonds are exempt only if the bonds fall within one of several very specific categories and are therefore deemed to be "Qualified Bonds." Privately operated transportation facilities and privately operated telecommunications facilities do not currently fall within any category of qualified bonds under the Internal Revenue Code (the "Code").

Bonds are reviewed in two dimensions: quantitative tests that determine whether a bond is deemed to be a private activity bond, and reviews of public-private arrangements such as private management contracts to determine whether private benefits are dominant in the bond-financed activity.

Tests for Private Activity Bonds

Obligations are private activity bonds if they meet *either* the "General Private Activity Test" or the "Private Loan Financing Test." These tests operate as described in the following subsections.

General Private Activity Test

Under the *General Private Activity Test*, bonds are private activity bonds if

- More than 10 percent of the proceeds of a bond issue are to be used for any private business use (*Private Business Use Test*),

and

- Payment of the principal of, or the interest on, more than 10 percent of the proceeds of such issue is directly or indirectly secured by any interest in (1) property used or to be used for a private business use, or (2) payments in respect of such property (*Private Security or Payment Test*).

The percentages are reduced from 10 percent to 5 percent if the private business use is not related to any governmental use of the proceeds, or if the private business use is disproportionate to a related governmental use, thus making it even more difficult to maintain tax-exemption for the debt financing.

Even where private business use and private payments do not exceed the 5 or 10 percent threshold under the General Private Activity Test for tax-exempt status, a new bond issue may be classified as taxable private activity bonds if the private portion of the issue exceeds specified maximum dollar limits referred to as the "Nonqualified Amount."

Private Business Use Test

The question of whether private use is "related" to governmental use in the shared resource context has not been addressed by the Internal Revenue Service (IRS). Recent proposed regulations (described later) attempt to provide some guidance. They indicate that whether a private business use is related to a governmental use is determined case by case, emphasizing the operational relationship between the two uses.

Use of a facility by a private party for the same purpose as use by the government is considered to be a related use, and subject to the more liberal 10 percent test, so long as the government use is not insignificant. If a private business also uses a facility for some purposes

unrelated to government use, the private business will be considered "related" so long as the government-related purpose is not insignificant. In general, a facility used for a related private business must be located in or adjacent to the governmentally used facility.

In the simple example offered by the proposed regulations, a privately owned pharmacy in a government-owned hospital is not an unrelated use simply because the pharmacy also serves individuals not using the hospital. In the shared resource context, it is arguable that the 10 percent threshold is appropriate in most cases, since the telecommunications facilities will be shared by government and private users or will be physically related.

Private Security or Payment Test

Rulings and legislative history suggest that the Private Security or Payment Test is to be applied very broadly. That is, under this test, both direct and indirect payments made by any person (other than a governmental unit) are counted in computation of the percentage that may trigger taxable status. These payments are counted whether or not they are formally pledged as security or directly used to pay debt service on the bonds.[49]

Even if the private payments are not expressly allocated to debt service, the Private Security or Payment Test may still be met because of an "underlying arrangement" between the parties, where the private party provides revenues in excess of the percentages given above. In the typical example of an underlying arrangement, a city issues bonds and lends the proceeds to developers to finance industrial buildings. Neither the payments by the developers nor the mortgages on the buildings are pledged directly to the bonds. It is anticipated that over the term of the bonds, however, the principal and interest payments made by the developers will be approximately equal in present value to the total debt service on the bonds. In such a situation, an underlying arrangement is inferred. The payments by the developers are treated as the actual security for the bonds, and the Private Security or Payment Test is met, thus classifying the debt as taxable private activity rather than tax-exempt governmental bonds.

An underlying arrangement may result from separate agreements between the parties or may be determined on the basis of all of the facts and circumstances surrounding the issuance of the bonds. An underlying arrangement will always be inferred if the payments made by the user of the bond-financed facility and the debt service on the bonds are approximately equal in present value. Other indications of an underlying arrangement are that the payments made by the private party are material and that the identity of the private party can be determined with reasonable certainty at the time of issuance of the obligation.

IRS Notice 87-69 (October 26, 1987) provides guidance to issuers in applying the Private Security or Payment Test. The Notice provides that, subject to certain adjustments (described below), the present value of the payments received from the private user is compared with the

[49]Also, payments to persons other than the issuer of the bonds may be considered. However, payments from persons who are not treated as using the bond proceeds under the Private Business Use Test are not counted, and revenues from generally applicable taxes are not treated as payments for purposes of the Private Security or Payment Test.

present value of the debt service to be paid over the term of the issue to determine whether the applicable percentage (5 percent or 10 percent) has been exceeded.

The adjustments are made in computing the payments received from the private user and the debt service on the obligations. Private payments does *not* include the portion of any payment that compensates the bond issuer for ordinary expenses for operation and maintenance of the property. Also, the debt service on an issue includes reasonable credit enhancement fees which are taken into account in computing the yield on the issue but does not include any amounts to be paid from proceeds of the issue. For example, debt service does not include accrued or capitalized interest or other amounts to be paid with proceeds of the issue (e.g., from proceeds in a reserve fund).

Private Activity Volume Cap

Even where private business use and private payments do not exceed the 5 or 10 percent threshold under the General Private Activity Test for tax-exempt status, a new bond issue may be classified as taxable private activity bonds if the private portion of the issue exceeds specified maximum dollar limits referred to as the "Nonqualified Amount."

The Nonqualified Amount is computed as the lesser of

- The proceeds of a municipal obligation which are used for a private business use

and

- The proceeds of such issue with respect to which there are payments which count toward the Private Security or Payment Test.

If the Nonqualified Amount does not exceed the applicable percentages (either 5 percent or 10 percent) but *does* exceed $15 million, the municipal obligation will still be considered a private activity bond, unless the issuer obtains a volume cap[50] allocation for the municipal obligation in an amount equal to the excess of the Nonqualified Amount over $15 million.

Private Loan Financing Test

Obligations also may be deemed to be private activity bonds if they meet the "Private Loan Financing Test." Section 141(c) of the Internal Revenue Code states that an issue meets the Private Loan Financing Test if the lesser of

- 5 percent of the proceeds of the issue, or
- $5 million

[50]States are allowed only a limited volume of tax-free obligations of this type. A portion of the allowed volume must be allocated by state authorities to a particular issue, covering the amount in excess of $15 million, in order to maintain status as a governmental bond.

is to be used (directly or indirectly) to make or finance loans to persons other than governmental units.[51]

The table at the end of this section summarizes the relationships among the tests that determine whether a bond is classified as private or governmental activity. In short, a bond qualifies as a tax-exempt governmental activity bond only if the answers to all four test questions are "no," or if there is a "yes" response to one (but not both) of the questions in the General Private Activity Test.

Private Management Contracts

Another example of a situation which appears to deal with a public facility but which under the tax law might be deemed to provide a private benefit, involves the use of a management contract as part of the transaction. For example, a highway agency might find it desirable to finance the construction of an electronic toll collection system on its roadways. If the agency does not have employees who are skilled in managing the day-to-day operations of such a facility, the agency might wish to enter into a management contract with a private operator which is so experienced.

This arrangement, if not carefully structured, may jeopardize the tax-exempt status of the obligations issued to finance the system or, conversely, restrict an issuer's ability to employ an independent party to manage and operate the facilities financed with the proceeds of tax-exempt obligations. Unlimited use by a private party under a management contract is considered a private business use and will result in the bonds' classification as private activity bonds, except in certain specific situations. Federal income tax laws provide the following guidelines to indicate when a non-governmental person's use of a bond-financed facility pursuant to a management contract will not be treated as a private trade or business use—that is, will not violate the conditions for governmental bonds:

1. The term of the management contract does not exceed five years (including renewal options exercisable by the private party);

2. At least 50 percent of the compensation to any manager other than a government unit is on a periodic, fixed-fee basis, and no amount of compensation is based on a share of net profits; and

3. The government unit owning the facility may terminate the contract (without penalty) at the end of any three-year period.

Summary Table: Determination of Bond Tax Status				
GENERAL PRIVATE ACTIVITY TEST		PRIVATE ACTIVITY OR VOLUME CAP	PRIVATE LOAN FINANCING TEST	TAX STATUS OF BOND
Private	*Private Security or*	Does private portion of	Are more than 5% of	

[51] Section 141(c)(2) of the Code provides an exception for any loan which enables the borrower to finance any governmental tax or assessment of general application for a specific essential governmental function.

Business Use Test: Are more than 10% of bond proceeds* used for private business?	*Payment Test:* Does private business pay or secure payment of principal or interest on more than 10% of bond proceeds*?	bond proceeds exceed $15 million, or does private sector pay or secure payments on more than $15 million of bond proceeds?	bond proceeds or more than $5 million going to be used to make or finance loans to persons other than governmental units?	
YES	**YES**	yes or no	yes or no	Private activity bond - NOT tax exempt
yes or no	yes or no	**YES**	yes or no	Private activity bond - NOT tax exempt
yes or no	yes or no	yes or no	**YES**	Private activity bond - NOT tax exempt
YES or no	**NO**	**NO**	**NO**	Governmental bond - tax exempt
NO	**YES** or no	**NO**	**NO**	Governmental bond - tax exempt

*This percentage applies when private business use is related to governmental use of the bond proceeds; otherwise, the threshold percentage for these tests is 5%.

Rules Applying to Bonds Issued Prior to 1986

The restrictions relating to the private use of proceeds of municipal obligations first appeared in the Internal Revenue Code in 1968. Thus, for bonds issued before May 1, 1968, the fact that a private entity benefited from the proceeds of municipal obligations did not adversely affect the tax-exempt status of such obligations.

For bonds issued on or after May 1, 1968, and on or before August 15, 1986, bonds deemed to be "industrial development bonds" (the predecessors of private activity bonds) were not tax exempt. The tests used to determine if bonds were industrial development bonds were similar to the tests for private activity bonds with one key difference: the level of private use and private security allowed under previous law was 25 percent, rather than the 5 percent or 10 percent limitation under current law.

Proposed Private Activity Bond Regulations

On December 29, 1994, the IRS issued proposed regulations which provide guidance with respect to private activity bonds. The IRS requested written comments through the end of April 1995 and held a public hearing on the proposed regulations on June 8, 1995. They are likely to be revised to reflect some of the written and oral comments received by the IRS (no final regulations have yet been adopted). The provisions of the final regulations will apply to bonds issued 60 days after their adoption.

The proposed regulations provide guidance on facilities which are used both publicly and privately. For example, in a mixed use facility—a facility that consists of (1) two or more discrete portions, or (2) an undivided ownership interest in an output facility or in a utility system such as a fiber-optics network—the measurement of the use of proceeds allocated to a discrete portion is determined by treating that discrete portion as a separate facility.

The proposed regulations provide that the determination of whether an issue constitutes private activity bonds is based on the issuer's "reasonable expectations" as of the issue date. An issue also constitutes a private activity bond if the issuer takes a deliberate action, subsequent to the issue date, that causes the Private Activity Bond Tests to be met; an involuntary action against the will and without the cooperation of the issuer is not a deliberate action.

The proposed regulations also expand the categories of qualified management contracts to include (1) contracts with terms not exceeding the lesser of 15 years or 50 percent of the useful life of the property if all the compensation is based on a periodic fixed fee; and (2) contracts with terms not exceeding the lesser of 10 years or 80 percent of the useful life of the property if at least 80 percent of the annual compensation is based on a periodic fixed fee.

In general, the proposed regulations favor shared resource projects in that they liberalize the use of management contracts and they provide clearer guidance with respect to the identification and quantification of private use.

4.2.2 Structuring a Shared Resource Transaction to Minimize Tax Issues

Municipal obligations[52] must meet *both* the Private Business Use Test *and* the Private Security or Payment Test in order to be characterized as private activity bonds subject to taxation. Thus, if a transaction is structured so that it fails either test, the bonds will remain tax exempt. For example, if the transaction involves payments to the public agency of less than the minimum 5 or 10 percent of the bond amount, the bonds will be characterized as tax-exempt governmental bonds, regardless of the amount of private business use.

Failing the Private Security or Payment Test

Under the Private Security or Payment Test, any actual payments from the private telecommunications company to the public agency, as well as the fair market value of any services or other consideration received by the public agency from the private telecommunications company as payment for use of the public agency's right-of-way must be considered. As long as the present value of such payments and services does not exceed the threshold percentage (5 or 10 percent, whichever is appropriate) of the present value of the total debt service paid with respect to the municipal obligations issued to finance the public facility (and making the appropriate adjustments, as described above), the tax-exempt status of the municipal obligations will not be jeopardized.[53]

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[52] The term "municipal obligations" is used here, as in the securities industry, as a generic term that includes all tax-free non-federal debt, including that of state and local public agencies.

[53] It should also be noted that with respect to large tax-exempt bond issues (those exceeding $300 million), it may be necessary to obtain an allocation of the state volume cap if the present value of the private payments exceeds $15 million.

Failing the Private Business Use Test

If a transaction is structured so that it fails the Private Business Use Test, the municipal obligations will be characterized as governmental bonds, regardless of the amount of private security or payments. The key issues involve (1) determining whether the private party is in fact using the bond-financed facility, and (2) if it is, finding a reasonable method of allocating that facility between the public and private uses.

For example, a situation might exist in which a municipality that owns an existing right-of-way uses the proceeds of tax-exempt bonds to finance highway improvements on that right-of-way. The fiber-optics network will be installed below the road surface. Under these circumstances, it can be argued that there is no private use of the bond-financed facility, which consists of the improvements to the surface of the right-of-way. Even if the fiber-optics operator has some use of the surface area of the right-of-way (e.g., electrical components, or the right to enter the surface area in order to maintain the fiber-optics system), it is likely that the amount of such use, using the allocation methods described below, will fall within the minimal amount of private use which is permitted under federal tax laws.

If the tax-exempt bond proceeds are used to acquire the right-of-way as well as to build the improvements upon it, then the construction of the fiber-optics network below the surface does constitute use of the bond-financed facility. It becomes necessary to allocate the bond proceeds to the various components of the bond-financed facility.

Federal tax laws permit the use of any reasonable, consistently applied accounting method to allocate proceeds to expenditures. Pursuant to this guidance, it is reasonable to allocate bond proceeds to the right-of-way in an amount equal to the purchase price of the right-of-way. Since the fiber-optics network uses only a portion of the right-of-way, however, it is necessary to break down the total cost of the right-of-way into its various components. This determination is made through the services of experts who provide appraisals of the relative values of the various components of the right-of-way. It is likely that such appraisals would assign relatively high values to the surface of the roadway and correspondingly low values to the subsurface. Therefore, it is probable that at the end of this process it will be determined that although the fiber-optics network constitutes a use of the bond-financed facility, based on the relative values of the surface and subsurface of the roadway, the use is less than the threshold proportion of the bond proceeds.

In some situations it may be possible to minimize the amount of proceeds used by the private party by arguing that only the incremental costs of a project are allocable to that private party. For example, if a municipality intends to install a fiber-optics conduit for its own use and uses bond proceeds to install a somewhat larger conduit to accommodate a private user, it seems reasonable to allocate to the municipality all the costs it would have incurred to install a conduit of a size sufficient for its own use and to allocate only the incremental costs of a larger conduit to the private use. Using this analysis, it may be possible to conclude that the amount of bond proceeds used by the private party does not exceed the threshold percentage of total bond proceeds.

4.3 OTHER FINANCIAL ISSUES

Although ROW valuation and bond status were in the forefront of financial issues, public officials identified two other topics that should be considered: valuation of private resources and public sector costs.

4.3.1 Valuation of Private Resources

Valuation of the public sector resource—the right-of-way—is one side of the valuation issue; the other is valuation of the resources provided by the private sector. Both are important in determining whether the deal is "fair" to the partners involved.

Of course, there is no issue of valuation of private sector compensation in a shared resource project when no barter is involved; cash lease or sale transactions are already monetized and valuation is an issue only for the public sector resources. But many projects being explored are based entirely or in part on barter arrangements in which the private sector installs capacity beyond its needs and dedicates the surplus to public sector uses.

The capacity that the private partner provides for public purposes can be valued in a variety of ways:

- *Avoided cost*, that is, cost of that infrastructure if the public sector were to install equivalent capacity as an independent project;
- *Out-of-pocket cost* to the private provider of installing the incremental infrastructure dedicated to public purposes;
- *Market value* of the incremental infrastructure if leased or sold to a commercial user;
- *Use-value* to the public sector of the infrastructure provided (that is, the opportunity cost of *not* having the communications capacity provided).

Of the cases reviewed for Task A, those that explicitly addressed the issue of valuing private sector in-kind compensation relied on computation of avoided cost or the cost that the public sector would have incurred had it undertaken to build its own telecommunications infrastructure. For example, Caltrans' project development branch prepared an avoided-cost analysis that documented the millions of dollars saved by its receipt of four fiber-optics strands in the BART-MFS shared resource arrangement. Similarly, Missouri DOT estimated the cost of its planned advanced traffic management system before it decided to enter a shared resource agreement for provision of this infrastructure.

4.3.2 Public Sector Support Costs

In determining participation in shared resource projects, public agencies should not lose sight of the direct out-of-pocket costs they will incur. These costs are a form of investment in

anticipation of greater net benefits, essentially a leveraging of public expenditure on administrative and management costs in order to reduce the costs of public communications infrastructure and operating expenses. Although the public sector support costs are generally assumed to be much less than the value of benefits received, a true estimation of net gains to the public entails realistic estimation of these costs, including the following:

- Preliminary evaluation of private sector interest; for example, pre-bid meetings;
- Specification of project components and formulation of RFPs or other solicitations;
- Screening and evaluation of private sector bids and negotiation;
- Management of construction and subsequent contractual relationships.

The research team's inventory of shared resource projects and other relevant cases revealed no example of explicit computation of these costs, which should be subtracted from anticipated compensation to derive a true estimate of net benefits to the public sector.

5.0 PROJECT STRUCTURE ISSUES

Shared resource projects can be structured in a number of ways, with variations in responsibilities for installation, ownership, and operation as well as the form of benefits and privileges granted to each partner. The focus group highlighted the structural issue of exclusivity for more detailed research, that is, whether access to highway right-of-way should or could be limited to a single private partner.

5.1 EXCLUSIVITY

In structuring a shared resource project, the question of whether the right to install and operate telecommunications facilities longitudinally in the public right-of-way should be exclusive must be addressed at the outset. For this discussion, "exclusive" means that during the term of the right, the public agency will not grant a right to another telecommunications facility to occupy the same section of the public right-of-way; i.e., only one longitudinal installation of a facility will be allowed in any particular segment of the highway.[54]

Shared resource agreements may (1) limit longitudinal access to public rights-of-way to a single private sector partner (that is, grant exclusivity), (2) require access for all interested firms that meet specified qualifications (e.g., fiber-optics installations), or (3) prescribe a structure between these two ends of the range. Stated more technically, the term "exclusive" means that during the term of the right, the public agency will not grant a right to another telecommunications facility to occupy the same section of the public right-of-way; i.e., only one longitudinal installation of a facility is allowed in any particular segment of the highway.

In making this determination, the public agency must balance certain competing considerations. On one hand, by granting only exclusive rights, the public agency will limit the number of third parties that will have access to the right-of-way at any given time, thereby promoting the agency's objectives in maintaining the safety and integrity of the

[54] It is still unclear to what degree the Telecommunications Act of 1996 will constrain exclusive arrangements in the interests of non-discrimination and barrier-free entry to the ROW for telecommunications. Future regulations and/or legal precedent will determine whether exclusive access and/or exclusive marketing rights but not exclusive use are permissible and, if some types of exclusive arrangements are sanctioned, any conditions applied to that partnership and how the private partner should be selected. Certainly, telecommunications providers will not be able to exercise a monopoly in any physical facility. Public agencies, however, may be allowed to grant exclusive access so long as the private partner (1) is selected by a competitive, nondiscriminatory, process and (2) cannot exercise a monopoly in any physical facility, i.e., must allow other providers to purchase capacity at market rates. Fortunately, in many shared resource arrangements termed "exclusive", the private party is strictly acting to re-market the conduit capacity rather than as a communications provider itself. It is thus by definition making all facilities available to competing providers.

highway. Further, by granting exclusive rights, the public agency may increase the perceived value of the access rights offered to the potential telecommunications partner. Thus both private and public partners to such an agreement benefit from exclusivity.

On the other hand, granting exclusive rights may foster anti-competitive effects. Non-exclusive access may increase the number of service providers in a given area and promote competition among them, thus benefiting the general public through lower prices for services. In fact, even the threat of entry when access is non-exclusive may generate competition-like results. Moreover, the public sector partner (generally the DOT) may benefit from non-exclusivity by receiving compensation from more than one partner, the sum total of in-kind compensation and cash revenue from multiple partners exceeding the amount likely to be forthcoming from a single exclusive partner.[55]

To address anti-competitive concerns, public agencies might consider requiring that the private party obtaining access to the right-of-way not discriminate in licensing its rights to third parties. In the Iowa Accommodation Policy, the DOT reserves the right to require that longitudinal utility facilities be installed in a multiduct system to be shared with others, and the department is authorized to designate the first utility facility owner requesting occupancy as the "lead company," responsible for design, construction, maintenance, and financing of the multiduct system. As new occupants are added, they must pay their proportionate share.[56] Massachusetts has taken a similar approach.[57]

The case studies took several approaches to exclusivity. Although Missouri has historically restricted utility access on the freeways to outer roadways or "limited utility corridors" in which access is open to utilities meeting state permit requirements, the state's agreement with DTI grants an exclusive easement for 40 years within highway airspace outside the standard utility corridor. Section 227.240 of the Missouri Code allows utilities in highway rights-of-way so long as they do not interfere with the roadway. The DTI facility was defined by the state as a "state highway facility" so it is permitted under the contract to be located in places other utilities are not located. The easement is exclusive only as to other fiber-optics cable systems or communications systems.

DTI's exclusive access is considered a procurement contract, awarded to a single contractor in a competitive process, rather than a special privilege, which might be subject to legal challenge. Missouri published an RFP for telecommunications infrastructure procurement that specified requirements for a basic statewide fiber-optics system. The winner of the contract, to be compensated with access to highway right-of-way for its own telecommunications system in the same corridors as the state system, would be that bidder offering the most attractive package for transportation telecommunications infrastructure and service over and above the minimum requirements.

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[55]Whether compensation under an exclusive arrangement exceeds that under multiple-partner agreements depends on (1) the value of exclusivity and (2) the number of partners and their willingness to pay for non-exclusive access in the given situation.
[56]Iowa Accommodation Policy, §§ 76-115.23 (306A et seq.).
[57]"Wiring Massachusetts."

Although DTI can locate within the standard utility corridor, location in that portion of the right-of-way is not exclusive. The exclusivity provision contains an exception that permits other firm's fiber-optics cables to cross DTI's easement at an approximate right angle, but only upon mutual agreement of the Missouri Highway and Transportation Commission (MHTC) and DTI regarding the location. The agreement expressly states that nothing in the agreement limits MHTC's authority to install its own fiber-optics cable within MHTC air space for highway purposes.[58]

In an interesting approach to exclusivity, the City of Leesburg Telecommunications Service Agreement with ACN requires that if other entities express interest in the City's cables, ACN must coordinate connection and equipment used for those connections. ACN is permitted to bill those other entities for time and materials spent in the evaluation. Further, since the city is sharing revenues from ACN's marketing of the network, it prohibited ACN from competing with the city's cables.

Essentially, there are two levels of private sector exclusivity in Leesburg: (1) the number of private sector partners involved in the shared resource agreement, and (2) the number of telecommunications service providers gaining access to the fiber-optics infrastructure. ACN is granted exclusivity as the marketing partner for city-owned cable built under the ACN-Leesburg contract. Leesburg is free to allow additional vendors to operate within the service area under other agreements with the city,[59] and the "Leesburg Telecommunications Systems Permit Ordinance" appears to contemplate open access to multiple vendors.[60] Exclusive access to the City-owned telecommunications capacity is not granted to telecommunications service providers. The fact that ACN is marketing infrastructure capacity on behalf of the City (rather than supplying telecommunications services itself) means that access is offered to bypass systems and common carriers, which compete with each other and with providers not using the City's infrastructure.

The Leesburg-ACN agreement has a unique reverse-exclusivity provision. Within the service area, ACN may not offer certain services to any person or entity on cables other than the cables provided by the City unless the City gives its prior written permission.[61]

In Maryland, although the rights granted to MCI and TCG are technically non-exclusive, the private partners have "practical exclusivity" because the state does not want to dig into the right-of-way more than once, and therefore will probably allow only one company to put in fiber and oversee maintenance. Additional partners would have been accepted if they had responded to the RFP with an acceptable bid. The window of opportunity was defined by Maryland for both practical and safety reasons. The state does not want to create problems with traffic congestion and accidents from additional construction. In the Baltimore-Washington Corridor, MCI has installed two conduits, one for itself and one for

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[58]"Fiber Optic Cable on Freeways in Missouri," Agreement between MHTC and DTI dated July 29, 1994, § 5.

[59]"Telecommunications Service Agreement," (1/11/93) §§ 5.40,8.

[60]Ordinance No. 93-25.

[61]"Telecommunications Service Agreement," *supra*, § 8.02.

Maryland, with no excess capacity. The state's preferred situation would be for a "bank of conduits" to be laid by MCI as the initial vendor, with excess capacity that the vendor can then sell or lease to future interested vendors at a mutually agreed-upon price. The licensing agreements for the Ohio Turnpike Authority's right-of-way are expressly non-exclusive.

Finally, Caltrans' lease of air space to BART appears to be exclusive for the conduit system. In turn, BART's license to MFS is expressly made non-exclusive; however, as long as the conduit system between two adjacent BART stations has unoccupied capacity and MFS is not in default under the agreement, BART has agreed that it will not grant a license for purposes of installing a communications system between such points. After the system is fully occupied this exception ceases, even if space later becomes vacant; however, BART must thereafter provide a right of first refusal to MFS if BART wants to add conduit capacity.[62]

Summary Table of Exclusivity	
CASE STUDY	**APPROACH TO EXCLUSIVITY**
Missouri	Exclusive easement outside standard utility corridor
City of Leesburg	No exclusivity for private party; city has exclusive right to ACN's services on cables provided by city
Maryland	Technically no exclusivity; practical exclusivity due to closed window of opportunity
Ohio Turnpike	No exclusivity
BART Caltrans MFS	 Exclusive lease Non-exclusive license

5.2 OTHER PROJECT STRUCTURE ISSUES

Other issues in structuring shared resource projects relate to the form of the property right to be granted, type of compensation paid to the right-of-way owner, and geographic scope of the project.

5.2.1 Form of Real Property Right

The form of the right to install and operate telecommunications facilities longitudinally in the public right-of-way involves two core issues: (1) what public resource is being shared and (2) how the right of sharing should be offered to the private sector.

The type of public resource to be shared with the private sector is directly affected by the constraints on public sector authority to use right-of-way for telecommunications facilities.

[62] License Agreement Between San Francisco Bay Area Rapid Transit District and MFS Network Technologies, Inc., dated September 29, 1994, §§ 2.3 and 2.4.

Can the public sector sell a property right which gives access to the right-of-way (i.e., convey a permanent easement), or must it provide access on a lease or license basis for privately owned conduit or cellular towers? Or is it precluded from both, but permitted instead to grant private sector access on a lease or license basis to a publicly owned conduit or tower?

Additional factors may influence the type of public resource, even where the public agency has expansive authority. For example, an agency may prefer to own the conduit, rather than granting an easement in the right-of-way, in order to maintain complete control of maintenance. For several reasons, however, public agencies may prefer to grant a more extensive interest in the right-of-way if allowed by state law. In most shared resource projects, the public agency will prefer to have maintenance of the fiber system remain the responsibility of the private party. The public agency will probably have to bear some of the cost of constructing the conduit if it is to retain ownership. Moreover, leasing conduit space may be construed as a type of ongoing business enterprise which puts the public agency in the position of a regulated public utility—a position most transportation agencies will prefer to avoid.

The related issue of how the right of access should be offered to the private sector is also governed in the first instance by any constraints on the authority of the public agency to use right-of-way for telecommunications. Access to the right-of-way can be granted under a variety of legal forms which vary in permanence and the extent of rights granted to the private party:

- *Easement*: a property interest in land owned by another. The types of uses allowed vary by state but, traditionally, easements are limited to certain uses including rights-of-way.

- *Lease*: an agreement that gives rise to the lessor/lessee relationship by granting rights to use property for a specific time period. There are many different forms of lease payment, including fixed-price, percentage, and graduated based on an independent index.

- *Franchise*: generally, a privilege granted to engage in defined business practices. Typically, a franchise is a business privilege and is not viewed as a real property right although, where land is involved, some states classify franchise as a form of real estate.

- *License*: the permission to perform an act which, without such permission, would be a trespass or otherwise illegal. This is a type of permit that is granted, for some consideration, to a private party to allow the practice of some business subject to police power regulation.

Generally, an easement gives the private party the most control, while franchises, leases, and licenses grant decreasing levels of private control, although the rights granted can vary

significantly depending on the provisions of a particular agreement. The most basic distinction among the four forms is that easement and lease agreements give rights to the land, while franchise and license arrangements may not.

In general, the four forms have differing implications for business, including some tax consequences. Property rules differ among states, however, and the nature of the property right granted under each form depends greatly on the terms of the grant. In fact, the different ways in which a private party can be granted access to the right-of-way may be less important than the specific terms of the grant—a more favorable lease may be more desirable to a private party than a restricted easement.

Colorado's Concorde procurement (for placement of coin and coinless landline and cellular pay phones[63]) explicitly conveys only a license, which is a "personal property right to [the] vendor and rests no property interest in the state right-of-way to the vendor."[64] Similarly, Palo Alto's agreement explicitly states that it provides a license, not a franchise; private sector telecommunications providers access a publicly owned conduit managed by MFS but do not control the conduits themselves.[65] Massachusetts' policy provides for granting a revocable license; the state owns real property improvements and the licensee owns all telecommunications equipment; however, the Missouri agreement grants an easement in the right-of-way to the private partner.

A concomitant issue is that of responsibility for maintenance of the communications infrastructure. A publicly owned system that leases capacity to private sector users will be maintained by the public sector; a privately owned system that leases capacity (but does not relinquish operating control) to the public sector will be maintained by the private owner. A mixed system raises some issues. A private party providing the network segment will probably want to control maintenance of the entire segment, including both its portion of the facility and any facility provided for public agency use, particularly if the two components are not physically distinct. This arrangement could complicate management of the network and isolation of network problems. Although installing the public and private facilities in separately maintainable conduits may reduce this problem, it would cost more.

5.2.2 Type of Consideration

Structuring a shared resource project involves determining the type of consideration that the public sector will receive from its private partner in return for the right to install and

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[63]The agreement with Concorde will permit installation of pay phones at 65 locations across the state on CDOT highway right-of-way at the vendor's expense, and Concorde will provide free 911 and information lines for hospital, hotel, roadside, and other services. The agreement is a 20-year lease.
[64]Draft Contract, Section IV.G.
[65]Unlike many state highway agencies which are just beginning to address shared resources, the Ohio Turnpike Commission has permitted longitudinal access for a number of communications utilities since 1984. The standard agreement form developed by the Commission covers a number of the issues that state highway agencies are now addressing. The standard agreement for access to the Turnpike provides only a non-exclusive license.

operate telecommunication facilities in the public right-of-way. Statutory or regulatory constraints on the public agency's ability to receive cash compensation for access may play a significant role in delineating the form of consideration. The type of arrangement most appropriate or desirable to the telecommunications industry should also be considered.

Shared resource projects to date have focused primarily on bartering right-of-way access for dedicated capacity. For example, Missouri's agreement with DTI gives the state a dedicated fiber bundle, telecommunications equipment, and services, but no financial interest. Maryland negotiated similar in-kind arrangements for its shared resource project (with two partners) on I-95. Massachusetts has asked private industry partners to provide the state with a one-time benefit in the form of dark fiber to enhance the commonwealth's private communications network and IVHS communications backbone.

The advantage of cash compensation is flexibility: It can be applied toward any transportation or public sector need, subject to statutory limitations on earmarking. An important advantage of barter arrangements is the wide spread between cost to lessee and value to lessor of in-kind compensation. That is, the right-of-way owner receives more in value than the lessee pays for the incremental infrastructure, which is not true for cash arrangements, where a dollar is worth a dollar to both parties. In other words, the avoided cost of telecommunications infrastructure desired by the lessor is significantly greater than the actual cost to the lessee of adding fiber-optics capacity in a conduit that the lessee is already installing for its own use, due to economies of scale in construction. In fact, needs-based compensation is often supported with estimates of costs avoided when physical infrastructure is supplied in exchange for right-of-way access; this helps right-of-way lessors affirm that they did indeed receive significant compensation for granting access.

In requesting in-kind services a public agency might find that, unless its documents are drafted broadly, it unnecessarily limits the value that it will receive for its right-of-way to a specific need to be addressed today, instead of harnessing that value to serve future needs. Moreover, the type of consideration required may effectively limit the universe of private entities able to take advantage of public right-of-way. For example, if the public agency specifically requires in-kind ITS services in return for access to the right-of-way, it may effectively weed out telecommunications firms that are not involved in ITS and thereby give firms with both telecommunications and ITS capabilities a perceived or real competitive advantage in the industry.

A more general disadvantage of strict needs-based compensation is the chance of settling for less than the lessee would be willing to pay. Some public agencies have combined cash compensation with needs-based compensation, thus garnering more than they would if they had settled for needs-based compensation alone. When cash compensation is based on a proportion of revenue received by the private partner, the agreement assures the public partner of compensation above in-kind needs yet accommodates any private partner with an aversion to fixed cash commitments unrelated to the venture's success. For example, Caltrans is compensated with a portion of the cash revenues generated by MFS/BART leases as well as with fiber-optics capacity for its own use. On the other hand,

several potential private partners, who participated in a workshop on shared resource projects, indicated that they were averse to revenue sharing with the public sector right-of-way owner unless that agency had shouldered some of the financial risk of the venture (which BART and Leesburg both did).

Another way to extend public sector benefits beyond needs-based compensation is through construction of excess public sector capacity, which the agency can then lease or use for other public agencies or even lease for a fee to private sector users. This option, however, may be precluded by statutory constraints (e.g., constraints on unregulated public utilities) or even by public opinion (mobilized against public sector competition with private telecommunications providers).

Aside from statutory limitations on cash arrangements, one of the strongest arguments in favor of in-kind compensation is timing. Barter arrangements may be more easily effected in a short time and, when the window of opportunity is limited, speed can make the difference between a deal and no deal.

5.4.3 Geographic Scope

Shared resource projects can be state-wide in geographic scope or limited to a single highway segment or municipality. Choice of project scope is a function of public sector needs, administrative preferences, and private partner focus. In turn, geographic definition can affect private partner response and, as well, the kind and magnitude of compensation received by the public sector. The impact of geographic scope on bidder response can be conditioned by the public sector's decisions on exclusivity.

In essence, there are three basic geographic formats plus a hybrid (fourth) format:

- *Extensive single project*—all (or most) segments and corridors in the public sector telecommunications plan are included in a single project;
- *Several smaller projects*, addressed independently—the state-wide plan is disaggregated into a series of regional projects, negotiated separately;
- *Bidder-defined projects*—the public sector invites bidders to define project scope in terms of rights-of-way segments that interest them; and
- *Bidder-constructed packages* aggregated from individual public sector-defined projects—a hybrid of the second and third approaches allowing bidders some flexibility in selecting geographic regions but precluding any "cherry picking" of specific road segments within each project area.

The disadvantage of projects that are extensive in scope is that they may discourage small bidders and firms interested only in limited areas. If private partners are willing to

undertake such projects, however, the public sector is assured of sufficient geographic coverage (though breadth may be at the expense of depth in equipment support).

On the other hand, a series of smaller projects or bidder-defined projects encourages different (and maybe more) bidders. But, if potential private sector partners are interested in only some of the projects or right-of-way segments, the public sector may have gaps in its telecommunications backbone that will have to be filled in at public expense. Moreover, long distance telecommunications providers may be discouraged from bidding on any projects unless they can be assured of access within a reasonable time period to contiguous right-of-way segments, which are distributed among different projects. If individual projects are awarded on an exclusive basis, one project at a time, long distance carriers run an even greater risk of ending up with gaps in the system they want unless they are prepared to outbid all competition for critical right-of-way links.

The hybrid format, which imposes some constraints on "cherry picking," could impose an excessive planning and institutional burden on the public sector because all projects would have to be ready to go to bid at the same time.

At base, decisions on project scope are conditioned by administrative considerations and the type and strength of market demand for highway rights-of-way—that is, private sector willingness to undertake extra financial or barter obligations in order to gain access to rights-of-way that are integral to their business development.

6.0 CONTRACT ISSUES

Contract issues address the details of each partnering arrangement, particularly the allocation of responsibilities between public and private partners and operational conditions specified by either party. As they focus on fine-tuning the partnership arrangement, contract issues are the last in the logical development of a shared resource project. Focus group participants were particularly interested in research on two issues: responsibility for *relocation* of telecommunications infrastructure when highway improvements require it; and allocation of *liability* between public and private partners in case of damage or accidents.

6.1 RELOCATION

Typically, when a utility is granted a franchise in the public right-of-way, the franchise law provides that the utility must relocate at its own cost in the event that the public agency with jurisdiction over the right-of-way wants to improve it. In the case of shared resource projects, two factors that have supported this policy in the past may be subject to challenge: (1) the belief that private companies gaining access to public property (right-of-way) do not compensate the public sector for the full value of the benefit they receive, and (2) an accepted definition of "improvements."

First, as noted earlier, utilities gaining longitudinal access to public sector rights-of-way in the past often paid no fees for such access or paid significantly less than the full market value of the rights granted. This "windfall" might have justified requiring the utility to relocate at its own cost. In a shared resource project, however, this traditional rationale may no longer fit if the party granted access to the public right-of-way has paid fair market value for such access. The variety of relocation arrangements negotiated in the case studies indicate a shift away from the traditional pattern (of utility responsibility for relocation) that may be due to loss of the windfall benefit that justified it.[66]

Second, despite laws that require relocation at the utility's expense to accommodate "improvements" to the public right-of-way, utility responsibility for relocation could be challenged if the partners do not agree on what constitutes a legitimate right-of-way or roadway improvement. Two kinds of roadway alterations can trigger relocation: (1) road widening and other highway road surface or right-of-way construction, and (2) installation within the right-of-way of transportation-management facilities. It is the latter activity that may invite questions of interpretation if terms are not clearly defined in advance.

[66]In some cases, state statutes and regulations explicitly allocate responsibility for relocation. Without formal legislation, these may preclude changes in the allocation of responsibility to reflect a shift in favor of market pricing for right-of-way.

Consider a situation in which a telecommunications company is granted a right to install conduit in the public right-of-way provided that it also installs conduit for non-transportation-related government services. Then, after entering into that arrangement, the public agency decides to install automatic vehicle identification or ITS applications in the public right-of-way, and the most efficient design of such system would require relocation of the previously installed telecommunications lines.[67]

While such activity should be considered an "improvement" to the roadway within the police power of the public agency and therefore trigger the telecommunications firm's obligation to relocate at its own cost, traditionally "improvements" have been conceptualized as physical improvements to the roadway. A court might not construe the term "improvement" broadly enough to include changes that modify driver behavior rather than the physical road. Further, if the public agency has entered into a public-private partnership to accomplish its goals, under the existing law a court may conclude that because of the "privatized" aspect of the relationship, the private entity whose facilities were placed in the road at the earlier point in time cannot be dislocated by another "private" entity.

Thus in shared resource arrangements, where it is considered appropriate to require the private entity to assume all or a significant portion of relocation costs to accommodate public sector-initiated improvements, the public agency should not rely upon existing laws to accomplish the desired result. It appears that most parties involved in the case studies anticipated this issue and thus incorporated fairly specific relocation provisions into their contracts; however, there is no consensus among the case studies on the allocation of responsibility among the concerned parties.

For example, the Ohio Turnpike agreement requires relocation, alteration, or protection of the telecommunications facility, at the licensees' sole expense, in order to avoid interference with the *operation*, reconstruction, improvement, or widening of the Turnpike.[68] The term "operation" should be construed broadly enough to include ITS applications; however, an agency modeling its agreement after Ohio's might consider expanding the definition of the scope of "operation" even more. The Iowa Accommodation Policy requires the utility facility owner to relocate at its own costs and it does not guarantee that if relocation is required, an alternative permit to occupy the right-of-way will be provided.

In contrast, the other case studies demonstrated that the "partnership" nature of shared resource projects suggests a departure from the traditional policy of imposing all relocation costs on the private party.

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[67] Although the same issues might arise if the conduit were for transportation-related public services, it is less likely since an ITS-oriented shared resource arrangement would probably explicitly provide for upgrade of ITS services.

[68] "Ohio Standard Form of Agreement" for telecommunications license, § 9 (emphasis added).

The Baltimore–Washington Corridor RFP for Maryland provides for cost sharing; that is, the state will pay for the necessary duct for the fiber-optics cables when relocation of the duct is required by construction or reconstruction of the roadway, and the contractor will relocate and provide ancillary equipment to reestablish the network connectivity to operate at "pre-move" performance levels. Potential contractors requested that the state commit not to require relocation for at least five years from the contract date. The state represented that it did not expect to move facilities within that five-year term, but it would not commit contractually to refrain from doing so. It is unclear whether relocation responsibility in the event of "modification" of the highway would include responsibility in the event that the state installs an ITS application.

In the BART-MFS License Agreement, BART is obligated to designate a new route for the conduit if it must be relocated, and all costs not paid for by a third party are to be paid by BART. One of the parties explained in an interview that this provision reflects the partnership nature of the arrangement. MFS stressed that, to attract private sector vendors as partners, the state needs to be willing to assume some of the risk associated with future state actions.[69]

Like the BART agreement, Missouri's agreement provides that the state will bear the cost of relocating. Again, this probably reflects the fact that in the Missouri RFP, contractors were requested to make a significant investment in the provision of in-kind services to the state with no cash compensation.[70] MHTC has the option either to acquire additional right-of-way in which to place the fiber-optics cable corridor in a manner acceptable to the fiber-optics contractor or to remove and relocate other utilities at its own expense, so that the fiber-optics contractor may place its fiber-optics cable system in the utility corridor if necessary.

The City of Leesburg document does not explicitly address relocation. It should be noted, however, that the agreement has only a five-year term. Therefore, it is likely that relocation was not viewed as a significant issue. In any case, the City owns the fiber-optics cable system and ACN acts as a broker without ownership. Therefore, it would be logical for the City to assume (financial) responsibility for relocation.

Summary Table of Relocation Responsibility

CASE STUDY	ALLOCATION OF RESPONSIBILITY
Missouri	State is responsible
City of Leesburg	Not explicitly addressed; responsibility appears to be city's
Maryland	Cost sharing: state provides duct; private partner relocates and reestablishes connectivity
Ohio Turnpike	Responsibility of private party
BART	All costs not paid by third party are paid by BART

[69]License Agreement Between San Francisco Bay Area Rapid Transit District, *supra*, § 5.5.
[70]Fiber Optic Cable on Freeways in Missouri, *supra*, § 16.

6.2 LIABILITY

Liability issues can develop as a result of

- System failure, which could be due to physical damage in the roadway or internal malfunctioning,
- Vehicular accidents resulting from interference in the roadway, and
- Breach of warranty.

Questions of liability for system malfunctions are especially important in shared resource projects where both public and private parties actively work in the right-of-way, with an attendant risk of damage, and both depend on the telecommunications infrastructure. Two types of roadway work occur in the rights of way: (1) installation and maintenance of the telecommunications infrastructure generally, but not always, undertaken by the private sector partner(s), and (2) construction, renovation, and maintenance of the roadway and right-of-way undertaken by the public authority. Both can trigger system failure (as can other factors) and vehicular accidents. Moreover, both can involve costs of physical "repair" and consequential damages.

Shared resource projects can involve a number of different types of liability: system repair, consequential damages and tort liability, among others. Other issues related to allocation of liability may also be raised: public agency immunity from liability may be compromised by participation in a public-private venture, and participants may experience difficulty in finding insurance to cover all identified risks. The documentation for each of the case studies addresses these issues similarly; however, careful reading of the contract provisions shows that seemingly minor differences in choice of language can result in significantly different allocations of liability between the parties.

6.2.1 System Repair

System damage may be caused by any party working in the roadway either on the telecommunications system itself or on transportation-related activities such as posting new signs. In the case studies reviewed, responsibility for physical repair of damaged infrastructure generally rests with the party that causes damage. In the Missouri documents, MHTC is not responsible for any liability incurred by the fiber-optics contractor. The contractor then assumes responsibility for all injury or damage for any *negligent* acts or omissions by it in services rendered under the agreement and agrees to "save harmless" MHTC for any expense or liability arising out of such negligent acts or omissions of the fiber-optics contractor, its contractors, subcontractors, agents, etc. The MHTC *has* assumed liability for actual repair costs if MHTC's personnel, contractors, or subcontractors damage or destroy any part of the fiber system or equipment installed by the fiber-optics contractor.

In the Maryland documents, the state's liability is limited to repair of any facilities that it damages. From a strictly legal drafting perspective, the Ohio Turnpike Agreement contains excellent broadly drafted indemnities. The Commission is only liable to the licensee to the extent that damage to its system is caused by the Commission's "gross" negligence.

6.2.2 Consequential Damages

Consequential damages (i.e., damages resulting from service interruption or breach of warranty) are potentially a significantly greater liability concern than system repair.

The public agency will want to limit its liability for damages to the network occasioned by routine road work. For example, in the City of Leesburg project, all liability for service interruptions is allocated to the private party.[71] The Iowa Accommodation Policy relieves the state from any liability for lost profits or business, indirect, special, consequential, or incidental damages in the case of its negligence.

A liability concern peculiar to shared resource projects is raised when separate cable or conduit is installed for the public and private parties, as in Palo Alto. In these circumstances, each party's maintenance activities on its own cable or conduit present a risk of damage to the other party's facility (assuming that maintenance for both facilities has not been delegated to a single party). Palo Alto's agreement with Digital Equipment Corporation provides that in the event damage is caused to a party's cable or conduit by the other party there is no liability for indirect, special, or consequential damages.

Liability issues are particularly complicated when multiple private vendors are permitted access to the public right-of-way. If there is a system failure, unless an adequate dispute review mechanism is set up so the public agency can require all potential parties to join their claims in one action, the public agency is exposed to the possibility of inconsistent results. None of the case studies addressed this issue directly; however, Massachusetts requires that the lead company and all participant companies agree to unified arbitration of disputes by the American Arbitration Association.

In the Missouri documents, the fiber-optics contractor assumes responsibility for all warranties and liabilities for service and performance to ensure satisfactory network performance. The documentation further provides that MHTC is not responsible for any liability incurred by the fiber-optics contractor. The contractor then assumes responsibility for all injury or damage for any *negligent* acts or omissions by it in services rendered under the agreement and agrees to "save harmless" MHTC for any expense or liability arising out of such negligent acts or omissions of the fiber-optics contractor, its contractors, subcontractors, agents, etc. MHTC has not assumed any liability for lost

[71] *See* City of Leesburg "Telecommunications Service Agreement, § 6, allocating all liability for service interruption to ACN.

revenues or other incidental or consequential damages sustained by the fiber-optics contractor.

In the Maryland documents, the state's liability is limited and under no circumstances is it liable for consequential damages for a break in the line. The contractor is strictly liable to indemnify the state for any dissemination of information pertaining to the contract and for its negligent performance of services under the contract. According to the interviewees, this was a significant issue in the negotiation of the contract. Because of MCI's status as a major long-distance contractor, potential liability costs for "consequential" damages could run into millions of dollars.

In the Ohio Turnpike Agreement the licensee is required to hold the Turnpike Commission harmless from losses, costs, claims, damages, and expenses arising out of or related to any claims as a result of the Agreement. The Commission is specifically granted the right to its defense by its own counsel and to maintain control over any claims made against it.

An important point is that the licensee is required to provide in the contracts with its customers that the customer protects the licensee and the Commission from liability for consequential damages due to service interruptions. This provision contrasts with that of the BART-MFS Agreement, in which the licensee's customers are required to indemnify MFS, but not BART. MFS indemnifies BART for everything resulting from MFS's performance under the Agreement, regardless of the negligence of BART or whether liability without fault is sought to be imposed on BART, except to the extent such indemnity is void or unenforceable under applicable law, or where the damage results from negligent or willful misconduct by a "BART Indemnitee" and was not contributed to by any omission of MFS. MFS is not obligated to indemnify BART to the extent of BART's own negligence or willful misconduct.

In the BART documents, both parties waived consequential, incidental, speculative, and indirect damages, lost profits, and the like. The Agreement includes as an exhibit the form of license to be used by MFS in marketing excess capacity to third-party customers, the "User Agreement." Interestingly, it requires the user to insure MFS, exculpate MFS from liability for service interruptions, and indemnify MFS. Inasmuch as BART is also named as a party to the Agreement, it is interesting to note that the user is not required to also insure, indemnify, and exculpate BART directly. Although arguably BART is protected by MFS's obligations under the BART-MFS document, if a state or local agency were to use the User Agreement as a model, it would be advisable to make the user's obligations also run directly in favor of the public agency. That way, the public agency would have another layer of protection in the event of bankruptcy or other inability to perform by its licensee.

6.2.3 Tort Actions

There is also a possibility of tort actions either directly or proximately resulting from the private sector's activities. By allowing one or more vendors access to the right-of-way, as

discussed earlier, the public agency runs the risk that hazards may be created in the safe operation of the roadway. Again, multiple vendors complicate this problem.

Additionally, tort actions may arise out of system failure. Generally, public agencies can expect vendors granted access to the public right-of-way to request limitations on their exposure to consequential damages. In the Massachusetts documentation, however, there is an express statement that the liability of the licensees, present and future, shall not be limited. In the Missouri documents, MHTC is not responsible for any liability incurred by the fiber-optics contractor. The contractor then assumes responsibility for all injury or damage for any *negligent* acts or omissions by it in services rendered under the agreement and agrees to "save harmless" MHTC for any expense or liability arising out of such negligent acts or omissions of the fiber-optics contractor, its contractors, subcontractors, agents, etc.

In the Ohio Turnpike Agreement, the Commission is indemnified for bodily injury and property damage, but such indemnity is limited to the extent of the licensee's negligence. The Commission is only liable to the licensee to the extent that damage to its system is caused by the Commission's "gross" negligence.

6.2.4 Related Issues

In the context of public-private partnerships, issues of the scope of sovereign immunity also need to be addressed. Where a "joint venture" is created between the state agency and the private entity, the state agency may be held liable as a partner for part or all of any liability of the partnership. A joint venture agreement may be construed to waive statutory limitations on the public agency's liability, and in some states, such as Colorado, that liability may not qualify to be paid from the state's self-insurance fund.[72]

An additional issue associated with liability is whether adequate surety for the vendor's obligations can be obtained at a reasonable cost in the marketplace.

In the Missouri documents, the contractor agrees to maintain insurance for bodily injury and property damage, product, and completed operation (with underground property damage endorsement, commercial automobile insurance, and worker's compensation insurance). Holders of sub-easements from the fiber-optics contractor are required to possess the same level of insurance that the fiber-optics contractor has agreed to provide.

The Ohio Turnpike Agreement documents require the licensee to maintain specified levels of insurance and to hold the Turnpike Commission harmless from losses, costs, claims, damages, and expenses arising out of or related to any claims as a result of the Agreement. The Commission is specifically granted the right to its defense by its own counsel and to maintain control over any claims made against it.

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[72] *See*, e.g., provisions of Colorado Risk Management Fund, C.R.S. § 24-30-1510(4).

Summary Table of Allocation of Liability	
CASE STUDY	**APPROACH TO ALLOCATION OF LIABILITY**
Missouri	Private party: responsible for all warranties and performance and/or damage; indemnifies state for negligence. State: Indemnifies private party for facilities damage caused by state; No liability for consequential damages
City of Leesburg	City has no liability for all service interruptions or consequential damages, and contractors' contracts with customers must exculpate City from liability. Private party indemnifies City for tort damages.
Maryland	Private party is strictly liable to indemnifying state for performance of services under contract. State's liability is limited to state caused damage to facilities. No liability for consequential damages.
Ohio Turnpike Commission	Broadly drafted indemnity from private party Commission's liability limited to its gross negligence commission. All contracts must relieve Commission of liability for consequential damages.
BART	Broad indemnity from BART to MFS; waiver of liability for consequential damages by both parties

6.3 OTHER CONTRACT ISSUES

Although the focus group emphasized the need for further research on liability and relocation, they recognized the importance of other contract issues. Restrictions on public agencies' procurement methods can create a significant nontechnical barrier. For example, restrictions on a state's ability to engage in sole source procurement or to request low-bid proposals (based on agency specifications) can significantly affect private sector interest and the speed with which a project can be developed.

Several other contractual issues were also addressed including obligations for future system upgrading and modification, intellectual property rights, and equity issues— "fair" distribution of communications infrastructure and financial benefits among social groups and jurisdictional entities.

6.3.1 Procurement Issues

Exclusivity is one issue in determining who will participate in shared resource projects; a concomitant issue is the procurement process—screening and selecting partners, and structuring the procurement. Both legal and practical factors play roles in the process.

The issues are virtually identical to those associated with ITS procurements generally. The public agency must determine whether the procurement must be done on a competitive basis or whether it has the authority to request proposals and negotiate the arrangement.[73]

[73]In reviewing the TRAVLINK and GENESIS projects in Minnesota, the Volpe Center discovered that the development of new forms of business relationships was one of the key issues concerning project participants. The conflict between the "traditional customer-vendor process" and the use of formal procurement methods posed a significant barrier. For example, public sector interviewees felt that finding partners outside of a formal procurement process raised both ethical and legal concerns. The interviewees concluded that a "new paradigm" is required to allow effective public-private cooperation. ("Review of the

Moreover, public agencies differ in their ability to negotiate terms once a private partner has expressed interest and tentatively offered compensation (cash or in-kind). For example, Maryland had the flexibility to extend a counter-offer when MCI's initial response to the RFP fell short of the listed terms and thus was able to close a deal that did not meet all of the technical requests in the initial RFP.

If the public agency elects to request a low-bid proposal based on specifications developed by the agency, it will probably need to consult with private industry in developing those specifications. This may create a problem in that the private entity that helps develop specifications may be precluded from bidding. Allowing that entity to participate may create a perception of anti-competitive behavior; other bidders may argue that the specifications necessarily favor the entity that helped the public agency develop them.

Whether the agency should obtain services from one vendor or multiple vendors is another early consideration. Maryland has divided its statewide effort into at least two procurements, one for the Baltimore–Washington Corridor and a second, to be issued later, for the rest of the state. Obviously, considerations related to exclusivity play a role here. Bundling services into one proposal necessarily favors the larger vendors. Dividing shared resource projects into multiple discrete projects could promote competition, but this benefit must be offset against the problems associated with broad access to the right-of-way and greater managerial complexities.

Massachusetts has addressed this issue by providing for a lead company agreement in which the first permit applicant has responsibility for constructing all of the Commonwealth's "component," but subsequent permittees must share the cost. Further, the lead company is responsible for all maintenance, on a shared cost basis with other participants. Initially the right-of-way is open to all applicants. Thereafter a lead company is designated and notice is published, and other potential participants have several weeks to enter into participant agreements. Those who fail to take advantage of the opportunity early, however, may be shut out later.

Many states have received unsolicited proposals from private entities offering to provide cooperation on goods or services for communications or transportation projects; however, state legislation often precludes entering into such arrangements without first subjecting the proposals to competition. Colorado has concluded that its "sole-source" procurement authorization, set forth in C.R.S. §§ 24-103-205 and 3-205.1 permits a procurement without competition *only* if the goods and services proposed are available from only one supplier, even if the private entity is willing to make a substantial contribution as part of a partnership effort. In developing its agreement with Concorde Communications for pay phones, the department called 30 pay-phone vendors to determine interest in the procurement. Only Concorde was willing to provide service at all locations; therefore, a sole-source procurement was authorized.

TRAVLINK and GENESIS Operational Tests," John A. Volpe National Transportation Systems Center, 1994.)

6.3.2 Modification

There are two facets to modification: technological upgrading to keep abreast of technical improvements, and expansion of capacity to meet subsequent needs (unforeseen or anticipated but not included in the initial project). A drawback to entering into arrangements sooner rather than later is that telecommunications technology is changing rapidly. Public agencies considering a shared resource project in which in-kind services are provided as consideration may want to consider requiring that the vendor provide upgrades and updates to technology as they become generally accepted in the industry. Technology aside, the public agency may not be able to envision all the capabilities it may desire in the future at the time the arrangement is negotiated and thus may find itself at some later date severely constrained by insufficient communications capacity. Care should be taken not to unduly restrict future options. At the same time, care must be exercised to not burden private partners with essentially open-ended obligations that might cause them to withdraw their offer to participate.

The agreement between Missouri and DTI calls for the installation of additional conduit in urban areas for future expansion. Similarly, the Maryland RFP calls for a multi-fiber cable for current use and spare capacity to handle local communications and future requirements. While such provisions for ensuring future capacity do not directly address system modification to upgrade technology, they do reduce the risk of extensive reconstruction to accommodate future ITS uses.[74] Capacity enhancements are probably easier to specify and estimate (in dollar terms) than as-yet-undeveloped technological improvements.

6.3.3 Intellectual Property Issues

Sorting out the intellectual property rights in a shared resource project may be extremely complicated. It may be difficult to distinguish prior "Party Intellectual Property" from property arising during the performance of the contract. Where complex in-kind ITS services are requested in return for access to the right-of-way, the allocation of rights in technology may be particularly important. The documentation for the Idaho Storm Warning System project (Stormwarn) and the Idaho Out-of-Service Verification project (OOS), both of which are multi-party IVHS partnership agreements, contain intellectual property provisions essentially following the federal guidelines. Even where ITS services are not part of the initial shared resource agreement, intellectual property concerns arise if the public agency contemplates installation of ITS facilities in the future. The private communications facilities may need to interconnect with public ITS facilities or services, raising concerns about granting the public access to private, proprietary, communications

[74]Added capacity is provided in two different forms. The Maryland RFP calls for the installation of additional conduit space, through which the state can later pull its own fiber for expansion of its capacity. An alternative method is that used by the ATSAC project in southern California, in which "dark fiber" is pulled during the initial phase of the project but not used by the public partner until demand develops.

protocols. This concern may be reduced if the shared resource agreement provides separate fiber for the public and private parties.

In addition, the public agency needs to be concerned with its ability to upgrade and update its facilities after the contractor's obligations end, and its ability to operate systems provided to it in the event that the contractor defaults under the agreement. Typically, the vendor will not want to give the public agency access to its proprietary intellectual property. This issue may be addressed through the structuring of an intellectual property escrow agreement.

Finally, the public agency will certainly want to address any required restrictions on the private sector's use of data generated as a result of the shared resource project. Again, this issue should be clearly addressed in contractual arrangements associated with the project.

6.3.4 Social-Political Issues

Most-Favored-Community Issues

In some communities, there may be a perception that private entities are inclined to offer a more favorable arrangement to communities that hold out in restricting access to their right-of-way for a longer period of time (i.e., the last link in the network can exact the highest price). In fact, officials from several of the jurisdictions interviewed in this study indicated that this perception is accurate. This issue may be addressed by inserting a "most-favored community" clause in the contract documents. Under such a clause, the entity obtaining rights in the public right-of-way must provide the grantor of those rights with the same benefits, concessions, or payments as those offered by it to any other jurisdiction served by the network.

Since the market value of different links in the network may vary, based on telecommunications demand or property values in different areas, some situations may call for the most-favored-community clause to be limited to assuring equality of benefits with "similarly situated" jurisdictions rather than across-the-board financial parity among communities.

Geographic and Social Equity

Most private sector companies are rarely required to address issues of equity beyond nondiscriminatory pricing; they are generally allowed to eliminate unprofitable ventures and concentrate on profitable undertakings. But companies that provide what are considered public services (telephone, basic transportation, utilities) are often held to a different standard and may be required to provide services that are a burden rather than an asset to corporate operations. The public sector is expected to provide benefits equitably to its constituent population. This entails the distribution of services and the allocation of benefits. In the context of shared resource projects, equity issues include severai related aspects:

- Distribution of communications capacity or revenue from shared resource projects among public sector agencies and uses, rather than restriction to transportation-related needs;

- Distribution of communications capacity evenly among political and geographical jurisdictions within the domain of the public agency negotiating the arrangement (e.g., sparsely as well as densely populated areas), even when not justified in a strict cost-benefit or profit-oriented framework;

- Distribution of cash revenues among projects and areas so that all members of the population receive "equal" benefits from the use of the public right-of-way by private partners (for example, rather than applying revenues only to transportation expenditures on infrastructure used by only part of the population).

Many of the participants in this study expressed a concern related to the most-favored-community issue—that private vendors may be interested in providing cable links only in or between densely populated areas, and not to rural areas or areas that are not commercially attractive.

In the case of access to state and interstate highways, a state may consider whether it has the right to require that the benefits of the shared resource arrangement be distributed equitably to the general public. The state or municipality may wish to require that benefits be provided to populations the private sector would not otherwise choose to serve (e.g., many telephone companies must maintain rural networks) to ensure equity, or because the public sector wants communication links there for its use.

Although Palo Alto has expressed interest in a city-wide communications system, private parties have focused on serving only more profitable areas. In June 1994 the City signed a non-shared resource agreement with MFS covering only the central business areas. Neither the agreement with MFS nor a separate agreement with Digital Equipment Corporation, which provides fiber links for some City services, provided fiber capacity to the low-profit business or residential areas of Palo Alto.

7.0 CONCLUSIONS

Shared resource projects present a new and timely opportunity for public-private partnering for transportation agencies. The furtherance of shared resource projects is particularly relevant to development of ITS products and services, many of which rely on fiber-optics-based telecommunications for operation. Although ITS services may be leased or purchased from private sector providers or installed, owned, and operated entirely within the public sector, use of a shared resource approach may offer a way for the public sector to achieve ITS implementation more rapidly and at lower cost.

Reviews of shared resource projects show that a variety of approaches to project financing and structure are viable. Because there are many ways to structure shared resource projects, they can be adapted to suit specific circumstances. Indeed, the number of shared resource projects that have been initiated and contracted for across the country within the last two years proves that the issues identified in this report can be addressed successfully. The best approach for a given project will have to be determined on a case-by-case basis, taking into account such context specifics as state statutes and regulations, project objectives, and demand for telecommunications capacity.

The following figure graphically summarizes the basic stages in development of a shared resource project. At the very outset, potential shared resource partners must address the threshold legal and political issues that, if not resolved, can preclude shared resource arrangements. In some cases, new statutes or regulations will be required to permit private sector access to the right-of-way or conduits in the right-of-way. In other cases, careful contractual arrangements can ensure effective private sector longitudinal access without violating legal or regulatory constraints; for example, using leases rather than easements to convey rights.

Moving Toward a Contract:
Key Decisions and Supporting Information

1. Determine Applicability	*2. Determine Options for Compensation*	*3. Refine Partnership Structure*
• Investigate existing authority	• Estimate public telecom needs	• Examine tradeoffs among partnership options
• Analyze market influences	• Address legal authority relating to compensation	• Determine geographic scope
• Evaluate institutional factors	• Estimate ROW value	• Address contract issues
	• Analyze types of consideration	

Threshold issues aside, most other issues can be addressed without resorting to legislative or regulatory change. For example, the issue of bond tax exemption can probably be addressed with attention to the ways that bond issues are structured and bond proceeds used. In some cases, the number of options available is limited by regulation so that there is little (or even no) choice absent legislative changes (for example, if cash compensation is precluded by statute). Even under these circumstances, shared resource projects can be effected without legislative initiatives so long as the potential partners are willing to accept an option that is within currently accepted boundaries.

For most non-threshold issues, the choice among ways to address that issue are based on preferences and an evaluation of the pros and cons of each option; that is, issues are really

opportunities to choose among options rather than barriers to implementation—the choice between exclusivity and multiple partners, allocation of responsibility for infrastructure relocation and liability for repairs, and selection of barter over cash compensation are often based on preference rather than necessity. For example, barter is advantageous when the ultimate objective is telecommunications capacity for public sector needs, since the private sector can supply this capacity as an add-on to capacity for its own needs at a cost that is significantly below the cost that the public sector would incur for self-supply (i.e., the avoided cost). Even if cash is allowed, barter may be the preferred form of compensation.

Shared resource partnering, however, is market-driven. This generates limits of two kinds that cannot be circumvented: upper bound compensation levels, and the time within which deals must be consummated. Market conditions determine the compensation that potential private partners are willing and able to provide for access to highway ROW or public property (e.g., conduits or towers). There is no "inherent" value for highway ROW; the value with regard to telecommunications access is derived from telecommunications revenue potential, tempered by the cost of other ROW that might be available to those same telecommunications firms.

Similarly, market conditions dictate response time for prospective partnering. As market forces change and technology advances, demand for access to highway rights-of-way may also change. In fact, timing can be a critical factor in the choice among options in structuring a shared resource project; for example, directing a public agency to effect a barter-only partnership because it is administratively easier and thus implemented more rapidly than a complex hybrid (barter plus cash) arrangement. In any case, because the window of opportunity is often narrow and potential private sector partners can have access to non-highway right-of-way for infrastructure, public agencies interested in effecting shared resource partnerships must address the associated issues in a timely fashion. Otherwise, the public agency may have to wait until market expansion or industry restructuring generates new demand for ROW.

From FHWA's perspective, it is important to plan for effective outreach on shared resource projects in the very near term. To this end, the FHWA Shared Resource Study included preparation of guidance intended for general distribution to public (and private) agencies interested in shared resource projects. This guidance, published as a stand-alone document, identifies issues associated with shared resource projects, catalogs the options available to address each issue, summarizes advantages and disadvantages of some of the most salient issues, and succinctly describes stages in development of a shared resource project.

APPENDIX: SUPPORTING DATA FOR COST COMPARISONS AMONG RIGHT-OF-WAY OPTIONS

This appendix presents the data from which Hess et al. (1988) selected representative cost figures and on which they based their cost comparisons among right-of-way types.

Given a wide range in values within categories, Hess et al. tried to select values for cost elements relatively *independently* of right-of-way type on the basis of additional detail or supporting sources, or a modal-type value. For cost elements dependent on right-of-way type, the authors generally chose the value provided by the carrier most experienced in that right-of-way type. Data indicated (one-time) cost ranges per mile as shown in the following table.

Data for Hess et al. Comparative Capital Costs

CATEGORY	COST RANGE	VALUE SELECTED fiber-optics R ANALYSIS
Engineering	$1,100-15,000	$3,000
Right-of-way Acquisition:		
Railroad	$8,000-$16,000	$12,000
Non-interstate highways - Urban[75]	$5,000 per year	$31,250
Non-interstate highways - Rural[76]	$1,000-2,000 per year	$6,250-12,500
Private land[77]	$240-5,160	$1,000 (USA average = $990)
Cable Procurement	$16,600--28,200	$16,600[78]
Cable Installation[79]		
Railroad	$3,200-16,000	$10,000
Private land	$2,100-30,000	$22,500
Non-interstate highway	$2,400-30,000	$27,500
Interstate freeway - median		$10,000
Interstate freeway - fence line		$16,000
Regenerators		$15,200

[75]Data from Georgia.
[76]Data from Georgia.
[77]Based on 2.4 acres per linear mile, 70 percent of land value per rural acre.
[78]Four options were presented, all with metallic sheathing; the lower figure is for a metallic central strength member, the higher for a nonmetallic central strength member.
[79]Costs are for fiber-optic cable plowed into the ground, not placed in conduits, at a depth of 36 inches.

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