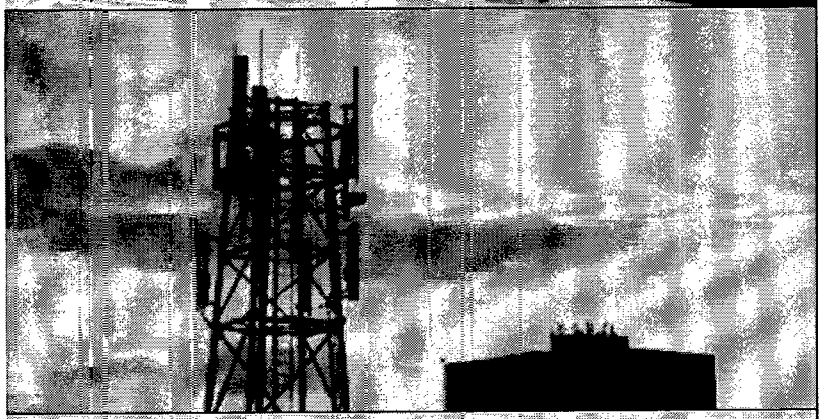
Effect on Broadband Deployment of Local Government Right of Way Fees and Practices



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July 18, 2011

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I. PURPOSE

In this report, we[1] comment on economic issues of right-of-way (ROW) use raised by the Federal Communications Commission's (FCC) *Notice of Inquiry* (NOI) in the matter of, "Acceleration of Broadband Deployment: Expanding the Reach and Reducing the Cost of Broadband Deployment by Improving Policies Regarding Public Rights of Way and Wireless Facilities Siting." Specifically, we consider whether (a) there is evidence that ROW fees charged by local governments are affecting broadband (BB) adoption or deployment; (b) whether there is reason to believe that fees charged in some locations are likely to impact deployment or adoption in other locations; (c) whether there are bases for setting reasonable market-based fees; and (d) whether there is a reason to be concerned that the fees may reflect monopoly power. These issues are raised by several of the information requests in the NOI[2]:

> *To what extent and in what circumstances are rights of way or wireless facilities siting charges reasonable?*
>
> *What are appropriate criteria for determining the reasonableness of such charges?*
>
> *Are permitting or application fees unreasonable to the extent they exceed amounts that would recover administrative and other specifically identifiable costs?*
>
> *Are "market based" rates for use of public rights of way or publicly-owned wireless facilities sites reasonable?*
>
> *Are market-based rates substantially higher than cost-based rates?*

[1] Bryce Ward Ph.D., directed this analysis. See Appendix A for his vita. ECONorthwest staff, Ed MacMullan, Paul Thoma, and Philip Taylor, worked under Dr. Ward's direction.

[2] FCC. 2011. Notice of Inquiry In the Matter of Acceleration of Broadband Deployment: Expanding the Reach and Reducing the Cost of Broadband Deployment by Improving Policies Regarding Public Rights of Way and Wireless Facilities Siting. WC Docket No. 11-59. April 7. Page 8.

II. SUMMARY OF CONCLUSIONS

Our analysis of the available data on ROW fees and BB deployment found that ROW fees have no measurable effect on deployment. Areas where local governments' authority to levy fees is strictly limited have the same levels of BB deployment and adoption as areas where local governments have relatively wider latitude to recover fair rents for use of the ROW.

Other factors likely explain the differences in deployment and adoption observed across the country. For instance, the relatively small percentage of communities un-served by BB account for a small percentage of the U.S. population. These communities lack BB services because of their isolated location, far from centers of population and commerce. These communities typically have few residences and businesses dispersed across large geographic areas. The costs of installing BB infrastructure and providing service greatly exceed the revenues that providers can earn on these services. The FCC calculates this gap at over $23 billion. Our analysis shows that limiting or abolishing ROW fees and subsidizing BB in currently un-served areas would likely have no measurable effect on BB penetration into most of these areas. The ROW-savings would be, at most, a small fraction of the required investment.

The literature on BB adoption identifies cost of service as one of the many factors that can influence adoption. The relationship between cost and adoption, however, is complex because of the many factors included in the cost of using or accessing BB service. Even if lower ROW fees were passed onto consumers as lower prices, this would not address many of the relevant costs factors that inhibit BB adoption—such as requiring deposits or long-term contracts, costs of computers and software, price increases after introductory offers expire, and the cost of purchasing BB bundled with other, unwanted services. A large gap exists between what current non-users say they would be willing to pay for BB services, and the maximum cost savings they could expect if providers passed on ROW-fee savings. Limiting or abolishing ROW fees would likely have little effect on BB adoption.

It is even more unlikely that limiting or abolishing ROW fees would have an impact on adoption given that BB providers advertise their, often national, prices excluding taxes, fees, installation costs and other costs. Unless lowering ROW fees in the places they are currently allowed led to changes in the nationally advertised prices, potential new customers would be unlikely to know the extent to which ROW-fee savings would impact the price they pay for BB services.

One argument by private BB providers for limiting or abolishing the ROW fees that they pay local jurisdictions is that the providers would use some of the savings to subsidize BB services in currently un-served or under-served higher cost areas. Even if one assumed that ROW fees drove BB deployment, such voluntary cross subsidization makes no economic sense for profit making firms. Firms allocate capital to investment that will generate the highest returns. It makes no business sense for private communications companies to take savings from not paying ROW fees and using that savings to fund less-profitable operations. More likely the firms would pocket the

savings and increase their profits. But, because fees are unlikely to drive deployment, even if we assume that BB providers did distribute ROW-fee savings from one market to another, it would likely have no measurable effect on BB penetration or adoption.

Allowing state and local governments to charge market value for use of public ROW is consistent with the economic principle of using prices to allocate scarce resources. From an economic perspective, a locality's ROW is a scarce resource just as lands—public or private—outside a ROW are scarce. Charging a fee for ROW access helps ensure that the ROW will be used efficiently, that is, that the ROW will not be misused or wasted. Furthermore, the closer the fee approximates the relevant market price, the more likely the ROW will be used in an economically efficient manner, a fundamental criterion by which economists evaluate the performance of a market and overall social welfare.

Reasonable charges for ROW can be established through any number of well-recognized mechanisms, including but not limited to contract negotiations. Local jurisdictions have little incentive to act as monopolists when negotiating or setting ROW fees. Local governments have different goals, responsibilities, and functions than do corporate entities. Localities hold resources—including ROW resources—in trust for their citizens and businesses. The local interest in promoting economic growth and development for residents and businesses disciplines ROW pricing. Also, local governments compete vigorously with one another to attract and encourage deployment of advanced and reliable utilities. Thus, local jurisdictions have a strong incentive not to overprice ROW access: a community that discouraged ROW deployment runs the risk of losing businesses and residents to neighboring communities.

While we find no evidence that a public policy that actually limited existing ROW fees would produce meaningful benefits in increased BB deployment or adoption, such a policy would reduce local revenues. Jurisdictions may be required to recover the lost revenues by raising taxes or fees charged to others. Another response could be to cut services. A locality may be forced to reduce the planning and management actions that help maintain efficient ROW uses. This would allow ROW users to externalize their own costs onto other ROW users. Also, the lack of efficient allocation of ROW resources could drive additional ROW costs onto taxpayers, and adversely affect residents, businesses, and ROW users. In addition, there would be a cost to regulation and compliance that could itself be substantial, and that would add to the negative impact of reducing ROW fees.

Given the absence of obvious, measurable benefits to BB deployment or adoption from regulating ROW fees, together with the prospect of harm to BB consumers, residents, businesses, telecom providers and other ROW users, and additional direct and indirect regulatory costs, it is difficult to find an economic justification for regulating local rights of way charges or practices.

III. No Evidence that ROW Fees Affect BB Deployment or Adoption

Underlying the premise behind FCC's inquiry into ROW fees is the assumption that reducing ROW fees will reduce the operating expenses of BB providers, which will ultimately yield increased BB deployment and adoption. This assumption may have a facial appeal to some. The available facts, however, describe a much more complex relationship between ROW fees and BB deployment and adoption. Our review of the available data does not find evidence to support the hypothesis that abolishing ROW fess would increase BB deployment or adoption. Such an action, however, would likely generate significant costs for a jurisdiction's residents, businesses, telecoms and other ROW users.

A. Do ROW Fees Affect BB Deployment?

Based on our analysis of the available data, we do not find evidence that ROW fees have a measurable impact on BB deployment. If ROW charges reduce BB deployment, areas with ROW charges should have less BB than areas without ROW charges. Our analysis does not find such a relationship. Areas with ROW charges have the same BB deployment rates as areas without ROW charges.

Our results agree with results from the only previous empirical study we found of ROW fees, ROW practices and BB deployment, a study prepared by Dr. Alan Pearce. Dr. Pearce compared competition in communities that charged fees for use of ROW by telecommunications companies, and that regulated use of the rights of way, and those that charged no fees, and had fewer right of way regulations. Dr. Pearce found that charges and regulatory practices did not deter competition, which necessarily means that the practices did not deter deployment of telecommunications facilities. Indeed, he concluded that by adopting a sound approach to pricing public property (charging market value for its use) and by regulating the use of that property to ensure that it functioned properly, localities created an environment which made the market more attractive to providers. This study was submitted to the FCC in response to the National Broadband Plan.[3]

Following Pearce, we conduct an analysis that compares BB deployment in areas with ROW charges to similar areas without ROW charges. To complete this analysis, we use data on BB deployment from the National Broadband Map,[4] data on ROW charges collected from a variety of sources, and data on other local characteristics (mostly from the Census). Specifically, we conducted a regression analysis that regressed the share of state population with access to various measures of broadband[5] on a categorical variable

[3] http://fjallfoss.fcc.gov/ecfs/document/view?id=7020247000

[4] US Dept of Commerce, National Telecommunication and Information Administration, State Broadband Initiative (June 30, 2010)

[5] We focus on the share with access to BB providers who offer download speeds greater than 3Mpbs and upload speeds greater than 0.768Mpbs, download speeds greater than 50Mpbs, upload speeds greater than 10Mpbs, and the share who have access to 3 or more BB providers. The data for the share with access to

that describes allowed ROW charges,[6] and local characteristics that might affect BB deployment or adoption (e.g., population, population density, share living in urban areas, median household income, share with a college degree, etc.).[7]

In this report, we focus on state-level differences in allowed ROW charges; however, we also conducted analyses that examined differences in actual fees and taxes across municipalities using data on 119 Oregon municipalities and the 59 cities examined in Tuerck et al (2007) that yield results similar to what we found in our state level analysis.[8]

ROW fees vary widely across both states and BB platforms. The Communications Act allows state and local governments to charge cable providers 5% of gross revenues in return for the grant of a cable franchise, which authorizes the holder to provide cable service via facilities in the rights of way.[9] Many local jurisdictions charge cable providers a franchise fee equal to 5% of gross revenues. However, some states limit franchise fees to amounts less than 5% (e.g., Rhode Island limits cable fees to 3% and Kentucky provides for a 2.4% tax on video services and localities must forego cable franchise fees to obtain the tax collection[10]).

Section 253(a) of the Communications Act provides that "no State or local statute or regulation...may prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service," but it goes on to state that "[n]othing in this section affects the authority of a State or local government to... require fair and reasonable compensation from telecommunications providers, on a

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>3Mpbs down and >0.768up and 3 or more providers were obtained from http://www.broadbandmap.gov/analyze. To analyze the data for higher speeds, we downloaded the raw data files for each state and calculate our own shares. We did not have access to the 2009 Geolytics population estimates for the 2000 census blocks used to create the estimates on the website. Instead, we used population estimates from the 2000 census to calculate our estimates. We assume that if any part of the block has access to a certain provider, then the entire population in the block has access.

[6] Obtaining data on the variation in ROW fees was difficult. Ideally, we would obtain a complete description of ROW charges (and other telecommunications taxes) for a large sample of jurisdictions. In the absence of that data we relied on (a) description of allowed state ROW charges from the "50-State Survey of Rights-of-Way Statutes" completed by NTIA (www.ntia.doc.gov/ntiahome/**staterow**/**row**table.pdf) , (b) description of each state's average state and local telecommunications taxes assembled by the Council on State Taxation (Telecommunications Tax Task Force of the Council on State Taxation (2005) "2004 State Study and Report on Telecommunications Taxation," Washington, DC.), (c) surveys or studies of municipal taxes or fees produced by various state governments or municipal organizations[6], and (d) local ordinances; and (e) information collected through various studies (like the Pearce study) and studies by utility commissions. Given our imperfect ability to classify states into ROW fee categories, we conducted a number of analyses that assigned states' with ambiguous ROW statutes to different categories. None of these alternative classifications affect our conclusions.

[7]Studies that describe similar analyses include: Kolko, J. (2010) "Does Broadband Boost Local Economic Development," Public Policy Institute of California., Burton, M.L. and M.J. Hicks (2005) "The Residential and Commercial Benefits on Rural Broadband: Evidence from Central Appalachia," Hu, W. and J.E.Prieger (2007) "The Timing of Broadband Provision: The Role of Competition and Demographics," AEI-Brookings Joint Center for Regulatory Studies *Working Paper 07-06.*

[8] League of Oregon Cities (2008) "Franchise Fee Survey," Summer 2008; Tuerck, D,, P. Bachman, S.Titch, and J.Rutledge (2007) "Taxes and Fees on Telecommunication Services" The Heartland Institute, May 2007.

[9] 47 U.S.C. Sec. 542

[10] 47 U.S.C. Sec. 542, R.I.Gen Laws § 39-19, KY. Rev. Stat. Ann. § 136.616(2)(a)

competitively neutral and nondiscriminatory basis, for use of public rights-of-way on a nondiscriminatory basis..." Relative to fees on cable services, fees vary more widely across states. Some states do not limit municipal fees as long as they meet the "fair and reasonable" criteria (e.g., Maryland and New York). Other states provide for gross-revenues based fees (e.g., Rhode Island law permits fees up to 3% and Oregon law permits fees of up to 7% of gross revenues on incumbent local exchange revenues[11]). Still other states do not allow a rental fee at all, but allow local governments to charge fees to recover specified costs (e.g., Alaska, California[12]) or costs of providing services. (e.g., New Jersey[13]).

To investigate the potential effects of ROW fees on BB deployment, we first compared BB deployment in states that allow telecommunications ROW charges that are not tied to a cost calculation (the "Fair and Reasonable Charge" states) to deployment in states that limit ROW charges to telecommunications companies to some defined portion of costs, (the "Cost" states) for four categories of BB deployment. Specifically, we examined the share of each state's population that lived in an area with more than three BB providers, the share that lived in an area with greater than 3Mpbs download speeds and greater than 0.768Mpbs upload speeds, the share living in areas with greater than 50Mpbs download speed, and the share living in areas with greater than 10Mpbs upload speeds. We observe no statistically significant difference in deployment between the "Fair and Reasonable Charge" states and the "cost" states, and the largest differences we do observe (for more advanced speeds) suggest greater deployment in ROW fee states. We summarize these results in Table 1.

[11] Or. Rev. Stat. § 221.515

[12] Alaska Stat. § 42.05.251, California Government Code § 50030

[13] N.J.S.A. §54:30A-124

Table 1. Differences in broadband deployment for states that allow ROW rent and states that limit ROW fees to costs

	Share with download speed >3Mpbs and upload speed >0.7Mpbs	Share with 3+ providers (any technology)	Share with max download speed >50 Mpbs	Share with max upload speed >10 Mpbs
"Fair and Reasonable" states	0.96 (0.01)	0.93 (0.02)	0.35 (0.08)	0.39 (0.09)
"Cost" states	0.94 (0.02)	0.94 (0.03)	0.21 (0.07)	0.28 (0.07)
Difference	0.02 (0.03)	-0.02 (0.03)	0.14 (0.11)	0.11 (0.12)
Difference, controlling for state characteristics	0.01 (0.03)	-0.02 (0.03)	0.22 (0.11)	0.14 (0.13)

Source: ECONorthwest

It is possible that the states that allow larger ROW fees differ from those that limit fees to costs, and that these differences obscure the relationship between ROW fees and BB deployment. To address this possibility, we compared BB deployment in states with ROW fees to otherwise similar states without them. For instance, we compared a state like Oregon, where many localities charge gross-revenues based fees to both cable and telecommunications companies, to a similar state like Colorado, which limits localities to charging telecommunications companies a fee to recover costs incurred in processing ROW permits.[14] Comparing these two states, we found the same results. Ninety-eight percent of Oregonians have access to broadband with greater than 3 Mpbs down and 0.768 Mpbs up, and ninety-nine percent of Coloradoans do. One-hundred percent of Oregonians have access to greater than 3 providers, and ninety-eight percent of Coloradoans do. However, with respect to advanced metrics, Oregon outpaces Colorado by a wide margin. Sixty-eight percent of Oregonians have access to BB with download speeds greater than 50Mpbs, but less than 2 percent of Coloradoans do.

In the final row of Table 1, we present the results of a statistical analysis that controlled for factors other than ROW charges that could affect BB deployment. Specifically, we controlled for factors that may affect supply of (e.g., population density or the share of the population living in rural areas) and demand for (e.g., median household income, share of population with a college degree, share non-white, share older than 60, etc.) BB

[14] Colorado and Oregon have relatively similar demographics. If anything, based on demographic characteristics, we expect Colorado to have greater levels of BB deployment and adoption. Colorado has higher median income, greater population density, a higher share of its population with college degrees (which all typically correlate with greater BB deployment and adoption).

services.[15] Even after controlling for these other factors, we observe no difference in BB deployment between areas with more liberal ROW charges and areas where charges to telecommunications companies are limited to actual costs, and more liberal states appear to have higher shares of their state's population living in areas with access to higher speed BB service (although these differences are not statistically significant).

We are aware that some states, (e.g., Florida) have replaced franchise fees with a statewide tax and that other states allow localities to level other local taxes on telecommunications revenues (e.g., utility taxes). As such, the share of telecom revenue collected by localities via taxes or fees may not differ across states. This is one potential reason why we did not observe a relationship between ROW fees and deployment. We conducted additional analyses that used differences in tax rates across places and found results similar to those described above – states with higher effective state and local taxes on telecommunication have access to BB at least as good (and in some cases better) than states with lower effective taxes on telecommunication.

While there are some weaknesses in the underlying data on which the analysis relies, at the very least one would have expected to see some consistent indication of a relationship between ROW charges and deployment or adoption if there was one.[16] Based our analysis, however, we find no support for the conclusion that reductions in ROW fees will meaningfully increase BB deployment. Before the FCC takes any action based on the presumption that reducing ROW fees will increase BB deployment, they should attempt more rigorous study of this issue.

The finding that ROW fees do not depress BB deployment may surprise some. Adopting simple economic intuition, some expect that reducing ROW charges will make BB deployment cheaper (or more profitable) and therefore encourage BB deployment. The actual economics, though, are more complicated. It is not difficult to imagine a number of plausible explanations for why ROW fees do not adversely affect BB deployment. For instance, it is possible that providers pass most of the cost of the fee onto consumers in the form of higher prices (and thus fees only marginally affect provider profits).[17]

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[15] Specifically we control for ln(population density), ln(population), ln(median HH income), share of population with college degrees, share older than age 60, share white, and share living in urban areas. We include all 50 states (and DC). States we cannot classify as "fair and reasonable" or "cost" states, we include as "other." To correct for potentially heteroskedastic errors, we use robust standard errors.

[16] Our analysis is an initial analysis and not a definitive analysis in light of the absence of ideal, exogenous data on ROW charges (as described in footnote six), and better data on BB deployment and adoption.

[17] We do not know the extent to which this occurs. Assessing the incidence of ROW charges in current telecommunications markets is difficult. In general, how much of a tax/fee is paid by different groups depends on their relative responsiveness to price changes – with the general rule that the most price insensitive groups pay most of the tax. For instance, 20 years ago, Hausman (2000) pointed out demand for basic wireline telephone service was not very sensitive to price (i.e., demand was inelastic), thus consumers paid nearly all of the taxes and fees imposed on wireline telephone service. A little over 10 years ago, demand for BB was fairly sensitive to price, as such, Goolsbee (2006) found that consumers likely paid between 50-60% of any tax on BB (with producers paying the rest). Dutz et al (2009), though, argue that in recent years demand for BB has become less sensitive. As such, simple economic theory would argue that consumers now pay an even greater share of ROW fees (and other telecommunications taxes); however, Christensen et al (2001) point out this potential increase in the share paid by consumers may be muted by

It is also possible that the gap between profitable and unprofitable investments dwarfs any change in profits from lower ROW fees. For instance, many analysts have concluded that communities that currently lack access to BB services lack those services because the costs of installing and providing services in these locations significantly exceed the revenues providers can earn on the services.[18] This has little to do with the ROW fees that local jurisdictions charge in areas where providers supply BB services.

Recent FCC analyses, which rely on improved data collection efforts, describe in detail the locations and characteristics of communities that do not have BB services, and the barriers to BB penetration into these communities.[19] The common characteristics among these communities include:

- Rural, isolated locations, far from centers of population and commerce.
- Relatively few residents, households, and businesses disbursed across large geographic areas.
- Mostly low-income, low-education households.
- A large percentage of residents uninterested in using the internet.

States with low shares of their populations who can access higher speed technologies tend to have similar characteristics.

The un-served communities account for a small percentage of the total U.S. population. FCC's *National Broadband Plan*, released in March 2010, reports an un-served population of approximately 14 million residents, or 4.5 percent of the U.S. population.[20] FCC's

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changing technology and the ability to switch among cable, wireline, and wireless services. Hausman, J. (2000) "Efficiency effects on the US economy from wireless taxation." *National Tax Journal* 53(2):733-742.; Goolsbee, A. (2006) "The Value of Broadband and the Deadweight Loss of Taxing New Technology," *The B.E. Journal of Economic Analysis & Policy* 0(1).; Dutz, M., J.Orzag, and R. Willig (2009) "The Substantial Consumer Benefits of Broadband Connectivity for US Households" CompassLexicon, July 2009.; Christensen, K., R.J. Cline, and T.S.Neubig (2001) "Total Corporate Taxation: Hidden, Above-the-Line, Non-Income Taxes" *State Tax Notes* (November 12, 2001), p.529-30.

[18] FCC. 2011. *Seventh BB Progress Report and Order on Reconsideration.* In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion. GN Docket No. 10-159. May 20; FCC. *The Broadband Availability Gap OBI Technical Paper No. 1.* April; FCC. 2010. *Connecting America: The National Broadband Plan.* March; FCC. 2011. *Bringing Broadband to Rural America: Update To Report On A Rural Broadband Strategy.* GN Docket No. 11-16. June 17; Schadelbauer, R. 2011.*The BB Adoption Summit All Aboard? Tackling Broadband Adoption. National Telecommunications Cooperative Association.* April 6; Rosen, J. 2011. "Universal Service Fund Reform: Expanding Broadband Internet Access in the United States," *Issues In Technology Innovation.* No. 8, April. Center for Technology Innovation at Brookings; Carlson, E. No date. *Broadband Adoption Barriers and Impacts.* A literature review; Smith, A. 2010. *Home Broadband 2010.* Pew Internet & American Life Project. August 11.

[19] FCC 2010, *Seventh BB Progress Report;* FCC 2010, *The Broadband Availability Gap;* FCC 2011, *The National BB Plan;* FCC 2011, *Bringing Broadband to Rural America.*

[20] FCC 2010, *The National Broadband Plan,* p. 136.

more recent *Seventh Broadband Progress* report from May 2011, puts the figure at 26.2 million, or 8.4 percent of U.S. population.[21]

The FCC report, *The Broadband Availability Gap*, describes the details of these financial barriers and the amounts of subsidy necessary for private provider to serve these communities. [22]

- The total economic subsidy to connect and supply BB services is $23.5 billion.
- Subsidizing all or part of the initial connection – the capital expenditures for the infrastructure – would allow private BB providers to serve approximately 46 percent of the un-served households. These providers would earn enough revenue to cover their costs so long as they do not pay the capital costs of installation.
- Servicing the remaining 54 percent of un-served households will require a one-time subsidy to install the infrastructure, and ongoing subsidies to cover the service costs.
- Serving the 250,000 households that require the greatest subsidy would cost approximately $14 billion of the total $23.5 billion to connect all 14 million un-served households. That $14 billion would be spent on just two-tenths of one percent of all U.S. households. *The average cost per household is approximately $56,000.*

The financial barriers limiting BB penetration into currently un-served areas are unrelated to ROW fees charged by local jurisdiction. Limiting or abolishing these fees will likely have no impact on increasing BB supply in these areas.

To further illustrate how unlikely ROW fees are to explain the lack of BB penetration in areas that currently lack it, consider the following back-of-the-envelope calculation based on the investment gap values mentioned above.

For an area to lack BB, the expected profits from serving an area must fall short of the amount needed to justify the investments required to serve it. For ROW fees to cause BB to not be available in an area, the expected change in profits from eliminating the ROW fee must be sufficient to change the necessary investments from unprofitable to profitable.

Consider, for instance, Josephine County in Oregon. According to the Investment Gap study, this county faces an investment gap of $28.8 million (or $7,106 per household). This is roughly the average per household gap for all counties.

If we assume that the average household pays $50 per month for BB, including a 5% franchise fee, then eliminating the franchise fee, at most, can increase provider profits by

[21] FCC 2011, *Seventh Broadband Progress Report*, p. 15.

[22] FCC 2010, *The National Broadband Plan*, p. 136-138.

$30 per household per year.[23] Thus, to assume that ROW fees prevent BB investments in Josephine County, we must believe that $30 per household per year—or $120,300 if every un-served household were expected to adopt BB if it were available—is the difference between a profitable and unprofitable $28.8 million investment. This is highly unlikely given the size of the required investment.

The FCC has better ways of increasing BB deployment in currently un-served areas—proven, effective public policies that work. The Universal Service Fund (USF) successfully extended and supports phone service throughout the U.S., including to the most remote and expensive service areas. The FCC originally designed and implemented the USF for the dominant technology at the time, landline phone service. The FCC proposes modifying and updating the USF to address barriers to BB penetration. The Connect America Fund (CAF) would modify the USF to include one-time and reoccurring subsidies that extend BB infrastructure and services to un-served areas. The Mobility Fund (MF) would provide one-time subsidies to extend wireless infrastructure.

Obvious parallels exist between the USF that subsidizes phone services in uneconomical markets and supplying BB and wireless services to many of these same communities. The point is not that the programs are perfect.[24] It is that from an economic standpoint these programs could be effective in encouraging BB deployment and adoption if properly adjusted and combined.[25]

B. Do ROW Fees Affect BB Adoption?

The literature on BB adoption identifies cost of service as one of the many factors that can influence adoption. The relationship between cost and adoption, however, is complex because of the many factors included in the cost of using or accessing BB service. Our own research, and results reported in the literature, indicates that to have more than a negligible impact on BB adoption, the total cost of BB services would have to drop by an amount much larger than could be achieved by limiting or abolishing ROW fees. A related point is that, to the extent that consumers purchase BB based on advertised monthly prices, which do not include taxes and fees, reducing ROW fees will have no impact on purchase decisions (unless the reduction in fees reduces the list price). For these and other reasons described below, limiting or abolishing ROW fees would likely have no impact, or at most a negligible effec on BB adoption.

A calculation of the difference between what non-adopters say they would be willing to pay for BB services, and the costs of BB services, shows just how far BB costs would have to drop to have any impact on increasing adoption. This drop is significantly more than could be achieved by passing on any ROW-fee saving.

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[23] This assumes that providers pay the entire ROW fee, consumers pay nothing. As we note above, consumers likely pay part—perhaps a large part—of telecom ROW fees.

[24] Rosen 2011.

[25] FCC. 2011. *Fifteenth Report in the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993.* WT Docket No. 10-133.

Research on non-adopters conducted for the FCC indicates that the average monthly cost of BB service is $41. Yet, the most that non-adopters say they would be willing to pay for BB is $25 per month.[26] This $16 per month gap is many times the likely savings that telecoms could realize by not paying ROW fees. Assuming not paying ROW fees reduces the total cost of providing BB services by 5%, the telecom would save $2.05 per customer. Assuming the telecom passes the full amount of that savings on to their customers—which is unlikely for reasons mentioned elsewhere in this report—this still leaves a gap of $13.95 per month.

Our analysis of the statistical relationship between ROW fees and BB adoption found that adoption in states that allow ROW fees does not differ from adoption in states that limit ROW charges. Using a statistical analysis similar to the one we used to examine the relationship between ROW fees and deployment, described in Section III.A. above, we found a tiny negative relationship between ROW fees and adoption (states that limit ROW fees to actual costs have adoption rates that average 0.1 percentage point higher then states that do not limit ROW fees).[27] This relationship, however, was not statistically significant, which as we described above means the data indicate no relationship between state and local ROW fees and BB adoption.

The literature on the factors that influence or hinder BB adoption support our results. Cost of BB services was more of a factor inhibiting BB adoption years ago than it is today. Now, barriers other than cost are more important.[28] Recent research conducted for the FCC on BB use and adoption found that 35 percent of the U.S. population do not use BB at home.[29] The main reasons given for not adopting are as follows:

- 15 percent cite monthly bill
- 19 percent cite hardware costs, installation fees, or aversion to required long-term contracts
- 41 percent cite lack of digital literacy or lack of interest in using the Internet

Other researchers found a lack of interest in the internet as a significant barrier to adoption. A recent survey conducted by the Pew Internet & American Life Project found that approximately 21 percent of Americans do not use the Internet at all—at home or elsewhere. Of this population, only 10 percent said they would like to start using the Internet in the future. Thus, 90 percent of current non-users have no interest in using the

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[26] Horrigan 2010.

[27] Our data on adoption rates come from: Section 8.3 of Exploring the Digital Nation: Home Broadband Internet Adoption in the United States, Prepared by Economics and Statistics Administration and National Telecommunications and Information Administration in the U.S. Department of Commerce, November 2010.

[28] Hauge, J. and J. Prieger. 2009. *Demand-Side Programs to Stimulate Adoption of Broadband: What Works?* October 14.

[29] Horrigan, J. 2010. *Broadband Adoption and Use in America OBI Working Paper Series No. 1.* Federal Communications Commission. February.

Internet even if they could. At the moment, this population appears content to remain non-users.[30]

Other cost-related barriers to BB adoption reported in the literature include:[31]

- requiring a deposit for new or low-income customers
- software costs, especially virus-protection programs
- computer maintenance costs
- price increases after introductory offers expire
- bundling of BB with other, unwanted services

Studies of BB adoption by residents of low-income households found that the decision to purchase BB services is a marginal decision. This population considers expenses for rent, food, utilities, and cell phone service necessities and more important than BB services. BB services are dropped or "unadopted" when the purchaser's available resources drop (because of job loss, health care costs and so on) or when prices increase unexpectedly so the service costs more than can be afforded (when introductory rates expire, for example) .[32] For this reason, researchers concluded that BB assistance programs should take the long view.

> "It is important to keep in mind that the [BB] adoption decision is not a one-time act of a customer choosing to purchase broadband Internet access, but rather an ongoing choice to keep using broadband month after month. It is therefore imperative that any support programs designed to make broadband affordable to those of limited means living in areas where the cost to serve is particularly high be both ongoing and sustainable."[33]

According to recent reports, consumers are adopting Internet-capable smartphones at a rate faster than almost any high-tech product in history. Most users who access the Internet exclusively using their smartphone are young minorities from low-income households. This group finds accessing the internet via smartphones a preferred alternative to purchasing more expensive computers and paying monthly DSL or cable bills.[34]

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[30] PEW Internet. 2010. *Home Broadband 2010.* PEW Internet & American Life Project. August 11; Schadelbauer, R. 2011. "All Aboard? Tackling Broadband Adoption," *The Broadband Adoption Summit.* National Telecommunications Cooperative Association. Washington, D.C. April 6. Page 14.

[31] Horrigan 2010; Dailey, D. et al. 2010. *Broadband Adoption in Low-Income Communities.* A Social Science Research Council Report. March; Schadelbauer, R. 2011. *The Broadband Summit, All Aboard? Tackling Broadband Adoption.* National Telecommunications Cooperative Association. April 6.

[32] Dailey et al. 2010.

[33] Schadelbauer 2011, p. 22.

[34] Kang, C. 2011. "As smartphones proliferate, some users are cutting the computer cord," The Washington Post and Bloomberg Business. July 11. http://www.washingtonpost.com/business/economy/a-smartphones-proliferate-some-users-are-cutting-the-computer-cord/2011/07/11/gIQA6ASi9H_story.html

The proceeding discussion described the complex relationship between BB cost and adoption. Of those who do not use BB at home, only 15 percent cite cost of monthly service as the reason. Cost, however, includes many factors that telecoms could not influence even if they paid lower ROW, and other factors (like deposits) that they could influence even without regulation of local fees and charges. Regulating ROW fees would do nothing to address the major barriers to BB adoption of lack of interest and low levels of digital literacy.

Another important reason why passing ROW-fee savings on to customers would likely have no measurable effect on BB adoption is the fact that BB providers do not include tax and fee information when quoting the price of their services. Our review of web sites of major BB providers[35] found that all of the providers list the monthly price of BB service *excluding taxes, fees, installation costs and other charges*. Thus, current non-adopters searching provider web sites would have no way taking ROW charges into account in deciding whether to purchase services. After initial adoption, the literature suggest that factors other than ROW fees—including the expiration of low introductory prices and the subscriber's financial situation—affect "un-adoption."

[35] Quest, www.qwest.com/residental/internet/broadbandlanding/; Verizon, www22.verizon.com/Residential/HighSpeedInternet/Plans/Plans.htm; Time Warner Cable, order.timewarnercable.com/OfferList.aspx ; AT&T, www.att.com/dsl/shop/plansShared.jsp?WT.SRCH=1; Comcast, www.comcast.com/shop/buyflow2/products.cspx?inflow=1.

IV. ROW Fees Charged in One Area Do Not Affect BB Deployment or Adoption in Other Areas

One argument by private BB providers for limiting or abolishing the ROW fees that they pay local jurisdictions is that the providers would use some of the savings to subsidize BB services in currently un-served or under-served higher cost areas. Such voluntary cross subsidization makes no economic sense for profit making firms. The prime directive for all private firms, including telecommunication firms, is generating the greatest returns to shareholders. Taking revenues earned on high-profit services – services provided in urban and suburban areas where they pay ROW fees – and voluntarily investing these revenues in low- or no-profit services cannot be justified from a profit or return-on-investment grounds. This is the financial equivalent of throwing money away.

Private telecommunications firms do have a history of voluntarily cross subsidizing among markets, but only to *increase* profits, not decrease them. For example, a firm operating in both a regulated and unregulated market has an incentive to shift costs from the unregulated to the regulated market. A related example is using the best and most advanced technology in the competitive market with a large user base, and using older, less efficient technology in the regulated, smaller market, for the same profit-maximizing reason.

The analytical assumptions underlying FCC's analysis of the BB availability gap describe the expected, profit-maximizing behavior of a telecommunication firm entering a BB market. The major analytical assumptions include:[36]

- Only profitable business cases will induce investments. Private capital will only fund investments in BB systems that return a profit.
- Investment decisions are made on the incremental value they generate. While firms strive to maximize the return on all their operations, investment decisions are evaluated based on the incremental value they provide.
- Markets currently un-served have their own unique or specific diseconomies of scale that affect the profitability – or lack thereof – of entering these markets. Entering these markets requires careful analysis of market details. A one-size-fits-all subsidy program will not work in these markets.

Previous Sections of this report summarize the mammoth financial challenges of bridging the BB gap for communities currently un-served or under-served. Researchers report that surmounting the barriers that limit BB penetration in these communities – including the costs of supplying these communities with BB services and the socioeconomic constraints of lower income, lower educational attainment and little interest in using BB services – requires more than a simplistic subsidy program. In an analogous study of cross-subsidies for telephone service, one researcher concluded,

[36] FCC 2010, *The Broadband Availability Gap*, p. 1-2.

"Reducing, or increasing, local telephone rates by a few dollars per month will do little to address fundamental problems of inequitable income distribution."

...

"Sector-specific regulators have no expertise at running poverty alleviation schemes and should not be doing so under the guise of setting rates."[37]

We have not seen any information that supports the notion of voluntary cross subsidization by private telecom firms from a profitable to less or unprofitable market, and the consensus economic literature refutes the assumption that a rational firm would ever do so. Firms allocate capital to investments that will generate the highest returns. It makes no business sense for private telecoms to take savings from not paying ROW fees and to use this savings to fund less-profitable operations.

The FCC can look to the experience of local jurisdictions that include build-out requirements as a provision for ROW access for evidence that BB providers are unlikely to voluntarily cross subsidize from profitable to unprofitable markets. Jurisdictions include build-out provisions to ensure that BB providers provide access to *all* neighborhoods in a community as a requirement to connect any. This ensures complete coverage for the community. Without this provision, BB providers would limit services to the most profitable areas.

To the extent that regulating ROW fees increases provider profits, they may return these profits to shareholders, invest in profitable BB markets, invest in other markets, or some combination of these three.[38] It is highly unlikely, however, that they would voluntarily invest in currently un-served or underserved areas because to do so would be unprofitable.

As our analysis described in Section III shows, passing on any ROW-fee savings to potential customers would likely have no measurable impact on BB deployment or adoption. These results also apply when considering the impact of regulating the fees and right-of-way practices in a one market on services in other markets. Even assuming ROW-fee savings were shifted from one market to another, there would be no measurable impact on BB deployment or adoption for the reasons mentioned in the preceding Sections.

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[37] Levin, S. and S. Schmidt. No Date. *Telecommunications After Competition: Challenges, Institutions, Regulation.* Pages22-23.

[38] To argue that any investments would be made with any increased profits from reduced ROW fees, one must also assume that providers would not have found some other way to finance these investments. That is, one must assume that these investments would not have been made but for a change in profits from reduced ROW fees.

V. SETTING REASONABLE, MARKET-BASED ROW FEES

The FCC's NOI asks several questions that suggest economically sound pricing mechanisms are inappropriate for pricing access for ROW use. In particular, the NOI asks:

> *Are "market based" rates for use of public rights of way or publicly-owned wireless facilities sites reasonable?*

In this section we describe fundamental economic concepts regarding using price signals and methods for setting prices that result in economically efficient and reasonable ROW fees, and conclude that "market-based" rates—by which we mean rates that property reflect the value of the asset—are reasonable.

A. Compensation for Use of Public Resources

Allowing state and local governments to charge for use of public ROW and other public property is consistent with the economic principle of using prices to allocate scarce resources. From an economic perspective, a locality's ROW is a scarce resource just as lands—public or private—outside a ROW are scarce. In contrast to "free resources," scarce resources do not "exist in such large quantities that they need not be rationed among those wishing to use them."[39]

Economic scarcity, though, encompasses more than a constraint on physical capacity. A resource can be scarce in an economic sense even if it can accommodate all users at a given moment in an engineering sense. For example, if the use of a resource by one party imposes costs on other parties, then it is scarce in an economic sense. This conclusion holds whether the affected party is a local government, another user of the ROW (a utility, a commuter, a truck driver, or anyone else) or a resident (a home owner whose property is affected by utility facilities in or under the street).

It is because a locality's ROW is scarce that charging for its use makes good economic sense. Economic texts describe a relationship between economic scarcity and economic cost, or opportunity cost:

"Just as scarcity implies the need for choice, so choice implies the existence of cost. ... A decision to have more of one thing requires a decision to have less of something else. It is this fact that makes the first decision costly."[40]

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[39] Samuelson, Paul A. and William D. Nordhaus. 2001. *Economics*, 17th Edition. New York: McGraw-Hill. Page 765. For other authors expressing the same concept, see Hall, Robert E. and Marc Lieberman. 1998. *Microeconomics: Principles and Applications*. Cincinnati, OH: South-Western College Publishing. Page 483; O'Sullivan, Arthur and Steven M. Sheffrin. 2001. *Microeconomics: Principles and Tools*, 2nd Edition. Upper Saddle River, N.J.: Prentice Hall. Page 2: Parkin, Michael. 1998. *Microeconomics*, 4th Edition. Reading, MA: Addison-Wesley. Page 42; Tregarthen, Timothy and Libby Rittenberg. 2000. *Microeconomics*, 2nd Edition. New York: Worth Publishers. Pages 3-4.

[40] Lipsey, R., et al. 1990. *Microeconomics*, 9th Edition. New York: Harper & Row. Page 4. For other authors expressing the same concept, see Nicholson, Walter. 2000. *Intermediate Microeconomics*, 8th Edition. Fort Worth, TX: The Dryden Press. Page 17; O'Sullivan, Arthur and Steven M. Sheffrin. 2001. Cited previously.

"It [opportunity cost] concerns the true economic costs or consequence of making decisions in a world where goods are scarce."[41]

The history of cities throughout the world offers compelling illustrations of economic scarcity, opportunity costs, and efficiency in the development of ROW.[42] Examples of cities in which we have observed such scarcity and opportunity costs first hand include New York, Chicago, San Francisco, Portland (Oregon), Tucson, Huntsville, New Orleans, and Seattle. This nearly universal pattern of municipal management of ROW has not arisen by chance or whim. It reflects real and substantial economic forces that create the so-called "joint-allocation problem," namely, allocating a single, scarce and therefore valuable resource among a number of competing demands.

Occupying space in the above- or below-ground portions of the ROW precludes a local government or others from using that same space now and in the future. That is, the three-dimensional space occupied by a given conduit or wire obviously cannot be occupied by another. Besides the physical space occupied by a conduit or pipe, many cities require minimum setbacks or clearances around utilities placed in the ROW. Also, depending on the specifics of the use, the installation, the maintenance, and the replacement of any given facility in the ROW may create problems for and impose costs on the locality and on other users of the ROW.

As applied to a locality's ROW, today's scarcity and the resulting opportunity costs will persist tomorrow. That is, today's scarcity manifests itself in those many locations in which the use of the ROW for one service inhibits the use of the ROW or other properties for other services by the same or other users. That scarcity and the associated negative spillover effects will persist into the future. Such negative effects may include increased excavation or construction costs, increased costs associated with design and planning, costs associated with loss-of-service attributed to construction accidents or

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Page 24; Parkin, Michael. 1993. *Macroeconomics*, 2nd Edition. Reading, MA; Addison-Wesley, Page 10; Tregarthen, Timothy and Libby Rittenberg. 2000. Cited previously. Page 5

[41] Samuelson, Paul A. and William D. Nordhaus. 1992. *Economics*, 14th Edition. New York: McGraw-Hill. Page 131. For other authors expressing the same concept, see Hall, Robert E. and Marc Lieberman. 1998. Cited previously. Page 18; McConnell, Campbell R. and Stanley L. Brue. 1996. *Economics*, 13th Edition. New York: McGraw-Hill, Inc. Page 26; Parkin, Michael. 1998. Cited previously. Page 42; Tregarthen, Timothy and Libby Rittenberg. 2000. Cited previously. Page 5.

[42] For various historical descriptions of the development of streets and rights of way, see Abbott, Carl. 1983. *Portland: Planning, Politics, and Growth in a Twentieth-Century City*. Lincoln, NE: University of Nebraska Press; Baldwin, Peter C. 1999. *Domesticating the Street: The Reform of Public Space in Hartford, 1850-1930*. Columbus, OH: Ohio State University Press. Pages 201-203, 207-208; Barrett, Paul. 1983. *The Automobile and Urban Transit: The Formation of Public Policy in Chicago, 1900-1930*. Philadelphia, PA: Temple University Press. Pages 13-14, 49-50; Bridenbaugh, Carl. 1938. *Cities in the Wilderness: The First Century of Urban Life in America 1625-1742*. New York: Alfred A Knopf. Pages 153-154, 159, 317; Hood, Clifton. 1993. *722 Miles: The Building of the Subways and How They Transformed New York*. New York: Simon & Schuster. Page 84; Pierce, Bessie Louise. 1937. *A History of Chicago: Volume I*. New York: University of Chicago Press. Pages 96, 336: Pierce, Bessie Louise. 1937. *A History of Chicago: Volume II*. New York: University of Chicago Press. Page 325; Quaife, Milo M. 1923. *Chicago's Highways Old and New: From Indian Trail to Motor Road*. Chicago, IL: D.F. Keller & Co. Pages 53-54, 60: Thwing, Anne Haven. 1920. *The Crooked and Narrow Streets of Boston: 1630-1822*. Boston: New England Historic Genealogical Society. Electronic Version; Whitehill, Walter Muir. 1968. *Boston A Topographical History, 2nd Edition*. Cambridge, MA: The Belknap Press of Harvard University Press. Page 8.

other damage to services in the ROW, increased travel time for vehicular traffic on the ROW, and lost revenues for businesses whose customers are inconvenienced by ROW construction.

Expressed on a cost basis, ROW fees should compensate a local government not only for the opportunity costs of occupying space in the ROW, but also for the other costs the locality incurs related to the ROW. To the extent that a ROW fee does not capture the full range of costs that the locality incurs related to the ROW, the resulting cost will subsidize the ROW user. That is, the user will not pay the full cost of establishing, occupying and managing the ROW. A subsidy to the ROW user also results in uncompensated costs to the locality.

These costs include, at a minimum: the fixed costs of establishing and developing the ROW, the costs over the long term of managing the community-wide ROW, the daily or periodic short-term O&M costs, and related administrative costs. Measuring each of these costs for a given ROW transactions would be complex, time consuming and inefficient. There are other, less expensive ways to determine a fair and reasonable price, and those methods, which we describe in the next section, are commonly used by private entities and by federal, state, and local governments.

Like other real-estate assets within a local government's boundary, a locality's ROW yields value to the users of the ROW. In an economy based on competition, producers and owners of goods and services with economic value typically do not give them away free. In economic markets, prices serve as signals that help society put its resources to efficient use.[43] Not charging for use of the local government's ROW would treat it as if it were a free good with no economic value. "A true 'free good' is one which is not scarce ... Examples of free goods are rare and perhaps becoming rarer still—sunshine in the Sahara Desert provides one example."[44]

Charging fees less than the value granted to the user for ROW access sends the signal that the resource is worth less than its true value. This will lead both to inefficient use of the ROW and to a subsidy to the user.

Allocating the ROW by first-come, first-serve or on some other non-market price makes no economic sense, especially given the external costs imposed on third parties if a ROW is over-consumed by any individual enterprise. The same result follows if one artificially limits a community to charging fees without regard to value. This is easily prevented by charging a ROW fee that reflects the ROW as a valuable asset or resource for which there are important and competing uses. Free and unrestricted–or underpriced—access to a locality's ROW allows a provider to avoid making choices that are important to make. For example, if a provider has a choice of proceeding down Route A and Route B, and

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[43] See, for example, Byrns, Ralph T. and Gerald W. Stone, Jr. 1992. *Economics*, 5th Edition. New York: HarperCollins. Page 71; Nicholson, Walter. 1998. *Microeconomic Theory*, 7th Edition. Fort Worth, TX: Dryden Press. Pages 514-515; Pindyck, Robert S. and Daniel L. Rubinfeld. 2000. *Microeconomics*, 5th Edition. Upper Saddle River, N.J.: Prentice Hall. Page 590; Samuelson, Paul A. and William D. Nordhaus. 2001. Cited previously. Pages 27, 291.

[44] Pearce, David W. (ed). 1997. *The MIT Dictionary of Modern Economics*, 4th Edition. Cambridge: The MIT Press, Page 163.

Route A passes through environmentally sensitive areas, one would want the provider to pay the cost of the environmental review and to pay all mitigation costs. This encourages a rational choice as to whether to proceed down one route or the other. Without proper price signals, providers can be expected to engage in behavior that will shift or increase costs to others and interfere with a balanced and economically use of this valuable and scarce asset.

Charging a fee helps ensure that the ROW will be used efficiently, that is, that the ROW will not be misused or wasted. Furthermore, the closer the fee approximates the relevant market price, the more likely the ROW will be used in an economically efficient manner, a fundamental criterion by which economists evaluate the performance of a market and overall social welfare.

B. Calculating a Reasonable Price for Occupying Space in a Jurisdiction's ROW

Appraisal literature describes a number of methods for calculating the value of ROW access, and setting fair prices for its use. We describe four methods.[45] The central point here is not that these methods are the only methods, or that a price is unreasonable unless it passes muster under one of these four tests. Rather, it is that there are a number of well-recognized ways of efficiently pricing ROW use that do not require significant regulatory intervention or require one to conduct a detailed cost/allocation analysis.

1. Land-based appraisals: Analysts calculate the value of a ROW based on the value of land adjacent to the ROW. This is sometimes referred to as the "across-the-fence" (ATF) method. A variation on the ATF method acknowledges that because a ROW provides a continuous corridor, a ROW has a higher value to users than the disparate, unassembled adjacent parcels. This corridor value can exceed the ATF value by a factor of six or more.

2. The willing-buyer-and-willing-seller method: Analysts seek to replicate market negotiations over the value of the use of the ROW. The seller considers his or her costs, including the value he or she could earn from other uses of the land. The buyer considers the income-generating potential of the ROW and the costs of alternative routes.

3. Income-based methods of valuation: Analysts take as given that a variety of assets contribute to a firm's income or value. A ROW may be one of many income-generating assets from which a firm would expect to earn a reasonable return. The analysts base the market value of the use of the ROW on the return the asset generates for the firm.

4. The comparable-transactions method: Analysts base the value users of ROW attach to the transaction by looking at ales or rental agreements for similar ROW.

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[45] National Oceanic and Atmospheric Administration (NOAA). 2002. *Final Report: Fair Market Value Analysis for A Fiber Optic Cable Permit in National Marine Sanctuaries.* NOAA, National Ocean Service, National Marine Sanctuary Program. August. Pages 7-13.

Information on most ROW transactions between private entities remains confidential. More publicly available information exists on ROW agreements between municipalities and private firms that want access to municipal ROW. The study of comparable transactions is an established practice for valuing ROW.[46] The degree of similarity between the comparable transactions and the ROW at issue helps specify the high and low measures of value.[47] While there are certainly not the same numbers of ROW comparables as for home sales, there are a significant number of comparables.

One of the problems with regulating ROW prices is that the regulation may foreclose innovative approaches to pricing ROW access that benefits both parties. For example, a BB provider who is installing fiber may be willing to trade fiber for access to the ROW in cases where the land owners value use of fiber greater than the revenue earned on the ROW fee, and the costs to the BB provider of the fiber are less than the ROW fee. Similarly, a BB provider may prefer a gross-revenues based fee because the fees by definition become due as the provider generates cash flow. The ability of localities to negotiate and develop different approaches to pricing over time can be important in ensuring that the ROW is efficiently and effectively used.

Regarding the FCC's question, "Are 'market based' rates for use of public rights of way or publicly-owned wireless facilities sites reasonable?", yes they are. Charging such rates does not create a barriers to deployment, but do encourage efficient use of the ROW.

[46] See, for example, Fitzgerald, Shawana. 2005. *Review of Fiber Optic Right of Way Pricing*. Prepared for the City of Portland. August 31. Page 6; NOAA. 2002. Cited previously; U.S. Department of Justice. 2001. *Uniform Appraisal Standards for Federal Land Acquisitions*. http://www.usdoj.gov/enrd/land-ack/yb2001.pdf

[47] Ring. A. 1970. *The Valuation of Real Estate*. Prentice Hall. In, Quan, D. and J. Quigley. 1989. "Inferring an Investment Return Series for Real Estate from Observations on Sales." *Journal of the American Real Estate and Urban Economics Association*, 17(2); and U.S. Department of Justice. 2001. Cited previously.

VI. No Evidence That ROW Fees Reflect Market Power

The FCC seeks information on the likelihood that local jurisdictions will exercise monopoly power and overcharge ROW users. Municipalities have strong incentives not to behave in such a manner.

Municipal entities have different goals, responsibilities, and functions than do corporate entities. Municipalities hold resources—including ROW resources—in trust for its citizens and businesses. For example, municipalities manage ROWs not to maximize profits or fiscal surpluses, but to promote economic development. The locality's interest in promoting economic development for residents and businesses disciplines its pricing of ROW access. To the extent that the electorate feels that elected officials have mismanaged the ROW access or other resources, or placed unreasonable restrictions on the use of private land, it can recall or not reelect these officials.

Moreover, the proposition that a local government would exercise monopoly power and charge supra-competitive rates to access its ROWs—even if it had such monopoly power—is a flawed economic-development strategy. Municipalities compete vigorously with one another to attract and encourage deployment of advanced and reliable utilities, that will in turn, attract and support new industrial, commercial and residential development. This is a strong incentive not to overprice access ROWs.

The fact that BB providers have incurred "sunk cost," as described by the FCC in the NOI, does not give local jurisdictions incentives to behave as a private firm might when it comes time to reauthorize a ROW agreement with the provider. In contract negotiations between two private, for-profit entities, each party has strong incentives to get the best deal they can. This includes using leverage one party may have over the other. The FCC's "sunk cost" argument assumes that because the BB provider incurred expenses installing infrastructure in the ROW, the local jurisdiction can use this as leverage against the provider during reauthorizing discussions. Localities have no such leverage, and the provider is not a helpless victim of sunk costs. In response to a demand for unreasonable ROW fees, a provider can state and publicize its position, that any increase in ROW fees will be passed through to subscribers. If the BB provider had to increase its prices to a level that disadvantaged the community in BB prices as compared to its competing localities, the local officials would disadvantage themselves in attracting businesses and jobs.

For these reasons and others, local jurisdictions have incentives to charge fair and reasonable ROW fees, even assuming that they have substantial market power as compared to providers.

VII. Responses by Local Jurisdictions to Reducing or Abolishing ROW Fees

In Sections III and IV we describe the likely outcomes of public policies that limit or abolish the ROW fees that local jurisdictions currently charge. We do not observe evidence that such an action would likely produce meaningful benefits in the form of increased BB penetration or adoption. Such a policy would, moreover, generate costs. There is, first, the cost of regulation itself. As suggested above, allowing for flexibility in price-setting allows communities and providers to agree on fees that can be easily calculated and enforced, and that can respond to market changes. Second, there is the cost caused if the federal government requires localities to provide access to property at less than market value - that is, if a subsidy is required. These costs—lost revenues to the local government and increased costs associated with responding to the federal regulation—could negatively affect telecom firms and consumers, residents and businesses, and the flow of services provided by jurisdictions.

There are only a few ways a locality can respond to increased costs and reduced revenues.

Jurisdictions could replace the lost revenue through new fees or taxes. Such a response could ultimately harm BB users. For example, if telecoms do not pass the savings from not paying ROW fees on to consumers, the consumers will see no change in their direct BB costs. If, however, the population of payees of the new replacement fee include BB customers, their total costs will increase by an amount in proportion to their portion of the new fee. Thus, BB consumers are worse off under this scenario.

If jurisdictions cannot replace the lost revenue or cover the increased costs through new fees or taxes, then the locality must cut services. For example, based on our experience we know that some jurisdictions use ROW fees to support efficient planning for and management of activities in the ROW. These efforts by the jurisdiction help avoid traffic and pedestrian disruption from construction activities in the ROW, or damaging infrastructure that occupies the ROW. ROW funds also support mapping the ROW that identifies congested areas. Reducing ROW revenues or adding regulatory costs could force jurisdictions to abandon ROW planning and management activities. Results could be business disruptions due to uncoordinated or mismanaged construction in the ROW. The resulting unnecessary or extended traffic delays could affect traffic-related costs for residents and businesses. Accidents in the ROW that interrupt infrastructure services could also negatively affect companies that occupy space in the ROW.

From an economic standpoint, the question is really not whether someone will pay for the rights-of-way, but who will pay: the providers who are using the asset, or the taxpayers. The latter will occur if the FCC takes any action which prevents localities from recovering less than the value of the right-of-way.

Given the prospect of no measurable benefits to BB penetration or adoption from limiting or abolishing ROW fees, but the prospect of harm to BB consumers, residents, businesses, telecom providers and other users of the ROW, it is difficult to find an economic justification for regulating local rights of way charges or practices.

APPENDIX A: VITAE

Bryce Ward, Senior Economist

Years of Experience: 10 years

Firm: ECONorthwest

Education: Ph.D Economics, Harvard University
B.A. Economics and History, University of Oregon

Bryce Ward joined ECONorthwest in 2005. His areas of expertise include econometric analysis and applied microeconomics -- including urban and regional economics, labor economics, public finance, and environmental and natural resource economics. Dr. Ward has applied his expertise to a variety of projects involving litigation support and policy analysis. He has provided oral and written testimony in over a dozen court, legislative, or administrative proceedings.

Right-of-Way

- Provided oral and written testimony regarding economic issues related to municipal right-of-way fees in New Orleans.
- Provided written testimony to the FCC regarding the economic aspects of allowing local governments to charge telecommunications providers for access to government-owned or managed property
- Addressed the economic issues of telecommunications firms' challenge, under the Telecommunications Act of 1996, to the City of Portland's franchise-fee agreements for use of the municipal right-of-way

Anti-Trust/Competition

- Testified regarding the economic aspects of alleged anticompetitive behavior in a market for outpatient diagnostic imaging services
- Analyzed the economic issues of class certification and damage calculations related to alleged antitrust violations in the market for residential lots
- Analyzed the market for MRI services in the Boise and Portland and assessed alleged anticompetitive behavior in this market
- Provided written testimony regarding the presence of competition in a market for private prisons and the likelihood of substantial competitive harm to private prison operators from a Freedom of Information Act (FOIA) request

Real Estate

- For attorneys representing the proposed class of plaintiffs, provided oral and written testimony on the economic aspects and harm, if any, to plaintiffs, from an alleged scheme that inflated the appraised market value of real estate

- For attorneys representing the proposed class of plaintiffs, provided written testimony on the economic aspects and harm, if any, to plaintiffs, from an alleged scheme that inflated mortgage costs without proper disclosure

- Described the impact of a pipeline rupture and related oil spill on residential property values

- Analyzed the effect of Portland's Intertwine (a network of open spaces) on property values in the Portland, OR Metro area using a hedonic regression analysis and data from county assessors' records

- Analyzed the effect of Seattle's Natural Drainage (low impact development) Projects on neighboring property values (4505) using a hedonic regression analysis and data from county assessors' records

- Analysis of the Effect of Regulations on Housing Prices in Greater Boston

- Assisted Harvard Professor Edward L. Glaeser in preparing a report for Harvard's Rappaport Institute for Greater Boston and the Pioneer Public Policy Institute that estimated the effect of local regulations on housing supply and housing prices

- Analysis of Neighborhood Price Dynamics

- Assisted Harvard Professor Edward L. Glaeser on a paper detailing the sources of housing-price cycles at the neighborhood level

Labor

- Organized data and conducted statistical analysis to evaluate claims of discrimination in employer discrimination lawsuits

- Calculated economic damages and testified in wrongful termination lawsuits

- Developed an analytical framework, gathered data, and conducted analyses of current market conditions for workers in comparable jobs and comparable communities as precursor to public-interest arbitrations involving transit districts

- Described the potential impact of the financial crisis, recession, and potential deflation on public interest arbitration

- Testified about the reasons and methods for adjusting wages for changes in the cost of living based on the Consumer Price Index (CPI) and the long-term consequences of not adjusting wages during periods of deflation

- Developed a short-term economic outlook for a regional economy in preparation to labor bargaining

- Analyzed historical wage and benefit growth for sheriff deputies relative to other public and private sector employees in preparation for labor bargaining

- Provided written testimony on the economic effects associated with increasing fees for Columbia River Bar Pilots
- Analyzed firm losses resulting from former employees' breaches of restrictive employment-contract covenants regarding future employment with a competitor
- Analysis of the Long-Term Labor Market and Family Outcomes of Harvard Undergraduates
- Calculated potential economic costs associated with proposed change in Oregon's meal and rest break rule

Environment/Natural Resources

- Described the impact of a change in harvest allocations on the economic health and stability of the commercial Dungeness crab industry in Puget Sound (WA)
- Calculated natural resource damages associated with a Superfund site using a Habitat Equivalency Analysis (HEA)
- Calculated lost profits to an oyster farm from chemical contamination
- Described potential economic damages suffered by municipalities as a result of oil spills
- Evaluated the potential economic effects of the U.S. Department of Agriculture and California Department of Food and Agriculture's proposed eradication of the Light Brown Apple Moth
- Calculated profit disgorgement based on emission violations
- Evaluated a contingent valuation study of a proposed wind farm
- Reviewed and evaluated the economic components of a feasibility study and preferred clean-up remedy for a contaminated site
- Evaluated the U.S. Environmental Protection Agency's draft report on groundwater and soil remediation scenarios for a creosote-contaminated Superfund site
- Assisted in an analysis that compared and contrasted benefits and costs, stemming from the use in California of MTBE-oxygenated gasoline with those stemming from the use of ethanol-oxygenated gasoline to determine if refiners could have used ethanol to meet federal reformulated gasoline mandates instead of MTBE during the 1990s

Personal Injury/Wrongful Death

- Calculated economic damages in wrongful death lawsuits
- Calculated lost wages and presented expert testimony in personal injury cases

Public Policy

- Evaluated the effects of tax differences between Oregon and Washington on migration patterns in the Portland metro area
- Described the likely impact of a proposed tax increase on state taxable income and economic growth
- Evaluated the effect of enterprise zone tax incentives on economic development using a regression analysis of longitudinal establishment-level data
- Developed a model and analyzed data to estimate gross revenues for video, voice, and data services at the city level for the League of Oregon Cities
- Described the growth in the market for third-party certified forest products and discussed the reasons why firms choose to pursue certification.
- Reviewed and evaluated current research on the impact of increased hospital supply on local health care markets
- Provided data collection services to determine garbage and yard debris can weights and set-out rates for Eugene residents

Education

- Designed and implemented a randomized evaluation that employed longitudinal student and school data to demonstrate the effects of Safe and Civil Schools' positive behavior support programs on elementary schools in the Fresno Unified School District
- Developed a method for using longitudinal student data to calculate and report student achievement growth (aka a school value-added-model (VAM)) as part of a school accountability program in Seattle, Washington
- Evaluated the effectiveness of the South Shore School (a public-private partnership school in Seattle, Washington) using a quasi-experimental regression analysis and longitudinal student data
- Evaluated the effectiveness of ASPIRE (a program to increased college enrollment among Oregon high school students) using a regression analysis and longitudinal student data that matched student K-12 records with college enrollment data
- Developed a district report card system for several Oregon school districts
- Evaluated the effectiveness of Pre-K and K programs in Bremerton, Washington using a regression analysis on longitudinal student data
- Testified before Oregon legislature regarding methods for funding school transportation systems

- Developed regression models to calculate funding levels for student transportation in Washington school districts and developed linear programming tools to evaluate the efficiency of district transportation spending
- Analyzed and presented results of a survey regarding methods for improving efficiency in Oregon schools
- Reviewed literature on motivations for and effects of mergers between institutions of higher education
- Reviewed and evaluated current research on using student test scores to assess school performance for Seattle Public Schools
- Described the Hispanic-White and Black-White achievement gaps in Oregon schools
- Estimated the economic effects of achievement gaps on Oregon's economy
- Reviewed and evaluated current research on the effectiveness of the Safe and Civil Schools program, and worked with clients to develop and implement additional program evaluation

Other

- Testified before the Oregon legislature regarding proposed legislation before the Oregon House that amends ORCP 32 by repealing subsection K and, therefore allowing recovery of UTPA statutory damages (currently $200) in class actions
- Calculated non-economic damages to a father denied access to his child for 17 years
- Calculated reimbursements to families who adopted foster children as part of a class action settlement
- Calculated damages suffered by an auto dealership and service department stemming from the violation of non-solicitation and non-compete clauses in an asset purchase agreement
- Reviewed and conducted analyses in order to determine specialty forest product harvesters are compelled to sell to a shed the brush they picked under the permit that shed issued them
- Analyzed the impacts of Measure 37 (property rights limitation) on the State of Oregon
- Provided testimony on the consequences to the healthcare markets in Portland of allowing a new hospital
- Estimated share of LCD TVs, LCD computer monitors, and notebook computer monitors were purchased by Oregon consumers and state and local governments as part of a price fixing lawsuit

Publications

"The Causes and Consequences of Land Use Regulation: Evidence from Greater Boston" *Journal of Urban Economics* 65(3): 265-278 Glaeser, E., and B Ward.

"The Effect of Low Impact Development on Property Values" *Proceedings of the Water Environment Federation, Sustainability 2008* , pp. 318-323 Ward, B., E. MacMullan, and S. Reich.

"Myths and Realities of American Political Geography." *Journal of Economic Perspectives.* Glaeser, E., and B. Ward. Spring 2006.

Regulation and the Rise of Housing Prices in Greater Boston. Glaeser, E., J. Schuetz, and B. Ward. Cambridge, MA: Rappaport Institute for Greater Boston, Harvard University, and Pioneer Institute for Public Policy Research. 2006.

"Distance and Social Capital: Can Isolation Be Good?," in *Social Interactions and Economics*, Ph.D Dissertation, Harvard University, March 2006.

"Does Reunion Attendance Affect Alumni Contributions?: Evidence from the Harvard College Classes of 1990-1999," in *Social Interactions and Economics*, Ph.D Dissertation, Harvard University, March 2006.

"Economic Bridges Falling Down." *Eugene Weekly.* Ward, B. and E. Whitelaw. October 8, 2008.

"The Economy: Now What? The Economists: Ward and Whitelaw" *Oregonian*, Ward B. and E. Whitelaw. September 20, 2008.

"Dream On." *Oregon Quarterly.* Ward, B. and E. Whitelaw. Winter 2007.

"Still the Land of Opportunity?" *Oregonian.* Tapogna, T., B. Ward, and E. Whitelaw. March 2006.

"The Price Is (Not) Right." Commonwealth: Growth and Development Extra. Glaeser, E., J. Schuetz, and B. Ward. January 2006.

Recent Speeches and Presentations

"Benefits and Costs of Seismic Mitigation" CREW Benefit-Cost Analysis Forum, January 2011.

"Does Low-Impact Development Affect Property Values?: Evidence from Seattle's Natural Drainage System Projects." Water Environment Foundation Sustainability 2008 Conference., June 2008.

"Compensation for ROW Access Under the Telecommunications Act of 1996: Fiscal Issues Related to Communications Services." NATOA 27th Annual Conference. Sponsored by the National Association of Telecommunications Officers and Advisors. Portland, Oregon. October 2007.

"Outside the Light: The real factors driving Eugene/Springfield's Economy." Eugene-Springfield Leadership Program. Sponsored by the Eugene Area Chamber of Commerce. Eugene, Oregon. October 2006.

"Deregulating the Housing Market." Preserving the American Dream Conference. Sponsored by the American Dream Coalition. Atlanta, Georgia. September 2006.

Teaching

Visiting Adjunct Instructor, Portland State University; Courses: Global Environmental Economics, Spring 2010.

Visiting Assistant Professor, Lewis and Clark College; Courses: Intermediate Microeconomic Theory, Econometrics, Public Economics, Environmental and Natural Resource Economics, Spring 2008 & Fall 2009.

Visiting Adjunct Instructor, University of Oregon; Courses: Labor Economics, Spring 2009.

Tutorial Leader, Harvard College; Courses: Everybody's Doin' It: Social Interactions and Economics, 2002-2006, Senior Thesis Tutorial: Labor, 2004-05.

Teaching Fellow, Harvard University; Courses: Intermediate Microeconomic Theory, Intermediate Macroeconomic Theory, Microeconomics: A Policy Tool for Educators, 2001-2003.

Teaching Assistant, University of Oregon; Courses: Principals of Microeconomics, Urban Economics, Economy of the Pacific Northwest, 1998-1999.

Edward MacMullan, Senior Economist

Years of Experience: 22 years

Firm: ECONorthwest

Education: M.S. Agricultural Economics and International Agricultural Development, University of California at Davis
B.S. Soil Science, Oregon State University

Edward MacMullan has been a senior economist with ECONorthwest since 1990. His areas of experience include assessing the economic effects of public policies, especially those that affect natural-resource management, and economic aspects of antitrust, intellectual property, right-of-way, telecommunication and healthcare topics. Before joining ECONorthwest he studied as a Fulbright Scholar at the Energy Studies Unit of the University of Strathclyde where he assessed the socioeconomic impacts of energy development projects in the highlands and islands of Scotland.

Right-of-Way Studies

- Conducted a valuation of a right-of-way occupied by a discharge pipeline from the Georgia Pacific facility in Toledo for the City of Newport.
- Submitted an affidavit in support of the fee that the City charges to access the municipal right-of-way.
- Analyzed the economic issues of telecommunications firms' challenge, under the Telecommunications Act of 1996, regarding Portland's franchise-fee agreements for right-of-way use, City of Portland.
- Evaluated the fees that a city in California charged a telecommunications company to access the city-owned right-of-way, private client.
- Reviewed economic issues specific to the Telecommunications Act of 1996 regarding the fees charged to telecommunications firms for right-of-way, City of Huntsville, Alabama.
- Evaluated right-of-way fees that were challenged by a telecommunications company under the Telecommunications Act of 1996, City of Tucson, Arizona.
- Provided economic analysis regarding the economic value of municipal rights-of-way and use of the rights-of-way by a telecommunications company, City of Portland, Oregon.
- Analyzed the economic damages from trespass outside a right-of-way in a New Mexico Pueblo during the construction of a petroleum production pipeline, Kelly, Haglund, Garnsey & Kahn.

Antitrust Economics

- Assessed potential anti-trust behavior in the market for acute care and tertiary medical services.
- Assessed economic aspects of alleged patent infringement of computer toolbar technology.

- For the plaintiffs, assessed economic damages to patent holders of alleged patent infringement in the power equipment market.
- Addressed the economic issues of class certification and damage calculations related to alleged antitrust violations in the market for residential lots.
- Studied the market for MRI services in the Boise area and assessed alleged anticompetitive behavior in this market.
- Analyzed claims of misappropriation of trade secrets, intentional interference with economic relations, and breach of contract, Schwabe, Williamson & Wyatt.
- Analyzed the market for diagnostic-imaging services in the Portland metropolitan area, Haglund, Kirtley, Kelley & Horngren.
- Calculated the economic impacts of alleged price fixing in the market for agricultural commodities, Tonkon, Torp, Galen, Marmaduke & Booth.
- Provided economic consultation in preparation for litigation regarding workers' compensation insurance, private client.
- Assessed the economic consequences of price discrimination and other antitrust behavior in the wholesale market for petroleum products in Cordova, Alaska, Condon Shoup.

Microeconomic Analysis

- For attorneys representing plaintiffs in a class action lawsuit, performed an analysis of the economic aspects of alleged violations by mortgage brokers of consumer truth-in-lending practices.
- For attorneys representing plaintiffs in a class action lawsuit, assessed the economic aspects of alleged inflated home appraisals.
- Determined the appropriate sample size required to confirm key characteristics about a phone pole population.
- Conducted an economic evaluation of a property at issue in a claim against a state.
- Provided economic analysis regarding litigation over a city's method of collecting user fees for stormwater services.
- Evaluated the financial feasibility of a proposed destination resort in Central Oregon on the Gould and Cline Buttes.
- Calculated the plaintiff's lost profits and reasonable royalty in a patent infringement case, Schwabe, Williamson & Wyatt.
- Studied the factors that determine the market price for grass seed grown in Oregon, private client.
- Determined a royalty rate as compensation for economic damages in a breach of contract lawsuit, Schwabe, Williamson & Wyatt.
- Provided economic analysis of a patent infringement claim regarding suspension systems for bicycles, Schwabe, Williamson & Wyatt.
- Analyzed the national market for cookware items and the financial performance of firms that participate in the market, Schwabe, Williamson & Wyatt.

- Evaluated the market for professional manuals used by attorneys and legal assistants in Oregon, private client.
- Calculated the economic impacts associated with a proposed petroleum-products pipeline across Texas, George & Donaldson.
- Assessed the economic effects associated with a proposed petroleum-products pipeline in Washington state, Schwabe, Williamson & Wyatt.
- Determined the economic consequences of a breach of contract associated with a computer software program, Moore & Orr.
- Calculated uncompensated expenses and lost profits associated with a contract dispute between a manufacturer of video lottery terminals and the Oregon State Lottery, Davis Wright Tremaine.
- Analyzed lost profits from various patent infringement cases, Kolisch, Hartwell, Dickinson, McCormack, & Heuser.

Economic and Socioeconomic Impact Analysis

- Reviewed the market for workers' compensation insurance in Oregon.
- Assessed the financial implications of switching from franchise fees to a gross-revenue tax on telecom services provided in the municipalities.
- Conducted an economic benefit-cost comparison of a conventional roof and a greenroof on a commercial building, for the City of Portland.
- Assessed the impacts of greenstreets in the Puget Sound on property values for adjacent properties.
- Analyzed the operations and financial performance of a timber company's cogeneration facilities and determined the profits earned by the company as a result of unfair competition stemming from violations of air-quality regulations.
- Described the economic aspects of zoning incentives to protect natural resources, City of Corvallis, Oregon.
- Conducted a market analysis for industrial products in regional and world markets, private client.
- Evaluated the socioeconomic impacts of hospitals on rural economies, Mercy Medical Center.
- Conducted a cost-benefit analysis of energy efficiency and renewable energy resources, Alaska Coalition.
- Calculated the economic impacts of restricting snowmobiles from several national parks, The Wilderness Society.
- Analyzed the potential economic impacts of designating a national monument on land currently managed by the Siskiyou National Forest and Bureau of Land Management, Siskiyou Educational Project.
- Reviewed an economic impact assessment of a submarine cable and terminus at San Luis Obispo, California, North State Resources.

- Assessed the socioeconomic impacts of the proposed Pelican Butte ski area, Winema National Forest.
- Evaluated the economic consequences of new restrictions on Alaska's fishing industry, Earth Justice.
- Analyzed the Interior Columbia River Basin Ecosystem Management Project to ensure it internalized the externalities of resource-extraction industries on federal lands in eastern Washington, eastern Oregon, and Idaho, W. Alton Jones Foundation.

Economics of Health Care

- Evaluated how the approval of a hospital's Certificate-of-Need application would influence market concentration, Thorp Purdy Jewett Urness & Wilkinson.
- Studied economic aspects of defining a hospital's service area as it applied to Oregon's Certificate-of-Need requirement for new or relocated hospitals, Thorp Purdy Jewett Urness & Wilkinson.
- Identified the relevant markets for hospital services and evaluated the extent to which hospitals exercised market power over insurance firms and competing hospitals, Schwabe, Williamson & Wyatt.
- Studied the market for home intravenous care in preparation for a possible antitrust lawsuit, Watkinson Laird Rubenstein Lashway & Baldwin.
- Provided economic consultation on the market for healthcare services in Southern Oregon, Schwabe, Williamson & Wyatt.
- Evaluated damage claims, researched prices for hospital services, and provided advice on the distinction between fixed and variable costs, Schwabe, Williamson & Wyatt.
- Calculated lifetime medical expenses and lost wages as part of various personal injury and wrongful death lawsuits, private clients.
- Assessed the economic impacts of a breach of contract associated with a medical diagnostic technique, Stoel Rives.
- Quantified the net present value of lifetime medical services associated with a medical malpractice suit, private client.
- Evaluated the growth and discount rates of life care plans, Calkins & Calkins.

Public Policy and Government Regulations

- Calculated the economic damages to a seafood-related business as a result of a license dispute with the State of Washington, private client.
- Studied the economic performance of the ski industry in the Lake Tahoe area, the market conditions that affect this sector of the region's economy, and the economic factors associated with avoiding and complying with regional water quality regulations and county permitting processes, California Attorney General's Office.
- Provided economic analysis regarding a contract dispute between the City of Eugene, Oregon and a tenant leasing city-owned property, Harrang Long.

- Calculated tobacco company profits associated with the consumption of cigarettes by under-age smokers, Attorneys General of Washington, Arizona, and Connecticut.

Labor and Welfare Economics

- Calculated the economic loss resulting from the employment termination of a 56-year-old male, private client.
- Quantified the economic loss to a regional bank associated with breach of contract by former employees, Arnold Gallagher Saydack Percell.
- Provided economic analysis for wage arbitration with municipal employees, City of Coos Bay, Oregon.

Analysis of Economic Damages to Natural Resources

- Assessed a construction company's ability to pay civil penalties associated with alleged violations of air-quality regulations.
- Described the economic value of water resources in California.
- Assessed the economic impacts on an oyster grower of the oil spilled from the grounding of the New Carissa, Davis Wright Tremaine.
- Conducted an economic analysis of the damages stemming from the Wheeler Point fire in central Oregon, Kafoury & McDougal.
- Calculated the economic impacts of the Exxon Valdez oil spill on Alaskan salmon fishermen, municipal governments, area businesses, and cannery workers, Stoll, Stoll, Berne, Lokting, Shlachter.
- Evaluated damage claims by area businesses and property owners affected by a pesticide spill in the Sacramento River, Lieff, Cabraser & Heimann.
- Assessed the economic consequences of a chemical spill on the municipality of Superior, Wisconsin, private client.
- Determined the economic impacts on area businesses of an oil spill off Huntington Beach, California, Law Offices of Gretchen Nelson.
- Evaluated the demand for recreational fishing in the Flathead Lake area of Montana, Montana Attorney General's Office.

Water Resources

- Developed an economic model to determine the economic benefits of riparian-restoration projects for Clean Water Services.
- Co-instructed a seminar at Portland State, "USP 505 Evaluating Low Impact Development (LID)," that focuses in part on the economic costs and benefits of managing stormwater by LID and conventional controls.
- Calculated the value of ecosystem services that could be degraded by stormwater runoff from expanded urban and commercial developments in the East Butte area of Portland for the City of Portland.

- Assisted the City of Portland staff in developing an approach to study the económic benefits and costs of alternative stormwater-management techniques in support of the City's Watershed Plan.
- Conducted a review of the literature on the economics of Low Impact Development for Waterkeeper Alliance.
- Analyzed the range of economic costs and benefits of projects and policy options affecting water quality and quantity in a Portland, Oregon watershed that drains to the Willamette River, City of Portland.
- Described the economic tradeoffs of allowing, limiting, or prohibiting development in significant riparian areas and wildlife habitat in the Portland metropolitan area, Metro.
- Developed a handbook on the economic factors associated with relicensing a hydroelectric dam, Hydropower Reform Coalition.
- Developed an economic model to determine the net economic benefits of riparian-restoration projects in Oregon, Clean Water Services.
- Reviewed the U.S. Army Corps of Engineers' Final Environmental Impact Statement on deepening the shipping channel in the Columbia and Willamette Rivers, private client.
- Studied the economic issues associated with water management services and the economic implications associated with the federal Endangered Species Act and Clean Water Act, Clean Water Services.
- Evaluated the economic impacts of bypassing four federal dams on the Lower Snake River and developed a plan to mitigate the negative consequences of the bypass, Trout Unlimited and Earthjustice.
- Determined the direct and indirect economic impacts of economic development projects in the Columbia River Gorge funded by the National Scenic Area Act, Columbia River Gorge Commission.
- Evaluated the potential impacts of a proposed gold mine in Montana's Blackfoot River watershed on employment and quality of life, Blackfoot Legacy.
- Assessed the economic consequences of modifying hydroelectric dams to protect and enhance riparian habitat, private client.
- Prepared a response to the Draft Environmental Impact Statement for the Columbia River System Operation Review, Confederated Tribes of the Umatilla Indian Reservation.
- Assessed the economic consequences of alternative strategies for managing the Columbia River and its tributaries, Northwest Water Law and Policy Project.

Endangered Fish and Wildlife

- Described the economic effects of designating critical habitat for two endangered species of fish in the Klamath Basin of Oregon and California, U.S. Fish and Wildlife Service.
- Critiqued a draft report on the potential economic consequences of designating critical habitat for the Steller's and spectacled eiders, private client.
- Evaluated the potential economic impacts of restricting Alaska's groundfishery in critical habitat for the endangered Steller sea lion, private client.

- Analyzed the economic consequences of designating critical habitat in California, Oregon, and Washington for the marbled murrelet, U.S. Fish and Wildlife Service.
- Assessed the economic effects of an injunction to protect salmon habitat on the Wallowa-Whitman and Umatilla National Forests, private client.

Forest Resources

- Prepared a critique of the U.S. Forest Service's estimated demand for timber from the Tongass National Forest, Alaska Rainforest Campaign.
- Analyzed the economic consequences on southeast Alaska's economy of reduced timber harvest in the Tongass National Forest, Sierra Club Legal Defense Fund and the Alaska Rainforest Campaign.
- Studied the relationships between forested ecosystems and regional economies in Oregon, Alaska, North Carolina, New Hampshire, New Mexico, and Wisconsin, National Science Foundation.
- Evaluated the opportunities and threats facing timber-dependent communities affected by logging restrictions on federal land in Washington state, Washington Community Development Department.

Recent Presentations

- "Low-Impact Development Economics." October 22, 2008. NEMO University-6.
- "The Economics of Low-Impact Development." NY/NJ Baykeeper 2008 Low Impact Development Conference. January 23, 2008. New York City, New York.
- "Assessing Low-Impact Development Using a Benefit-Cost Approach." California Stormwater Quality Association (CASQA) 3rd Annual Stormwater Conference. September 11, 2007. Costa Mesa, California.
- "Valuing Ecosystem Services in Portland, Oregon: A Case Study." Emerging Issues Along Urban/Rural Interfaces II Conference. April 9-12, 2007. Atlanta, Georgia.
- "Assessing Low Impact Developments Using a Benefit-Cost Approach." 2nd National Low Impact Development Conference. March 12-14, 2007. Wilmington, North Carolina.

Publications

"Low-Impact Stormwater Controls Can Increase the Bottom Line." *Home Building News.* August 2008.

The Economics of Low-Impact Development: A Literature Review. Waterkeeper Alliance. With S. Reich. November 2007.

"Cities Challenged in Their Economic Interpretation of the Telecommunications Act of 1996." *Municipal Lawyer.* With E. Whitelaw and A. Pearce. September/October 2006.

"A Framework for Estimating the Costs and Benefits of Dam Removal." *BioScience* 52 (8). With E. Whitelaw. August 2002.

The Economic Benefits of Renewable Energy and Cost-Effective Energy Efficiency. Alaska Coalition. With E. Niemi and A. Fifield. September 2001.

An Economic Strategy for the Lower Snake River. Trout Unlimited. With E. Whitelaw. November 1999.

The Potential Economic Consequences of Designating Critical Habitat for the Marbled Murrelet: Final Report. U.S. Fish and Wildlife Service, Portland Field Office. With E. Niemi, E. Whitelaw, and D. Taylor. 1996.

The Potential Economic Consequences of Critical Habitat Designation for the Lost River Sucker and the Shortnose Sucker: Final Report. U.S. Fish and Wildlife Service, Portland Field Office. With E. Niemi and E. Whitelaw. August 1995.

Economic Consequences of Management Strategies for the Columbia and Snake Rivers. Confederated Tribes of the Umatilla Indian Reservation. With E. Niemi and E. Whitelaw. July 1995.

Economic Consequences of an Injunction to Protect Salmon Habitat on the Wallowa-Whitman and Umatilla National Forests: Preliminary Report. With E. Niemi and E. Whitelaw. 1995.

The Columbia River and the Economy of the Pacific Northwest. With E. Niemi, E. Whitelaw, and A. Gorr. May 1995.

The Potential Economic Consequences of a Reduction in Timber Supply from the Tongass National Forest. With E. Whitelaw. December 1994.