Review of the September 2000 Draft of "Fair Market Value Analysis for a Fiber Optic Cable Permit in National Marine Sanctuaries"

Richard Schmalensee
Dean of the MIT Sloan School of Business

November 30, 2000

Using an income allocation approach, this draft recommends that 25-year cable permits in certain national marine sanctuaries (those where appreciable environmental damage has been found to be unlikely) should be sold for $120,000 per mile of right of way. I have no expertise on the legal issues raised by the relevant statutes and, accordingly, I have no opinions on the discussions of those issues. I will instead (1) explain why the "Willing Buyer – Willing Seller" (WBWS) approach should be the conceptual starting point for discussion, (2) explore some of the theoretical implications of that approach, and (3) evaluate the recommendation of this draft in light of that discussion.

I conclude that (1) it is reasonable to apply a constant per-mile price across at least broad classes of permit transactions, (2) while not unreasonable, the income allocation (or income-stream) approach rests on assumptions that may not hold in the future and it is thus less attractive for long-term use than a direct analysis of contemporary transactions data, though it can be a useful supplement to such an analysis, (3) analysis of the permit price data in the draft report suggests that the report's $120,000 per mile recommendation is more likely to be too low than too high, and (4) it is vital that whatever rule or regulation contains such a price also contain a provision providing for frequent (perhaps annual) and relatively automatic updating of that price. The data in the report make it clear that market prices have changed substantially in the past, and similar changes may occur in the future. If the government's permit price does not follow suit, most or all of the benefit from moving to fair market value pricing could easily be lost.

1. Why WBWS?

Since telecommunications traffic can typically travel from any origin to any destination along any of a large number of paths, no cable project is in any useful sense essential. (For example, even if it is essential that Guam be able to communicate with San Diego, there is nothing essential about a fiber optic cable between Guam and San Diego.) The rationale for allowing any cable projects at all in some national marine sanctuaries is that some such projects might on balance, taking into account all relevant costs and risks, be socially preferable to alternatives not making use of those sanctuaries. In making decisions between alternative cable projects (and, indeed, other telecommunications projects not involving cable), investors compare their costs.

The costs of telecommunications projects *not* involving national marine sanctuaries will be based on prices, including prices for rights-of-way, determined by willing buyers and willing sellers. This prices (normally, at least) reflect all relevant costs and risks. If the costs of projects that do involve sanctuaries are based on permit prices on average below WBWS prices, investors lucky enough to get permits will build too many projects in national marine sanctuaries and realize windfall benefits. If, alternatively, costs of rights-of-way in these

sanctuaries are on average above WBWS prices, too few projects will be built in national marine sanctuaries, and society's telecommunications costs will be inefficiently high.

Market prices for fiber optic rights-of-way have risen dramatically in recent years (p. 14); nothing rules out similar rises or falls in the future. If the prices charged for rights-of-way involving national marine sanctuaries do not tract future changes in market prices, the problems described above will occur – perhaps in dramatic fashion. Today's correct price, if frozen, will with certainty be wrong tomorrow. Thus *it is vital that whatever rule or regulation sets a per-mile price (or prices) for fiber optic cable permits in national marine sanctuaries also provide for frequent (perhaps annual) and relatively automatic updating of that price (or those prices).*

Note that the case for WBWS permit prices is not weakened even if such prices yield "unconscionably high" or "unreasonably low" returns to one party or the other. Only in long-run equilibrium are reasonable, competitive returns guaranteed to both buyers and sellers, and the market for fiber-optic rights-of-way has apparently been out of long-run equilibrium for some time (p. 13).

2. Theoretical Implications

As is often the case in economics, a simple abstract example helps to clarify thinking. Let us consider a proposed fiber optic cable project that is expected to yield its investors an economic profit of Π before payment for right-of-way, and let P be the price charged by the government for the right-of-way in question. Thus if the government issues a lease at P, the investors earn $\Pi - P$. Let $\Pi - A$ be the investors' return if a permit is not issued. Thus A is the increase in project cost (including incremental build-around and right-of-way costs) if the government does not issue a permit. If no comparable project is feasible without a permit, this implies $A = \Pi$. In any case, A measures the maximum amount that the buyer would be willing to pay for a lease. I abstract from issues of timing for simplicity; all these quantities should be thought of as initial payments or present values.

To think about what the WBWS price might be in this example, suppose the government is "a rational seller, willing but not obliged to sell," taking fully into account the possible environmental consequences of issuing a permit. (I will assume throughout that in most cases, issuing a permit to one cable project in a sanctuary does not foreclose issuing additional permits. And I will neglect direct costs of issuing and administering permits; they should just be added dollar for dollar to permit prices.) While it is not contemplated that permits will be issued in areas in which risks are clear and substantial, such a seller would attach some (necessarily subjective) value to the incremental environmental risk or amenity loss of any particular project.[1] Let that value be C for the project under consideration.

Suppose now that this "rational seller, willing but not obliged to sell" were across the table from the firm hoping to build the project – "a rational buyer, willing but not obliged to buy" a right-of-way permit. On what value of P would they agree? There is no universally accepted model of bargaining in situations like this one, but the Nash cooperative model is one of the most plausible and appealing, and other models yield the same answer in this particular

[1] Because I do not believe that people generally have well-informed, fixed preferences for commodities like preserving marine sanctuary X from cable project Y, I doubt that the value of E for any particular project can reliably be made objective by asking a sample of people how much they would be willing to pay for such a commodity and extrapolating to a larger population.

case. If no bargain is struck, the government gets zero, and the firm gets ($\Pi - A$). If a bargain is struck at price P, the government gets ($P - C$), and the firm gets (Π – P). The Nash model predicts that P will be chosen to maximize the product of the parties' gains: $[(P - C) - (0)][(\Pi - P) - (\Pi - A)] = [P - C][A - P]$.

This quantity is maximized by

$$\boldsymbol{P^* = (A+C)/2},$$

which gives equal weight to the seller's (subjective) costs and the buyer's gain (which is determined by the profitability of alternative projects). With a price of P^*, the seller's and buyer's gains from reaching agreement are equal.

One interesting polar case involves $\Pi = A$ (no good alternative projects) and $C = 0$ (negligible environmental cost or risk). In this case, $P^* = \Pi/2$ – the permit price equals one half the gross (of right-of-way costs) economic profit.

3. Measurement/Estimation Implications

In general, there is no reason to expect C and A to be the same across projects. And, unfortunately, the draft report is clearly correct when it argues, in effect, that it is simply too difficult to estimate these quantities on a project-by-project basis. Thus I agree that the WBWS approach cannot be directly applied to determine project-specific fair market values and that, accordingly, *it is reasonable to apply a constant per-mile price across at least broad classes of permit transactions*. But one can use the abstract analysis of the WBWS approach presented above to shed some light on how data on other transactions can be used to obtain workable approximations to at least WBWS averages, approximations that might be applied to all or classes of submarine leases. I discuss the income allocation approach at the end of the section.

The draft report indicates (p. 16) that at present, market prices for perpetual leases are generally between $90,000 and $120,000 per mile. These seem to be mainly prices for overland leases on private lands (with one very interesting exception) and can thus be thought of as approximating WBWS prices. Suppose that we are in fact observing lease-specific values of P^*. If we can say something about how C and A differ on average between the leases we observe and potential leases through national marine sanctuaries, we can say something about how WBWS prices on the latter might relate on average to the report's $90,000 – $120,000 range.

The report has very little to say about seller's cost, C, for overland fiber optic cable leases. This at least suggests that this cost is not an important determinant of observed prices, except, perhaps in what seem to be unusual cases in which leasing to one buyer precludes later leasing to another, and what matters in these cases is mainly opportunity cost, not out-of-pocket cost. Except in these cases, it might thus be reasonable to assume that C is close to zero so that, from the formula above, we should think of observed market prices as centered on $A/2$ – half the buyer's willingness to pay. The report suggests, at least, that the objective component of C is generally small for the submarine leases contemplated here. But there are clearly some unknown risks, and, some would argue, substantial "non-market amenity" cost associated with just knowing that a portion of a sanctuary is no longer pristene. In any case my reading of the report indicates that C is at least as large for the submarine leases contemplated here as for the

overland leases for which we observe WBWS prices, for which $C = 0$ may be a good approximation.

As discussed on page 16 in the draft, because sanctuaries are large, one would expect A to be on average high for the leases contemplated here relative to on-shore projects where there are more likely to be alternative routes with reasonable cost. It is interesting that San Francisco officials managed to charge $350,000 per mile, more than double the high end of the range stated on page 16, for a right-of-way across the Golden Gate bridge – where attractive alternative routes are clearly scarce. Without evidence of non-trivial environmental or other costs, this suggests a willingness to pay (A) in the vicinity of $700,000 per mile. Similarly, the only submarine data (p. 21), which seem to reflect a situation in which alternatives are scarce, implies a price for a perpetual lease of about $280,000 per mile. Even if C is, say, $40,000 per mile, the formula for P^* indicates A was around $520,000 per mile. By contrast, the $90,000 -- $120,000 range for onshore leases, even with $C = 0$, corresponds to values of A between $180,000 and $240,000.

To summarize, it seems likely that C is somewhat higher on average for leases through national marine sanctuaries than for typical onshore leases, though it is probably small in most cases, while A may be substantially higher than in leases involving sanctuaries than for on-shore leases. All this suggests that *$120,000 per mile for a perpetual lease, the draft report's recommendation, is more likely to be below than above the average WBWS for a fiber optic cable permit in a national marine sanctuary.* Unfortunately, I do not believe I have enough information to suggest a better single number.

Finally, I must say a few words about the report's favored approach: income allocation or income-stream. As applied here, this approach seems to rest on careful modeling of particular ventures, with 50% of network income then assumed to be required for rights-of-way. The main rationale for this number is that it has been useful in negotiations and seems consistent with some actual transactions. (There is an apparent relation to the polar case discussed at the end of Section 2: $\Pi = A$ (no good alternative projects) and $C = 0$ (negligible environmental cost or risk), which imply $P^* = \Pi/2$. But Π here is economic profit, while the income allocation approach seems to involve accounting profit.) This is not an unreasonable approach, and it is comforting that its results (p. 18) seem broadly consistent with the implications of onshore permit prices. But there is no guarantee that the models used in this analysis or the 50% figure on which the final results rest will remain valid in the future if and as market conditions change. Thus, *while not unreasonable, the income allocation (or income-stream) approach rests on assumptions that may not hold in the future, and it is thus less attractive for long-term use than a direct analysis of contemporary transactions data, though, as here, it can be a useful supplement to such an analysis.*

KMI Corporation

Review and Comments:

"Fair Market Value Analysis for a Fiber Optic Cable Permit in National Marine Sanctuaries"

KMI was contracted by the National Marine Sanctuaries Program (NMSP) to review its report on the "fair market value" of a permit to place fiber-optic cables in marine sanctuaries. KMI's comments are limited to an evaluation of the soundness of the economic and business analysis and the accuracy of the information presented. KMI's comments do not address the appropriateness of either installing fiber optic cables in marine sanctuaries or charging a fair market value fee.

KMI has conducted extensive research on all aspects of the fiber-optics market and is a leading consultant in the telecommunications industry. KMI has evaluated the right of way (ROW) market on several occasions and does on-going research on undersea cables and the transoceanic fiber optic market. The following comments are based on KMI's experience and in-house data.

The information and analysis presented in the NMSP report is thorough and accurate. The method of establishing a ROW value using historical data on previous transactions is standard practice in the industry. While KMI was not familiar with all of the ROW examples cited in the report, the resulting ROW costs were similar to those KMI has researched.

The practice of allocating a portion of cable revenue to a ROW owner is less common and entails significant uncertainties. Combined with an assessment of previous transactions, some sort of income analysis is reasonable. KMI has furnished its own analysis of cable income based on in-house data, an analysis that NMSP may wish to incorporate into its report.

It is noted that NOAA considered both long-haul and metropolitan ROWs in its analysis of previous transactions. The metropolitan ROWs are generally more expensive than long-haul ROWs. Permit applicants may argue that cables to be installed in marine sanctuaries are either international or domestic long-haul cables and should not be valued based on higher-priced metropolitan routes. KMI agrees with NMSP that inclusion of metropolitan routes may be justified based on certain considerations, but the NMSP report could provide a broader discussion of the issue. For example, the sanctuaries require, in general, less than 100 miles of ROW to cross, a distance far shorter than typical long-haul routes. Also, the protected nature of sanctuary territory may be more akin to higher-priced urban land than low-valued routes following a mid-western railroad.

A few notes on the undersea burial of cable are in order. Cable is buried one *to two* meters deep in the ocean floor. Also, the repair of a cable may require a hook to be dragged along the bottom of ocean floor to locate the cable. As the cable is raised for repair, it is pulled out of its meter deep trench. The repaired cable may have to be reburied. KMI is not familiar with the installation of cable in coral reefs.

NOAA might want to consider a discount for ROWs over a certain length. Also, it might be appropriate for the fee to be revised on an annual basis due to rapid changes in the fiber-optics industry.