

# Review of Cost Issues in International Settlements

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*DRAFT*

## I. Introduction: the question of costs

The center of the policy and economic debates surrounding accounting/settlement rate reform is the question of costs. There is a broad consensus that settlement payments – or any new mechanism for inter-country carrier compensation – must become more “cost-based,” that present rates are well above cost, that market forces will increasingly drive settlement charges toward cost, even where administrations may wish to forestall such movement.

The challenge, of course, is to define *which* “costs” should, in fact, be recovered through settlements or equivalent charges, and then to *measure* the appropriate cost elements accurately.

This is fundamentally a regulatory, and a philosophical exercise. In the long run, if market forces truly come to dominate the international telephone service market, the definition and measurement of costs would be moot, since the market would dictate both costs and prices. But the prevailing belief is that any transition to a purely market-based global industry will take a long time, and will come about piecemeal in different regions. Thus, policymakers and negotiators should seek to agree on methods for determining appropriate costs to use as a basis for revised settlement rates, as an interim step in the industry’s evolution.

“Appropriate,” in this context, ought to mean only those costs that would ultimately be included in a theoretical market-based settlements regime. In practice, without knowing precisely how the “market” will eventually play out, “appropriate” costs are a matter of opinion – both the definition of what types of cost components should be included, and the methods for measuring such costs.

## **II. Cost component definition: the ITU framework**

The most widely accepted framework for defining settlements-related costs is the ITU Standardization Sector's Recommendation D.140 on Accounting Rate Principles for International Telephone Services (ITU-T Recommendation D.140). This model defines three basic operational components (network elements) of international telephone termination service:

1. International transmission facilities
2. International switching facilities
3. National extension

The ITU recommends identifying both direct costs of international service associated with each of these elements, and some allocation of "indirect" or common costs, to be included in the calculation of cost-based settlement rates.

ITU-T's TAS Group has also developed a spreadsheet model and a series of recommendations and models for further assisting national administrations and carriers to identify and measure the appropriate allocation of each of these cost components. Following is a brief summary of those guidelines:

1. International transmission. This element consists of the following components:

- Earth station
- Submarine/terrestrial cable system
- Cable landing station
- International terrestrial radio links
- National links between these facilities and the International Exchange

2. International switching. These facilities include the international switching center and associated equipment:

- International telecommunications maintenance and operations center
- Telephone exchange
- Associated transmission and signaling equipment

3. National extension. This component is defined by the Recommendation D.140 as follows:

The national extension, used for international telephone traffic, consists of national exchanges, national transmission facilities and, if appropriate and identified under a bilateral or multilateral agreement, the local loop.

The questions surrounding this component are discussed in the next section.

## **The national extension cost issue**

In the end, national extension costs represent the core philosophical question in this entire debate. It is relatively clear that (properly measured) costs for international transmission and switching should be compensated, in some manner, through charges for international calls. Those components are dedicated to international services, more or less exclusively. The more difficult question is: “What is the ‘cost’ to deliver a call to its end recipient after it crosses from the international gateway into the domestic exchange network?”

(For additional discussion of this issue, see Section IV, below.)

Unfortunately, the ITU’s guidelines do not offer much in the way of specifics to answer this question. In the first place, the ITU hopes that negotiators will simply come to some agreement on the national extension cost. According to the TAS cost model guidelines, “it should be possible to identify and apportion costs for the national network which relate to the extension of the international telephone service only.”

As further guidance, however, the TAS model’s input instructions suggest two sets of elements to include in the national extension cost:

- A. For combined international and national administrations:
  - Trunk switches/national exchanges
  - National transmission facilities
  - Local loop, if appropriate and identified under bi-lateral/multilateral agreement
  
- B. For separate international and national administrations:  
Payment by international administration to national administration on the basis of:
  - Per minute
  - Annual lump sum
  - Revenue/Cost sharing (e.g. percentage of international collections), or
  - Combination of any above three

These clarifications, however, still leave open many fundamental questions. One of the most controversial is that of local loop costs. For integrated carriers, the guidelines insist that loop costs should only be included if “appropriate” and mutually agreed. However, for independent international carriers, it is directly recommended that the full amount of any interconnection payments to local carriers be part of the termination cost. There is a risk of inconsistency in these two positions, because domestic interconnection charges often include explicit or implicit allocations of local loop costs. The instructions provide no further guidance in resolving this issue, or the means of calculating or allocating the costs identified.

### III. The FCC methodology: Tariffs as surrogate for costs

In its extensive and controversial Order on international settlement “benchmarks” (Docket 97280), the U.S. Federal Communications Commission devised a method for approximating international call termination costs for other countries, without the use of actual cost data. The FCC effectively endorses ITU-T Recommendation D.140, claiming that its approach is “based on” D.140. In particular, the FCC adopts the three part classification of service cost components into international transmission, international switching, and national extension.

The Commission’s approach to measuring costs in each category has been subject to considerable debate, with the national extension component again the most controversial. The main methods and issues in the FCC decision are summarized below:

#### 1. International transmission:

The FCC uses a “Tariffed Component Price” (TCP) method to estimate costs for the various cable, satellite, and radiowave segments of international transmissions. It assumes that the tariff prices charged by a country’s international carriers for international *leased circuits* recover at least the cost of such physical connections to the meet-point between countries. The FCC formula involves dividing the nation’s highest monthly price for a 2.048 Mbps circuit (1.544 Mbps in some cases) to the U.S. by an assumed capacity of 120 voice-grade lines, and by an assumed usage level of 8,000 minutes per line per month.

Needless to say, these simplifying assumptions have been disputed by countries that claim their utilization of inter-country capacity does not match the levels used in the FCC formula, or that the cost characteristics of dedicated lines otherwise do not mirror those of international voice circuits. The FCC did not obtain any actual usage (or cost) data from the countries studies, but based its figures on U.S. carrier experience, and merely assumed the utilization relationships were conservative estimates for worldwide average traffic patterns and network engineering.

The TCP results for the international transmission component using this methodology range from 0.7¢ per minute (Mexico) to 25.5¢ per minute (Kenya), with most countries’ results falling below 10¢ per minute.

#### 2. International switching:

While acknowledging that reliable data on international switching facility costs are not available, and that, even if such data were available, an accurate cost estimation methodology would be difficult to design, the FCC nonetheless devises a cost component estimate for this network element. In essence, the FCC utilizes the existing settlement charges among the 42 members countries of TEUREM (essentially the European continent), as published by the ITU, which are broken down into transmission, switching,

and national extension components. The FCC has chosen to adopt the values of the switching component of these settlements as a proxy for worldwide international switching costs. The figures are divided among all countries according to three categories of economic development, and range from US\$0.019 to \$0.048 per minute.

The FCC does not venture to explain why it accepts existing European settlement charge levels for the switching cost element, while ignoring or rejecting the equivalent TEUREM charges for international transmission and national extension costs. It also does not address the likelihood that switching costs are lower in most European countries than in developing countries, which face higher costs of capital and hard currency requirements for the purchase of foreign manufactured equipment.

### 3. National extension:

For the national extension component, the FCC again uses a tariff-based proxy formula for costs of call termination beyond the gateway. In principle, this method attempts to apply the same mix and level of tariff charges that would be incurred for domestic calls traveling equivalent routes over the national network. In practice, the formula involves complex routing and timing distribution matrices, and weighted averages of local and in-country long distance tariffs to arrive at a unique “tariffed component price” for each country’s national extension costs. The results range from a high of \$25.2¢ per minute to a low of *zero*, for three countries that don’t charge for domestic calls on a per-minute basis.

### **Problems with the benchmark approach**

For the past two decades, the FCC has taken an assertive lead in the restructuring of the U.S. telecommunications industry. Despite consistent challenges and resistance from multiple vested interests on virtually every major issue that has come before it, the FCC has steered a generally successful course toward widespread competition, lower prices, technological revolution, and universal service in the U.S. market.

Unfortunately, in this, its most important and aggressive foray into *international* policy reform, the FCC has not lived up to its own standards of analytical rigor, thoroughness, and objectivity. On the contrary, the methodological and theoretical shortcomings of the Tariffed Components Price approach to redefining international settlements implicate a policymaking process that has been hasty at best, and unnecessarily so.

To begin with, the FCC has chosen the concept of “benchmarks” to attempt to force settlement rates down to drastically lower levels. The Commission has applied this concept before, for example in its implementation of cable television rate regulation a few years ago. The term “benchmark” is also in vogue to describe attempts to arrive at a national model of costs of universal service. Benchmarks differ from “price caps”

principally in that they are meant to describe average or target price levels for an entire industry, rather than specific price ceilings for a particular regulated carrier.

By their nature, benchmark prices will not necessarily reflect the actual cost experience of any given operator. The goal, instead, is to establish an approximate industry-average cost, and set this as an objective for all operators to move toward. The Commission took this approach in the cable TV proceeding, calculating what it asserted were appropriate “competitive” or “efficient” cost levels, which should become the basis for cable service prices where effective competition did not yet exist. The FCC also created a range of options for operators to seek exceptions to the benchmark rates, to reflect unique cost conditions. Essentially, operators could file individual cost studies, using the basic benchmark formula and their own company-specific costs, to seek exceptions to the price levels mandated by the industry average costs.

In its settlements benchmarks decision, the FCC has gone even further, attempting to determine the average costs of telephone services in the entire world, in a single, accelerated proceeding. Rather than creating a formula for national administrations to use as a guideline to determine their own costs (as the ITU has done), the FCC presumes to define precise benchmark costs that should apply across all countries, loosely grouped into three income levels.

Even if one assumed that the FCC could somehow accurately calculate worldwide average costs using its methodology, this approach would be clearly inappropriate for deciding settlement rates that should apply to bilateral relations. By definition, benchmarks are *averages*, which means about half of the countries entering into the calculation would exhibit actual costs somewhere *below* the benchmark, and the rest would be somewhere above. To attempt to impose settlement rates equal to the average upon carriers whose costs are above average is to demand that those carriers, in effect, incur financial losses on all calls received from the U.S.

The benchmark theory, as applied to U.S. cable operators, is that the industry’s cost structure should be largely similar across comparable systems throughout the country, with allowances for specific extenuating circumstances. If some cable companies are operating above the benchmark cost, the pricing requirement is intended to compel them to achieve greater efficiencies, as a competitive market would demand.

This theory is not explicitly repeated in the settlements Order, but it is clearly assumed in the blanket application of identical benchmark rates across the planet. And yet, it is the most elementary fact of international economics that cost structures of given industries *do* vary, often substantially, from country to country and region to region. This is not simply a question of management efficiencies in different corporations, but of the interweavings of the entire fabric of a nation’s economy: labor costs, capital costs, trade balances, inflation, geography, demographics, climate, and a hundred other factors.

Take as just one example the difference between Thailand and Russia, using the FCC's own figures. If we accept, for sake of discussion, the tariff-based component costs determined by the FCC, then the "cost" of completing international calls is 17¢ per minute for Thailand and 35.4¢ per minute for Russia. The overall average benchmark level for all countries in the Lower Middle income group is 19¢ per minute. Under the FCC's ruling, then, Thailand would receive settlement payments of 19¢ for every minute of incoming international traffic, and hence would retain a "profit" from those calls of some 2¢ per minute. Russia, on the other hand, would receive the same 19¢ per minute in settlements, but, *according to the FCC's own calculations*, its cost is 35.4¢ per minute, and thus Russia would be forced to absorb a 16.4¢ loss for each minute of incoming U.S. traffic.

This effect is a self-evident result of the use of broad worldwide averages to determine country-specific bilateral prices, and is an inherent flaw in the FCC's method, even assuming all cost calculations were accurate. The FCC's only response to this objection is that the tariff rates used to develop proxy costs are likely to be *greater* than actual underlying network costs, because retail tariffs recover costs for marketing, uncollectibles, and similar non-network functions, and thus achieve a margin of comfort above true incremental costs (para. 48). This reasoning, which the FCC repeats numerous times in its Order, will be addressed separately below. But it is worth pointing out that the wide variation in individual country results in the FCC's own calculations makes it highly unlikely that even this "retail cost margin" would make up the roughly 45% loss to Russia in the above example, or similar disparities for many other countries.

The FCC further notes that its decision to classify countries according to income levels, and to allow higher benchmarks (and delayed implementation) for poorer countries, is intended to help mitigate the impact of drastically reduced settlements revenues on those countries. The use of averages, however, as opposed to country-specific benchmarks, is explicitly intended to overcome the inherent "inefficiencies" in those countries telecommunications operations. Again, the Commission's method ignores inherent, real cost differences between countries, and presumes to compel efficiency improvements around the world by ordering below-cost payments for terminating traffic.

### **Problems with the "Tariffed Component Price" methodology for national extension costs**

The criticisms put forth by various commenters of the FCC's assumptions concerning leased line tariffs as a proxy for transmission costs, and using the ITU's data for international switching costs, merit much more thoughtful consideration than the Commission provides in its Order. Even if costs were developed on a per-country basis, rather than broad averages, these proxy approaches would be suspect at best.

Still, the most troubling aspect of the TCP methodology is clearly its approach to national extension costs. In this case, it is not immediately clear what standard of policy the FCC is attempting to apply. On the one hand, the Commission claims to be pursuing “cost-based” rates, and devising a method for estimating legitimate costs. On the other hand, it justifies the use of tariffs as the basis for settlement payments by saying it would be “discriminatory” to charge international carriers rates different from those paid by domestic customers for the same service.

Apparently, this “non-discrimination” standard dominates the “cost-based” standard, although the FCC nowhere articulates the distinction. If this is the case, however, there is no reasonable basis for claiming that international telephone calls should necessarily be charged precisely the same rates for the national extension segment as domestic local and long distance calls, in the absence of any cost standard for either type of usage. Nor is such a practice realistically possible, because each incoming call would then have to be charged according to its terminating location. This reasoning makes no more sense than suggesting that a 100 km domestic call in any given country should be charged precisely 2 times the price of a 50 km call, or 100 times the price of a 1 km call, or else there is “discrimination” among such calls.

In truth, discrimination only enters into the issue if a carrier charges different rates to different *international* carriers for the identical termination service. No one outside of the FCC has seriously suggested that a revised international settlements policy should include dictating domestic tariff setting policy, and specifically strict parity between domestic and international charges.

If, on the other hand, we are talking about apply the actual *costs* of domestic long distance and local call delivery to international settlements (and doing so on a non-discriminatory basis), then we are at least still in the territory of the ITU’s mandates on the issue. The problem is, the FCC’s methodology fails to provide a reasonable measurement of such costs. This is true even if we assume that the Commission’s International Bureau has calculated as precisely as possible the distribution of incoming calls to each country across distances and times of day, and has properly applied the relevant domestic tariffs in coming up with its weighted average TCPs.

The fundamental flaw is that the FCC assumes that domestic usage tariffs for most countries tend to reflect closely the pertinent costs of national switching and transport. The Commission asserts such a relationship, without any supporting evidence, and in spite of the fact that it is widely accepted throughout international telecommunications policy circles that most countries’ domestic tariffs are *far* from cost-based. In fact, one of the principal goals of the ITU and other global policy fora in relation to telecommunications policy reform is to help promote the “rebalancing” of tariffs, and general movement *toward* costs. To start with an assumption that such tariffs inherently provide a reasonable estimate of underlying service costs is to completely ignore this reality.



Moreover, there is no disagreement about the *direction* of the mismatch between most countries' domestic tariffs and costs: in the aggregate, the tariffs are *below-cost*. This is especially true of local service tariffs: the systematic tendency in nearly all countries has historically been to cross-subsidize local telephone service with revenues from other services (especially international services). Domestic long distance prices follow a less consistent pattern; in many countries they are above cost, and contribute to the local service subsidy, in others they are lower, and may be subsidized themselves.

The FCC dismisses this vital criticism of its methodology by assuming, without evidence, that above- and below-cost domestic tariffs will balance each other out:

to the extent domestic local tariff rates are priced below cost, any underrecovery of costs should be offset by traffic that is distributed to service classifications such as long distance or international whose tariff rates are above-cost. (para. 70)

This assumption, however, has no basis in fact. It appears that the FCC is drawing solely upon the experience of the United States, in which the very great distances and preponderance of interexchange calling (and high prices) indeed formed the principal source of local service subsidies for many years. However, anyone familiar with the tariff, traffic, and revenue patterns of developing countries in particular can verify that domestic inter-city long distance revenues invariably contribute but a small percentage of total revenues, not nearly enough to overcome basic local network service deficits. Those shortfalls are made up principally from *international* service revenues, including both settlements and domestic user charges, along with any specialized business services, data services, cellular concessions, paging, Internet access, and the like. Notwithstanding the misleading reference in the above quote, the FCC's formula takes none of these other services into account, including international service tariffs. Instead, it produces national average tariffs solely for local and inter-city charges, which are likely anywhere from 50% to 90% or more below the aggregate unit costs of the services to which the tariffs apply.

In fact, in some cases, they're 100% below actual costs. The most clearly fallacious element of the FCC's national extension formula is that it applies *zero* cost to three countries (Kuwait, Barbados, and Hong Kong) which do not have local or national per-minute charges at all. Rather than remove these obvious outliers from the average, or apply some substitute, they are incorporated in the calculation as if it truly costs nothing to transit telephone calls from the international gateway to end users in those countries.

A similar assumption is somewhat hidden under the national extension tariff calculations for several other countries, which charge domestic long distance rates, but not local per-minute tariffs. This effect can be seen in the results for Guyana (0.6¢ per minute), El Salvador (1.1¢), Singapore (0.7¢), Jamaica (1.0¢), and others. No U.S. carrier regulated by the FCC would tolerate an Order claiming that its systemwide cost for interconnection and call termination was this low.

The simple fact is that, in addition to cross-subsidies from other services, many countries choose the same perfectly legitimate policy for local service tariffs as exists in a large portion of the U.S. market: they include local usage charges in a “flat rate” monthly basic service subscription tariff. The fact that such tariffs form an integral part of local service cost recovery in a number of countries is thoroughly ignored by the FCC, which makes no attempt to incorporate any portion of local subscription charges in its national extension TCP formula.

The above problems are exacerbated by the fact that the FCC’s traffic data reveal that the majority of incoming international traffic in most countries terminates in major metropolitan areas. Where the international gateway is located in the same city, the formula only applies local usage tariffs in developing its weighted average costs. To the extent relevant per-minute local tariffs either don’t exist, are incorporated in basic subscription charges, or are heavily subsidized by international and other services, the formula systematically and substantially *underestimates* the costs of domestic call completion for nearly every country in the sample.

This irony of this analysis is that, the most likely, and generally advocated, effect of reducing settlement payments, and of market restructuring in general, will be a rebalancing of tariffs that will lead to *increases* in domestic prices, especially for local service. To the extent this occurs, the FCC’s own formula will rapidly become outdated, as the tariff proxy inputs will be well below the new cost-based tariffs. The FCC has not, however, proposed revising its formula in the future to take into account changes in the data inputs. Nor, for that matter, has it considered updating the formula even within the 2 to 3 year time frame by which its benchmarks are to be imposed, to reflect any rebalancing, or inflation-related or other changes in the very tariffs it presumes to use to estimate other countries’ costs.

### **The nature of costs in developing networks: infrastructure development**

As mentioned above, the FCC’s main response to various criticisms that its formula understates true costs of international call termination is to point out that retail tariffs typically cover costs for marketing, billing, uncollectibles, and other activities that are not relevant to inter-carrier call termination services. Thus, the FCC is not only confident that any underestimate of costs is compensated, but in fact believes that its result *exceed* the true costs of the service (see, e.g., para. 44).

However, the above discussion demonstrates that, at a minimum for the national extension component, retail tariffs are typically well *below* costs. Therefore, the theory that these tariffs recover non-network function costs is incorrect. In any event, the FCC’s assumptions about the magnitude of commercial retail costs again reflects a toward a U.S. style market. In developing countries with monopoly public operators, “marketing” costs are typically a fairly insignificant aspect of operations (although there may be other

inefficient administrative costs). At the same time, basic infrastructure costs, including technological upgrades and network expansion, make up a far larger portion of ongoing costs than they do in mature networks.

These infrastructure costs do not solely consist of so-called “universal service” obligations, i.e., the extension the access network to unserved customers and regions, although that is also an important policy question. In many cases, network investments by national carriers involve replacement of outdated, poorly operating physical plant in the core network; introduction of digital switching and advanced signaling systems; and increasing central office and trunk capacity to reduce blockage and improve transmission quality. All of these activities directly benefit *international* calling services as well as domestic services, by making it more likely that calls will go through, enhancing quality of service, and increasing overall efficiency in the system.

The same can be said, to a large extent, of operations costs in developing countries. Where services and technology are rapidly evolving, operation and maintenance support of domestic network functions is especially crucial to assure that incoming calls are properly processed, that faults are repaired, that problems can be resolved effectively, and that users can access directory and operator services when necessary. These are legitimate costs to apportion to international termination service, not extraneous commercial costs of no consequence to foreign callers.

Again, the bulk of these infrastructure and operations costs have traditionally been recovered from sources other than local usage tariffs, and disproportionately from international services. A tariff proxy method that only takes into account domestic usage tariffs as a measurement of national extension costs cannot adequately compensate operators, especially in developing countries, for the bona fide services that are provided to incoming international telephone callers.

### **Universal service contributions**

Finally, the FCC objects to the prospect that U.S. carriers should contribute to subsidizing universal service obligations in other countries, even though it acknowledges that such subsidies are “legitimate telecommunications policies” (para. 86). The thrust of the objection is again the issue of “discrimination,” as the FCC feels that “foreign termination services from certain countries should [not] be required to finance a disproportionate share of network costs . . .” (*id.*).

The policy question of using international settlements revenues to subsidize basic network expansion in developing countries is largely separate from the previous discussion about legitimate costs of international call termination, but not entirely so. It is important to recognize that, on the whole, expansion of telephone access worldwide is clearly to the economic benefit of international carriers, essentially in proportion to their share of the global market.

## *Cost Issues in International Settlements*

In the case of the U.S., for example, the volume of outgoing calls to, say, Mexico or the Philippines from expatriates and immigrants is already vast, and, all things equal, should increase as the penetration of telephones in those countries increases. Settlement debates aside, those calls are certainly profitable to the U.S. carriers that connect them. One could argue, therefore, that it is in the economic interest of the U.S. international telephone industry to continue to contribute, to some degree, to universal service investments in developing countries. (This is to say nothing, of course, of the U.S. and other developed country operators that are now part *owners* of numerous developing country carriers.)

It is difficult to accept, therefore, that attempts to include universal service elements in international carrier payments constitute “discriminatory” treatment. Again, discrimination would occur principally if some foreign carriers were charged more than others for the same services.

As competition is introduced in many countries for non-basic services, often including international gateway service, this issue becomes more complicated. As some commenters to the FCC have pointed out, competing and independent international gateway operators in many carriers operate under interconnection rules that require payments to the national network operator of charges that can include universal service contributions, or otherwise are considerably greater than the FCC benchmark levels. If the benchmarks are imposed as planned, these carriers could be forced out of business, as they would lose money on every incoming international call, with little opportunity to raise outgoing rates to make up the difference. Such an anti-competitive effect of the FCC policy would certainly not be consistent with its stated objectives.

The FCC has stated that it is prepared to consider exceptions to its benchmarks where carriers can demonstrate “they do not permit the carrier to recover the incremental costs of providing international termination service” (para. 74), although this offer is specifically presented in the context of currency exchange rate fluctuations. It is unclear what standards the Commission would apply in reviewing applications for such exceptions, but if the benchmark policy remains unchanged, it should be prepared for a flood of requests.

#### **IV. Cost allocation options: Toward a theoretical basis for calculating national extension costs of terminating international traffic.**

If, in some theoretical future, market forces or enlightened regulation drive telephone tariffs worldwide to the true level of costs, then some tariff-based proxy for costs might be a reasonable basis for setting international call termination charges. In the meantime, if there is to be an economically rational basis for such charges, some form of cost-oriented calculation methodology will need to be established.

##### **Conflicting cost standards for different market structures**

The initial question in developing such a methodology is, what should be the theoretical basis for defining “appropriate” costs of terminating international traffic? The theories of regulated markets and emerging competition that can be readily applied within national boundaries are considerably more problematic in a multi-lateral international environment. A national regulator, for example, can decide how much cross-subsidy to incorporate in tariff rates, and how fast to open markets to competition, and these decisions will partly influence which cost methodology will be most appropriate for interconnection charges.

In a world where many nations are actively moving into a competitive structure, while others are likely to remain monopolized for the foreseeable future, it is difficult to prescribe a single standard that will be both fair and efficient.

The preference of the U.S. FCC, and presumably of most policymakers advocating a market-oriented direction, is to base inter-carrier compensation on *incremental costs*: the added cost per minute to provide the service. If there were, in fact, a competitive market for terminating international calls, the charges for such terminations would tend toward incremental cost. Were a carrier to attempt unilaterally to impose charges well above incremental cost, competing carriers could offer lower prices while still earning a profit, and force the market price back toward the incremental cost level.

The FCC preference, in fact, is for use of the concept of “Total Service Long Run Incremental Cost,” or TSLRIC, plus a “reasonable” contribution to “joint and common costs”. TSLRIC is defined as the added cost of providing the entire service, measured over a period long enough for all input costs to be variable. TSLRIC costs are a purely theoretical standard used to promote efficiencies in competitive markets, for example in interconnection charges between carriers. These costs may differ from short-run incremental costs to the extent network design, technology deployment, and operational efficiencies might change in the future relative to current experience. In practice, however, since future costs cannot be known in advance, current unit costs are used to estimate future unit costs, only with adjustments for known future changes.

In a traditional regulated monopoly market, especially a developing market, incremental cost is not necessarily the preferred standard for pricing all services. Support for fixed investment costs of infrastructure expansion and technological upgrades, which may not be immediately recoverable through service-specific prices<sup>1</sup>, typically comes from other services exhibiting the highest value to the customer: so-called Ramsey pricing. Where regulation supports this type of policy, some form of “Fully Distributed Cost” (FDC) allocation is often employed, implicitly or explicitly. The monopoly environment permits this approach, as no competitors can underprice the incumbent, even where marginal costs are below the regulated price.

It is a fallacy to assume that the FDC monopoly approach is inherently less economically efficient than a regulated market that requires incremental cost pricing. In macroeconomic terms, the cross-subsidization of network development and basic service subscriptions is justified on efficiency grounds if the *network externalities* resulting from universal service exceed the “dead weight losses” of suppressed usage demand or supply resulting from to cost-price distortions. In a fully developed network, such subsidies can likely be minimal, as the externality effects are already fully realized. But where penetration rates are below 50%, or even 25%, there is room for huge economic gains from expansion, and thus FDC and other subsidy-oriented cost methods may be perfectly legitimate elements of national telecommunications policy.

The problem of international communication is unique in this respect, particularly for traffic between fully developed and developing economies and networks. This is because, where competition and incremental cost-based pricing prevail, market forces will tend to draw demand toward the lower prices, and away from higher priced, monopoly subsidizing tariffs. This is especially possible with modern technology (hence, the call-back phenomenon).

Thus, the legitimacy of alternative costing methods for different environments comes into direct conflict, not merely because foreign carriers, and callers, are compelled through settlements to contribute to other countries’ network development, but because competitive markets will inevitably be “penalized” for their lower prices, with an increasing proportion of traffic, and thus subsidy payments, shifting in their direction.

On the other hand, a move to purely incremental cost-based prices for terminating international traffic in developing countries would potentially undermine broad economic goals, to the detriment of long-term growth and efficiency objectives, even for foreign users.

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<sup>1</sup> The extent to which such subsidies may, in reality, be necessary to permit infrastructure investment, is a separate analytical question. Monopoly markets have been shown to be inefficient in other ways, including limiting the degree to which economic forces might promote self-financed network expansion. This is a domestic policy issue, however. For purposes of international negotiations, it is necessary to accept a country’s actual cost and market structure, albeit while adjusting the results as those costs change over time.

The “economically correct” answer, for any particular bilateral pathway, lies in an impossibly complex calculus of network costs, efficiency gains, externalities, demand elasticities, and the like. There is some theoretical formula which could capture all of these factors, including the economic benefit to *calling* countries of wider access to called-country populations, and generate a unique (and ever shifting) termination cost/price for that communication partnership.

### **Outline of a cost model**

In the absence of perfect information, however, we can construct a “second best” model that at least sets the boundaries for the cost to be associated with international calling. The elements of such a model should include the following:

1. For the *international transmission* and *international switching* components, the average cost per minute for the use of these facilities to transmit or receive switched telephone traffic.
2. For the *national extension* component, the floor cost should be (1) the incremental cost of domestic network usage. Added to this should be (2) a contribution to residual joint and common costs that is proportional to the service’s share of total carrier operations, plus (3) a contribution representing the proportional estimated value of network externality benefits accruing to foreign users due to infrastructure expansion. The attached model framework illustrates the elements of this calculation, as discussed below.

How are these elements to be measured in practice? The following sections elaborate on the proposed method, describing both the theoretical and practical basis for calculating each of the elements, and sub-elements.

For the international transmission and switching components, the ITU-T Recommendation D.140, and the associated TAS cost model form an excellent foundation for this cost analysis. The cost calculations must be country-specific, however, and not based upon averaging or estimates from outside sources, if at all possible. Any given country’s operating costs for its international facilities are real costs, and foreign carriers using those facilities to bring in traffic should expect to pay their proportionate share. Just because apples cost 50¢ apiece in one country doesn’t mean travelers from that country should expect to buy apples for 50¢ in another country, where the grocers wholesale cost is 75¢. As long as the average direct costs of international facilities are accurately measured, even where they may include “inefficiencies,” those costs are the only valid basis for component prices.

### **Incremental cost of national extension in developing networks**

As for the national extension component, there are theoretical and methodological issues surrounding each of the elements of that cost definition. To begin, the definition of

the incremental cost of national network usage by incoming international calls itself raises important theoretical questions. Whether the specific concept of TSLRIC is relevant here or not is uncertain.

The notion of an “incremental” cost implies a cost that is *added* to something else, to a pre-existing network or service. In the U.S. market, where most of these cost standards originate, the generally accepted framework is of a basic exchange telephone network, to which national and international long distance have been added. A local switch, therefore, is part of local service, and only the extra capacity required to accommodate long distance calls (a small, variable cost) is considered part of the incremental cost of long distance. The loop is almost entirely a local service cost, or at most a joint cost.

In many developing countries, it is worth noting that this image of the telephone network, and its costs, evolving from the center outward is historically inaccurate. A more common evolutionary construct would see international connections as often the *first* network component to be built, especially in countries that remained colonized until well into the era of telegraph and telephone technology. The installation of international cables between the colonial power and a landing point in the colony often initiated the construction of domestic communication facilities, invariably linked back to the original gateway. Over time the internal network expanded, and other international links were added, but the legacy of underdevelopment is evidence that the emphasis of telecommunications investment in many countries was not, historically, domestic services.

This raises the question: in developing country networks, what is incremental to what? If the national network has been engineered, designed, and configured initially to support international communication, then isn't its “total service” incremental cost equivalent to the cost to replicate such a national extension, including tandem switches, trunks, and even local exchanges?

The issue seems, at the very least, to be open to reasonable debate, and the actual answer should again differ from country to country. In a forward-looking, long-run study, one might put aside the historical legacy and anticipate the evolution of the future network as more inwardly-focused. But again, for many countries, the balance of international versus domestic demand is likely to remain very different from the U.S. model, and hence the burden of cost allocation should differ as well.

The only workable answer, therefore, to the question of national extension incremental costs, is to assume that all minutes of use, throughout the network, depend equally upon the same infrastructure, and no one usage is incremental or additional to another. In practice, this requires measuring the capital and operating costs of all usage-sensitive network facilities (exchange switches, tandem switches, trunks, signaling equipment, etc.), and dividing by total usage to produce a per-minute national incremental



usage cost. This is shown in the attached chart under Section 1, Incremental national usage cost.

### **Joint and common cost recovery**

The costs of the local loop, and of basic telephone service operation in general, are not, in this construct, treated as part of incremental usage costs, even if we consider that loops are an extension of a network that began at the international gateway. Loops are, more accurately, a “joint” facility, commonly used by all telephony services, including incoming international calls, but whose cost is not usage-sensitive. Operating costs such as commercial services, operator assistance, and so forth (but *not* marketing costs), should similarly be considered “common” costs, not incremental costs of usage. Economic theory would suggest that fixed loop and operating costs should be borne principally by fixed monthly rental charges. However, since some of the benefit of these joint facilities and common activities accrue to those who call *into* a given line, including international callers, it is also appropriate to recover a portion of their recurring costs from usage-based charges.

To see this, we should consider the marginal basic service subscriber, whose presence on the network provides a marginal externality benefit to all other subscribers, including international users. If a price set equal to incremental cost were just above the perceived benefit to the subscriber of the service, that subscriber would disconnect, and the externality to others would be lost. Thus, the collective body of worldwide subscribers should be willing to pay, through usage charges, the marginal difference between incremental basic service subscription costs and customer prices, where those prices are below cost for some customers who otherwise couldn't afford the service.

Not knowing what the optimal price for basic telephone service should be, we must accept actual tariff prices as the best measure of average willingness to pay for basic service subscriptions. The formula for including joint and common cost contributions in national extension costs, therefore, should be to subtract gross subscription revenues from total basic network operating costs (excluding marketing costs), and to divide the remainder by all minutes of use for all services. This is shown in the attached chart, as Section 2.<sup>2</sup>

In any event, it is clear that such an allocation of ongoing basic network costs represents a “reasonable” portion of joint and common costs, which even the FCC's theory advocates. Pure incremental cost pricing for all services would result in a carrier being insolvent, and thus all services, even in a purely competitive environment, should be expected to support such joint and common costs to some degree. The allocation

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<sup>2</sup> Note: There might be a more sophisticated calculation of this element: If costs, revenues, and traffic could be differentiated between, for example, business and residential usage, then the relative proportions of international versus domestic traffic in each category could determine an appropriate weighted component charge.

suggested here is equitable, and recognizes the inherent benefit in maintaining maximum subscribership levels.

### **Support for infrastructure development**

An important distinction must be made here between ongoing *operational costs* associated with the existing loop network, and the *investment costs* of new facilities and expanded infrastructure. When international calls are received, they go to present network subscribers, and the cost, today, to reach those subscribers is reflected in current –operating costs, and recurring costs of capital for past investments. The correct long-run incremental cost of using today’s network does not include the cost of adding new lines. (This is not a philosophical distinction, it is merely a precise application of the theory.) In the future, when the network has, in fact, expanded, its long run incremental operating costs may or may not increase in reflection of new investments: that will depend upon factors of technology and usage, among other things, related to the new subscribers.

The final component of the cost model, therefore, must take account of the future benefits of expanded infrastructure, by allocating a portion of the investment cost to present users. (The theory unavoidably assumes that present and future users are the same population.) The net amount to be allocated should be the difference between average annual investment in loop network growth, and average annual connection charge revenues from new subscribers. This investment cost does not, in this instance, include future operation and maintenance costs, as these are already captured in the loop operation cost calculation above.

Again, the simplest allocation method would be to divide the resulting deficit by total usage, to achieve an average per-minute capital cost, as shown in the attached chart, under Section 3.. This would in effect assume that every category of caller, both domestic and international, receives an equal average externality benefit from access to every existing and new subscriber line. This is probably not accurate, as the marginal benefit likely diminishes as the network grows, and the relative value of expansion to international callers in particular is probably somewhat smaller than to domestic callers, although there is no empirical evidence to prove this.

It may be most appropriate to leave to bilateral negotiations the precise allocation of net loop investment costs in international termination charges. The average cost for all network usage should perhaps be treated as a ceiling, with the possibility of recognizing lower incremental benefits to specific countries, based upon demonstrated usage patterns, demand elasticities, and other factors.

### **Evolution to open markets**

In conclusion, we should recognize that this theory is meant to apply to international telephone service inter-carrier settlements, according to the traditional regime of separate operators in separate jurisdictions. As that system itself is evolving, with competitive entry by foreign carriers into domestic markets, joint ventures, and

## *Cost Issues in International Settlements*

mergers and acquisitions, the cost elements attributable to connections between telephone carriers of different countries, or at least different borders of origin and termination, are likely to evolve as well.

In particular, the point of interconnection between networks may increasingly vary, from the traditional international half-circuits and gateway switches, all the way down to the local exchange itself in some cases. Obviously in these situations, “unbundled” costs for the only facilities used would be the appropriate interconnection charge standard. The cost methods and data required to fulfill the methodology described here should help provide a foundation for calculating facility-specific unbundled costs as well.

However, the theory’s treatment of joint network costs and network investments to achieve future externality benefits should still be incorporated in such unbundled interconnection charges as well. Indeed, even in a fully competitive market, mechanisms such as Universal Service Funds and other contribution or construction (“play or pay”) options are certain to remain a central element of telecommunications development policy, and international correspondent carriers should expect to continue to participate in those practices, as they will continue to benefit from them.

<b>National Extension Cost Model</b>			
	Annual Capital costs	Annual Operation + Maint. costs	Total
<b>1. Incremental national usage cost</b>			
National trunks			
Tandem switches			
Local switches			
Total			
/ minutes of use			
= Cost/minute			
<b>2. Proportionate share of joint, common costs</b>			
Local loop			
Administration + commercial			
Total			
- subscription revenues			
= Net cost			
/ minutes of use			
= Net cost/minute			
<b>3. Contribution to infrastructure development (ceiling)</b>			
Annual investment in netwk expansion			
- connection chg revenues			
= Net cost			
/ minutes of use			
= Net cost/minute			
<b>Total National Extension Cost</b>			