

METHODOLOGICAL NOTE CONCERNING THE USE OF COST PROXIES

Contribution to the SG3 Focus Group from the ITU Secretariat, 7 August 1998

Context

The Chairman's working document (revised, 12th June 1998) for the work of the Focus Group on accounting rate reform sets out four main tasks to be undertaken by the Group, and proposes four main "interim transitional mechanisms" by which they might be achieved:

1. Determination of price caps for the settlement rates and the transit rates;
2. Designated target ranges;
3. Estimated cost elements obtained in the nine case studies;
4. Best practice rates.

Contributions to the work of the Focus Group have already explored several of these mechanisms in some detail¹. However, relatively little work has been done on the first interim mechanism, namely the use of cost methodologies or cost proxies to determine price caps or "benchmarks". This paper aims to go some way to filling that gap. This contribution draws upon data submitted to the Focus Group up to the start of August 1998 in order to explore the usefulness of cost proxies in achieving the goals set out for the Focus group. It should be borne in mind however that other data may become available later, and alternative cost proxies might be defined, so this note represents *work in progress*.

Cost methodologies

In an ideal world, the best way to calculate cost-oriented termination or settlement rates would be to use an agreed cost methodology. The most elaborate cost methodology for incoming international telephone calls available to date is that developed with the Regional Tariff Group for Asia and Oceania (TAS). TAS has carried out annual surveys since 1995 to establish target rates for direct and indirect relation of different distance. The results of the most recent studies are described in document TAS/98/D1 (available at <http://www.itu.ch/itudoc/itu-t/tas/dc-may98.html>) and summarised in Table 2 of this document. The survey, which is based on 12 responses covering 280 relations, shows an average cost of between 0.331 SDR per minute (for relations of less than 3'000 km) and 0.428 SDR per minute (for relations longer than 6'000 km). The trend however is downwards with a rate of decline of between 7-10 per cent per year since 1994. However, the TAS methodology has not been widely used outside the Asia-Pacific region and even within the region it is not unanimously accepted (see, for instance, contribution D6 from China).

Several of the other Focus Group contributions refer to cost methodologies, but usually only to note the difficulty of reaching consensus between the various alternatives (e.g., Long-Run Incremental Costs (LRIC), Fully Distributed Costs (FDC) etc) within the time available. One contribution, (No. 19 From Trinidad & Tobago) does refer to data derived from a cost study, using an "efficiency gains" model. For Trinidad & Tobago, this suggests a cost of terminating calls in that country of around US\$0.43 (SDR 0.322) per minute which is comparable with the high end of the individual Case Study cost elements and the low end of the TAS cost study. However, as recognised in the Chairman's report, the likelihood of achieving an agreed cost methodology, and gathering the full range of data that would be necessary to implement it, is very low given the timescale available to the Focus Group. Indeed, as the Chairman's report notes, developing a common costing methodology is more properly the role of Study Group 3 itself.

Cost proxies

Instead, therefore it would appear more practical to use "cost proxies" rather than to try to agree upon a common costing methodology, in order to determine target ranges for settlement rates and transit rates.

¹ For instance, contribution 1 incorporates work from the TAF tariff group on designated target ranges; contribution 2 from the ITU Secretariat looks at the Case Study cost elements, and contributions 18, from the ITU Secretariat, and 20 and 21 from Hongkong SAR deal with best practice rates in the context of country groupings.

A cost proxy involves the use of data which *approximates* to costs, or can be used as a surrogate for real costs. There are several possible sources of data that could be used:

- Existing **settlement rate** data could be interpreted as a proxy for costs in that, for the originator of the call, the payment made in net settlement is an important part of the cost of providing the service. The “Best practices” approach, explored in contributions 15, 18 and 20, uses the “average of the five lowest settlement rates” in each of several country groupings as being a proxy for the costs of terminating calls within that grouping. The rationale is that best practice represents an approximation to real costs once inefficiencies have been subtracted. However, it may appear a somewhat circular argument to use settlement rate data as a means of establishing future settlement rates.
- **Interconnect rates**, notably between fixed line operators or between mobile and fixed-line operators, could provide an indication of the cost of the national extension part of call termination. In the contributions received to date, data on actual and best practice interconnection rates have been submitted by the EU (contribution 11) and for 12 selected middle and high income countries (contribution 7). There is also some interconnect data available in the case studies. The available interconnect data is summarised in Table 1. There are two notable features of this data. The first is that even the highest national interconnect rate (0.07 SDR per minute in Dominican Republic) is lower than the lowest existing accounting rate (0.075 SDR in Australia for TNS-TeleGroup). This would suggest that interconnect amounts to, at best, only a small proportion of the total costs of terminating an international call. The second feature is that there appears to be an inverse correlation between national wealth and level of interconnect thus that the case study countries which have the lowest GDP per capita (e.g., Lesotho, Samoa) have an interconnect fee between mobile and fixed-line networks of zero (i.e., sender-keeps-all), whereas some of the wealthier countries in the sample such as Finland have an interconnect fee as high as 0.035 SDR per minute. This would seem to suggest both that many developing countries have not yet rebalanced their tariff structures, thus interconnect prices are not cost-based but rather represent a “negotiated” price which is the outcome of commercial negotiations or political pressure.

Table 1: Interconnect rates for national (double tandem) connection to fixed-line network, in SDR/100 per minute

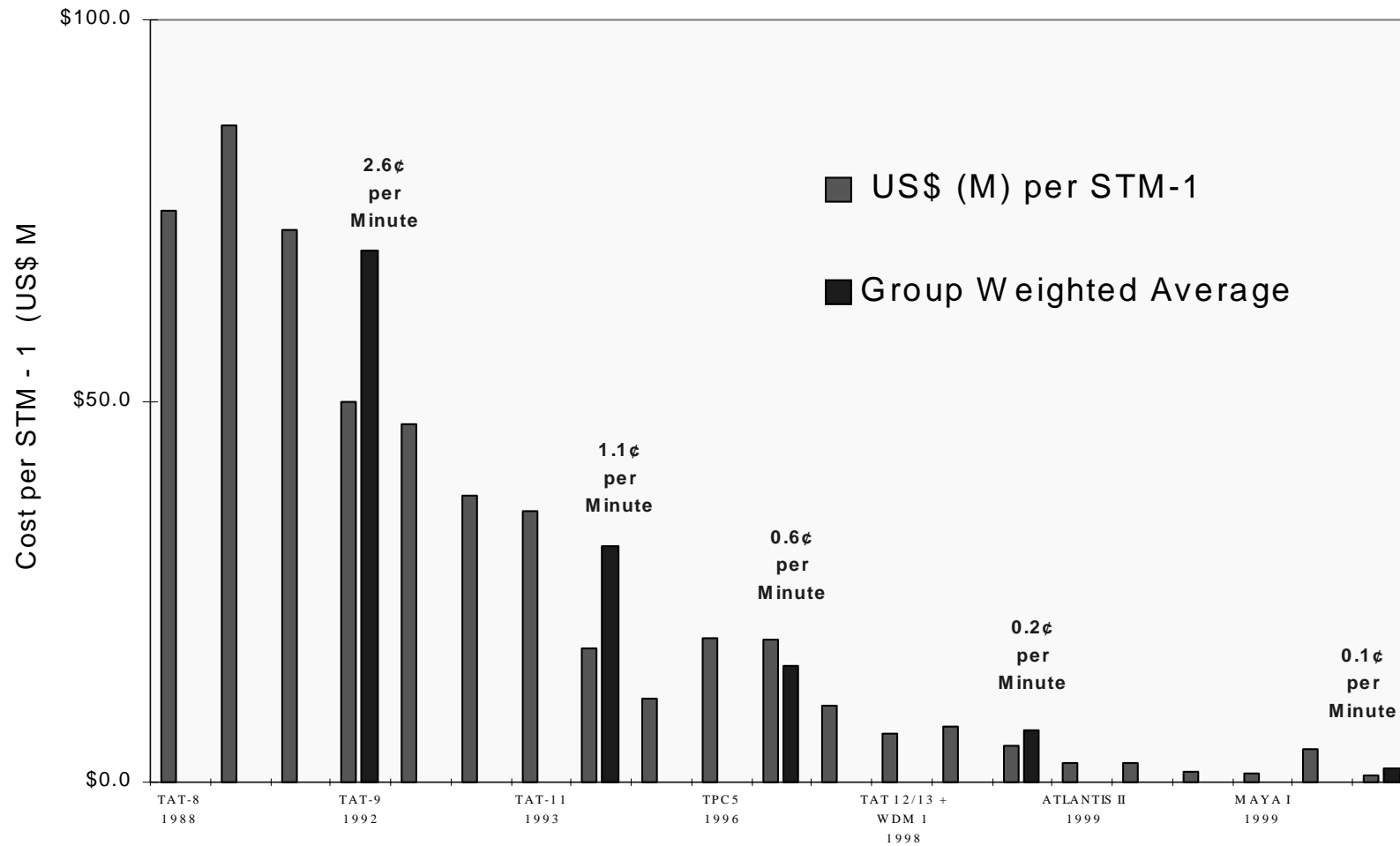
	<i>European Union (March 1998, source: EU)</i>		<i>Other selected countries (source: AT&T)</i>		<i>Case studies</i>	
Actual rates (in SDR/100)	Netherlands	1.360	Canada	0.591	Lesotho	0
	UK	1.469	Japan	1.198	Samoa	0
	Denmark	1.875	Korea (Rep.)	1.340		
	Sweden	2.010	Chile	1.347		
	Austria	2.069	Mexico	1.347		
	France	2.153	USA	1.422		
	Germany	2.204	El Salvador	1.699		
	Belgium	2.550	Colombia	1.924		
	Finland	3.547	Israel	2.470		
	Spain	3.564	Indonesia	2.632		
			Brazil	3.293		
			Dominican Republic	7.485		
Average		2.280	Average	2.229	Average	0
Best practice rates (average of lowest 3)		1.568	Best practice	1.043	Best practice	0

Note: Where there is a separate call-set up charge in addition to the per minute charge, the set-up charge has been divided by three (e.g., as per a three minute call).

Source: EU (Contribution 11), AT&T (Contribution 7), ITU/CTO Country Case Studies.

Figure 1: Trends in 155 Mbit/s Trans-Oceanic cable costs 1988-2000, submitted by AT&T (Contribution 7)

Trans-oceanic cable costs per STM-1 (155 Mbps)



Depreciation cost per minute (non-multiplied voice circuits) =
 (\$ per STM-1 ÷ # of 64k ckts per STM-1 ÷ 96,000 minutes per ckt per year ÷ 15 year depreciation schedule)

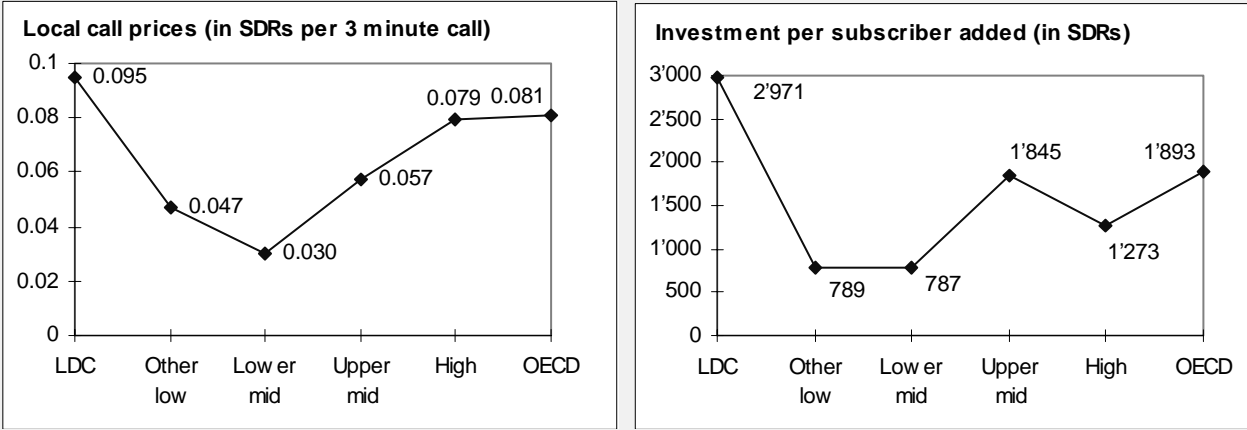
- For the international transmission segment of call termination, it may be possible to use **circuit costs** as a proxy for the cost of providing international call service. Trends in transatlantic and transpacific circuits submitted in contribution 7 (from AT&T) show the price per non-multiplexed 64 kbit/s voice circuit trending from 2.6 US cents (SDR 0.019) per minute in 1992 to a projected 0.1 cents per minute in the year 2000. This is based on a capacity utilisation of 18 per cent (i.e. 96'000 minutes per year out of a possible total of just under 526'000 minutes) over a projected 15 year life span. It is not clear whether or not the costs include the costs of capital or only of construction. Furthermore, these costs would only be applicable to the handful or so of operators that both have direct access to a 155 Mbit/s cable for incoming calls and direct or indirect part ownership (i.e., an IRU or Indefeasible Right of Use) of the cable. Other countries would be obliged to rent capacity at retail rates (see below). Nevertheless, there would appear to be a strong *prima facie* case for using circuit costs as a suitable proxy for the transit part of international calls.
- Beyond those PTOs that own their own access to major undersea cables, other PTOs can purchase **leased-line capacity** at wholesale prices. Because such contracts are confidential, it is necessary to use a proxy in order to estimate prices. In this case, the proxy that could be used is the retail price of a 64 kbit/s line. Again it is necessary to use certain assumptions about capacity utilisation and length of rental period. The FCC, in its "Report and order in the matter of International Settlement Rates" (August 1997), uses a Tariffed Component Prices (TCP) methodology. This data was cited in contribution 15. For the international transmission component, this is based on the retail price of a 1.5/2.0 Mbit/s half circuit where available. The circuit is split into 64/kbit/s channels which are, in turn multiplexed into 4 voice channels. Thus, a 2.0 Mbit/s circuit would yield 120 voice channels (30 x 4). It is further assumed that the capacity is in use for 96'000 minutes per year (i.e., 18 per cent capacity utilisation. Discounts for volume, length of rental etc., were also taken into account. The resultant figures for the 65 countries deemed to have suitable data show an average cost of 5.86 US cents (SDR 0.044 SDR) per minute for international transmission. The range is between 0.9 US cents (SDR 0.007) per minute from Mexico and 25.5 US cents (SDR 0.191) per minute from Kenya. A word of caution should be noted in that the countries selected were not intended to be representative of the *diversity* of countries of the world, but only representative in terms of high traffic volume countries. Thus, the other 150 or so countries not included in the FCC survey might be expected to have transmission costs in the high end of the range as they all have low levels of incoming international telephone traffic. As an indication of this, the results from the TAS cost study are considerably higher than for the FCC TCPs even for the same region (Asia-Pacific) as shown in Table 2.
- A second area in which the FCC TCP methodology uses price data to estimate cost elements is for the national extension where the **price of a national telephone call** is used. The methodology takes first the distribution of incoming calls from the United States to different parts of each country and then calculates the weighted average of distance from the international gateway(s) that each call would travel before assigning a price based on the domestic tariff schedule. The use of call data from the United States introduces an element of bias into the calculations in that the calls would tend to be more oriented towards the capital city of the terminating country than would, say, calls from bordering countries. Also, because some of the traffic from the US is likely to call-back traffic, this may tend to bias the traffic data against those parts of the foreign country where call-back service is unavailable. Thus the US data produces a high percentage of calls that stay within the local call zone of the international gateway, as high as 80 per cent of all incoming traffic in the cited example of Argentina. Local call prices frequently bears little relation to actual costs (see Figure 2), especially where there is political pressure to keep local call prices low. A further problem arises in those countries which have free or unmetered domestic calls such as Hongkong SAR, Kuwait or Barbados where the national extension component is inaccurately estimated in the FCC methodology to be zero (ignoring the fact that the price of these calls is embedded in the monthly subscription charge). The FCC results show an average national extension charge of 9.03 US cents (SDR 0.0068) per minute with a range between zero in countries with "free" domestic calls and 25.3 US cents (SDR 0.189) per minute in Russia.
- The third area in which the FCC TCP methodology uses a price surrogate is in attempting to estimate the international switching or gateway component by using the degree of **network digitisation** as a variable. The FCC methodology uses old data for the advanced industrialised nations of the TEUREM region and presumes that this data can be applied worldwide. Curiously though, instead of using actual digitisation

data (available, for instance, in the ITU’s World Telecommunication Indicators Database), the FCC study assumes that digitisation varies with level of economic development. The resulting figures range from 1.9 US cents (SDR 0.0014) per minute in high income countries, to 3.4 US cents (SDR 0.0025) per minute in middle income countries to 4.8 US cents (SDR 0.0036) per minute in low income countries. Methodologically speaking, this is the weakest of all the surrogates used in the FCC study.

- Finally, a further way of looking at costs is to examine the **investment cost required to add a new subscriber** to the network. This may be approximated by taking the total capital investment during the year of a particular country (or PTO) and dividing by the number of new subscribers added. The indicator can be modified to take into account that it costs less to add a subscriber to a mobile network than a fixed line one. This can at best be only a rough estimate because PTOs invest not only in expanding the network but also in modernising it. Nevertheless, the results are quite illuminating (see Figure 2). It appears that the costs of adding new subscribers are lowest in low and lower middle income groups, which are the economies in the full throes of network expansion, rather than in the LDCs (where unit purchases are too small to gain economies of scale) or in OECD Member States where network modernisation is a more important cost than network expansion.

Figure 2: Local call charges (in SDRs per 3 minute call) and investment cost per subscriber added (in SDRs)

By income group



Note: In the left chart, local call charge is defined as the first three minutes of a call rather than the cost per minute multiplied by three. This is to take account of the fact that many PTOs charge a higher rate for the first minute and/or have a minimum call charge. In the right chart, investment per subscriber added is calculated as total capital investment during year divided by new fixed line subscribers plus new mobile subscribers divided by two (i.e., assuming it costs half as much to add a mobile subscriber as a fixed line subscriber).

Source: ITU World Telecommunication Indicators Database.

Table 2: Comparative Cost elements from ITU/CTO Country Case Studies (9); FCC TCPs for Asia-Pacific (15); and TAS Group-1998 survey (12) (in SDR per minute)

<i>Component</i>	<i>Range</i>	<i>Average</i>	<i>% of Total</i>
<u>1. Transmission</u>			
Case Studies (9-Global)	5.2 - 21.0	14.0	40.0%
FCC-TCPs (15-Asia-Pacific)	4.0 - 14.7	6.8	33%
TAS Group- 1998 Results (12-Asia-Pacific)	5.4 - 49.8	17.6	43.9%
<u>2. Switching</u>			
Case Studies (9-Global)	1.9 - 5.0	3.7	10.0%
FCC-TCPs (15-Asia-Oceania)	1.9 - 4.8	3.5	17.0%
TAS Group- 1998 Results (12-Asia-Oceania)	0.9 - 9.4	3.9	9.7%
<u>3. National Extension</u>			
Case Studies (9-Global)	3.1 - 26.0	17.8	50.0%
FCC-TCPs (15-Asia-Oceania)	0 - 23.9	9.9	50.0%
TAS Group- 1998 Results (12-Asia-Oceania)	5.4 - 32.8	18.6	46.4%
Total All Components	Range	Average	
Case Studies	13- 52	35.5	
FCC-TCPs	7 - 35.5	20.2	
TAS Group	17.5 - 120	40.1	

Note: Case studies and FCC data relate mainly to 1996; TAS data to 1997. Case studies data covers mainly LDCs and other developing countries; FCC and TAS data covers a range of countries at different levels of economic development.

Source: ITU TAS Group/Asia-Pacific regional office.

Usefulness of cost proxy approach

What conclusions can be drawn from the use of the cost proxies examined in this study?

1. The first is that, insofar as the proxies examined here do approximate to cost, then there must be a very wide variation in real costs. The data cited in the different contributions to the Focus Group, notably that from the TAS Group, shows a very wide range which is not at fully reflected in the range for either the averaged FCC benchmarks) which range from 15 to 23 US cents (0.112 - 0.172 SDR) per minute or in the average case study cost elements, which range from 30-38 US cents (0.225 - 0.285 SDR) per minute. It is of course possible that the actual range in costs is not so wide, as argued, for instance, in contribution 23. In that case, it would be necessary to devise a better set of cost proxies than is available to date.
2. The second conclusion is that cost proxies for international transmission appear to be more reliable than cost proxies for national extension or international switching. That is because the prices charged for international service tend to be more directly related to the cost of delivering a particular volume of traffic (minutes, per destination, per year) rather than to a “negotiated” or “politically-sensitive” price, such as that for local calls or national interconnect.
3. A third conclusion is that volume of traffic is a more significant element in determining termination costs than either geographical distance or level of network modernity. This factor is insufficiently treated in the FCC study which excludes low-traffic economies. For international transmission in particular, there are serious cost efficiencies to be gained from having access to, and sufficient traffic to justify, a high bandwidth connection, such as a 155 Mbit/s cable. However, unit costs rise steeply as the volume of traffic on a particular connection falls. Low volume routes, using say a fractional 64 kbit/s line, are likely to be the highest in cost.

The overall conclusion to be drawn therefore is that cost proxies, based on circuit costs or leased line prices, may represent an adequate and sufficient approximation to transit costs, especially where the transit carrier is able to aggregate traffic from several different sources. However, for the purposes of the Focus Group, it will be necessary to graduate target transit charges according to the volume of traffic on a particular route. For international switching and national extension costs, the cost proxies submitted thus far to the Focus Group, based on price data, interconnection charges or levels of digitisation do not adequately reflect cost structures, and in some cases may be seriously misleading. For this reason, for international switching and national extension it would be better either to develop more accurate cost methodologies, such as those used in the TAS methodology, or to seek an alternative approach to establishing target rates, perhaps based on best practices within defined country groupings as called for in contributions 15, 18 and 20/21. Best practices is, itself, a form of proxy for costs, but appears to be more reliable as an indicator of real, underlying cost differences than price data.