

## METHODOLOGICAL NOTE ON TRANSIT RATES

*Contribution to the SG3 Focus Group from the ITU Secretariat, 12 August 1998*

### Why are transit rates important?

The Chairman's working document (revised, 12<sup>th</sup> June 1998) for the work of the Focus Group on accounting rate reform sets out four main tasks to be undertaken by the Group, the first of which is:

*“to develop a set of figures for direct and transit relations which may take the form of target rates (expressed in fractions of an SDR per minute) or targets for staged reductions (expressed in percentage change per year)”*

To date, most of the contributions to the Focus Group have concentrated on direct relations. However, transit relations are also very important, particularly for developing countries and for small or land-locked economies. For instance, while for the United States, transit traffic (568 million minutes in 1996) represents only around 2 per cent of total in/out traffic, it represents a much higher proportion in developing regions such as Africa, where transit traffic originated in the region and passing through the United States represents 36 per cent of total traffic to the United States, or for the Arab States where transit traffic to the United States represents 27 per cent of the total. Among the nine case study countries, transit traffic is particularly high in Lesotho, where the vast majority of traffic to carriers other than Telkom South Africa or BT (of the UK) is transit traffic. Lesotho's transit payments are so high that the country maintains a settlement payment deficit with the rest of the world. Similarly, in Samoa, direct relations (via satellite) are available with only six other nations. All other destinations are served from Samoa by transit relations.

The indications are that transit is likely to become more important in future years. This is not for reasons of technology or capacity limitations; if anything the increase in the number and coverage of submarine cables and telecommunication satellites should increase the scope for direct relations between countries. Rather it is due to factors which are related primarily to the economics of the international transmission industry:

- **Economies of scale** mean that unit costs are much lower on high bandwidth routes (“thick routes”), which sustain a high volume of traffic, than on “thin routes”. As the data on submarine cable costs (submitted in contribution 7 from AT&T) show, where 155 Mbit/s fibre cables are available, point-to-point capacity should cost as little as 0.1 US cents (SDR 0.0007) per minute to provide. Such economies of scale are not available on routes where the traffic is sufficient to support only, say, a 256 kbit/s line. Consequently, traffic will tend to gravitate to thick routes.
- Whereas transit has traditionally been a business of necessity, providing a link between countries with no direct relation, it is increasingly being seen as a business opportunity for international infrastructure owners as they attempt to become **hubs**, competing for traffic by offering refile services or low-cost transit capacity. Such hubbing arrangements will increasingly draw traffic away from direct relations, especially where settlement rates remain high.
- Similarly, as international telephone service providers form **alliances** with each other (recent examples include AT&T/BT, MCI/WorldCom, GlobalOne, UniSource, Cable & Wireless Federation etc.,) they are increasingly able to act as carriers' carriers and provide a one-stop-shopping service for small operators unable to negotiate their own bilateral arrangements with the 500 or so other international carriers around the world.
- In the longer term, the **Internet** may become the medium of choice for much of the world's telecommunication traffic, especially if international settlement rates are not quickly reduced towards cost. On the Internet, virtually all traffic is conveyed as a form of transit traffic. That is because, *via* the Internet, multiple networks, few of which would have direct correspondent relations, co-operate to carry a particular message, on a “best efforts” basis.

Indeed if the Internet is, as some commentators claim, a precursor to the future public telecommunication network, then we can expect most future messages to pass through an average of between 15 to 30 “hops” before reaching their destinations. In such a business, “transit” and “peering” might effectively replace direct correspondent relations.

### Transit arrangements as a political issue

Transit arrangements have long been a political issue. Where two countries have no political relations, a transit partner is necessary to convey traffic. But beyond that, transit has become a political issue because the providers of transit services tend to be the large multinational telephone service providers (AT&T, BT, KDD, TeleGlobe, Hong Kong Telecom etc.,) whereas the customers tend to be operators in developing countries. In many cases, today's transit arrangements mirror colonial relationships of former times. For instance, Cable & Wireless, FCR and CPRM still provide transit services for former colonies of Britain, France and Portugal respectively.

In discussions over transit, the positions adopted by operators of the developed North and the developing South are often the reverse of the positions adopted over settlement rates. For instance, countries of the North which are net exporters of telephone traffic have adopted a position of wanting to see settlement rates reduced towards costs, in a

transparent, non-discriminatory and cost-oriented environment. In the case of transit relations, it is the countries of the South which are pushing for lower rates, and the operators of the North which are resisting the call.

Opinion B of the World Telecommunication Policy Forum called upon Member States and Sector Members in both developing and developed countries,

*“to mitigate the effects of settlement rate reform on developing countries, and in particular on the least developed countries, inter alia by encouraging competition for transit traffic and a substantial reduction in transit rates as a result of the significant decrease in accounting rates”*

and

*“to apply to transit rates the principles of transparency, non-discrimination and cost orientation in all situations in which the transit service provider holds a dominant position”.*

If implemented, these moves would go a long way towards ensuring that transit rates are not a source of friction between the developing South and the developed North. However, as shown below, the signs are not currently hopeful.

### **Published rates, official rates and shadow rates**

The publication of accounting rates, by countries such as the United States, United Kingdom and New Zealand, has done much to demystify this arcane world and to promote transparency in negotiations. Publication of rates provides a scale of reference against which individual operators can compare their own rates. The increasing rate of decline in settlement rates since 1996 can be attributed, at least in part, to this greater openness. For transit rates however, there is no such transparency. No country obliges its operators to publish transit rates and few regulatory agencies even require operators to report transit rates. The FCC for instance, requires the reporting of transit minutes and transit payments but not transit rates. Furthermore, the FCC does not publish transit minutes by country, but only on a regional basis, to maintain carrier confidentiality.

One of the reasons for this lack of transparency is because there is frequently a difference between the apparent and actual transit rates (see Table 1). A transit carrier may agree one rate for a traffic stream with both origin and destination countries (the official rate) but actually charge a different, lower rate (shadow rate) to the origin country. On the face of it, this would seem to be a good system in that a lower price is charged to the sender without disadvantaging the receiver, and it certainly encourages loyalty among those that participate in it. However, this lack of transparency causes a number of problems:

- Because those operators that benefit from shadow rates are sworn to secrecy, there is little scope for creating a truly competitive market for transit. There are no published reference tables and it is not possible (formally at least) for an operator in one country to compare what operators in other countries are paying for a similar service. Transit contracts often have long-term lock-in clauses that discourage operators from shopping around for better offers.
- The lack of transparency creates a suitable environment in which bribery and corruption might be presumed to thrive. If one rate is published, but another rate is actually paid, there may be temptation for the officials involved to pocket at least a part of the apparent difference.
- Because only the transit operator knows the precise discounts offered to the origin and destination parties, there is scope for discriminatory treatment. One can imagine that the party offering the highest traffic stream, or the party operating in the more competitive market, might be offered a greater discount (i.e., a lower shadow rate) than the party offering the lower traffic stream, or operating in a more monopolistic environment. The former is likely to be a developed country, the latter a developing one. Similarly, a transit operator that has commercial links with one party (e.g., through a carriers' carrier alliance) might be expected to offer more preferential rates to that party. What this means, as illustrated in Table 1, is that the accounting rate is frequently not split on a 50:50 basis in switched transit relations.

### **Transit rates, and the honest broker's striptease**

The transit operator is supposed to act as an honest broker, serving the interests equally of the origin and destination operators. However, the lack of transparency which surrounds transit arrangements provides an incentive for the transit operator to relax some of the principles of cost-orientation, symmetry, non-discrimination and honesty. Among industry insiders, it is common knowledge that the official rates for transit rarely correspond to the rates actually paid. The examples in Table 1 and Figure 1 illustrate this. The Table shows five hypothetical cases in which principles of symmetry, non-discrimination and agreed routing are progressively relaxed without altering the actual settlement rate between A and B.

**Table 1: Hypothetical cases of transit routing**

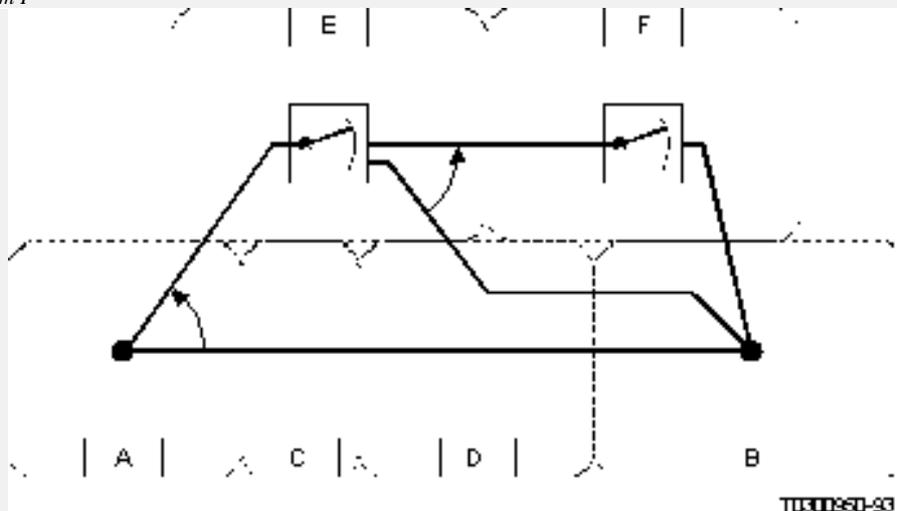
In each case, the accounting rate for traffic between A and B is set at 0.8 SDR

Description	Share of operators in country A	Share of transit operator (s)	Share of operator in country B	Comments
1. In the case of <b>direct transit</b> , the cost of facilities used in countries C and D (presumably leased circuits) would simply be deducted from the total revenue raised on the bilateral traffic stream.	0.40 SDR minus 50% of shared transit costs	Flat rate, based on cost of facilities	0.40 SDR minus 50% of shared transit costs	Symmetrical relation, based on flat rate fee
2. In the case of <b>switched transit</b> , the "Administration of the first transit exchange", (i.e., operator E) would quote an official rate to operator B for handling operator A's traffic. Suppose this official rate is 0.20 SDR; then the destination country would receive 50 per cent of the remaining accounting rate (i.e., 0.30 SDR) in settlement payment for every minute of traffic landed.	0.30 SDR	0.20 SDR	0.30 SDR	Symmetrical relation based on unit cost fee. Transit operator E would settle separately with any other operators (such as F) whose facilities are used as part of the transit arrangement.
3. The transit operator may not charge the official rate (i.e. 0.2 SDR) from A but may actually charge a <b>shadow rate</b> , say with a 50% discount.	0.40 SDR (i.e. 0.30 plus 0.10)	0.10 SDR (i.e., 0.20 minus 0.10)	0.30 SDR	Asymmetric relation, Operator B is not aware of the discount offered to A by the transit operator.
4. The transit operator may offer an even lower shadow rate to B, say a 75% discount, for its traffic to A.	0.30 SDR	0.05 SDR (i.e., 0.20 minus 0.15)	0.45 SDR (i.e. 0.3 plus 0.15)	Asymmetric relation with <b>discrimination</b> by transit operator.
5. Transit operator negotiates a settlement rate of 0.10 SDR with B and <b>refiles</b> traffic coming from A and disguises it as its own traffic to B.	0.40 SDR (i.e. 0.30 plus 0.10)	0.30 SDR (i.e., 0.10 transit plus 0.20 profit)	0.10 SDR	Asymmetric relation in which B is ignorant of actual traffic origin.

Source: ITU.

**Figure 1: Hypothetical example of transit relations**

For traffic routed from an origin (A) to a destination (B) via either a direct transit relation (C and D) or a switched transit relation (E) which may also use facilities from F



Source: ITU-T Recommendation D.150.

### Data analysis (1): ITU Regional Tariff Groups

As noted above, there is little published data on transit rates and even that which is available is not necessarily reliable because of the practice of maintaining official and shadow rates. Three of the regional tariff groups, TAF<sup>1</sup> (Africa) TAL<sup>2</sup> (Latin America) and TAS<sup>3</sup> (Asia-Pacific) carry out regular inquiries into accounting and transit rates.

<sup>1</sup> The latest TAF study, with data for 1995 and 1996, which was discussed at the meeting held in Harare, 18-20 February 1998, is available on the ITU website at: [http://web.itu.ch/itudoc/itu-t/taf/reports/r002\\_46365.html](http://web.itu.ch/itudoc/itu-t/taf/reports/r002_46365.html). <http://www.itu.int>.

The data from the latest TAF study is summarised in Table 1. What this data shows is that the average transit share for Africa (0.337 SDR, or 45 US cents per minute in 1996) is very high, especially when one considers that the FCC benchmarks for the region are between 0.14 and 0.17 SDR per minute (19-23 US cents). If these benchmarks were imposed without a significant reduction in transit rates, then actual settlement rates would be negative. The likelihood of a significant reduction in transit rates seems low. Of the nine countries in the sample with transit relations, only three changed between 1995 and 1996: two down and one up. Transit shares fell at a much slower rate between 1995 and 1996 (average -3.2%) than either non-Africa accounting rates (-6.4%) or collection charges (-9.0%). The price rigidity or “stickiness” induced by transit relations is confirmed by the fact that the four countries in the sample without significant transit relations were able to reduce both their non-Africa accounting rates (-9.4%) and their collection charges (-10.9%) by a more significant amount than those countries with transit relations.

**Table 1: Average transit shares, non-Africa accounting rates and collection charges, for a sample of thirteen sub-Saharan African countries, with and without transit relations**

*Figures are shown in SDR per minute. Non-weighted averages are used*

<u>Nine countries with transit relations</u>			
<i>Year</i>	<i>Average transit share</i>	<i>Average non-Africa accounting rate</i>	<i>Average non-Africa collection charge</i>
1995	0.348	1.428	2.119
1996	0.337	1.337	1.929
% change, 95-96	-3.2%	-6.4%	-9.0%
<u>Four countries without transit relations</u>			
<i>Year</i>	<i>Average transit share</i>	<i>Average non-Africa accounting rate</i>	<i>Average non-Africa collection charge</i>
1995	n.a.	1.358	1.895
1996	n.a.	1.230	1.688
% change, 95-96	n.a.	-9.4%	-10.9%

*Note:* The numbers vary slightly from those recorded in the TAF study as the averages have been recalculated.

*Source:* TAF inquiry into accounting rates and collection charges, 1998.

The results for the Latin America region are even more discouraging. Although they are based on a smaller sample size (4 countries) they represent countries with a much greater traffic stream. Nevertheless, the average 1997 transit share of 0.345 SDR (46 US cents per minute) is actually higher than in the Africa region, having *risen* by almost 8 per cent since 1996. Outgoing international traffic fell in both countries with transit relations in 1997, despite a cut in collection charges of almost 40 per cent. The result is that the incumbent operators in the two countries concerned, which are not necessarily atypical of the region, are being squeezed between higher transit charges and lower settlement and collection charges. In both cases their net international revenue (collection charges plus net settlement minus transit share) fell in 1997. For one country, this drop was almost US\$50 million, or some 36 per cent of total international revenue.

<sup>2</sup> The latest TAL study, with data for 1996 and 1997, which was discussed at a meeting in held in Geneva, 1-2 June 1998, is available: <http://web.itu.ch/itudoc/itu-t/tal/dcontr.html>.

<sup>3</sup> The TAS study on the costs of inward IDD services, which was discussed at a meeting held in Male 17-20 May 1998, is available from the ITU website at: [http://www.itu.int/itudoc/itu-t/tas/dc-may98/1\\_46445.html](http://www.itu.int/itudoc/itu-t/tas/dc-may98/1_46445.html).

**Table 2: Average transit shares, non-Latin-America (TAL) accounting rates and collection charges, for a sample of four Latin American African countries, with and without transit relations**

*Figures are shown in SDR per minute. Non-weighted averages are used*

<u>Two countries with transit relations</u>			
<i>Year</i>	<i>Average transit share</i>	<i>Average non-TAL accounting rate</i>	<i>Average non-TAL collection charge</i>
1996	0.320	1.775	2.255
1997	0.345	1.355	1.385
% change, 96-97	7.8%	-23.7%	-38.6%
<u>Two countries without transit relations</u>			
<i>Year</i>	<i>Average transit share</i>	<i>Average non-TAL accounting rate</i>	<i>Average non-TAL collection charge</i>
1996	n.a.	1.145	1.855
1997	n.a.	0.990	1.715
% change, 96-97	n.a.	-13.5%	-7.5%

*Note:* The numbers vary slightly from those recorded in the TAL study as the averages have been recalculated.

*Source:* TAL inquiry into accounting rates and collection charges, 1998.

The TAS Group does not publish specific transit share data as part of its cost study. Nevertheless it publishes actual rates and target costs for inward IDD services for both direct and switched transit routes. For long distance relations (greater than 6'000 km), the actual reported non-weighted target rate for transit relations is 0.940 SDR (US\$1.25) per minute and for direct relations it is 0.647 SDR (86 US cents). The approximate level of the transit share can be calculated by subtracting one from the other and multiplying by two (because the TAS cost methodology takes into account only half the transit rate). This would imply that the full transit cost would be 0.586 SDR (78 US cents) per minute. Using the same methodology, the calculated transit cost for short relations (less than 3'000 km) would be 0.608 SDR (81 US cents) per minute and for intermediate relations (3-6'000 km) it would be 0.454 SDR (61 US cents) per minute. These data imply no obvious relationship between transit costs and distance. The transit relations for this part of the world appear much higher than the other two regions which is consistent with the very low traffic streams generated from those Pacific islands which are the main transit users in the region. A series of mini case studies of international services in four Pacific islands, commissioned by the ITU in July 1998, should generate more data for this region.

### **Data analysis (2): US carrier data**

The data reported by the regional tariff groups is useful and highlights the high prices charged for transit and are a long-way removed from underlying costs, as well as the price rigidity of transit charges which, in some cases, appear to be rising rather than falling. The difficulty remains though that the transit charges reported in the regional tariff studies may represent the "official" rate rather than the "shadow" rate which is actually charged. One way around this problem is to use data on revenue derived from transit services by US carriers, reported by the FCC, for different regions. Using the methodology (retained revenue reported, divided by minutes of transit traffic carried), it is possible to derive an estimate of how much is actually paid per transit minute. This estimate could be expected to be lower than the costs reported by the regional tariff groups because it is based on shadow rates not official rates and because the United States may be only one of several transit carriers on a particular route.

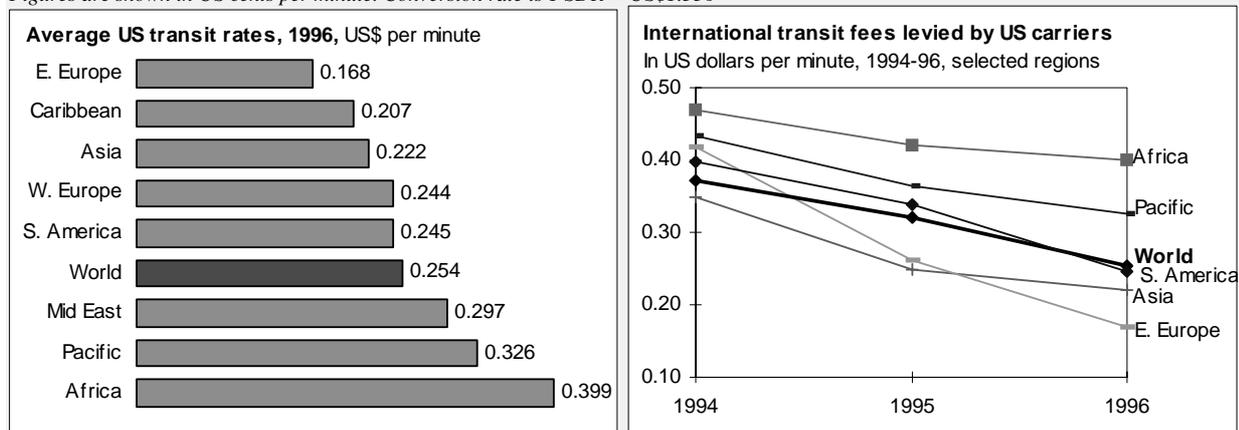
Nevertheless, the results confirm that transit charges are indeed very high. In 1996, the global average transit rate paid to the US carriers was 25 US cents (0.187 SDR) per minute with a range between 17 US cents (0.126 SDR) per minute in Central and Eastern Europe and 40 cents (0.299 SDR) per minute in Africa. The case of Eastern Europe is interesting because this used to be one of the more expensive transit routes with costs as high as 42 US cents (0.312 SDR) per minute in 1994. The reduction in price, presumably caused by competition from transit carriers based elsewhere and from new facilities coming on stream, as well as driven by high demand in the region, means that transit traffic rose by 31 per cent in 1996 whereas in Africa, where transit rates remain stubbornly high, US transit traffic fell by 21 per cent. This would appear to confirm the price sensitivity of transit traffic. US carriers could gain a higher share of the market by lowering their prices.

However, while US transit rates are coming down (the average figure charged by US carriers fell from 37 cents per minute in 1994 to 25 cents in 1995) this rate of reduction is not as great as for settlement rates. Using the same methodology to calculate effective settlement rates for US traffic (i.e., dividing revenue by minutes) shows that settlement rates for outgoing US traffic have fallen from 92 cents per minute in 1994 to 43 cents per minute in 1996, a

fall of 31.6 per cent per year compared with a fall of just 17.4 per cent per year for transit charges. As a consequence, transit charges are rising as a proportion of overall settlement rates. It seems odd that US carriers, which are exerting pressure on their trading partners in international fora to move towards cost-oriented rates, are achieving much higher rates of reductions in settlement rates, over which they enjoy only shared control, than over transit rates, over which they have full control.

**Figure 2: Transit charge costs per minute, for US carriers, by region 1996, and trends 1994-96**

Figures are shown in US cents per minute. Conversion rate is 1 SDR = US\$1.336



Note: Unit costs per minute are calculated by dividing the revenue paid by foreign carriers, minus the revenue paid out to foreign carriers, by the minutes of traffic originating from each region.

Source: Adapted from FCC "Statistics of Common Carriers Yearbook", various years.

## Target rates for transit

One of the tasks of the Focus Group is to establish target rates (or rates of reduction) for transit charges. Given the lack of available data, the options for how this might be achieved are relatively few. It would not, for instance, be possible to establish rates of reduction without knowing the existing rates. Similarly, given the lack of data, it would not be possible to use "best practice" rates (except perhaps to use best practice settlement rates to put an upper limit on the maximum reasonable transit charge) or case study cost elements. Instead it would be necessary to use either a cost proxy or to designate a target rate that is acceptable to all parties. Here we use a mix of the two methodologies.

In order to make progress it is necessary to unbundle transit charges from settlement rates (not discussed here) and to establish separate target rates for each. To do this, it will be necessary to distinguish between the transit charge and the international transmission element of the settlement rate.

On the basis of the review of cost proxies presented in contribution 26 from the ITU Secretariat, it is possible to propose two alternative methodologies:

- A methodology based on a **cost methodology**, such as data on circuit costs. Data submitted by AT&T (contribution 7) show that the cost of ownership of a 64 kbit/s voice circuit is likely to be as low as 0.1 US cent (0.0007 SDR) per minute by the turn of the century for transit carriers with access to a 155 Mbit/s undersea cable. However, as not all carriers have direct access to such cables, these figures could be better used as lower limits rather than upper limits on transit target rates. A better alternative therefore would be to use INTELSAT satellite circuits which, because they reach virtually every part of the globe, are accessible to most countries via an Earth Station. INTELSAT's charges to its signatories (i.e., wholesale prices) range between US\$250 and US\$1'000 per month for a 64 kbit/s half circuit with a typical price being US\$315 per month. Assuming a usage efficiency of 18 per cent and a 4:1 compression ratio, this would suggest a typical price per minute of 1 US cent (0.007 SDR) per minute per half circuit. For higher circuit speeds, the unit cost would be considerably lower.
- A methodology based on a **cost proxy** such as leased line prices. To date, the only leased line data submitted to the Focus Group is that used by the FCC in their calculation of the Tariffed Component Prices (TCPs) for international transmission, which is somewhat different from transit rates. These range between US\$0.009 (0.007 SDR) per minute for Mexico and US\$0.255 (0.191 SDR) per minute for Kenya, based on similar assumptions to those noted above. A transit carrier would be unlikely to collect traffic from every single country but rather would establish regional hubs from which to source traffic. The lowest TCPs for different regions from the US are 5.2 US cents (0.039 SDR) for Africa (South Africa), 4.0 US cents (0.030 SDR) for Asia (Thailand), 0.9 US cents (0.007 SDR) for

Central America (Mexico), 2.9 cents (0.021 SDR) for both South America (Chile) and the Caribbean (Jamaica), and 2.4 cents (0.018 SDR) for Europe (UK).

In both approaches discussed above, it would be necessary to add also some consideration of **other costs** borne by the transit operator related to the switching infrastructure (e.g., a proportion of the cost of a satellite earth station and gateway switches) and possibly also an element of costs related to operation and maintenance. It would be reasonable to assume that the transit operator would use the same, or similar, facilities for carrying traffic to and from its own network and that the transit traffic of several different clients would share the same facilities. For that reason, the allowable elements would be expected to be much smaller than for terminating traffic. The only data submitted thus far to the Focus Group that would help with this would be the TCP (Tariffed Component Prices) methodology used by the FCC which estimates the cost per minute of switching incoming international traffic (in high income countries) as 1.9 US cents (SDR 0.0014) per minute. It would seem reasonable to add, say, one half of this to leased line prices as a cost proxy for transit switching.

On the basis of the analysis in this paper, it would seem better to base target rates for transit on the expected volume of traffic on a particular route (which approximates to line capacity) rather than on geographical distance. Thus, bearing in mind the discussion above on circuit costs and leased line prices, Table 3 proposes some upper limits for transit shares. These rates are consistent with best practice leased line prices plus an element of earth station and international gateway costs. They represent a generous margin over typical circuit costs.

**Table 3: Proposed target rates (upper limit) for transit charges on routes of varying traffic volume**

<i>Route minutes</i>	<i>Routes with up to 350'000 minutes per year</i>	<i>Routes with between 350'000 and 1.5 million minutes per year</i>	<i>Routes with &gt;1.5 million minutes per year</i>
<i>Typical circuit</i>	<i>64 kbit/s</i>	<i>256 kbit/s</i>	<i>1.5/2 Mbit/s</i>
Proposed target rate (upper limit) for transit charge, in SDRs (US cents) per minute	0.06 SDR (8.0 US cents)	0.05 SDR (6.7 US cents)	0.03 SDR (4.0 US cents)

*Note:* Estimates of line capacity are based on a 4:1 compression ratio (e.g., a 64 kbit/s line provides four voice circuits) and an 18% capacity utilisation.

*Source:* ITU Secretariat.

These proposed target rates are put forward for discussion within the Focus Group. Members of the Focus Group are invited to submit alternative proposals or additional data that will help in establishing target rates for transit charges.