INTERNATIONAL TELECOMMUNICATION UNION

CASE STUDY OF THE CHANGING INTERNATIONAL TELECOMMUNICATIONS ENVIRONMENT

THE BAHAMAS

FINAL REPORT

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AUTHOR'S NOTE

This is the Final Report of the ITU Case Study on the impact of changing international settlements policies on the telecommunications sector in the Bahamas. David N. Townsend & Associates, a telecommunications policy and economics consulting firm, based in the United States, have conducted this study. The principal study author is David N. Townsend.

Objectives and Methodology

The purpose of the study as originally stated reads: "to consider some of the developing countries likely to be the most vulnerable to changes in the international accounting rate system, to examine likely scenarios and to evaluate possible responses, both at the policy-making and commercial levels." To address these goals, we have conducted an in-depth analysis of the conditions of the Bahamas telecommunications industry, especially in international services. Using the information gained, we have constructed a series of economic models of industry costs, traffic, and revenues, which simulate the impact of changes to a wide range of variables, most importantly present and future settlement rates.

Acknowledgement

The author would like to thank the Bahamas Telecommunications Corporation (BaTelCo) for its vital assistance with the information gathering for this report. In particular, Ms. Faith Johnson offered exceptional support throughout the process. We would also like to thank Mr. Leander Bethel of BaTelCo for his assistance and support. The findings and analysis of this study are based upon the information provided by BaTelCo and other sources, but the study conclusions are those of DNTA only.

1 THE BAHAMAS: OVERVIEW

1.1 Geography, Population, Government

Although small in size, population, and economic influence, the nation of the Bahamas bears at least one unique distinction in the Western Hemisphere: its small island of San Salvador was so named by the explorer Christopher Columbus, as it was his (and Europe's) first landing point in the New World. Today, the Bahamas, an archipelago nation consisting of some 700 islands, only 30 of which are populated, is reputedly the most popular tourist destination among the nations of the Caribbean basin. It is situated closest of the Caribbean countries to the United States, with the nearest point only 50 miles off the coast of Florida. The two main islands of New Providence and Grand Bahama are home to the bulk of the population and of economic activity.

The population of the Bahamas is approximately 290,000, with an additional 25,000 or so tourists inhabiting the country at any given time (over 3-million total tourists annually). The permanent population has been growing at a rate of about 2% per year since 1990. Some 67% of inhabitants live on New Providence, which has a population density of more than 2,000 persons per square mile. Another 16% reside on Grand Bahama; only 13 other islands have as many as 400 inhabitants.

The government of the Bahamas is a parliamentary democracy, and has remained politically stable for nearly three centuries, since British colonial authorities overcame the infamous Pirate clans that first controlled the islands. The country obtained independence from Great Britain in 1973, but remains a member of the Commonwealth. In recent years, the government of Prime Minister Hubert A. Ingraham has been pursuing policies of political decentralization and economic diversification.

1.2 Economy

The economy of the Bahamas consists of tourism, offshore banking, and then everything else. The economy as a whole is generally quite strong, especially among countries in the region, with a Gross Domestic Product in 1996 of US$3.5-billion, an increase of 2% from 1995, which translates into a GDP per capita of some $12,280. Fully 50% of GDP is directly or indirectly attributable to tourism, as is half of the islands' employment. Tourist expenditures grew nearly 8% in 1996 to $1.45-billion. In spite of the government's efforts to diversify the economy, this growth far outpaced the overall 2% growth rate for GDP.

Off-shore banking constitutes about another 8% to 10% of the Bahamian economy. There are some 425 banks registered to do business in the Bahamas, including branches of nearly every major international bank, especially from the United States. Their activities consist primarily of management of assets for non-resident, off-shore individuals and companies. The Bahamas strongly encourages this industry, with strict financial privacy laws (modified recently by new anti-laundering initiatives), and zero taxation on deposits and earnings. Because these offshore institutions deal entirely in foreign currency, they contribute some $267-million per year in foreign exchange to the Bahamas economy.

The largest source of private foreign investment in the Bahamas is in the tourist sector, specifically hotels and resorts, most of which are partly or wholly foreign owned and operated. The large new Freeport Container Port is also foreign owned. The Bahamas permits complete repatriation of all investments and profits by foreign investors.

The following statistics summarize the present economic condition of the Bahamas, and highlight the economy's relatively strong performance (the Bahamian dollar is at par with the US dollar):

Table 1.1: Economic Statistics of the Bahamas

	1996	1990
GDP (US$-mil.)	$3,500	$3,100
GDP per capita (US$)	$12,280	$12,245
National Debt (US$-mil.)	$1,543	n/a
Debt % of GDP	44.1%	n/a
Inflation	1.5%	4.7%
Unemployment	11.1%	n/a

Source: Various.

Bahamian national economic policies seek to emphasize the natural advantages and opportunities of the islands' position as an attractive destination for both tourists and foreign investors. The government levies no income or capital gains taxes either on citizens or foreigners with investments in the country. Property taxes are also relatively low (1%-2% of assessed value per year), although there is a stamp tax on property sales of up to 8%.

The low tax environment has led the government to rely primarily upon import and export duties as its main source of public revenues. These duties make up nearly 50% of the government budget, some $368-million in the present fiscal year. Import tariffs in particular are quite high, at 25%-35% on most imported items, and substantially higher on certain imports (for example, automobiles, with a 45% to 65% tariff). An additional 7% "stamp tax" is also levied on most imports. Although the government has exempted several categories of imports to encourage development of new industries, it fully intends to remain dependent upon import duties for public finance.

Because of its extensive reliance on import duties, the Bahamas is not a member of the World Trade Organization (WTO), which obligates members to reduce import tariffs to encourage trade. Similarly, the Bahamas has not joined the Caribbean Common Market. The Bahamas do, however, take advantage of duty-free import opportunities into other countries, including the United States (under the Caribbean Basin Initiative), Canada (under CaribCan), and the European Union (under the Lomé IV Convention). The Prime Minister has also expressed support for the proposed Free Trade Area of the Americas (FTAA), with a general commitment to simplify, but not substantially reduce or eliminate, many import tariffs with the region.

The Bahamas imports vastly more goods than it exports. In 1995, the figures were about $1.25-billion in imports, versus $180-million in exports. In both cases, the United States represents over 80% of the Bahamas international trade. Of the hard currency obtained through exports, net revenue from international settlements represents less than 2% of the annual total.

2 TELECOMMUNICATION POLICY AND NETWORK DEVELOPMENT

This section presents an overview of the telecommunications sector in the Bahamas, the government's policy and the industry's degree of development.

2.1 Telecommunications sector policy and regulation

2.1.1 Current regulatory framework

Telecommunications in the Bahamas began in 1892 with the connection of the first submarine cable from Florida in the United States, at what is still known as Cable Beach. The first manual exchange was installed in 1906; thus, international communication preceded domestic telephone service by some 12 years. Regulation and control of services came under the state Telegraph and Telephone Department (later Telecommunications Department), until the passage of the Telecommunications Act of 1966. This created a state-owned corporation, Bahamas Telecommunications Corporation or BaTelCo, which still operates as a quasi-public monopoly in most services today.

Although constituted as an operating company, BaTelCo also conducts the regulatory functions of the sector. These functions consist mainly of frequency management and licensing responsibilities, including assignment of frequencies, monitoring and inspection, and issuing of new radio licenses. Service development, investment, financial, and tariff decisions are made by the Board of Directors and General Manager, subject to approval by the Minister of Public Utilities.

BaTelCo holds a monopoly on the provision of basic domestic and international telephone services, as well as cellular telephony. Since 1993, there has been a gradual opening of certain non-basic markets, including Closed User Group data networks for international corporations, Internet access, paging services, and independent radio trunking systems. There are also 5 competing national radio broadcast stations, and an independent cable television franchise. In addition, there are no restrictions on the provision of Internet access, and there are currently two private providers in addition to BaTelCo's Internet services (see below).

The broadest experiment with market opening to date involves the market for paging services. Since license applications were invited beginning in 1993, there have been 7 paging licenses granted, and 2 special arrangements with partial foreign entity participation. The effect has been a 50% decline in prices, and a large increase in facility investments to improve service quality by BaTelCo, the former monopoly provider of paging services.

2.1.2 Recent and pending changes in sector regulation

Beyond the market changes since 1993 that have introduced limited competition to BaTelCo, the Bahamas government is moving to implement more comprehensive restructuring of the country's telecommunications industry. In particular, it announced in 1996 plans to privatize BaTelCo, by bringing in a strategic equity investor that would have a minority of shares, but management control. As of December 1997, the Minister of State for Public Enterprise, along with a privatization committee headed by the Governor of the Central Bank, were reported to be close to selecting a privatization advisor, with invitations for bids from foreign investors expected before the end of 1998. The government is also moving toward establishing an independent Public Utilities Commission, that would assume regulatory responsibilities currently exercised by BaTelCo. Details of the planned privatization processes have not yet been made public.

In spite of the fact that the Bahamas is not a member of the World Trade Organization, it did submit an informal "offer" last year with respect to WTO telecommunications reform mandates. However, despite the intentions to privatize BaTelCo and the liberalization of certain markets, there is no present plan to expand competition to include basic services or international services. BaTelCo and the government are looking into reforms in tariffs and accounting rates in response to pressures of globalization in the telecommunications market.

2.2 Telecommunications sector development

2.2.1 Network architecture and services

Telecommunications network infrastructure development in an archipelago presents unique challenges. This is especially true in a case such as the Bahamas, where the great bulk of the population is on only two islands, but service must be extended to at least a dozen others.

BaTelCo's network is based on New Providence, and forms an extended star architecture to Grand Bahama and the "Family" islands, as well as to international destinations. Each outer island is host to one or more small telephone exchange switches or nodes, with capacity of anywhere from 50 to 2,000 subscriber lines. In some cases, the geography of a given island dictates the use of numerous exchanges to serve a relatively small number of subscribers. On the island of Abaco, for example, there are 14 separate nodes serving about 5,000 telephone subscribers. In all, there are 62 such small exchange nodes on the family islands, with a combined total capacity of about 25,000 lines, currently serving some 17,000 subscribers. Obviously, this is not an architecture that would be employed in a landlocked country with a population of only 290,000.

The networks on Grand Bahama and New Providence are somewhat more conventional. The majority of subscribers (about 12,000) on Grand Bahama are served by one of two DMS100/200 exchanges, although there are a dozen other small nodes as well. On New Providence, there are four major DMS 100/200 exchanges, plus one 5ESS, serving about 67,000 subscribers. All exchanges in the Commonwealth of the Bahamas are digital.

The star configuration of the telephone network means that all inter-island calls must pass through one of the two "hubs" of Grand Bahama and New Providence. Each island has at least one tandem switch to transmit both inter-island and international traffic in the direction of the nearest hub. Calls are then routed to the destination island via tandem switch, or to the international gateway.

The following charts identify overall trends in network development, in both basic telephone access and other services:

Table: 2.1 Total telephone access lines, 1988-1997

1992	1993	1994	1995	1996	1997	CAGR
75'668	75'765	78'861	83'707	89'463	96'310	4.90%

Source: BaTelCo.

Table 2.2: Other service indicators

	1990	1997
Public payphones	560	2’000
Cellular mobile subscribers	1’920	5’700
Packet switched subscribers	30	31

Source: BaTelCo.

Domestic telephone traffic falls into two categories, intra-island and inter-island. A tariff of $0.40 per minute ($0.30 at night) applied to inter-island traffic, while there is no per-minute charge for calls within an island. In 1996, there were about 19-million minutes of domestic traffic in each category, yielding domestic revenue of about $6.9-million.

Finally, Internet access is provided by BaTelCo through its BaTelNet service, and by two other firms, and is fairly well developed in the country. BaTelNet is the most extensive, serving the two main islands of New Providence and Grand Bahama, plus Abaco and Eleuthera. One private company, Bahamas On-Line, utilizes leased fibre optic circuits and private international satellite links. The system provided by radio station Tribune/100 Jamz focuses on business clients, and has its own satellite downlink as well.

2.2.2 Financial indicators

The following data provide an overview of BaTelCo's recent financial position:

Table 2.3: BaTelCo tariffs and revenues

	Tariffs	Revenues ($M)		
		1994	1995	1996
Connection charges	$360.00	$1.31	$1.18	$1.61
Monthly subscription charges	$24.50	$2.62	$31.82	$33.16
Domestic long dist charges	$0.40	$8.63	$6.25	$6.90
International long dist charges		$67.56	$73.11	$79.48
Net settlement payments		$0.94	$2.45	$1.55
Mobile com services		$8.81	$7.83	$5.93
Data com services		$0.44	$0.31	$0.24
Leased line services		$3.08	$3.10	$2.96
Other revenue		$7.88	$10.10	$12.82
TOTAL REVENUE		$101.27	$136.15	$144.65

Source: BaTelCo.

International service tariffs vary widely. Total BaTelCo revenues have increased gradually, from about $100-million in 1990 to $145-million in 1996, an annual growth rate of about 7.5%. Revenues from outgoing international service make up more than 55% of BaTelCo's total income. Monthly subscription account for another 23% of revenues. Net international settlement revenues amount to only about 2%.

2.2.3 Development challenges and plans

By the standards of most developing countries, the Bahamas has already succeeded quite well in providing communications resources to a large portion of its population. The penetration rate of basic telephone service is just over 30 per 100 population, which is at the high end of developing countries. Nevertheless, BaTelCo has established a more ambitious objective of achieving near Universal Service (a telephone line in every household) over a 3-year period, for an anticipated investment of some $140-million.

There is a current waiting list of around 6,000. This is despite the fact that utilized network capacity system-wide is only about 70%; again, the topographic limitations of the islands makes it costly and difficult to serve many customers, even where exchange capacity is readily available.

As the chart above indicates, access line growth has accelerated in recent years, to an average of close to 7% per year; in 1997, BaTelCo added over 1,000 new lines per month. At this pace, both the outstanding waiting list and near Universal Service should be satisfied within the next few years.

2.2.4 International gateways

The two major international gateways are the Bahamas II undersea cable and an earth station link, which both link New Providence to all international destinations. In addition, a direct satellite link to Switzerland provides connectivity primarily between the large banking communities in both countries.

3 INTERNATIONAL TELECOMMUNICATIONS ENVIRONMENT

3.1 Regulatory status

International telecommunications services in the Bahamas are provided exclusively by BaTelCo, including both public switched services and private line services. There is no present option for competitive provision of international services, even through resale.

Call-back services have been illegal in the Bahamas since the 1993 amendments to the Telecommunications Act eliminated all loopholes. It is not known to what extent there may be circumvention of this ban, but the comparatively low tariffs for calls to the US ($0.80 peak) reduce the incentive to pursue this market. In addition, the Bahamas offers discounted international "800" service to the United States, and US carriers are permitted to provide country-direct service utilizing these special 800 numbers. However, as a large portion of international traffic originates in tourist locations, especially hotels and resorts, which impose substantial surcharges on BaTelCo tariffs, the effective market price paid by many users is much higher than the nominal tariff. Call-back services do not typically target tourist customers, however, and their illegal status would inhibit any operators from marketing to tourists via the normal channels.

In practical terms, the availability of local Internet access for sending electronic mail can serve as a close substitute for much voice (and even data) communication. Thus, users do not necessarily require voice-over-Internet capability to shift their communication habits significantly, in favour of this very low-cost alternative. Although there is no indication in the available data as to the impact such substitution may have had to date, as Internet access expands in hotels and other public areas, as well as among businesses and even Bahamian citizens, there could be a noticeable impact upon international voice traffic.

3.2 International traffic, tariffs, revenues, and settlements

International telephone communication for the Bahamas is overwhelmingly dominated by traffic with the United States, which makes up some 80% of incoming and outgoing minutes. Net revenues from international settlements worldwide constitute less than 5% of BaTelCo's total revenue. The surplus from the United States is the only substantial source of net income; with the rest of the world, on the whole, the Bahamas incurs a net deficit in international settlements, including a fairly large deficit with other Caribbean countries. International traffic has been growing rapidly in recent years, although net revenues from settlements have fluctuated up and down.

The following tables and graphs provide detail concerning the recent evolution of international telephone traffic, settlements, and revenues in the Bahamas, particularly in relation to those countries and regions with which it has the most correspondence. To maintain the confidentiality of BaTelCo information, the precise figures showing the amounts of revenues and traffic have largely not been included, but the range and relative magnitude of the trends can be clearly seen.

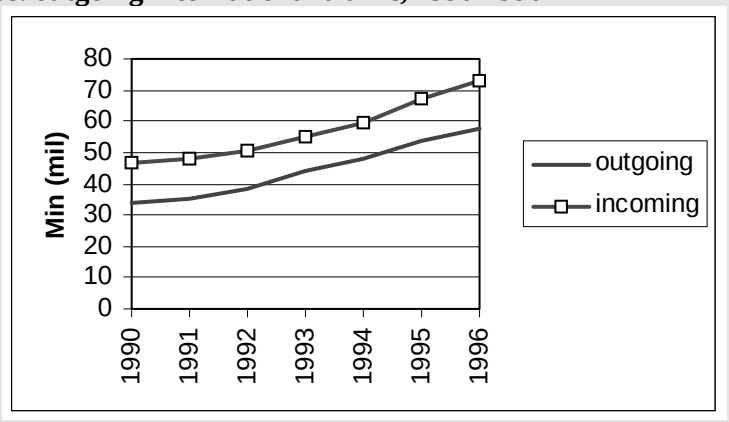
Table 3.1: International traffic growth

	1990	1991	1992	1993	1994	1995	1996
Incoming min (mil)	47.0	48.1	50.3	54.8	59.3	67.1	72.7
Outgoing min (mil)	34.1	35.0	38.2	44.2	47.9	53.8	57.3
Total min (mil)	81.1	83.0	88.4	99.0	107.1	120.9	130.0
% growth		2.3%	6.5%	12.0%	8.2%	12.9%	7.5%
access lines	69'936	78'722	75'668	76'765	78'861	83'707	89'463
min/line	1'160	1'055	1'169	1'290	1'358	1'445	1'453
% growth		-9.1%	10.8%	10.4%	5.3%	6.3%	0.6%

Source: BaTelCo.

International traffic has been increasing at a fairly steady pace in recent years, although as the table shows, traffic on a per-line basis has been growing more slowly, and hardly at all in 1996. This suggests that the majority of new lines added to the network tend to be lower users of international traffic. The main body of international users, especially at tourist locations and major businesses, has not generated as much demand for new access lines, and usage per line may be reaching a peak. It will be worth watching to see if this trend continues in the next few years, and also to ask whether the impact of price changes, and technological substitutes such as e-mail, contribute to this trend.

Figure 3.1: Incoming vs. outgoing international traffic, 1990-1996



Source: BaTelCo.

Figure 3.1 shows the relative trends in incoming and outgoing international traffic. In contrast to many developing countries where tariff differences and the effects of call-back are strong influences, the relative levels of traffic in each direction have remained very stable in the Bahamas. In fact, the gap has closed slightly, as 58% of traffic was incoming in 1990, compared with 56% 1996.

Traffic connecting with the United States represented 87.6% of all international traffic in 1996, a slight increase from the level of 86.3% in 1990, which is due to a doubling of traffic with Canada in that period. Outgoing traffic exceeds incoming by a wide margin for the Caribbean region as a whole (59% to 41%), and the same is true for the balance of other countries throughout the world (60% to 40%).

It is unclear to what extent incoming traffic from the U.S. and Canada may in fact represent "refile" traffic, which originated in other locations. Since these countries have comparatively very low settlement rates with the Bahamas, it could be in the interest of U.S. and Canadian carriers to transport Bahamas-bound traffic from elsewhere through their countries, and benefit from the lower settlement charges. This phenomenon, in particular, could partly explain the recent increase in Canadian-originated traffic. BaTelCo could not provide any specific information on this possibility, however.

Figure 3.2: Net settlement revenues, main locations, 1996

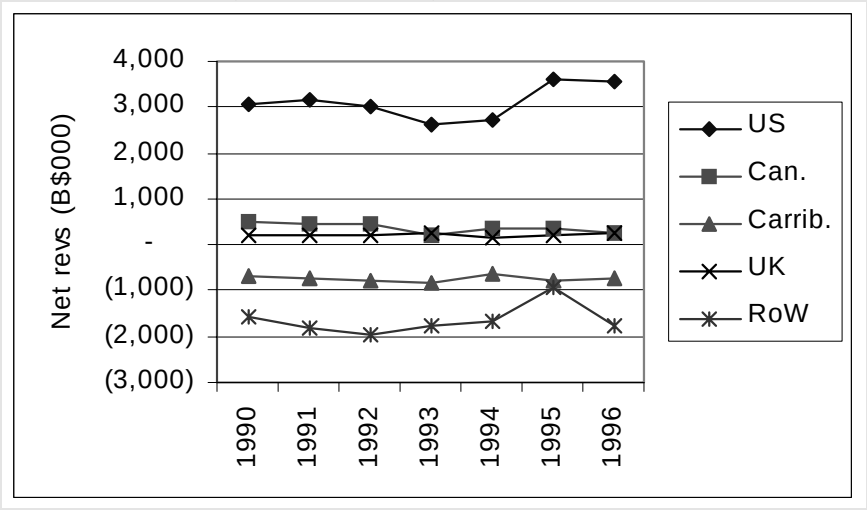


Figure 3.2 shows the source and relative magnitude of net international settlements revenues to BaTelCo. Clearly, the most significant income is from the United States, in the range of $3-million to $4-million per year. With the United Kingdom and Canada, there are small surpluses. With other Caribbean countries, the net deficit runs just under $1-million per year. For the rest of the world, the Bahamas incurs a further deficit of some $1.4-million as of 1996. In fact, this deficit grew in 1996 largely due to a change in net revenues from Europe outside of the United Kingdom, which declined by about $500,000, from a net surplus to a deficit.

Table 3.2: Combined net settlements revenues ($M)

1990	1991	1992	1993	1994	1995	1996
$1.46	$1.30	$0.91	$0.46	$0.94	$2.45	$1.55

Source: BaTelCo.

The combined net revenues that BaTelCo earns from international settlements has fluctuated during the past several years from below $1-million to almost $2.5-million, with significant variation (in percentage terms) in recent years. This amounts to about 1% to 2% of BaTelCo's total annual revenues. The 1996 amount of $1.51-million is slightly above the average level received during this period. If nothing else in the international settlements regime were to change, it is unclear whether this amount would be likely to increase or decrease in coming years, but the magnitude of change would not likely be more than $1-million in either direction, given the pattern.

Table 3.3: Tariffs, traffic, and settlements data for major regions

Country/Region	**BaTelCo tariff** *(peak/min)*	**Outgoing** *mins (mil)*	**Incoming** *mins (mil)*	**Settlement** *rate/min (avg)*	**Net settlement** *revs ($mil)*
USA	$0.80	45'579	61'378	$0.30	$3.55
United Kingdom	$2.75	1'679	2'489	$0.30	$0.26
Caribbean	$2.00	2'692	1'917	$0.79	($0.60)
Europe	$2.75	1'251	1'212	$0.87	($0.11)

Source: BaTelCo.

The most revealing aspect of the present tariff and settlement rate structure is the differential between settlement rates and BaTelCo call tariffs to most countries outside of the North American and Caribbean region. The most extreme example is the United Kingdom, with which the settlement rate is only $0.30 per minute, but the outgoing call tariff is $2.75 per minute. Thus, although BaTelCo only earned around $260,000 in settlement revenues from the United Kingdom, it took in about $5-million in tariff charges for outgoing calls to the United Kingdom, a figure that is growing. This pattern applies to many other countries as well.

4. COST EVALUATION OF INTERNATIONAL TELECOMMUNICATIONS SERVICES

The issue of costs of international telecommunications services is both complex and controversial, as there is no common agreement on either the theories or the methodologies for measuring the cost components that should be attributed to terminating international telephone traffic. Submitted separately with this report is an in-depth Review of Cost Issues in International Settlements, which both provides a discussion of some of the most important and controversial issues surrounding certain proposed cost methodologies (particularly that of the US Federal Communications Commission), and offers a framework for an alternative approach to developing costs to serve as a basis for future revisions to the international settlements regime. For purposes of this report, we summarize below the key elements and issues of the alternative methods and calculations, including the estimated results using the method proposed by DNTA in that paper.

Beyond methodology debates, the determination of international service costs is limited by the availability of reliable, detailed cost data, regardless of the method used to evaluate that data. Further, where certain cost data may be available, this information is among the most commercially sensitive to carriers such as BaTelCo, especially in an environment of emerging competitive forces. Consequently, the data and calculations presented below are in summary form, and provide a basis for understanding the relative magnitude of service costs, without necessarily quantifying specific facility cost inputs.

4.1 The ITU TAS methodology

The general framework for calculating international telephone service costs defined by ITU-T Recommendation D.140 has been widely accepted as a de facto standard, subject to interpretation mainly in terms of how to calculate its various elements. This approach begins by defining three basic groups of network components associated with international service:

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

The ITU recommends calculating both the direct costs of facilities in each group (e.g., earth stations, cable systems, international gateway exchanges and operations centres) required to provide international telephone service, as well as the indirect costs (administrative, overhead, etc.). For the first two components, this process simply involves allocating the total costs of these dedicated international facilities between “telephone” (i.e., switched voice service) uses, and other (e.g., dedicated line) uses.

The concept of the “national extension” is the source of most controversy, and subject to the widest range of interpretation. In principle, this element measures the cost required to transmit calls from the point at which they leave the international gateway, across the national and local network to the termination point. (In the case of outgoing international calls, it is the same cost, measured in the opposite direction.) Because the facilities involved are jointly used for all other national telephone traffic, and their costs may differ under alternative assumptions, it is problematic to define a single allocation formula or theory. This is especially true for the costs of the “local loop,” or customer access line, which are generally non-traffic sensitive (fixed) costs, and which have, in many countries, traditionally been greatly supported by revenues from usage-based services, including national and international long distance, and international settlement revenues.

The ITU methodology does not take a strong position on the means to calculate national extension costs for purposes of developing revised international settlement rates. It recommends including some unspecified allocation of costs for national exchanges and transmission facilities, and “if appropriate and identified under a bilateral or multilateral agreement, the local loop.” In one key situation, however, the ITU amplifies on this position: for countries where the international carrier is separate from the national or local carrier, and must itself pay an access charge for terminating international traffic, the ITU recommends that this access charge should be the basis for national extension costs allocated to settlements as well. This implicitly would include any universal service or local loop cost component included in such access charges.

4.2 The FCC "Tariffed Components Price" methodology

The FCC, in developing its "benchmark" rates for international settlements between United States carriers and other countries, follows the basic ITU framework, adopting estimation methods for costs of international transmission and switching, and for national extension. Rather than pursue bilateral settlement rate negotiations, however, utilizing the ITU proposed methodology and country-specific cost data and calculations, the FCC chose to develop worldwide average cost benchmarks, based not upon costs but principally upon tariffs for services in other countries.

This so-called "tariffed components price" (TCP) methodology is based upon several key simplifying assumptions. First, it assumes that tariffs for telephone services in the subject countries, on the whole, reasonably reflect the underlying costs of those services (indeed, the FCC asserts that such tariffs substantially overstate costs). Second, it assumes that the average of costs (or tariffs) for many different countries in different regions can be taken to represent a global target or "efficient" cost level, toward which all countries (within each of three income groups) should be expected to converge in an increasingly competitive market.

The elements of the FCC method as applied to each of the three components of international telephone service are summarized briefly below:

4.2.1 International transmission

For this component, the FCC assumes that the tariffs charged by a carrier for international private lines represent approximately the underlying costs of international transmission facilities, the same facilities required to provide the transmission component of switched international calls. The FCC's method makes simplifying assumptions for the number of equivalent circuits per 2.048 Mbit/s dedicated channel, and for the average minutes of international usage per derived channel, and calculates the equivalent "cost" per minute for switched transmission facilities.

Most debate over this method has focused on these simplifying assumptions, as the FCC used data from US based carriers to derive average capacity and usage levels per cable, without accounting for the possibility that other countries, particularly in the developing world, would exhibit lower utilization levels than in the United States The results of the FCC methodology range from 2.4¢ per minute to 25.5¢ per minute. The derived result for the Bahamas is 5.2¢ per minute.

4.2.2 International switching

For the international switching component, the FCC did not have access to "tariff" figures for services using equivalent facilities. It instead relies upon the switching cost component of the actual accounting rates used for traffic among the European group of TEUREM countries, as a proxy for the same component between the United States and the rest of the world. The only modification is to divide the world into categories according to the degree of digitalization of the network, assuming that switching costs are higher for less digitalized countries.

The use of TEUREM data has been criticized as being unrepresentative of the switching costs confronting countries elsewhere in the world, especially those with less access to hard currency and volume discount prices for switching equipment, among other disadvantages. The results of this method produce cost components ranging from 1.9¢ per minute to 4.8¢ per minute, with the Bahamas at the low end of 1.9¢ per minute.

4.2.3 National extension

The FCC's methodology for estimating national extension costs involves the most complicated of its calculations. Tariffs for domestic long distance and local calling are assumed, under this formula, to approximate (or even overstate) the relevant costs of those services. The FCC conducted an in-depth process of calculating weighted averages of incoming international traffic according to the distance the call

travels from the international gateway to its termination point, and applied the lowest related domestic tariff for calls of each distance within the sample traffic distribution.

This method has been the most criticized of the FCC's approach, for a variety of reasons. These include the fact that most domestic call tariffs do not generally cover the costs of service, and are instead typically subsidized by revenues from international service, among other things. The FCC also greatly oversimplified the actual application of domestic tariffs in many cases, including ignoring the role of monthly subscription charges in recovering local network costs. In the case of the Bahamas, for example, the fact that all intra-island calls do not carry a usage charge was ignored by the FCC method, so that only costs (tariffs) for inter-island calls would be reflected in the national extension component results.

This method explicitly seeks to eliminate any "subsidy" or universal service support component from the costs applied to national extension of international calls. This is the case even in countries in which national and international service are provided by separate carriers, where the international carrier must pay access charges to the domestic carrier that may include a universal service component.

The FCC method for this element yielded costs ranging from zero to 25.2¢ per minute. For the Bahamas, the result was 12.8¢ per minute.

4.2.4 Summary average "benchmark" costs

The combined average "benchmark costs" that the FCC has subsequently determined should be used as the basis for future settlement rates between US carriers and those in other countries, fall into three groups, according to degree of economic development. The overall figures are 15¢, 19¢, and 23¢ per minute, to be applied to all countries in each group, regardless of the individual costs calculated by the same method for any particular country. This application of average "costs" on a worldwide basis has also been widely criticized, irrespective of the validity of the component cost methods, as it would effectively impose the average cost upon those countries whose cost characteristics exceed the average. In the case of the Bahamas, the FCC would apply the combined average cost for "high income" countries (i.e., equivalent to France, Canada, Switzerland, etc.) which is 15¢ per minute. The actual combined "cost" calculated by the FCC for the Bahamas is 19.9¢ per minute, implying that, even accepting this method, the Bahamas would receive revenues that were 25% below its supposed costs for all terminating international traffic from the United States, if settlement rates were equal to the FCC proposed level.

4.3 DNTA methodology

In response to the evident shortcomings of the FCC methodology, and the fact that the ITU cost methodology does not materially address the costs of the national extension component, David N. Townsend & Associates (DNTA) have devised an alternative proposal for addressing the national extension cost component of international settlements. This methodology, and the rationale for it, is discussed at length in the separate paper on cost issues in international settlements. In summary, the proposed approach would recognize three elements of the costs of transmitting international calls through the domestic network:

1. Incremental national usage costs. This component is comparable to the treatment of costs for purely international switching and transmission facilities, basically following the ITU methodology. It assumes that each minute of use imposes the same incremental cost on the facilities that transport the call. Thus, the formula is to divide the total capital and operating costs of national trunks, tandem switches, and local switches by the combined total minutes of use throughout the network. This could be modified to apply separate local and trunk network costs.

2. Proportionate share of joint and common costs. This component addresses the capital and operating costs of jointly used facilities (principally the local loop) and common administrative and overhead expenses. All services share these functions, although their costs are fixed rather than usage-sensitive. The method first subtracts revenues from fixed monthly subscription charges from the total, recognizing that these charges directly recover fixed costs. The remaining unrecovered joint and common costs are

then divided by total minutes of use in the network to produce an equitable distribution of these costs across all usage services.

3. Contribution to infrastructure development. This component addresses the sources of investment financing for network development (as opposed to recurring capital costs associated with previous investments, which are included in the previous element). The objective is to identify forward-looking annual investment requirements, using some reasonable period and level of development. The model subtracts anticipated connection charge revenues from these costs, since connection charges directly pay for network growth, and then divides the remaining investment cost by total network minutes of use. This results in an equal degree of support for infrastructure development by all usage services.

This methodology seems to be a reasonable basis for determining appropriate and equitable forward-looking settlement charges, or perhaps terminating access charges, since the results are unlikely to be equal in both directions between two countries. The costs would change frequently as network costs and conditions change. Naturally, accurate calculation of the costs suggested by this methodology depends heavily upon reliable and detailed data for the international and especially national network costs of the operator(s) involved.

For this study, we have been able to produce a reasonable approximation of the cost components determined by this methodology for the Bahamas, which are presented in the next section.

4.4 BaTelCo costs

4.4.1 Overall operating results

Table 4.1 provides overall annual capital and operating costs for BaTelCo from 1990 to 1996, for all services. (This information was provided in aggregate form by BaTelCo, without further elaboration.)

Table 4.1: BaTelCo total costs, 1990-1996
($M)

	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Capital costs							
Depreciation	$20.00	$19.20	$18.20	$19.60	$19.30	$18.80	$19.10
Interest	$2.80	$2.50	$2.40	$2.10	$1.80	$1.80	$1.70
TOTAL	$22.80	$21.70	$20.60	$21.70	$21.10	$20.60	$20.80
Operating costs							
Overhead	$51.80	$57.60	$58.90	$59.10	$62.80	$67.70	$72.20
Administrative	$24.50	$30.70	$36.30	$34.30	$37.60	$33.90	$31.90
Other	$4.70	$7.10	$9.50	$8.70	$8.80	$10.20	$9.60
TOTAL	$81.00	$95.40	$104.70	$102.10	$109.20	$111.80	$113.70
TOTAL Costs	**$103.80**	**$117.10**	**$125.30**	**$123.80**	**$130.30**	**$132.40**	**$134.50**

Source: BaTelCo.

4.4.2 Range of costs for international traffic

To determine a useful overall per-minute "cost" to apply to international traffic for purposes of the analysis of this study, it is necessary to consider that the true result should fall within some range of reasonableness, with the precise value being virtually impossible to establish with any certainty. This requirement derives not only from the debates over different methodologies and assumptions, but also from the relative lack of detailed data on facility costs and operating costs. Moreover, costs are anything but fixed in a dynamic telecommunications network, and are in fact shifting regularly, especially where certain costs are dependent upon both domestic and international economic trends, such as exchange rates, inflation, labour costs, and so on.

We have therefore taken the available information, provided by BaTelCo, as well as that utilized by the FCC, and calculated a range of costs for the different components of international service in the Bahamas. The low end of this range would certainly be the FCC result, for many of the reasons mentioned above: its assumptions concerning each of the components appear to understate the actual costs that would be experienced in the Bahamas, most particularly the national extension element, since it excludes all costs of intra-island calls, which would comprise the majority of incoming international terminations. Thus, the floor cost for international traffic should be taken as the FCC's Bahamas-specific figure of 19.9¢ per minute.

To derive a further range from BaTelCo data on operating and investment costs unfortunately requires other simplifying assumptions not dissimilar to those employed by the FCC, although utilizing actual costs, rather than tariff data. The figures presented on the following page are derived from various (proprietary) BaTelCo data, and conform to the ITU and DNTA proposed methods for calculating appropriate international telephone service related costs. This calculation uses actual BaTelCo costs for 1996, proportionately allocated to telephone services as a category. As the model shows, costs are divided into three categories: incremental usage costs, proportionate share of joint and common costs, and support for infrastructure development.

Based upon these calculations, the incremental cost for both incoming and outgoing international traffic is some 26¢ per minute. This figure includes no allocation of joint and common costs at all. If an equal proportion of joint and common costs (less monthly subscription revenues) is allocated to all minutes of use in the network, the combined international usage cost becomes 50¢ per minute. The estimated annual allocation of forward-looking network investment costs (less connection charge revenues) is another 20¢ per minute, again assuming that all usage would equally contribute to such investments.

It is important to understand what these figures represent, and how they may relate to other cost calculations for international traffic. The 26 cent incremental cost figure is not dramatically different from the FCC's own calculation of 19.9 cents, and quite likely reflects realistic cost differences between the Bahamas and the simplifying and averaging assumptions utilized by the FCC methodology. For example, the FCC takes no account of the costs of local call terminations within New Providence, since there is no domestic tariff for such local calls. This factor alone arguably adds several cents per minute to the true incremental termination cost.

Beyond incremental costs, however, the 50 cent per minute figure is based, as discussed above, on an allocation of joint (loop) network and common (administrative) costs equally to all minutes of use of BaTelCo's services: local, inter-island, and international. This method results in a near 100% markup above incremental costs, simply because international traffic makes up such a large proportion (over 50%) of BaTelCo's total service. Of course, any allocation of joint and common costs is, by definition, essentially arbitrary. Our use of the 50 cent factor in the scenarios in the following section provides a real-world illustration of the present sources of contribution to joint and common costs from BaTelCo service revenues.

Where we identify a potential "deficit" from international traffic, either outgoing or incoming, we are referring to situations where revenues from a service fail to cover incremental plus allocated common costs. Such as result requires BaTelCo to make up the difference from other services disproportionately, possibly through tariff increases, at least in the short run.

Thus, the use of a "cost" figure of 50 cents per minute, while quite high in relation to the calculated incremental cost of international traffic, provides a realistic picture of the impact upon BaTelCo's financial position of changing revenue and pricing policies, relative to the current balance of revenues and contributions.

Table 4.2: DNTA Cost Model, Bahamas

Note: allocations to international, national, and local are based on relative traffic +
Facility inv. costs; model uses 1996 data
Switched service is 88.4% of total costs

	Annual Capital costs	Annual Operation + Maint. costs	Total
1. Incremental internat. + national usage cost			
International transm + switching ($M)	$4.86	$16.86	$21.72
National trunks ($M)	$0.65	$2.27	$2.92
Tandem switches ($M)	$0.07	$0.23	$0.29
Local switches ($M)	$4.14	$14.35	$18.49
Total ($M)	$9.71	$33.71	$43.42
/ minutes of use (mil)			168.6
= Cost/minute			$0.26
2. Proportionate share of joint, common costs			
Local loop ($M)	$8.27	$28.71	$36.98
Administration + commercial ($M)			$36.65
Total ($M)			$73.63
- subscription revenues ($M)			$33.16
= Net cost ($M)			$40.47
/ minutes of use (mil)			168.6
= Net cost/minute			$0.24
Total incremental usage + common cost/minute			$0.50
3. Contribution to infrastructure development (ceiling)			
Annual investment in network expansion ($M) (3-year plan, $140M)			$46.67
- connection charge revenues ($M) (per new line added)			$7.47
= Net cost ($M)			$39.20
/ minutes of use (mil) (projected future)			192.22
= Net cost/minute			$0.20
Total international cost/minute w-infrastructure support			$0.70

5 SCENARIOS FOR CHANGES IN THE INTERNATIONAL ACCOUNTING SYSTEM

This section presents a quantitative and qualitative analysis of the potential effects of alternative scenarios for changes in the present system of international telephone service accounting and settlements. The issues of greatest concern involve direct changes in the settlement rates themselves, and resulting impacts upon net revenues from settlements, as well as indirect impacts of concurrent market changes that relate to international settlements, such as outgoing call tariffs.

From the point of view of the Bahamas, as of the many other countries affected by these issues, the pertinent questions revolve around the ability of BaTelCo to continue to promote development of the country's telecommunications infrastructure, the potential for changes in the market structure, and also indirect effects upon the economy of the Bahamas in general.

To examine alternative scenarios, we have created a robust simulation model of the Bahamas telecommunications sector, particularly the international services market and basic infrastructure development. The model permits various assumptions concerning potential traffic growth along each major international route (inward and outward), as well as the level of settlement rates (or equivalent charges), outgoing call tariffs, cost levels and changes over time, and demand elasticity. By varying these assumptions under the following series of basic scenarios concerning international settlements policy, we can examine the range of likely impacts of the different options upon the key factors of revenues, and infrastructure development.

5.1 Baseline scenario: No changes in settlements policy

For each scenario examined in this section, we describe generally the assumptions that define the scenario, and the range of input variables used to measure potential impacts, including the most likely outcome for that scenario. All impacts of the scenarios are measured against a Baseline trend for revenues and network growth, which is the presumed set of results that would occur, over a 6-year period, in the absence of any material changes in international settlements policy. This Baseline scenario is described below.

Assumptions

All inputs and assumptions can be varied within the model to test the sensitivity of results. Most can also be varied separately for different countries or regions, for example, to assume different costs or traffic patterns for different locations. These assumptions were used as the starting point for the Baseline scenario, and for each alternative.

Traffic growth. Traffic is assumed to grow over time at a pace that is equal to the average growth rate over the previous 3 years. This applies to both incoming and outgoing traffic, with different growth rates for each of the countries and regions studied. The overall average growth rate is 11% per year for incoming traffic, and 10% for outgoing traffic.

Cost of international traffic. We use as the base the combined incremental cost and contribution determined by the DNTA method above, of $0.50 per minute. The same cost applies equally to all incoming and outgoing international minutes. This cost represents the incremental cost of international traffic, plus an equitable contribution to common costs, but no amount attributed to infrastructure development. Any surplus of revenues above this cost can thus theoretically be applied to network investment.

Cost and tariff changes. We assume a small decline in incremental usage costs over the study period, of 1% per year. We measure the impacts of greater cost reductions in the sensitivity analysis. For the Baseline, we assume that outgoing international call tariffs do not change to any other country. The weighted average BaTelCo call tariff for the entire world is $1.18 per minute.

Network development. Baseline network development is assumed to be dependent upon international revenue surpluses. We assume that new basic network investment would continue at the same pace as that estimated for 1997, subject to available funds. We recognize that network investment plans do not necessarily depend upon the immediate availability of surplus revenues to finance the full cost. However, we can assume that any reduction in profits would affect the operator's ability to finance growth either directly or indirectly, in comparison with the Baseline scenario level of expected growth.

Results

The Baseline results are shown below. The results are expressed in terms of several outputs, over time, including the following:

- net settlements revenues;
- international terminating surplus/deficit (i.e., the different between net settlement revenues and the calculated costs of all incoming traffic);
- international originating traffic revenues;
- international originating surplus (i.e., the difference between international originating traffic revenues and the calculated costs for all outgoing traffic);
- overall net international surplus/deficit, or "profit" (i.e., the difference between all revenues – settlements and call charges – and costs for all minutes: the sum of the previous two surplus/deficit figures);
- projected line growth that can be achieved from the available revenue surplus.

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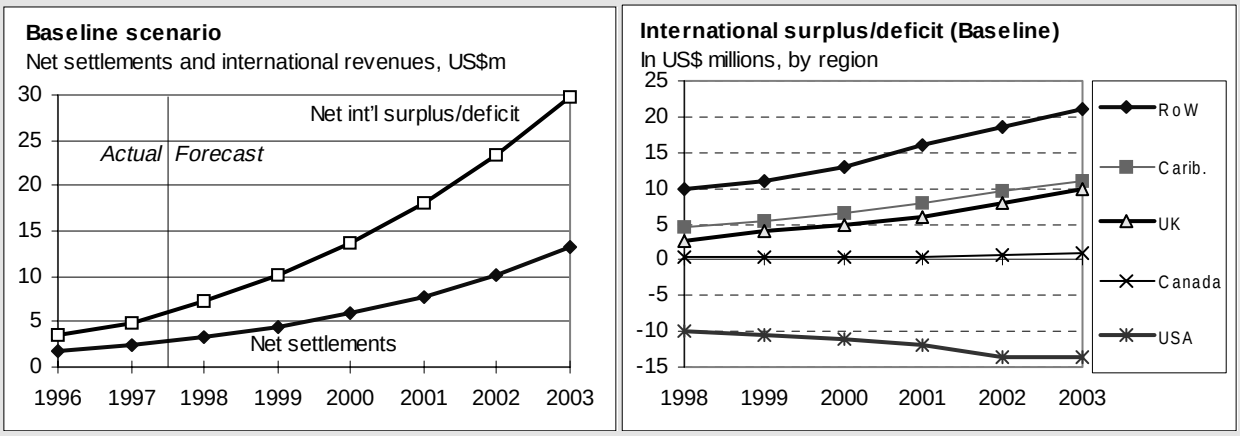
Table 5.1: Baseline results

	Base			Scenario 0: Baseline					
	1996	1997		1998	1999	2000	2001	2002	2003
Net settlmt revs (M)	$1.70	$2.38		$3.27	$4.40	$5.87	$7.74	$10.13	$13.17
Int. term surp/deficit (M)	($34.63)	($38.03)		($41.30)	($44.83)	($48.61)	($52.66)	($56.97)	($61.54)
Internat orig rev (M)	$66.72	$74.50		$82.99	$92.56	$103.36	$115.58	$129.41	$145.09
Int orig surp/deficit (M)	$38.05	$42.94		$48.57	$54.99	$62.31	$70.68	$80.26	$91.23
Net internat surp/def (M)	$3.42	$4.91		$7.27	$10.16	$13.70	$18.02	$23.29	$29.69

Line growth	5,756	6,152		3,304	4,619	6,152	6,152	6,152	6,152

Source: Case study.

Figure 5.1: Baseline Scenario, Net Settlement Payments and International Revenues, US $M
In total and by region, 1996-2003



Source: Case study.

Sensitivity

The above results are rather sensitive to changes in the assumed traffic growth rates. In recent years, although the United States still dominates international traffic, usage to and from other countries, including the Caribbean and most of Europe, has been growing much more rapidly that US traffic. For many countries, incoming traffic to the Bahamas has increased on average faster than outgoing traffic, although this trend somewhat reversed itself in 1996. If we assume that traffic growth slows, or shifts more toward outgoing calls, this can reduce the net revenues from international services significantly. This is due to the relatively high settlement rates between the Bahamas and most of the world; it is much less the case for the United States and Canada, where changes in the magnitude and direction of traffic growth do not greatly affect net revenues.

The results are also quite sensitive to changes in the base cost assumption, and to cost decreases over time. Utilizing the FCC cost estimate of 19.9¢ per minute directly increases net revenues by a proportionate amount, given that net revenues are simply gross revenues minus minutes times cost. With respect to future cost changes, a 1% per year decline in the international cost factor leads, after 6 years, to an increase of nearly 25% in the combined surplus, all other things equal. Similarly, a change of $0.01 in the per minute cost results in a 10% change in the net surplus at the end of 6 years. These strong impacts partly reflect the degree of traffic growth, since the cost figure is multiplied by total minutes, and thus higher traffic means higher costs (or savings).

Finally, the net revenue results are quite sensitive to the outgoing call tariff rates, especially those that are currently high, in the range of $2.75 per minute, which includes Europe, Asia, and South America. Even though calls made to these countries are relatively few compared with North America, the substantial profit margin above incremental cost that these prices reflect contributes the largest proportion of the net international service surplus. If the tariffs come down to an average of even $2.00 per minute, all other things equal, BaTelCo's international profits would be cut in half.

Analysis

The second graph above is quite revealing of some important aspects of international telephone service in the Bahamas today. According to our analysis, which identifies incremental international costs at $0.26 per minute, with an additional $0.24 for common cost contribution, international service between the Bahamas and the United States, incurs a net deficit already, of nearly $10-million per year. This is due to both the low effective settlement rate with the US (23¢ per minute on average), and the comparatively low tariff for outgoing calls to the United States (about 80¢ per minute on average). It is also a result of the relative balance of traffic in each direction. The Bahamas only obtains about $3.5-million in net settlement revenues from the United States, but the total incoming traffic is over 60-million minutes. At a cost of 50¢ per minute, that yields a deficit of almost $27-million per year on incoming US traffic.

Even using incremental costs of 26¢ per minute, or the lower FCC figure of 19.9¢ per minute, incoming US traffic still incurs a deficit for BaTelCo of at least $9-million. This loss must be made up through charges for outgoing calls to the United States, which also incur the same cost per minute. At the present tariff and traffic levels, such outgoing traffic produces about $45-million in revenues, which generates a small surplus over incremental cost, but does not allow this service to contribute proportionately to common costs, let alone network investment. Thus, when the fully allocated cost figure of 50¢ per minute is used, we see the above deficit for US traffic of $10-million per year, and rising.

For the rest of the world, BaTelCo on balance covers its incremental and common costs of international service, through the combination of settlement revenues and outgoing call charges. The surplus is entirely dependent, however, upon the outgoing call tariffs, as net settlement revenues in no case cover even the costs of incoming traffic. Again, this reflects the relative balance of traffic flows. Over time, the Baseline surpluses grow for all countries but the United States, because this scenario assumes that the much higher tariffs for outgoing calls to these countries will remain unchanged, and thus their combined margin above cost will grow as traffic increases.

The implications of this base level analysis are clear, and are further demonstrated by the alternative scenarios described below. Given the present approximate cost of originating and terminating international telephone traffic, and of BaTelCo joint (loop) network, and administrative and overhead costs, there is precious little room for reductions in either settlement rates or present international call tariffs. Of course, a rebalancing of domestic tariffs could have an effect, in particular an increase in the monthly subscription charge, to shift fixed costs more toward end users. We have not examined, however, the elasticity of demand or affordability of such a tariff increase for current subscribers.

5.2 Scenario 1: FCC benchmark policy

This scenario examines the estimated impact of reducing bilateral settlement rates to the level of 15¢ per minute as of Jan. 1, 2000, as contemplated by the FCC's benchmarking decision with respect to "high income" countries (actually, this rate might be imposed as early as 1999). This option can be generally considered in two ways: first, that the FCC policy would apply only to settlement rates between the Bahamas and the United States, and second, that settlement rates with all other countries would be reduced to the same 15¢ per minute level. Obviously, it is possible to test other settlement levels in between, which is principally the focus of the next scenario.

Assumptions

Settlement rates. The main assumption of this scenario is to move the settlement rate between the United States and the Bahamas to 15¢ per minute as of January 1, 2000. Initially, we retain settlement rates with other countries at their present levels, but we then examine the alternative hypothesis that all settlement rates would follow the FCC's lead.

Traffic growth. Basic traffic growth assumptions are the same as in the Baseline scenario, except that there is a presumption of some demand stimulation in relation to tariff reductions that may correlate with the settlement rate reductions. The initial stimulation effect is assumed to be small, but other assumptions are also examined.

Cost and tariff changes. We again use the Baseline fully allocated cost figure of 50¢ per minute, which is obviously higher than the proposed settlement rate. We examine the effects of using different cost assumptions. Also, this scenario assumes some degree of reductions in outgoing call tariffs in parallel with settlement rate reductions, and we also examine the sensitivity of this assumption.

Network development. Network development financing is again assumed to be directly or indirectly dependent upon profits from international services. We examine the decrease in such funding under each calculation of this scenario, and the change in the number of new lines that can be installed given the available revenue surplus.

Results

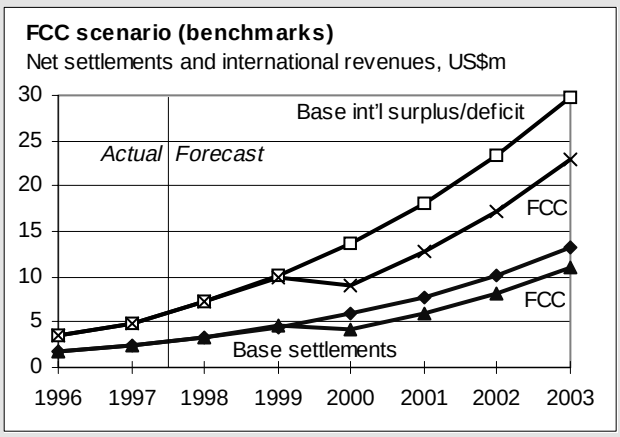
The results for the initial run of this scenario, using the assumptions described above (only changing the US settlement rate; small impacts of demand stimulation and tariff changes) are as follows:

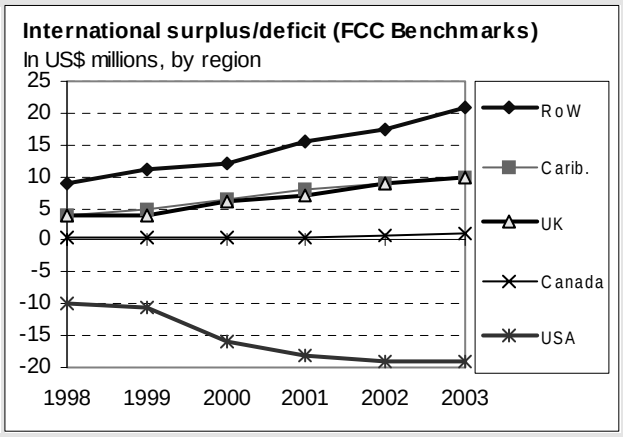
Table 5.2 : Scenario 1: FCC benchmark policy

	1998	1999	2000	2001	2002	2003
Net settlement revs (M)	$3.35	$4.59	$4.21	$5.96	$8.21	$11.11
Int. term surp/deficit (M)	($41.40)	($45.04)	($50.91)	($55.38)	($60.16)	($65.25)
Internat orig rev (M)	$82.99	$92.56	$100.99	$113.00	$126.60	$142.04
Int orig surp/deficit (M)	$48.57	$54.99	$59.93	$68.10	$77.46	$88.18
Net internat surp/def (M)	$7.17	$9.95	$9.02	$12.72	$17.30	$22.94
Change from Baseline (M)	($0.10)	($0.21)	($4.68)	($5.30)	($5.99)	($6.76)
Line growth	3,259	4,522	4,101	5,784	6,152	6,152
Change in line growth	(45)	(97)	(2,051)	(368)	0	0

Source: Case study.

Figure 5.2: FCC Benchmarks Scenario, Net Settlements and International Revenues, US$M
In total and by region, 1996-2003





Source: Case study.

Sensitivity

We first examine the impact of extending the FCC scenario to all countries with which the Bahamas corresponds. At the extreme, this implies a settlement rate of 15¢ per minute with all countries, while more modest options might assume higher rates with most countries (we assume Canada and the United Kingdom would also use the FCC rate). Varying this input obviously leads to lower net revenues; at the extreme, with all settlement rates at 15¢, BaTelCo's net revenues decline by some $15-million to $20-million per year.

A corollary alternative assumes that tariffs for outgoing calls would decline at a more rapid rate, keeping pace with the lower settlement rates. This is a critical assumption, as a reduction in BaTelCo tariffs to the United States of only 12% to 15% would roughly double the revenue net loss from international service. If even greater reductions occurred in BaTelCo's higher tariffs to other countries, combined with substantially lower settlement rates, BaTelCo's net revenues from international services would be negative.

This effect could be mitigated by two other trends: traffic stimulation and cost efficiency gains. For example, with low stimulation and cost reduction assumptions, BaTelCo would lose money on international service with settlement rates at 15¢, and a 50% reduction in its highest tariffs, especially to the United Kingdom and the Rest of the World. To return to today's approximate level of net earnings under these pricing assumptions, BaTelCo would have to achieve cost savings of about 3.5% per year (compounded). Alternatively, outgoing traffic would have to be stimulated about 10% above the Baseline trend by the price reductions (with no further stimulation of incoming traffic).

Analysis

The basic finding of this scenario is that, under present circumstances, the unilateral imposition of the FCC mandated settlement rate of $0.15 per minute would result in a reduction in BaTelCo revenues of about up to $25-million over the next 6 years. This would translate into slower network growth by some 2,500 lines during that period. These are not dramatically burdensome impacts, by themselves, which reflects the fact that both tariffs and settlement rates, as well as traffic imbalance, with the U.S are relatively modest already. The greater concern involves the general impact of changing market trends upon BaTelCo's financial position, which the FCC benchmark policy might be presumed to catalyze.

Because BaTelCo makes up for its deficit in incoming traffic by charging international tariffs that are several hundred percent above cost, it is highly susceptible to pressures that might force reductions in those tariffs. As noted above, cutting present call tariffs to places like Europe (typically $2.75 per minute) by 50%, combined with lower settlement rates, would be financially devastating to BaTelCo, unless one or more of three other changes also occurs: (i) significant efficiency-based cost reductions, (ii) major shifts in the balance of international traffic, and (iii) increases in domestic tariffs, such as monthly rent. Of the three, the most within the control of BaTelCo would be trying to reduce its own costs, as large local tariff increases might not be affordable to the public, and traffic patterns are subject to numerous influences. Some combination of these ameliorating factors would be required, however, in the event of large drops in both settlement rates and international call tariffs.

5.3 Scenario 2: Gradual reduction of settlement rates

This scenario is essentially a modification of the previous scenario, changing two principal parameters of the evolution of settlement rates: the pace at which they decline, and the end level at which they arrive. Rather than a short-term, drastic reduction to the rate levels proposed by the FCC, this scenario involves a more gradual decrease, with a higher (more cost-based) eventual settlement rate. Also, this scenario is applied to all regions initially, rather than only to the United States market.

Assumptions

Settlement rates. We assume that settlement rates with all countries decline by a fixed proportion each year, through 2002. At that point, the resulting rates should be equal to the identified cost of international service (which itself may decline over time). The initial cost/rate level toward which rates decline is about 47¢ per minute.

There is a problem with this assumption, however, with respect to those countries with which the present settlement rate is already below our initial identified cost (United States, Canada, and United Kingdom). For these countries, settlement rates would actually have to increase in the basic scenario, to reach the cost level. Instead, for this analysis, we assume a small annual reduction in rates of 5% to 10% per year, for these countries, reducing the eventual settlement rate to the FCC level of 15¢ by 2002. As an alternative, however, we also model the impact of in fact increasing these settlement rates to the identified cost (as well as alternative cost levels).

Traffic growth. We again use historical traffic growth trends to all regions as the starting point. We also assume traffic stimulation due to lower tariffs, this time in all directions. Stimulation is higher for countries with higher initial settlement rates.

Cost and tariff changes. Costs are assumed initially to remain the same, as with the other scenarios, but we test the impact of various cost efficiency gains over time. Tariffs for international traffic are assumed to decline more or less in parallel with the reduced settlement rates, so that outgoing international tariffs to all regions from the Bahamas decrease at least somewhat over time in this scenario.

Results

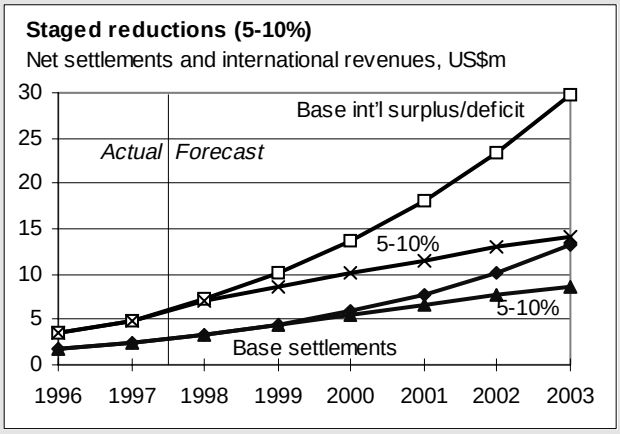
The results of the initial scenario, with reductions to cost to most of the world, and 5% to 10% annual reductions to the United States, Canada, and the United Kingdom, are as follows:

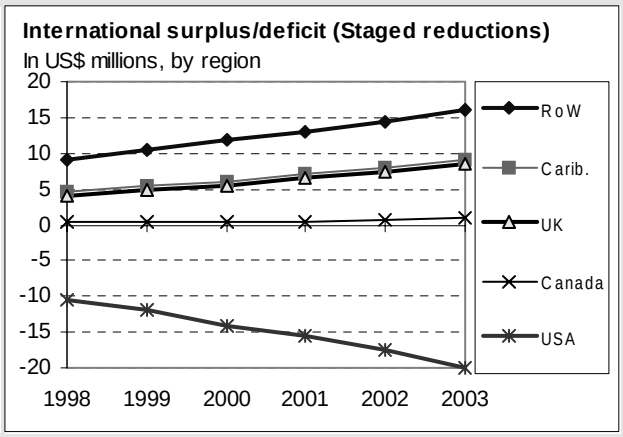
Table 5.3: Scenario 2: Gradual reductions

	1998	1999	2000	2001	2002	2003
Net settlmt revs (M)	$3.37	$4.40	$5.49	$6.61	$7.66	$8.55
Int. term surp/deficit (M)	($41.42)	($45.32)	($49.81)	($55.01)	($61.13)	($68.42)
Internat orig rev (M)	$82.99	$91.47	$100.93	$111.48	$123.29	$136.50
Int orig surp/deficit (M)	$48.57	$53.90	$59.88	$66.59	$74.14	$82.64
Net internat surp/def (M)	$7.15	$8.57	$10.07	$11.58	$13.01	$14.22
Change from Baseline (M)	($0.09)	($1.56)	($3.60)	($6.42)	($10.27)	($15.47)
Line growth	3,249	3,897	4,578	5,264	5,913	6,152
Change in line growth	(41)	(708)	(1,574)	(888)	(239)	0

Source: Case study.

Figure 5.3: Gradual Reductions Scenario, Net Settlements and International Revenues, US$M
In total and by region, 1996-2003





Source: Case study.

Sensitivity

These results exhibit the same sensitivities as for the previous scenario. If international service costs decline by 4.5% per year, the deficit with the United States would be eliminated by 2002, and the overall international surplus would become $38-million, an increase of $8-million over the Baseline. However, if tariffs for outgoing calls decline more substantially (e.g. by 50% over the study period), BaTelCo would require much greater cost savings, or revenues from rebalancing, totalling some $23-million annually, to avoid losses from international service. Demand stimulation from these lower tariffs could offset the losses somewhat; each 1% increase in projected worldwide calling demand yields about an extra $1-million in annual net revenues.

Analysis

The basic impact of this scenario is a reduction by 2002 of about $15-million in net international revenues, or about 50% versus the Baseline scenario. This is less favourable than the first scenario, but only because it applies settlement reductions to all countries, rather than just the United States For US traffic alone, gradual settlement reductions, combined with the assumptions about traffic stimulation and tariff changes, cause a revenue decline that is $6-million smaller than under the straight FCC scenario. Obviously, the many variations on this option make precise net revenue projections impossible, but the general conclusion is that BaTelCo would lose revenue, but not a great deal, with gradual settlement reductions.

Once again, however, we are faced with the sensitivity of the result to the outgoing call tariffs, upon which BaTelCo will increasingly depend if settlement revenues decrease. The impact would be less dramatic under this scenario, but could still cause fundamental disruption of the company's finances, if other revenue sources, or cost reductions, were not readily available.

5.4 Sender-keeps-all

This scenario involves a straightforward alternative to changing settlement rates: the elimination of such payments altogether. Each country's international operator would retain all revenues generated by callers within its territory, and pay nothing to terminate calls elsewhere. In principle, this option would assume that there would be a relative balance of traffic and costs in each direction among all countries, such that

reciprocal payments for bilateral traffic would be superfluous. In practice, this scenario is potentially more realistic for regional traffic than for global traffic, for example within the Caribbean region (it is already practised among Central American countries).

Assumptions

Settlement rates. For this scenario, we reduce settlement rates to all regions in equal proportions over the study period until arriving at a zero rate by 2002. We also measure the impact separately of eliminating settlement charges only among Caribbean countries (combined with various gradual reductions of rates to other regions).

Traffic growth. We assume in this scenario that elimination of settlement payments leads to lower call tariffs worldwide, and thus results in significant stimulation of incoming traffic. We assume much less stimulation in outgoing traffic, however, as tariff reductions are harder to implement domestically, due to the lost settlement revenues.

Cost and tariff changes. We retain costs the same for the initial run, then test efficiency gain levels. As for outgoing call tariffs, despite the theoretical removal of settlement charges, the only international tariffs that decline in this scenario are those for calls to countries with which the Bahamas today has a deficit of settlement payments. Other tariffs remain relatively high, as compensation for the lost settlement revenues. We test variations on this assumption.

Results

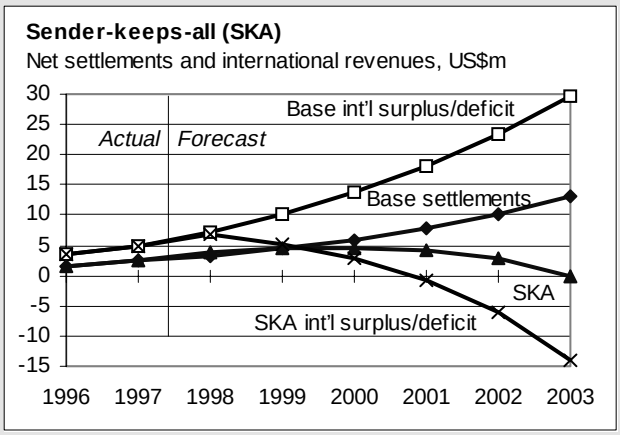
The results of the scenario of global elimination of settlement charges are illustrated below:

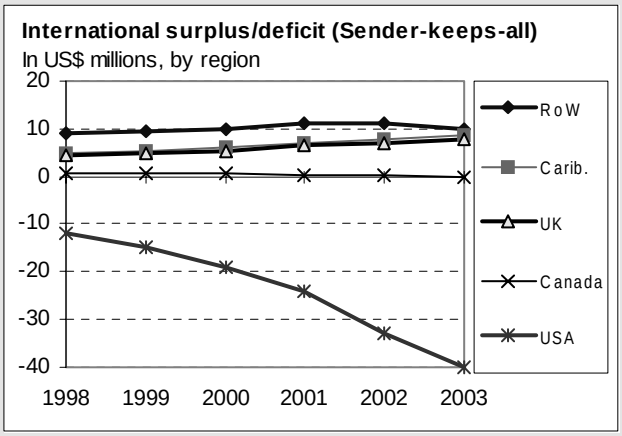
Table 5.4: Scenario 3: Sender Keeps All

	1998	1999	2000	2001	2002	2003
Net settlmt revs (M)	$3.72	$4.37	$4.61	$4.20	$2.81	$0.00
Int. term surp/deficit (M)	($41.98)	($47.36)	($54.01)	($62.30)	($72.72)	($85.88)
Internat orig rev (M)	$83.23	$90.50	$98.43	$107.10	$116.58	$126.96
Int orig surp/deficit (M)	$48.68	$52.64	$56.92	$61.54	$66.54	$71.94
Net internat surp/def (M)	$6.70	$5.28	$2.91	($0.76)	($6.18)	($13.95)
Change from Baseline (M)	($0.54)	($4.85)	($10.77)	($18.76)	($29.46)	($43.64)
Line growth	3,045	2,400	1,322	0	0	0
Change in line growth	(3,107)	(3,752)	(4,830)	(6,152)	(6,152)	(6,152)

Source: Case study.

Figure 5.4: Sender Keeps All Scenario, Net Settlement Payments and International Revenues, US$M
In total and by region, 1996-2003





Source: Case study.

Sensitivity

The most significant variation on this scenario is to model the sender-keeps-all option only for the specific region of the Caribbean. As the graph above shows, net revenues from the Caribbean tend to increase slightly over time, in the absence of settlement charges. The surplus is lower than under the Baseline scenario, as we anticipate the Bahamas would receive a net surplus of settlement revenues from the Caribbean over the future study period, and this option would eliminate that gain, in the amount of about $8-million by 2003. However, this result is highly dependent upon our assumptions about traffic flows within the region, and a shift of only a few percent from average incoming to outgoing Caribbean traffic would lead to a net increase in revenues from this scenario, as compared with the Baseline.

If a regional sender-keeps-all scenario is combined with a gradual reduction in settlement rates with the rest of the world, as in Scenario 2, the effect is a net decline in BaTelCo revenues of $17-million by the end of the study period. This is about $2-million more than the loss of the previous scenario applied globally. Cost reductions required to offset these losses would be about 2% per year.

Where a sender-keeps-all policy is used, the relative inflow and outflow of traffic with a particular country has a vital impact on the net revenues. The higher the relative growth of outgoing traffic, the greater the revenues. For example, if we assume that outgoing traffic to the United States grows 5% faster than the Baseline, with incoming traffic remaining the same, and no settlement charges, this improves the result for this scenario by $14-million in 2003. However, once again, if tariff decreases are required to achieve this rebalancing of traffic, the gain is mitigated; a decrease of 50% in the US tariff offsets nearly all the gain from higher traffic balance.

Analysis

The Bahamas would not be as dramatically disadvantaged by a global sender-keeps-all policy as would many other countries that exhibit very high traffic imbalances, especially with the United States That is not to say, however, that such a policy would be tolerable for BaTelCo, financially, since our calculations show that the company would lose $14-million on international traffic in 2002 under a sender-keeps-all regime. By global standards, this is a "mild" impact of this concept. In any event, it would be entirely unworkable in the foreseeable future to eliminate all settlement charges to the Bahamas.

As for the option of a regional agreement within the Caribbean to do away with settlements, the analysis shows that this option could be viable, although with present trends it would be slightly unfavourable for BaTelCo. Each country in the region would effectively be gambling, under such a scenario, that their outgoing traffic growth would exceed incoming traffic growth, and obviously someone would have to lose. If co-ordinated policies prevented the most extreme potential deviations of this scenario, such as carriers seeking to establish regional "hubs" for routing outside traffic, it might be advantageous to the Caribbean nations to pursue a non-settlement policy among themselves. The benefits could include cost savings due to a simpler system of international traffic exchange within the region, and the replacement of transit traffic between Caribbean countries via the United States with direct connections.

5.5 Scenario 4: Unilateral termination charges

The final scenario category we examine is an alternative to traditional settlement rate policy, which removes the assumption that payments for terminating traffic must be equal in both directions, and introduces uniformity within each country in charges. This is the replacement of bilateral accounting rates with unilateral termination charges or access charges, based upon each country's unique cost of terminating incoming international traffic. There are two basic types of termination charges:

a) Combined termination charges: incoming traffic access charges, based upon the overall combined costs of international services. All incoming service, from all other countries, would pay the same charges.

b) Unbundled termination charges: separate termination charges for the different components of international transmission, switching, and national extension, based on the isolated cost of each component. These charges could be available for foreign carriers that might be allowed to construct their own facilities within Colombia, to avoid using part of the domestic network. Such carriers would only pay the terminating charge for the network components used to complete a given call.

This scenario can be examined in at least two different global contexts: implementation of termination charges on a mutual, worldwide basis, or selective implementation bilaterally with specific countries, notably the United States In practice, wherever terminating costs of international traffic, and cost-based interconnection charges, are essentially equal in both directions, this scenario is identical to a bilateral settlement rate policy.

Assumptions

Termination costs and charges. It is difficult to anticipate what precise form termination charges might take, especially in an unbundled scenario. One likely possibility is that the network components for international transmission would be removed from the cost equation, as international (especially US) carriers would be inclined to deliver traffic directly to a gateway, paying the transmission component themselves, or through a 3rd party transmission wholesale provider. We therefore assume that the cost bases for terminating charges would be approximately the previous settlement-based cost of 50¢, minus the cost for international transmission, which is about 15% of the total. The resulting cost of 42.5¢ per minute is the basis for a transition to uniform terminating access charges. This figure then declines over time with cost efficiencies.

To the extent further unbundling of the domestic network might be pursued in the future, the effective access charge received by BaTelCo would be lower, and we estimate this impact in the sensitivity analysis.

Importantly, the terminating charge paid by BaTelCo to other countries would not likely be the same, and in the case of the United States, Canada, and the United Kingdom, at least, it would be much lower. For these countries, we assume incoming access charges would be between 10¢ and 15¢ per minute, based upon the cost levels the FCC has ordained for the United States, and the European Union interconnection charge mandates. These costs could be significantly lower still.

(On the other hand, it is conceivable that the Bahamas, as a non-member of the WTO, might not have the same access to "best price" interconnect charges in some countries.) For other Caribbean countries, and for the balance of other countries in the world, we assume that terminating costs and charges would be the same as for the Bahamas.

Traffic growth. The impact of a new system of terminating charges upon international traffic patterns is also very speculative. If we assume that tariffs will reflect changes in settlement/access costs, then there may be larger proportionate reductions in outgoing tariffs to the United States than in those for calls into the Bahamas. This trend should cause a shift in traffic balances, to some degree. We initially assume a stimulation rate for lower cost countries that is 1% greater for outgoing traffic.

Cost and tariff changes. The costs to BaTelCo under this scenario for outgoing international traffic would not be the same as for incoming terminating traffic. Whereas we remove the cost of international transmission from the incoming service, this cost remains (and might be higher) for outgoing traffic. Thus, we retain the initial 50¢ per minute cost for outgoing minutes, but test the sensitivity of the results to substantial cost reductions. Tariff changes, as mentioned above, might be proportionately greater with this scenario, so we assume a high correlation between the terminating access charge in other countries, and changes in the tariffs for calls to those countries.

Results

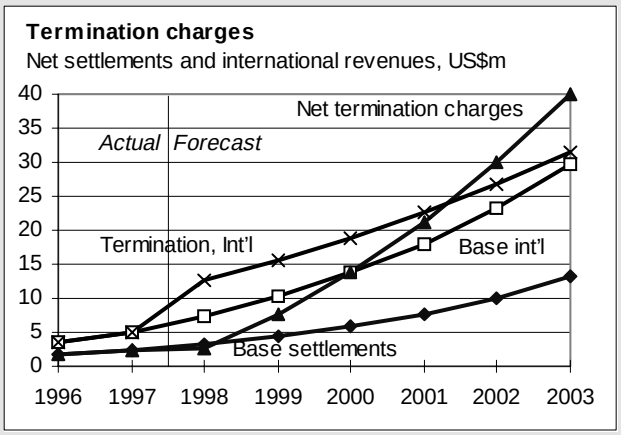
The results below incorporate the above assumptions, applying a single termination charge to all incoming traffic. For consistency, revenues from these charges are still referred to as "settlement revenues".

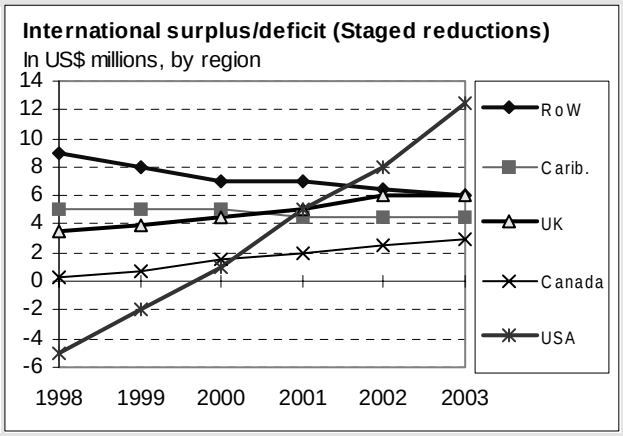
Table 5.5: Scenario 4: Termination Charges

	1998	1999	2000	2001	2002	2003
Net settlmt revs (M)	$2.53	$7.76	$13.97	$21.30	$29.90	$39.97
Int. term surp/deficit (M)	($34.69)	($32.59)	($29.76)	($26.10)	($21.46)	($15.70)
Internat orig rev (M)	$81.72	$85.39	$89.01	$92.54	$95.90	$99.06
Int orig surp/deficit (M)	$47.45	$48.18	$48.60	$48.65	$48.25	$47.31
Net internat surp/def (M)	$12.75	$15.59	$18.84	$22.56	$26.79	$31.60
Change from Baseline (M)	$5.51	$5.46	$5.17	$4.55	$3.51	$1.91
Line growth	5,796	6,152	6,152	6,152	6,152	6,152
Change in line growth	(356)	0	0	0	0	0

Source: Case study.

Figure 5.5: Termination Charge Scenario, Net Settlement and International Revenues, US$M
In total and by region, 1996-2003





Source: Case study.

Sensitivity

For this scenario, the most important variable is the cost figures used to set both incoming and outgoing termination charges. If we move from the initial terminating charge of about $0.40 to a level of $0.21, which is the equivalent pure incremental cost of termination without transmission, net revenues in 2002 decline by $20-million. This assumes that underlying costs don't change at the same time, but instead that the termination charge simply doesn't recover any joint or common costs. If the underlying costs decrease, then of course a proportionately lower terminating charge does not hurt net revenues.

At the same time, if we assume that terminating charges, and costs, for other countries are higher, this also reduces net revenues proportionately, as BaTelCo must pay out a higher percentage of its tariff for such charges. Lower termination charges, however, could permit lower outgoing call tariffs without the negative impact on net revenues that occur in other scenarios, resulting in greater potential gains to BaTelCo from traffic stimulation. For example, if the US termination charge is set at $0.08, and we assume a ripple effect of somewhat lower BaTelCo tariffs and higher traffic, the net result is an additional net revenue gain, rather than a loss from the lower prices.

Analysis

The most basic application of this scenario, utilizing the initial cost levels calculated for the Bahamas, yields the result that revenues from incoming international traffic would increase slightly, as would overall net international revenues, if terminating charges were applied based upon costs. With the United States specifically, however, net revenues would rise dramatically, as the graph above shows. This result reflects, primarily, the estimated difference in such costs between developed networks and those in developing countries such as the Bahamas. Even if we base terminating charges on pure incremental usage-sensitive costs, excluding international transmission (about $0.21 per minute for the Bahamas, less than $0.10 for the United States), the difference between cost levels creates a net gain versus the present equal-payment settlements regime.

Nevertheless, a system of terminating charges would be the most economically efficient in the real-world environment were costs differ across different countries. This is assuming such charges would be accurately based upon appropriate terminating costs for all countries. Moreover, as the international (and domestic) markets open to further competitive entry, cost-based and unbundled access charges would tend to promote greater efficiency throughout the industry, as operators could more frequently choose between paying other carriers to transmit their traffic, and providing facilities themselves, based upon the differential costs.

The fact that, in the short run, cost-based terminating charges would lead to greater payments from lower cost countries to higher cost countries reveals that the present settlements system is not, in fact, so inefficient as it has been described by some. In the case of the Bahamas, settlement revenues almost certainly do not pay the full cost of incoming traffic, especially when a reasonable share of common costs is included. The reason for this is that the process of paying settlements based only on the net traffic flows assumes implicitly that terminating costs in the other country (e.g. the United States) are equal to those in the Bahamas. To the extent this is not the case, the equal sharing of the "accounting rate" for all bilateral calls leads to underpayment of real costs in the lower cost country. Cost-based terminating charges in each direction would remove this paradox, At the same time, the implicit with the effect of causing foreign operators to pay the full cost of delivering traffic to a given country.

Once again, however, this scenario depends upon a number of assumptions concerning future trends which, if changed, could alter the actual levels of access charge payments from outside carriers. Obviously, if costs decline, terminating charges must decline with them. And if outgoing tariffs decrease and traffic increases, the balance might shift in favour of the higher cost country, reducing the net in-payment of access charges. This possibility has been described as "reverse call-back," a phenomenon that could result from large discrepancies between terminating charges in developing and developed countries, with originating traffic moving to the higher cost country, seeking to pay the lower terminating charge.

The reverse call-back scenario does not seem to be a significant concern under current conditions, however, at least not in the Bahamas. For BaTelCo to attract a substantial shift in traffic flows, its own outgoing tariffs would have to decline to reflect the lower external terminating charges. However, as we have shown, BaTelCo depends heavily upon those tariffs, and even a large increase in outgoing traffic would not much offset significant price reductions. Meanwhile, the Bahamas does not appear inclined to authorize competing international outgoing telephone service, which could form the basis of an independent "reverse call-back" trend.

6 CONCLUSIONS

Our immediate observation upon researching the issue of the impact of changing international settlements policies upon the telecommunications sector in the Bahamas was that, for this case study, the impact would not be very significant. BaTelCo only earns about $1.5-million in net settlement revenues worldwide, a minimal percentage of its total revenues. Any scenario for changes in the settlements system could not be expected to have a major impact, it would seem.

Upon further investigation, we have learned that this superficial conclusion is misleading. The reason that the Bahamas is not directly dependent upon settlements revenues is that, for traffic with its largest partner, the United States, BaTelCo has already negotiated an effective settlement rate of less than 30 cents per minute (accounting for off-peak discounts), well below the average between most other countries and the United States At the same time, the tariff for outgoing calls to the United States (placed in large part by tourists calling home, and paying hefty surcharges to their hotels), is only $0.80 per minute. These prices may not represent the "best practice" rates for anywhere in the world, but they must be among the very lowest for telephone service between developing countries and the United States In a sense, therefore, the Bahamas has already achieved close to the long-run ideal for international pricing with the United States, at least as embodied in the FCC's Benchmarks policy (which would, nevertheless, reduce the Bahamas settlement rate to $0.15 per minute).

The troubling aspect of this observation, however, is that the cost structure for BaTelCo's operations does not appear have yet caught up with this pricing trend, as the company's average total operation costs are more in line with other developing country operators, which tend to rely much more heavily upon settlements revenues. Using our estimate of an average cost of $0.50 per minute, the Baseline analysis shows BaTelCo actually incurring a net deficit on US incoming and outgoing traffic. This doesn't mean that BaTelCo loses money on such traffic, but it does mean that the United States contributes almost nothing to the common costs, overheads, and network development of Bahamas' telecommunications. This situation would be even more serious with further settlement rate reductions, and potentially disastrous if the outgoing call charge were reduced much more. The fact that call charges from the Bahamas to other countries remain much higher is evidence that BaTelCo must make up for the near-zero profit margin from US traffic from other sources.

While the company has been pursuing tariff rebalancing, it is uncertain how much additional revenue can be generated from domestic subscribers and local service. More than 50% of the company's revenue now comes from international telephone services. And there is also little evidence that lower outgoing international call tariffs would stimulate traffic enough to make up for the price cuts; BaTelCo's users have not exhibited much price elasticity to date, a fact which would also be supported by the extent to which actual rates are augmented by hotel surcharges and the like.

BaTelCo's greatest opportunity to improve its economic position, and move away from its precarious dependence upon high international tariffs to countries other than the United States, is likely to rest with the intended privatization of the company in the next year or so. If privatization both brings in new capital and promotes cost efficiency gains and innovations, BaTelCo may be able to sustain its present US rate and traffic patterns, while earning somewhat of a profit from those services, and commensurately bringing tariffs and settlements with the rest of the world more into line.

Meanwhile, as far as settlements policy options are concerned, BaTelCo would clearly benefit most from a move to unilateral termination charges, even if those charges were based upon incremental cost alone. This would tend to remove the pressure of imbalanced settlement payments and encourage a more efficient relationship between pricing and costs. If the privatization of BaTelCo is followed by further moves that bring greater market forces into the industry, there would be additional opportunities to align prices with (more efficient) costs.