DARDEN
BUSINESS PUBLISHING
UNIVERSITY of VIRGINIA

UV1460

TAURUS TELECOMMUNICATIONS CORPORATION: A NEW PREPAID PHONE CARD

Kyle Shilling loathed sales meetings. A brand manager at Taurus Telecommunications Corporation (TTC), Shilling felt certain the sales team's job description was simple: "to fail to sell perfectly viable products." To him, these meetings were just forums for the Sales department to make excuses for its lackluster results.

Worse, Peter Francona—TTC's chairman—actively participated in the meetings. An ex-beverage salesman, he seemed remarkably sensitive to the alleged plight of the salespeople. On joining the firm three months ago (straight out of college), Shilling had appreciated the opportunity to work closely with the CEO of such a large company. But, as of late, his interactions with upper management had become cumbersome.

Today's meeting was proceeding as he had expected. With growing frustration, Shilling listened to complaint after complaint about his new product line. Never known for his adherence to protocol, Shilling eventually lost his temper.

"Great Odin's Raven!" Shilling shouted at the lead sales manager, interrupting a tirade on the product line's lack of competitiveness in Long Island.

> We've created the last six products exactly to your specifications, because you argued the sales team's knowledge of the market exceeded ours. And yet, week after week, all we hear in these meetings is how non-competitive our products are! The last five-dollar card we released offers forty minutes to Mexico; at that rate, we are severely straining our profit margins. Why can't you do your job?

"Sit down, Kyle," retorted the sales manager, whose official title was vice president of Sales:

> The fact is our customers don't believe our advertised rates. And even if they did, the competition just released a card offering fifty minutes to Mexico. What we need is a card that offers sixty minutes. We could sell a card with sixty minutes. The current product is just unsellable.

This was the kind of insularity that drove Shilling batty. Current costs for a call to Mexico were around $0.0845 a minute. At that rate, the company was very close to losing money on every 40-minute card they sold (the common joke was that they'd make up any losses on volume). Of course, Peter Francona would never accept Shilling's reasoning.

Just as expected, Francona chimed in: "Wow, sixty minutes. Now *that's* a great idea … we could sell a million of those cards a month. Kyle, why didn't you think of that?"

"Because we'd lose about a dollar on every card we sold, Peter."

"Kyle, you've got to think outside the box." Sadly, Francona was being serious and he continued:

> Don't worry about costs; we just got new pricing for Mexico from three different carriers. It's pretty cool—they've given us some novel pricing offers. Run the numbers, will you? I want an absolutely clean card, and I think we can get about $5 million in revenue a month from this card.

Why Francona had waited until that moment to mention the new rates to Mexico was beyond Shilling, but he would dutifully perform the cost analysis.

The Prepaid Phone-Card Industry and TTC

United States prepaid phone cards allowed users to place a call from any domestic location to anywhere in the world. At the turn of the millennium, phone cards were particularly popular among the immigrant populations, because phone cards generally offered cheaper international rates than traditional service providers, and they eliminated the need for a home telephone account, which many populations found unattainable due to poor or nonexistent credit. In 2000, the prepaid phone-card market totaled about $3.4 billion in revenues. Ethnic minorities and lower-income customers comprised roughly 85% of the market. Industry analysts expected revenues to exceed $5 billion by 2005, primarily due to the opening of mainstream markets.[1]

Taurus Telecommunications Corporation had captured about $250 million of the total market in 2000. The company found it difficult to maintain any single product for a significant period of time. As a result, TTC's four brand managers constantly created new products and adjusted old ones. Although the differences among these products were slight, the sheer number of products—which was somewhere in the thousands—made management difficult. Mistakes were quickly identified by the consumer population (and sometimes exploited; in one case, a typographical error had resulted in the loss of over $100K in a single night).

---

[1] *Intelecard News* printed 10/01/01, the online version at http://www.intelecard.com/factsandfigures/03factsandfig.asp?A_ID=6(3)].

Prepaid Phone-Card Operations

The first key part of a phone card was its set of access numbers, which were printed on the back of the physical card. A set of access numbers was unique to a product line, but not to a single card. The user dialed one of the access numbers to connect to the phone card manufacturer's switch (a telephone switch is simply a computer that handles telephone calls). Manufacturers provided users with both toll-free access and local access numbers; local access numbers were non-toll-free numbers with the area codes in which the card had been sold (e.g., 212-578-7007 in New York).

The second key part of a phone card was its Personal Identification Number (PIN), which was unique to each card. After the user dialed one of the card's access numbers, the switch prompted the user to enter the PIN. The PIN was effectually the user's account; the switch maintained a database of each PIN, the per-minute rates applicable to that PIN, and the dollar balance remaining on the PIN. After the user entered his PIN, the switch checked that the PIN existed in the database and had a positive balance.

The switch then prompted the user to enter the number he wished to call (known as the destination number). The switch determined a per-minute rate for the call based on: (1) the PIN, (2) the access number, and (3) the destination number. The switch then informed the user of the maximum number of minutes the call could last, based on the PIN's remaining balance and the per-minute rate. The switch then rang the destination number and, assuming the dialed party answered, completed the connection.

Once the connection was completed, the switch began to decrement the balance of the PIN based on the per-minute rate. If the call was terminated before the entire balance of the PIN was exhausted, the remaining balance was stored in the switch's database; the user could re-use the phone card until the balance ran down to zero.

The prepaid phone-card manufacturer (PPM) served as the middleperson for this entire process. Some manufacturers maintained their own switches; nearly all contracted with other firms to bring the call from the user's phone to the manufacturer's switch and to take the call from the manufacturer's switch to the phone of the destination number.

The first part of the call was known as the "inbound leg"; the PPM contracted with an inbound carrier. The manufacturer usually contracted with a single toll-free inbound carrier and several different local inbound carriers (each corresponding to a different geographic location; there was little competition among local inbound carriers). Local inbound agreements were usually structured as flat fees for a certain amount of fixed capacity; if the capacity was fully utilized, the per-minute rates tended to be far lower than those explicit in toll-free agreements.

The second part of the call was known as the "outbound leg"; the PPM contracted with outbound carriers. A manufacturer contracted with dozens—if not hundreds—of outbound carriers, as this leg comprised the majority of the expense of a call. Although there was

significant competition among outbound carriers, each carrier tended to specialize in a certain region of the world (e.g., South America); some carriers specialized at the country level (e.g., Brazil). Often, this specialization represented the deregulation and liberalization of a country's state-owned telecommunications operations.

The manufacturer's switch determined which outbound carrier to use based on a "routing queue." The routing queue listed every materially different destination in the world, along with a prioritized set of outbound carriers to use for each destination. Outbound carriers could only handle a certain number of simultaneous calls—a maximum capacity. In the event the first-choice carrier's maximum capacity had been reached, the switch automatically routed new calls to the second-choice carrier.

The determination of the routing queue was the key in cost optimization. A manufacturer contracted with hundreds of carriers; each offered a different rate to each of the hundreds of destinations worldwide. The simple method of using the least-cost route for each destination was complicated by three factors: (1) scarcity of capacity for each carrier, (2) variability in quality, and (3) payment terms.

Outbound carriers were often small operations; thus, they were rarely capable of meeting a manufacturer's capacity needs at full-price optimization. The competitive environment among outbound carriers generally created a positive correlation between carrier size and higher price. Furthermore, outbound carriers were loath to commit all of their capacity to a single manufacturer, due to a history of fly-by-night phone-card operations. Manufacturers did not want to depend on a single outbound carrier, due to the similarly short life spans of many low-cost firms, so capacity-per-carrier was severely limited. If a carrier provided a least-cost route for more than a few destinations, the optimization algorithm had to take into account that carrier's inability to handle traffic to all of those destinations.

Many low-cost outbound carriers were either running traffic through "gray routes" by using connections that avoided government monitoring and the concomitant fees, or running traffic over a decrepit telephony infrastructure. These factors contributed to significant variability in the quality of an outbound carrier, which was measured by the clarity of the connection and the length of the time a connection would remain open, etc. A wired telephone call was made over an electrical circuit; poor wiring at any point along the circuit significantly interfered with normal processing. Phone card users were willing to accept relatively poor quality, because per-minute rates were at such a discount to traditional carriers, and international infrastructures were known to be poor. Nevertheless, low-cost carriers frequently fell below the threshold that customers were willing to accept—or that manufacturers were willing to accept—and thus pure cost optimization was often not of practical use.

Finally, outbound carriers required varying credit terms of their customers, spanning the range from prepayment to net 60 or even 90 days. Massive power at lower points in the phone-card distribution network often forced manufacturers into difficult cash flow situations; thus, the manufacturer was sometimes forced to use a higher-cost carrier that offered delayed payment terms.

These three variables complicated an optimization algorithm, but by no means made such an algorithm impossible. Unfortunately, organizations were not sophisticated enough to develop or implement a workable algorithm. Given the level of traffic handled by TTC, the inability to develop an optimization scheme resulted in tens of millions of dollars in wasted profit over a four- to five-year period. Moreover, routing inefficiencies undoubtedly contributed to a long-term inability to compete in the marketplace.

Sales and Distribution

The PPMs' distribution scheme consisted of regional master distributors, sub-distributors to those masters, and small endpoint stores (e.g., bodegas). Most PPMs retained an in-house sales force to manage relationships with the regional master distributors. Significant inter-relationships among the large distributors resulted in a high degree of cross-shipping, so regional promotions and margin differentials were difficult to maintain. A master distributor usually purchased a phone card at a 32–38 percent margin (on face value); of this margin, about 22–25 percentage points were left to the store owner.

Endpoint stores sold every phone card for cash; as a result, the entire network operated on a cash basis. Single transactions between the regional distributors and manufacturers would often exceed $300K in cash. With so much cash exchanging hands, it should not come as a surprise that internal and external procedures often strained the limits of legality.

Master distributors were often immigrant-owned, ethnically specialized organizations; furthermore, these distributors implemented significant barriers to entry (which were not capital barriers but were far more demotivating). Combined with the heavy competition among manufacturers, this resulted in tremendous power for the distributors. The primary result was distributor demands for onerous credit terms and margins from manufacturers.

The cash nature of the business and the complexity of the distribution system were the primary reasons that larger, incumbent domestic telephone firms did not enter the international prepaid phone-card market. Although many well-known providers did offer domestic cards, the space in which TTC competed was primarily composed of immigrant customers making international calls.

National and regional advertising were generally eschewed in favor of word-of-mouth and channel-saturation techniques. Immigrant communities tended to be very close-knit; thus, a well-performing card (either in quality or minutes) did not go unnoticed for long. Master

distributors were powerful enough to block the sale of a good product should the manufacturers have failed to offer sufficient margin or terms; there was much debate about whether the same distributors were capable of producing a similarly powerful positive effect on sales. Brand loyalty was exceedingly low; the general consensus was that heavy competition among manufacturers had forced commoditization of the product.

PPMs advertised the rates for each product using point-of-sale posters, which often displayed the price of the card ($5, $10) and the corresponding minutes the user would receive on a single call to every nation worldwide. If a customer purchased a card, he would find the same rates quoted by voice-prompt on dialing the PPM switch.

Decrementation Practices

The phone-card industry grew quickly and without the burden of federal regulation. Stiff competition and increasingly robust switching software led to industry-wide acceptance of false advertising. PPMs' quoted per-minute rates (both on posters and by voice prompt) were substantially increased by unquoted surcharges (per-minute percentage increases) and one-time fees of various incarnations (weekly fees, per-call fees, etc.). At times, these additional surcharges and fees were so high that the charged rate was more than twice the advertised rate.

The practice of false advertising became so pervasive that the average consumer assumed that most products offered far fewer minutes than they delivered. Consumer perception was strongly tied to the manufacturer's label, and so new products generally suffered from the same bias.

The actions of manufacturers only exacerbated the situation. Often PPMs released a new product that delivered exactly as advertised; however, because of perceptions of false advertising, the PPMs were forced to advertise untenably low rates in order to generate even baseline sales. Sales would quickly balloon as word spread, and the product would cannibalize existing, profitable products and quickly become significantly unprofitable. The PPMs were then forced to increase the unquoted fees on the products to stem the outflow of cash, which further strengthened perceptions of false advertising.

A card that offered exactly its advertised rate and imposed no additional fees beyond the per-minute rate was known in the industry as a *clean* card. Clean cards had become exceedingly rare.

The New $5, 60-Minute Phone Card

Kyle Shilling thought TTC's economic analyses of new products were generally inaccurate and simplistic. In particular, he was concerned that they failed to take into account uncertainties the firm knew existed. Shilling was convinced that the limitations of TTC's

economic analyses were responsible in part for the firm's inability to resist the temptation to deviate from clean cards. For this reason, Shilling decided to use the analysis of the proposed new card—which Francona had specifically said he wanted to be clean—to think more carefully about *how* TTC performed analysis of this type. He started where he always did, by considering the three main components of the economics of any card: revenue, inbound cost, and outbound cost. He decided to use the two-week period as his unit of analysis.

Revenue

Shilling knew that TTC's master distributors had recently been satisfied with receiving a 32% discount on the face value of phone cards. This meant that TTC would receive as revenue 68% of the face value of the new $5 offering, a sum of $3.40. Total revenue would then be determined by three key factors:

Period 1 sales (in number of cards): The phone-card market was extremely efficient in reacting to new product offerings: A card would realize its market potential almost immediately, and retain that level until a new, clearly dominant card would typically cause its immediate and complete demise. Peter Francona had thought (somewhat optimistically in Shilling 's opinion) that the new card would sell one million units in the first month, which translated into a best guess of 500,000 cards in the first two-week period, or $1.7 million in revenue.

Period sales growth (percent of period sales): Although a competitive new card offering would go from "zero to sixty" in a hurry, there was almost always some residual growth, as long as the card stayed competitive. Although changes from fortnight to fortnight varied, they did not do so dramatically. Also, the size of the initial splash clearly influenced the subsequent growth rate. For anything in the 500,000 card range, however, Shilling decided it was not unrealistic to assume, on average, a 2% per two-week period growth rate for as long as the product stayed competitive.

Product lifespan (in bi-monthly periods): Due to heavy competition and a commoditized industry, products rarely experienced gradual declines in sales; more frequently, a product dropped out of the market in the span of only a week. How many periods the card remained viable on the market was the direct result of how quickly a competitor could come up with a more attractive option. Sometimes, cards were "one-hit wonders," selling well for two weeks and then being completely cannibalized by a better product. Yet, a good card, often based on a special, particularly favorable one-off cost structure, could last for as long as a year before becoming cannibalized (sometimes by the very company that issued it in the first place). The lifespan of a product also depended on how well the product was received by the company's own sales team, the distribution network, and consumers. Shilling decided as a base case to assume a lifespan of 10 bi-monthly periods, about average for TTC products.

Inbound carrier costs

Salespeople at TTC often had an annoying tendency to overlook inbound carrier costs, because the per-minute costs were generally low compared to outbound rates. As outbound rates continued to drop, however, the inbound leg of the call became more important. The product was going to offer both toll free and local access. Local access rates were currently fixed at $10,000 per two weeks per card. Toll-free costs were charged at per-minute rates and varied minimally with the location of the origination number. Currently, the average per-minute cost to TTC for toll-free access numbers was $0.0080. While it was certainly possible that this figure could change—up *or* down—Shilling could not conceive of it changing by more than a few percentage points in either direction.

Because the local-access charge was fixed per two-week time period, the more customers that used the local-access numbers, the lower TTC's total inbound costs. Shilling had some direct experience with Mexican consumers on previous cards; he estimated that 75% of total minutes on the new card would arrive over toll-free access numbers. He could not imagine being off by more than a couple percentage points in either direction.

Outbound carrier costs

Shilling talked to the routing department and found that three potential outbound carriers—two fairly established, the other brand new—were indeed offering novel pricing schemes to Mexico. Shilling understood that carriers traditionally offered a single rate *to* a given country; however, recently some carriers had begun offering separate rates for different destinations *within* a country. Furthermore, some carriers had started charging different rates at different times of the day. At TTC's behest, the carriers were also offering volume discounts, contingent on exclusivity. Shilling also knew that carriers were infamously undependable. They would not allow prices to be locked in under a contract beyond the first couple of weeks and routinely adjusted rates irregularly as their own costs changed. Also, carriers occasionally experienced service interruptions, which forced PPMs to scramble and use expensive back-up providers to meet demand until service could be restored. Shilling would need to account for all these factors in choosing among the three carriers.

Arbitel

Arbitel was the most progressive and largest of the three carriers, bringing with it a reputation for relative dependability. On its offer sheet, the firm had listed hundreds of destinations within Mexico, but had also categorized each destination as either urban or rural. Calls to all urban destinations were charged at the same rate, as were calls to all rural destinations. Also, Arbitel offered a significant discount for calls placed from 12:00 a.m. to 11:59 a.m., a period Arbitel labeled "off-peak." Arbitel did not have a history of large unannounced rate increases or service interruptions.

BC Tel

Shilling had also heard of BC Tel; the firm had very humble beginnings but had established itself as a low-cost provider over the last few years. Although BC Tel charged the same rate for every destination in Mexico, it did offer a 50% discount for calls placed during off-peak hours, which it also defined as 12:00 a.m. to 11:59 a.m. BC Tel was known as one of the only carriers that passed cost decreases as well as increases along to its customers and had offered TTC a substantial discount, if the company managed to hit an aggressive traffic target. The carrier also had a relatively good track record of limited service interruptions.

Course Communications

TTC's director of Carrier Relations admonished Shilling about placing too much stock in Course Communications because it was a very new operation and very little was known about its size, origination, or business practices. The carrier was not offering any time-of-day discount but did offer amazingly low rates to the urban areas of Mexico, which it defined in basically the same way as Arbitel. Given the director's concern, Shilling believed Course Communications in terms of continuity of service and constancy of rates was the least reliable of the three carriers. The carrier's offer sheet included a nominal discount.

A summary of the carrier's pricing schemes is given below. The discount volume is given in total minutes over a billing period, which was the industry's standard two weeks.

	ArbiTel	BC Tel	Course Communications
Peak - Rural Cost	$0.0693	$0.0600	$0.0788
Peak - Urban Cost	$0.0452	$0.0600	$0.0294
Off Peak - Rural	$0.0534	$0.0300	$0.0788
Off Peak - Urban	$0.0348	$0.0300	$0.0294
Discount Volume	32,500,000	33,500,000	27,500,000
Discount	5.0%	10.0%	2.0%

Peak/Off-Peak, Rural/Urban

To perform an economic analysis of the three pricing schemes, Shilling knew he would have to make assumptions about what percentage of customers would call during the peak and off-peak hours, as well as what percentage would call rural versus urban destinations. Even though he had experience with Mexican consumers, he had little feel for this aspect of the analysis. Because carriers had not historically differentiated rates based on these categories, Shilling had no reason to pay attention to them. Extrapolating on his very modest knowledge of other countries, Shilling decided to assume that 80% of all card minutes would be incurred during the peak time period, and 25% of all minutes would go to rural areas. He was very aware, however, of how limited his knowledge was in this area.

Period-Rate Adjustments

As mentioned previously, outbound carriers were free to raise (or lower) rates, even on existing contracts, as market conditions changed, and the current offers retained that right. Thus, to be on the safe side, Shilling allowed for the probability that rates would change (probably upward) if the card survived its initial launch. Even though rate changes did not occur at regular intervals, Shilling assumed a steady rate of increase (or decrease) captured long-term trends in rate adjustments and reasoned that it would be a conservative approach to protect TTC from unanticipated increases. For Arbitel, he decided to assume an average 1.0% increase per two-week period. For BC Tel, who seemed to more successful at holding rates steady (and also to pass on decreases as well as increases), he decided to assume no change (0.0% increase). But because of its newness, Course Communications was more difficult. Given the carrier's aggressive rates to urban areas, Schilling decided to assume a 2.5% increase per two-week period. To simplify his analysis, he further assumed that all rates would be adjusted by the same percentage; this was also consistent with his experience with other countries, that carriers found it easier to justify overall rate increases (as being beyond their control), as opposed to changes in the relative rate structure.

Service Interruption

This was the trickiest part of the analysis, as far as Shilling was concerned. Service interruptions could occur as the result of foreign government intervention, infrastructure problems, or poor business practices (such as overselling capacity). Larger, higher-cost carriers tended to be more stable than cheaper ones, meaning fewer service interruptions. The cost of an interruption depended generally on its length, which was a function of how quickly the carrier could restore service. Again, the more established carriers seemed to be more efficient in restoring service.

Shilling knew he wanted to correct the failings of previous analyses, which ignored the costs of the inevitable service interruptions. He also believed that Course Communications had to be the most at risk in this regard—more than either Arbitel or BC Tel. Based on his general knowledge of the Mexican market, he decided to set aside $1,000 per two-week period for Arbitel and BC Tel for unexpected service interruptions. And influenced by cautious attitude of the director of Carrier Relations regarding Course Communications, he decided to set aside $5,000 per two-week period. If Course Communications could overcome *that* handicap, Shilling reasoned, he would feel comfortable going with them.

The Crux

Shilling was happy with his base-case analysis and his incorporation of the important factors (for his model, see associated spreadsheet file). But he knew he had made a lot of assumptions, and he was convinced that TTC's failure to account for the uncertainty in key

inputs was hurting its ability to come up with popular *and* profitable products. Unfortunately, fully grasping the complexities of the situation and building the base-case model had taken a full day of work, and Peter Francona expected a complete analysis from him the day after tomorrow. Shilling knew that the CEO regarded economic cost analyses as a highly questionable use of time. If he was going to have any hope of changing Francona's point of view, he would have to do so quickly. This meant he had just tomorrow to go out and find data that might help him come up with better estimates of his input, as well as to determine how much actual uncertainty to allow for. Shilling wondered how best to spend that time.