

THE ECONOMICS OF CALLER ID

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Abstract

Several regional holding companies (RHCs) have proposed a range of Custom Local Area Signalling Service (CLASS) tariffs, which would include a service called Caller ID. Caller ID relies on automatic number identification (ANI) to reveal the telephone number of the calling party on a special device on the customer's telephone. The Caller ID service is controversial because of privacy concerns of persons who do not wish to divulge their telephone number to other parties. Opponents of Caller ID have called for mandatory free "blocking" of the service on a per call or per-line basis.

This paper analyzes the economics of Caller ID. There are several levels of analysis: (1) the need for the RHCs to find new sources of revenue in a post-AT&T era, (2) the costs to the RHCs for offering Caller ID with or without mandatory blocking, (3) the costs to the consumer for Caller ID and other CLASS services among the various RHCs, and (4) the relative value of Caller ID with blocking to Caller ID without blocking.

The Economics of Caller ID

In the decade following the divestiture of AT&T, several regional holding companies (RHCs) and their regional Bell Operating Companies (RBOCs) have proposed a range of Custom Local Area Signalling Service (CLASS) tariffs, which would include a service called Caller ID.¹ Using digital information that already exists in the form of automatic number identification (ANI) for toll-charge billing purposes, Caller ID would provide the consumer with a means to see the telephone number of the caller's telephone between the first and second ring. The privacy implications of Caller ID have received a great deal of attention (e.g., Campanella, 1990; Katz, 1990; Maney, 1990; Rhodes, 1990; Schlossberg, 1990; Smith, 1989). However, such discussions have been largely policy-based. This paper examines the advent of Caller ID from an economic, rather than a legal, perspective. A discussion of marketing forces in this paper is a by-product of economic considerations.

To be sure, there is a lack of information regarding the costs of the Caller ID service, although pricing has been set by the RBOCs. On a micro-level there is an economic balance between the value of services and what the market can bear (Maksimowitz, 1991). But macro-level considerations, including background information on Caller ID itself and its functions, must precede any discussion of cost, price, and perceived value.

Background Information

Caller ID first became available to residential and small business customers in Jersey City, New Jersey in April 1988, statewide by December 1988. Currently, the service is offered statewide in Maryland, Tennessee, Vermont, Virginia, and West Virginia. Some other states have ruled the service in violation of wiretap laws. Telephone companies in these states where Caller ID

is unavailable (e.g., Bell Atlantic in Pennsylvania) have opted to substitute Call Return to simulate the security functions of Caller ID (Maksimowitz, 1991).

As of April 1991, there are 225,000 Caller ID units in place in the Bell Atlantic RHC (Maksimowitz, 1991) with 100,000 of those in the New Jersey Bell RBOC ("NJ Bell," 1991). This represents from 2.5 to 6 percent of the respective service areas. In 1990 Kenneth Pitt, director of media relations at Bell Atlantic, forecast penetration for his firm between 18 and 20% by 1996. By 1991, the Bell Atlantic forecast dropped to 15% penetration by 1996 (Maksimowitz, 1991). Much earlier, there had been some concern that Caller ID and associated "smart" services had not been as successful with residential customers as expected (Lopez, 1989).

Caller ID (also known as Caller-ID, Caller*ID, Identacall, CID, CPI, CPID, CLID, ICLID, CND, CPNI) is offered by telephone companies separately or as part of a package of custom calling features (CCF) based on Bell Atlantic's signalling system 7 (SS7) protocol. CLID is Calling Line Identification, CPID is Calling Party Identification, and CND is Calling Number Delivery. There is some disagreement among Caller ID critics whether the identification points to the caller or the caller's number or line. Many of the privacy concerns involve the telephone number, not the caller's real name. ICLID means "intelligent" calling line identification, revealing the person's name, with or without the number being delivered. ICLID with calling number delivery is being tested by US West in Boise, Idaho (Karpinski, 1991).

The necessary equipment for Caller ID is priced between \$30 and \$120, depending on features. A typical device is ClassMate(tm) from Bell Atlantic Business Supplies at \$49.95. In Hudson County, New Jersey, where Caller ID has been available the longest, the penetration is 6.5% -- small compared to answering machines which can simulate the screening function of Caller ID.

In order to understand Caller ID, it is necessary to be acquainted with the other SS7-based services. The names vary from RHC to RHC because of registered service marks, so the following describes Bell Atlantic's CLASS(sm) features. Call Return allows the subscriber to ring the calling party, without learning the actual number. Call Block permits the user to filter out calls from unwanted telephone numbers. Repeat Call dials the same number over and over for 30 minutes until the called party is reached. Priority Call delivers a distinctive ringing for a predetermined list of telephone numbers. Select Forward is the same as Call Forwarding, except it only forwards those calls from designated numbers.

Maksimowitz (1991) noted that Bell Atlantic positioned Caller ID as a premium ("flagship") service for \$6.50 per month. Additional CLASS services are \$1.50 per month, with quantity discounts. Another scheme is to bundle services. GTE's CLASS features range in price from \$2 to \$5 but discounts only apply in packages of 4 or 9 services.

Call Trace is a service offered by some RHCs that simulates the security features of Caller ID. Call Trace does not reveal the caller's number to the subscriber but sends it to the telephone company. Pacific Bell charges \$10 per trace and specifies that three annoyance calls must be intercepted before the authorities are notified (Marshall, 1991b). Other RHCs offer Call Trace at lower prices.

Privacy advocates are often concerned about the callers' privacy, demanding that Caller ID be provided with some means of blocking the delivery of a calling number. Blocking of Caller ID is achieved by entering a code (e.g., *67) into the telephone before pressing in the telephone number (per-call blocking), or by specifying per-line blocking. The latest wrinkle is "block-block"

being tested by US West in Boise, Idaho. With block-block, the subscriber's telephone never rings if the caller is using any kind of blocking.

The RHCs dislike blocking because they believe it "denigrates the value" of Caller ID ("Rochester Bell seeks," 1991). At least three states have authorized trials of Caller ID with blocking and the RHC (e.g., Illinois Bell) has opted to decline, citing the worthlessness of Caller ID with either per-call or per-line blocking. In states where the regulatory commissions have proposed the widespread availability of per-line blocking (beyond the usual suicide prevention or rape crisis hotlines), telephone companies are settling for Caller ID with per-call blocking. Maksimowitz (1991) noted no dropoff in sales when Maryland ordered per-call blocking for the 50,000 then-existing customers. Only 0.1% of all calls are blocked, yet that amounts to 30,000 telephone calls per day.

Thus, Caller ID is one component of a package of services, each with a varying marketability. There is a possible analogy of plain-old-telephone-service (POTS) to "passive" broadcast television stations. Just as the real revenue growth of cable television came when the emphasis shifted from improved reception to a package of services, the telephone companies may find its future revenue growth in information-based services.² It will be important for the RBOCs to market these services correctly.

Marketing Advantages

Dennis Maksimowitz, director of product management for Bell Atlantic, explained that until recently the telephone companies had conditioned the consumer market not to expect much in the way of innovative services. He noted that the controversy surrounding Caller ID is actually a benefit because of all the free publicity (Maksimowitz, 1991).

Maksimowitz noted the means by which Bell Atlantic marketed Caller ID: telemarketing, direct mail, and bill stuffers. The telephone company has a built-

in advantage over most other companies in that all three of these methods require up-to-date telephone number and address information. There is no need for RBOCs to buy partial lists and try to build a universe of potential customers. Virtually all potential customers are in the telephone company's database. Bell Atlantic also uses television advertising to dramatize the features of Caller ID (e.g., ammunition against crank calls and "heavy-breather" calls). Lack of dramatic marketing may explain the RBOCs' previous lackluster 29% penetration for its Call Waiting feature, after more than a decade of availability (Lopez, 1989).

The information from Bell Atlantic shows that 92% of the Caller ID subscribers are residential (Snow, 1991). The remainder are one and two line businesses and municipal agencies. The Return Call feature actually leads Caller ID among all 516,621 Bell Atlantic CLASS services as of December 1990: 38% Return Call, 35% Caller ID, 15% Repeat Call, 7% Call Block, 4% Priority Call, and 1% Select Forward.

The Utility of Caller ID Functions

Baxter (1990) wrote "customers are willing to pay for convenience and functions" (p. 89). He demonstrated this willingness with data showing that 30% of the most recently purchased residential telephones cost more than \$80 (p. 90).

Bell Atlantic conducted focus groups in the initial stages of Caller ID planning. The two main benefits, in the minds of the consumer, are convenience and security (Maksimowitz, 1991). The "convenience" benefit is a bit abstract, and neither represents a comprehensive list of benefits or functions. One possible "convenience" is the ability to store numbers with advanced Caller ID devices now available. The subscriber comes home after a couple of hours and can discover how many calls had been received and who had called (Kurtz, 1990).

Caller ID provides several unique functions not available (as a group) from the other services: (1) perceived identity, (2) security, (3) screening, and (4) entertainment. The first and fourth functions are related; one is informational and the other is recreational (Snow, 1991).

Call Trace can be substituted for the security functions of Caller ID. Proponents of Call Trace assume that the only possible valid need for Caller ID is security, thus the delivery of the calling party number (CPN) is overkill. Even the Call Return feature offers some degree of security with out CPN disclosure. Of course, all identification methods can be defeated. Marc Rotenberg has said, "the safety features of Caller ID are greatly overstated. It is easy to defeat the call locating capability of Caller ID and to place a call from a pay phone . . ." (testimony before House hearings on H.R. 1304 and 1305, April 24, 1991).

Screening is a Caller ID function that fits contemporary "cocooning" lifestyles. Another modern trend that influences the public's demand for Caller ID is "living alone by choice" (Sheth, 1991). But, a sophisticated answering machine (e.g., Panasonic Easaphone Model KX-T2634, which requires the caller to provide a secret code to achieve a ringing connection) can be substituted for the screening abilities of Caller ID at a one-time \$120 cost. Even rudimentary answering machines selling for \$30 provide a means of screening calls. In 1988 over \$545 million was spent on answering machines (Sims, 1989). By 1990 the figure reached \$671 million per year (Economic World, March 1991, p. 52).

A key element of price elasticity of demand is substitutability (Amacher, 1983, p. 348). Apparently, perceived identity and the "I know who you are" enjoyment associated with it are only available by subscribing to Caller ID. The desire for Caller ID among many owners of answering machines is evidently linked to the thrill of seeing the number of the calling party before the phone rings a second time. The Caller ID subscriber can decide to let the telephone

ring without answering, although many people are conditioned like Pavlov's dog to pick up the receiver even when getting an unfamiliar number. The benefit usually comes from filtering out known numbers, although Call Block simulates this feature.

The utility of Caller ID is difficult to determine because there is no marginal utility of buying "more" Caller ID. Except in the case of annoyance calls, the demand for Caller ID puts it in the luxury category. However, the small relative cost per month (compared to the price of a movie), after the initial \$30 outlay for equipment, favors the service for those with normal amounts of discretionary income.

Historical Forces

There are historical and situational considerations that complicate the value of Caller ID. First there is the growth of "unlisted" numbers³ in the United States ("Information and privacy," 1991). The national penetration is 28.2%; cities such as Las Vegas and Los Angeles can boast nonpublished-number rates of 58% and 60%, respectively. Telephone customers are paying at least an additional dollar per month to avoid having "their" number published in the telephone directory.

The second and more powerful historical trend has been the growth in technology, driving down the cost of long-distance calling as well as other software-driven services. This underlying technology is certainly hardware (e.g., fiber optic cables and geostationary communication satellites) but so entirely efficient that economies of scale and scope are much greater than with previous systems using twisted-pair copper wiring and terrestrial interconnections.

Another basic economic consideration underlying telecommunications services like Caller ID is that the balance of economics is influenced by what Wenders (1987) calls "the capture of legislation" (p. 156). That is, the unique

nature of public utilities puts telephone companies into a dual framework that is regulatory and economic at the same time. Normal market forces (e.g., supply and demand) are powerfully influenced by legal and political forces. An example of how complicated this relationship can be is seen in the subsidization of local telephone rates by long-distance toll charges. Wenders cites Becker (1976; 1983) to describe the present system in which the minimum winning coalition is pitted against the economist's view of balance at the margin.

Another situational consideration is that the telephone industry operates as a giant cartel. There is no doubt the Department of Justice had this in mind during the Antitrust proceedings that led to the Modified Final Judgment (MFJ) and the break-up of AT&T. Even so, the remaining pieces, the RHCs and their RBOCs, are regional monopolies regulated by public agencies, such as public service regulatory commissions (PSRCs) and the FCC. Even their independent competitors are regulated monopolies.

These factors have created a situation where the RHCs need to find new revenue streams to replace the old way of doing business (Lopez, 1989). Information services are forbidden by the MFJ, at least for the RBOCs. But innovative services whose domain is in an "information gray area" show promise for greater revenue with little additional investment.

Costs of Caller ID

Most of the data regarding the cost of offering Caller ID and related services is proprietary and expurgated from public documents published by state regulatory commissions. Researchers are usually limited to the data provided willingly by the RHCs. For example, SS7-based services are "a major investment" according to Maksimowitz (1991). The estimated cost of blocking alone is reportedly between \$9 and \$15 million (Clarke, 1990).

The nature of telecommunications services is software-driven, with a corresponding impact on costs. The system of relays, switches, and electronic interfaces necessary for "plain old telephone service" (POTS) is already in place, based on local access and interstate connection. The provision of new services rarely requires that the system be reconstructed, although some equipment at the non-RHC competitors is not fully digital. In a digital environment, the system need only be reprogrammed. According to GTE's Jon Baker (1991, personal electronic mail message), "the major cost to the telco is in the software. . . . Thus, when you buy caller-id. . . , you are not just paying the telco to change the database and start billing you. You are paying MY salary, and that of a lot other engineers who make these features work."

Certainly the electronic components are not expensive. Sierra Semiconductor Corporation sells an integrated circuit SC11210/211 to decode FSK (frequency shift key) modem signals that deliver a calling telephone number. The chip sells for \$2 in quantities of 10,000 (Electronic Products, April 1991). A few other integrated circuits and a power supply bring the cost to under \$15 for the stripped-down \$30 Caller ID device.

Even so, covering costs does not guarantee making a profit. Jack Grubman, telecommunications analyst for PaineWebber, has estimated that the RBOCs need 25% penetration for services like Caller ID to be profitable, and 50% for any "material impact" on earnings (Lopez, 1989). Perhaps better marketing can push Caller ID and its companion services to the 25% level, but the evidence thus far from New Jersey Bell is not encouraging.

There are also costs to society, specifically in the loss of privacy or anonymity, that can have an impact on the value of Caller ID. Among residential customers being acquainted with Caller ID, there is usually a two-step awareness of privacy cost. Typically, the idea of being able to see who is calling

(more accurately, see the number of the telephone being used to place a call) is initially appealing to consumers. This results from a consumer's nearly universal association with the telephone as something that intrudes with a ringing bell and an incoming communication. Hence, in the first step the consumer sees the value of Caller ID as a protector of privacy.

It is usually a little later for most consumers that they realize the telephone is equally useful for outgoing messages, which have been technologically anonymous in recent decades following the demise of the operator-assisted switchboard. This de facto anonymity is a separate kind of privacy for which Caller ID is hardly a protector.

Cooper (1990) argued, "the mere availability of Caller ID imposes societal and economic costs on all subscribers, even those who do not want the service, while it provides benefits to some others. The costs stem from the customer's loss of control over his or her telephone number" (p. 600). Cooper (and Rotenberg, 1991) submit that telephone use is based on the assumption of anonymity. Once this assumption is lost for some, it is lost for all.

The societal cost of lost privacy is impossible to calculate, because interested parties cannot agree on the threat of Caller ID. Katz (1988) wrote, "telecommunications technologies which do have a privacy cost will also need to have explicit counterbalancing benefits" (p. 362). Presumably, if the benefits are great enough for the most people, then the cost is negated. Elseewi (1990) made the analogy of Caller ID to Call Waiting, where the positive aspects of Call Waiting outweigh the annoyance drawbacks (Elseewi, 1990).

Information itself has a value and is subject to demand and price considerations. Information (and concomitant privacy) is a by-product of machine-assisted communication. Whereas land was the resource for an agricultural economy and capital was the resource for an industrial economy,

Sheth (1991) declared "information is the new resource" for the service economy now sought by telephone companies. (This is not surprising, as Naisbitt (1982) emphasized the shift to an information society as his first "megatrend" for the 80s and 90s.) According to David A. Bohn, regional marketing director for AT&T Network Systems, businesses were once the primary revenue source but now revenues are expected to stay flat in that area (Sheth, 1991). One of the reasons for the push in residential services is the "mass multipliers" that are available in that market (e.g., \$5 service times a percentage of total subscribers per month). Jagdish Sheth described all technological advances as proceeding through four separate markets over time, with corresponding drops in unit cost: government, industrial, commercial, and consumer. He called this a "paradigm shift in the telecommunication industry" (Sheth, 1991).

Pricing of Caller ID

In reading the various plans put forth by the RHCs and RBOCs to implement Caller ID, one is struck by the arbitrary and capricious nature of prices. Although Bell Atlantic charges \$6.50 per month for a Caller ID service that they claim would be devalued by blocking, New England Telephone has proposed the same service with per-call blocking for only \$4.95 per month (Mason, 1991). The Bell Atlantic fee is the same for businesses and residences, but US West is charging \$9.95 and \$4.95, respectively (Karpinski, 1991).

In the absence of hard data from the telephone companies, the conclusions to be drawn about Caller ID pricing are sometimes conjectural. For example, blocking is judged by critics of Caller ID to be a free service. GTE North proposed a one-time \$5 fee for installing (or removing) line block (Marshall, 1991b).

Price is a ordinarily a function of several items: supply, demand, budgetary constraints, income, cost of substitutable items, and marginal utility.

In the case of Caller ID, the actual cost to produce Caller ID (as discussed above) may not even have a close bearing on price. Janowiak (1990) suggested "pricing should be done first, without regard to costs." Instead, "pricing must be in harmony with the customer perceived value and positioning" (p. 8). Pricing for one company should also take into consideration the pricing among other similar companies.

Maksimowitz (1991) explained that Bell Atlantic decided to use focus groups to determine a price for Caller ID: whatever the market will bear. Sicherman (1991) has postulated a "magic range of acceptability of price" for consumers "beyond which customers more critically examine the cost/benefits of services and the telephone companies seek to keep offerings within this safe range." Some analysts have criticized these strategies, suggesting lower per-use, rather than monthly, fees for customers who perceive lower demand (Lopez, 1989).

There is some cost/price data that has leaked out from the various hearings by state public utility/service commissions. Calling Number ID proposed by GTE is priced at about 200% over cost (Marshall, 1991a). The RBOCs could presumably produce enough financial data to show the PSRCs that the costs justify the prices. In some states the pricing for "smart" telephone services like Caller ID is presented as a way of preserving low rates for POTS (Public Service Commission of Nevada, 1990). If prices still seem predatory, the marketers could defend the price as being in line with perceived value.

The Future of Perceived Value

The residential customer has been predictable for the telephone companies, so long as POTS was considered essential. But the entrance of the RHCs into ancillary services like Caller ID is marked with many pitfalls. Sheth (1991) noted that there are many more failures in the residential market than

there are in the business sector, although Geurtz (1987) found business users more interested in cost savings than clever features.

Perhaps services like Caller ID appeal to psychological and safety needs that occupy a lower and broader-based level on the Maslow pyramid of needs, compared to business needs. If this is true, the telephone company may indeed find a greater potential in the public. Yet, the public is fickle, especially in its demand for non-essential services. Cable television operators complain of "churn" whereby subscribers continually add and subtract services, often unpredictably.

There are expected changes in the perceived value of Caller ID that could dramatically alter the customers' continued satisfaction. For example, the person who is interested in Caller ID for security may soon discover the "heavy-breather" calling from a telephone booth, where Caller ID is less informative. If it becomes purely a screening device, the customer may begin to wonder how Caller ID is better than an inexpensive answering machine. The entertainment value is subject to the "novelty effect" where users become bored with expensive toys that provide limited value.

The link between the number of the calling line and the identity of the actual caller is tenuous. New services will arise to circumvent Caller ID. For example, Private Lines is a service in Los Angeles that will launder your telephone calls for \$2 per minute (Nilsson, 1991). The service is simple to use: One calls 1-900-STOPPER and receives a new dial tone. The display on the Caller ID terminal shows only that the number is outside the local area. Of course, some might argue that even the absence of information is itself a kind of information (i.e., the called party knows who is not calling).

Caller ID is immensely attractive because of its unique ability to approximate the identity of the caller, hence the name. If this advantage is sufficiently diminished, as users (and abusers) become acquainted and familiar

with its power, the value may become greatly impaired -- more so than is achieved by ordinary blocking. Perhaps the efforts to protect privacy through legislative means are hasty or misguided. The survival of Caller ID may be too vulnerable to basic economic forces, as society adjusts to its presence. On the other hand, its function may still appeal to those who would be satisfied with a less-than-perfect utility. The unanswered question is: Will there be enough subscribers? Future research needs to evaluate the success and failure of individual RBOCs' entry into residential services.

Notes

¹CLASS is a registered service mark (sm) of Bellcore. Katz (1990) suggests "calling number identification" (CNI) as the generic term, but "Caller ID" has gained the widest spread acceptance.

²Indeed, the approach of broadband fiber optic delivery systems may merge cable television with telephone service, albeit with considerable wrangling similar to the struggle between cable television and broadcast networks.

³The telephone companies are careful to use the term "non-published number" in their literature, rather than the common term "unlisted number" familiar to most people. Although some suspect this is an attempt to defuse the customer's feeling of ownership for a telephone number, the telephone companies explain that they offer customers "non-published" numbers and "non-listed" numbers, at separate rates established by tariffs. The latter version is protected from telephone workers who have access to non-published numbers.

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