

**Before The  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of )  
)  
Implementation of the )  
Telecommunications Act of 1996 )  
) WT Docket No. 96-198  
Access to Telecommunications Services, )  
Telecommunications Equipment, and )  
Customer Premises Equipment )  
by Persons With Disabilities )

**TRACE R&D CENTER COMMENTS**

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**About Trace**

The Trace R&D Center is a research and development center in the College of Engineering at the University of Wisconsin-Madison that works with industry in developing commercially practical ways to build accessibility into standard commercial products. The Trace Center has been working on technology and disability for the past 27 years, and has been working with companies in many industries who have been building features into standard commercial products for the past 12 years. Companies have included Apple, IBM, Microsoft, Pacific Telesis, SBC, Intuitive Solutions, Quad Media, Election Systems & Software and others, all of whom have features that were developed or recommended by the Trace Center built into their standard mainstream products which allow their use by individuals with disabilities.

## Is It Possible to Meet the Telecommunication Guidelines?

- **Yes - it is possible**

It is possible today to meet all of the telecommunication act guidelines in a single product. For example, commercial touchscreen kiosks that have been installed in the Mall of America and other locations, as well as the new Quad Media/ESS voting booths, can meet all of the requirements in the proposed FCC/Access Board Guidelines.

- **Today it is not readily achievable for all telecommunication products to meet all the guidelines.**

Even though it is possible to meet all of the guidelines on larger products, it is not currently possible to meet all of the guidelines for all telecommunication products. Some telecommunication products are small enough and low cost enough that building such things as speech recognition or text to speech will not *currently* fit within the form factor or the cost constraints. That is, adding these capabilities would substantially change the form factor or cost of today's products. If it were not for the "readily achievable" clause in the laws and regulations, it would not be possible to comply today in a reasonable or commercially viable fashion.

- **But, today it is possible to comply with the guidelines for all products because of the "readily achievable" clause.**

Given the fact that the "readily achievable" clause is in the guidelines, it is possible to comply with the guidelines for every product manufactured. *In addition*, most products can be made accessible to a wide range of users, and a smaller but ever-increasing number of products can be made to meet most or all of the guidelines.

- **In the future it will be readily achievable for most all products to address all of the telecommunication guidelines.**

Technology is advancing at such a rate that capabilities and functionality which would be unheard of in the past will have very little impact on cost or product size in the future. In addition, most of the new technologies/capabilities that are required in order to meet the guidelines will be used within the products for other non-disability related functions. Thus they will not need to be added for accessibility. They will only need to be implemented correctly.

For Example: In the not too distant future, adding speech output to a device is likely to cost less than the plastic case the product is housed in. When this occurs, it will be readily achievable to add speech to many products. In fact, speech output will be added to many products as an "alternate" display for everyone. For instance, it would be a handy additional feature in standard text pagers so that people who don't have their reading glasses on, can just hold the pager to their ear and hear the page read to them. This would be especially handy where pages are received while a person is driving. They would not have to take their eyes off the road, fumble for reading glasses or try to read the pager while holding it at arms length. Such a feature is too expensive today but will cost cents, not dollars, in the future - and the guidelines and rules should be written with this in mind.

## Today versus Tomorrow and the Role of “Readily Achievable”

*It should be remembered that...  
...the guidelines and rules should primarily be written for  
FUTURE TECHNOLOGIES, not past or current products.*

In many of the industry comments, examples are cited where something is impossible or very difficult with current products or technologies. This is then usually used as an argument for the guidelines not being adopted or not being applied, etc.

These discussions seem to skip over the role of the term "readily achievable" as well as the difference between yesterday's and today's technologies and those of tomorrow.

In the law and the guidelines, the term “readily achievable” was very carefully chosen to prevent the difficulties cited in the industry comments. The cases cited are not a compliance problem precisely *because* they are “unreasonable or impractical” and are therefore not readily achievable. The definition of readily achievable is “easily accomplishable and able to be carried out without much difficulty and expense.” Therefore, if things are clearly impractical today, then they are exempted.

Most of the examples cited in the industry comments also focus on past or current technology. It may be true that requiring people to add voice output to text pagers *today* would involve costs (e.g., for a faster processor, more memory, and more battery power) that would make it not readily achievable. However, technologies are rapidly becoming available that will allow this functionality in devices that will easily and inexpensively fit into both pagers and (eventually) wristwatches. Voice technologies (both recognition and synthesis) have made tremendous progress in the last few years and are accelerating. Processing power is going up by a factor of ten every four years. The size of devices continues to shrink and the cost of memory is dropping precipitously. We would be surprised if anyone from a telecommunication company's R&D department would take a \$1000 bet with 10 to 1 odds (in their favor) that they won't be routinely putting voice output capabilities into their pagers with visual displays in five to eight years for use by their general customers (not just those with disabilities). In fact, voice technologies will soon hit a cost threshold where they will be so inexpensive that they will be a common feature (optional display) in a very wide range of products.

Another example of this is the infrared connection. Only a short while ago phone companies were complaining that it was completely unreasonable for them to build an infrared capability into their phones just to meet the connector-less requirement in the guidelines (FCC 98-55 page c7, Sec. 1193.51 (a)). ***And they were correct***; it would not have been practical for them to have added the infrared connectivity just for that purpose, at the costs that were involved at that time. ***However, only 12 months later*** we are finding the infrared capability being built into phones and

telecommunication products both at the high and low end of the cost spectrum. At the high end, full IrDA infrared is being incorporated into phones to allow them to connect to laptop computers for control and data modem purposes.

One company is reportedly planning to use an infrared connection in their telephone to communicate with vending machines. Anyone with a cell phone could simply hold it up to a vending machine or other sales terminal and have the cost of the purchase charged directly to their phone bill. (A sort of infinitely deep cash card, telephone style.)

Infrared links are even being built into low cost pagers. It turns out that an infrared link is an excellent, low cost, rugged connection point that can be used both for testing and programming of the pagers. The IR link allows the pagers to be programmed in the store rather than the factory, allowing greater flexibility.

In each of these cases it may or may not have been “readily achievable” to build the infrared capability into the product solely for the purpose of adding accessibility. However, as infrared is built in for other purposes--the cost to include disability connectivity drops to zero for hardware and essentially zero over time for the slight amount of additional software.

And we will see this trend across the board. Continually advancing technologies will cause the technologies needed for cross disability accessibility to appear in telecommunication products for other reasons. This will in turn make it “readily achievable” to incorporate more and more of the FCC / Access Board Guidelines into more and more products for little additional cost (or no cost where the feature is added for all users, such as a vibrating alert on a pager, or the ability to have a page read to you, or the ability to tell your phone what number to dial, etc). Already, Intel is talking about every application running on its next-generation processors being speech-enabled by this time next year (see InfoWorld article in Appendix D).

**There will always be some products which cannot meet some of the guidelines – so the “readily achievable” phrase will always be important.**

For example, it is not clear how the guideline that requires ‘access by individuals with low vision without requiring audio’ would be readily achievable for a telephone that was voice controlled and fit entirely inside of one’s ear. Such an *“all-in-the-ear” telephone* could be compatible with a hearing aid or hearing aid function, but would not necessarily meet the guidelines for “low vision access without audio.” Thus, the “readily achievable” phrase will be important to allow such innovations to occur as technology allows them.

## Will the Access Guidelines and FCC Stifle Innovation?

The comment has been made repeatedly that accessibility provisions are bad for innovation. These comments appear to be made under the assumption that:

- 1) Innovations by their very nature will make products less accessible rather than more, and
- 2) Companies would be prevented by the FCC from implementing innovations due to accessibility considerations.

First, it turns out that most innovations that have been introduced in telecommunication products have actually increased accessibility or have enabled the products to be easily made more accessible. In some cases, the products were serendipitously made more accessible. In other cases, the innovations introduced new interfaces, new displays, new programmability, new audio capabilities, etc. which would make it quite easy to make the products more accessible. All of the trends in fact are toward most innovations making products more accessible, not less.

*There are innovations which might make a product less accessible for one group or another - or which might preclude a feature which had been on the previous phone (e.g., a new product is too small to hold a vibrating ringer or the new product has a touchscreen so the nib can no longer be placed on a five key). As long as reasonable efforts are made to develop alternate accessibility, however, any remaining accessibility issues should be covered by the "readily achievable" clause (and industry should be allowed to introduce the product). As a result, there should be no bar on innovation. In fact, seeking ways to make products accessible is likely to both require and inspire innovation, much of which is likely to benefit all users.*

**The access guidelines as written *would not stifle innovation.*  
Rather they would *stimulate it.***

Because of the "readily achievable" clause, there is no reason for the access features to stifle innovation in any fashion. If a new innovative device such as the all-in-the-ear phone were technically possible, it could be introduced without violating the guidelines because of the "readily achievable" phrase.

On the other hand, companies *would* have to think about accessibility and see if there was a way of meeting the access requirements. This does give them something else to think about (additional work), but it is not going to double their workload. There are already thousands of issues and constraints that must be kept in mind when developing a cellular phone or other telecommunication product. Building access in is difficult primarily because companies have not been addressing this issue (these users) in the past and the strategies and techniques for providing access are not yet second nature to their design teams (as the thousands of other aspects of telecommunication design are). Once "design for readily achievable accessibility" is part of their regular design practice, and the teams have the access issues and approaches down pat, and the past products designs they are working from include access features, then access features will

come naturally for existing products designs - and designers can begin to their own accessibility innovations.

In fact, having different ways of looking at the design of a product is likely to spur new innovation. The typewriter, carbon paper, long playing records, the Jacuzzi bathtub and a long list of other inventions and innovations were first developed to meet the needs of people with disabilities. (The typewriter for a blind countess, carbon paper for people who were blind and could not use a quill easily, long playing LP records for recorded books and the Jacuzzi by Mr. Jacuzzi to help his son with cerebral palsy relax his muscles).

Also, vibrating pagers, talking caller ID, and a whole host of other innovations, which have widespread customer appeal (*and which may or may not* have first been thought of to address the needs of someone with a disability), would have been *thought of and introduced earlier* (and with great profit) if companies would had been thinking about the needs of individuals with disabilities when they designed and introduced the original products.

Other innovations such as the different uses for an infrared link, or ways to make phones friendlier using voice, or safer by making them easier to use while driving, etc., all may result from people carrying out the mental exercise of testing whether or not there are ways that it would not only be “readily achievable” but also advantageous to add the technologies to the product necessary to support the flexibility for disability access. For example, trying to figure out how to make the all-in-the-ear telephone compatible with hearing aids might lead one to the thought of creating an all-in-the-ear dual purpose hearing aid-telephone. Thus, opening up a new market for a new type high priced (high profit) telephone that would address needs of a rapidly aging mass market of baby boomers.

## Product Line Approach Does Not Work

The product line approach basically seeks to reduce the number of products which need to be made accessible under the supposition:

- That not all products can be made accessible to everyone (as discussed above);
- That disability access features for different groups will interfere with each other (discussed later);
- That the reason companies put out different products is to allow users to pick the product that best matches their needs and preferences; and
- That it is not possible to build all of these features into all of their phones.

The natural extension of the product line strategy applied to a manufacturer is the application of the strategy to the product line of a reseller or even to the industry as a whole. “If another company makes accessible equivalent products then a company has met its obligation.” In fact, one of the industry commentators (the Information Technology Industry Council, page 15) proposed just such a “market wide basis” for determining whether a manufacturer has met its accessibility obligations.

In most of the comments, the argument is made based on the difficulties involved in putting accessibility for every possible person into every possible product. The guidelines in fact, do not require this. They simply require that every product be looked at from the perspective of every disability. It is only if the features are "readily achievable" that they need to be included in a product. Where it is not readily achievable to address a particular group with a particular product then it is not required. However, if it is “easily accomplishable and able to be carried out without much difficulty or expense” on any (or all) products, it is not clear why it should not be done.

The questions then become:

- Is it readily achievable (easy) to provide an access feature into this (every) phone?
- If not, on which phones is it not readily achievable?
- Why not put it on the rest (where it is readily achievable)?
- If not readily achievable to make any of the phones fully functional, is it readily achievable to make the basic functions of the phone accessible?
- If it is not readily achievable to put a feature into all or many of the individual phones, is it readily achievable to put it into one of the phones in each class or product line?

This shows how a product line approach can be used effectively as a *second tier* strategy to address those instances where an access feature is not readily achievable to build into every product. It is not clear, however, why it is necessary to invoke the product line strategy for those features that were “easily accomplishable and able to be carried out with much difficulty or expense” on most or all of the products.

For example, it is not clear why all phones having a physical number pad would not have a nib on the five key or have keys which are tactilely discernable (versus having them covered by a perfectly flat membrane). And if the phone has a headset jack, why not use a standard headset jack that would allow the connection of neck loops, amplifiers, etc., which the consumer may

already have, rather than using a connector or electrical characteristics that are incompatible with standard audio enhancement products. (The electrical characteristics for the “standard” connector can be selected to accommodate very low power products such as those we are likely to see in the future.)

### **Why doesn't the product line approach provide essentially the same benefit?**

In examining this topic it is fair to flip the question around and ask: What is the good, or additional, benefit (or need) for having access features in every product rather than just having just one product in a line? Why isn't “at least one product which is usable by each person” good enough?

The reasons are many.

Essentially, the answer comes down to the same reason: there isn't just one product offered by the telecommunication manufacturer in the first place, coupled with the fact that a consumer rarely has access to more than a very small portion of a company's product line at any time.

- Will there be an accessible version of every product in the manufacturer's product line?
- If one product is accessible to people who are deaf and one for individuals who are blind and one for people with physical disabilities, will all three be carried by every store that a person who has a disability goes shopping in?
- Will the accessible version(s) all be offered as part of the 1-cent sign-up package (see Appendix A); the \$39 sign-up package with a phone having enhanced features; and the \$100 package with a phone having still more features and/or services?
- Many individuals wait to purchase their products until there is a clearance sale when prices drop into a range that's more affordable to them. Will each of the different accessible phones also be available at clearance prices?
- How about people who don't buy new equipment at all, but purchase used equipment?
- Then there is the situation of the employer who buys a batch of cell phones, pagers, or other telecommunication products; the employee who acquires a disability, who is getting older, or who shows up later needs basic access features which are not included or part of the “company standard product.” It can take 8 -10 weeks for a compatible product to be located, tested, approved, ordered, stocked, shipped and activated. In the meantime, the individual is unreachable. If the product malfunctions or is damaged, they are unable to draw from the company pool and drop off the communication net again, while their special version is sent in for repair, etc.

When individuals are traveling and try to rent a piece of telecommunication equipment,

- Will the particular version which has the accessibility features they require be the one which is available for rent?
- How about if there are different versions - one for each different type of disability? Will they all be available at the rental counter?

When a person checks into a hotel,

- Will the phone system in the room be one that is accessible?
- If there are different phones for different disabilities, will the hotels have to have different rooms with different phones for different disabilities?

When a consumer goes shopping for a phone,

- When they walk into a store that carries only two or three models (out of 20) from each manufacturer, will the two or three models be the accessible ones? (Most people are only aware of those phones which they see at their local store and which the local sales people are familiar with.)
- When stores advertise phones (either via the mail or in their stores), will it be the accessible phones that they are advertising?
- Will the store salespersons even be aware of the accessible models? (IBM produced a keyguard for their typewriters that was a “special order item.” Not only were sales people unaware of the product and, therefore, not able to mention it to consumers who might have required it, but when asked if something existed, they consistently replied “no.”)
- One of the commentators talked about targeted markets and the fact that the same phone could not be sold to teenagers as to corporate executives. Will versions of the accessible telecommunication products be marketed for each of the different disabilities for each of the target markets?
- Will the disability-accessible versions (each of them, if the manufacturers decide to make one different phone accessible to different groups) provide the same variety, choice, and features as are available to everyone else?

All of the above questions, of course, are limited by “where readily achievable.” The issue isn’t whether phones should be accessible when it is not readily achievable. The law and the guidelines are clear that individual phones do not need to be accessible when it is not readily achievable. The question is only whether or not phones, which could have been made accessible easily and without difficulty, were not made accessible because the product line approach was taken. Should the fact that a single phone in the product line has a feature, exempt all of the other products from having to have the feature no matter how easy it would be to incorporate. Why have only one phone accessible if it is readily achievable to include many (but not necessarily all) of the features on many (but not necessarily all) of the products?

***Why not use a hybrid, two-tier approach?***

***- All products should have those access features built into them that it is readily achievable to incorporate.***

***- Where it is not readily achievable to build a feature or capability into all products in a line, then it should be built into as many modes as are readily achievable.***

## Adding Accessibility for One Group Does Not Make the Product Less Accessible for Others

Another argument that is given for the product line approach is that accessibility features for one disability group make it less accessible to another. Although no specific examples are given, one commentator did suggest that adding options would increase the complexity of the product and thus make it less accessible to people with cognitive disabilities.

First, making products more accessible is properly done by *providing options, not by changing the basic function* of the product. For example, in addition to being able to see a display the product may have an option to allow the display to be read. This does not make the product less accessible to people who are deaf since they can still read the display. This provides an option of having the display read for people who cannot see or cannot read or whose eyes are busy. Adding the extra option or function may add slightly to the complexity of the device (for individuals who have cognitive disabilities). However, the removal of the need to read the display is likely to have a greater positive impact for individuals who have cognitive disabilities than the slight increase in complexity due to the extra button.

In most all cases where people cite access features for one individual interfering with another, they are talking about removing a display or control option and replacing it with another. However, if a second display or control option is provided *in addition* to the first then the problem does not occur.

For example, adding closed captions to television makes it more accessible to individuals who are deaf (as well as anyone watching the television in a sports bar), but does not reduce its accessibility to individuals with visual impairments unless you remove the soundtrack when you add the captions. Similarly, adding a vibrator feature to a pager makes it more accessible to individuals who are deaf (as well as any of the rest of us in a loud environment or a silent environment), but does not reduce its usability to anyone. Having auditory cueing for someone who is blind does not make it less accessible to people who are deaf unless you remove the visual display. Creating a pager which plays back your message auditorally does not make it less accessible to people who are deaf unless you were to remove the visual display from the pager. If you did so, you did not make the standard pager more accessible. What you have done is to introduce a different kind of pager. You didn't add accessibility, you changed the product to an entirely different one.

A "separate but equal" or "product line" approach could mean that if you have an auditory pager, your visual pagers would not need to be accessible. However, auditory pagers actually work on a different technology and cannot receive messages intended for a visual pager. Some type of network-based bridge would be required for the individual to convert their text pages into auditory pages. This may or may not be available for the particular manufacturer or in the particular cities or with the particular vendor or communication package that is used by the individuals, colleagues, company, etc. (It isn't available in our city, for example.) If it cost 1%-2% more to add voice to the digital pagers (which is likely within five to eight years), would it not make sense to have all pagers do both visual and voice? Wouldn't we all find it more useful to be able to read our pages or to simply push the button and hold it up to our ear to listen to the page being read to us; especially, if we are driving down the highway, or if we've left our reading

glasses behind, or if we simply want to listen to the page without making a big production by pulling out our reading glasses to read the display while we are sitting in an important meeting?

The key to making products more accessible is to make them more flexible. That is, to add, not remove, display modes or operational modes. As a result, the user is provided with the option of operating it in one fashion or another or having the information presented in one fashion or another. As a result, adding options which make it more usable for one group does not interfere with or prevent its use by another. Individuals simply turn on or turn off features to make the product appropriate to their needs and preferences.

Is it possible to think of a way to institute accessibility features so that they would restrict usability by other disability groups? The answer is yes, but that is not what is being proposed. In fact, the guidelines themselves specifically speak against developing accessibility features in this fashion by requiring that all disabilities be looked at, in parallel, rather than individually.

When Apple introduced the Macintosh, they introduced the idea of using a mouse but did not remove the keyboard. They did, however, make it so that some functions could only be handled by the mouse. Presumably, this was done to help encourage people to use the mouse. Later they added the ability to control the mouse functions from the keyboard (MouseKeys) as a part of their accessibility features. The cost to do this was simply adding a small amount of code, which currently represents less than a thousandth of the code, and has been found to be useful by people without disabilities. People also prefer the Microsoft Windows implementation which allowed both keyboard and mouse access to all functions (basically, because when it was first introduced not everybody had mice). Thus the preferred approach of most is the one that provided the option of using the keyboard or the mouse.

If an instance comes up where it isn't readily achievable to implement features for both one disability and another, then it isn't readily achievable and the manufacturer may need to select one or another approach. These unusual cases would be good places for the product line approach to be used to fill in functionality when it is not "easily accomplishable and able to be carried out without much difficulty or expense" for all products.

## **Telecommunication *Components* and *Software* Must Be Covered**

In the past, when you bought a telecommunication product such as a telephone, in almost all cases, it would have been manufactured by a single company. In the future this will not be true. A large percentage of the telecommunication products will, in fact, be either software in nature and/or assembled from components manufactured by different companies. Let's examine each of these separately.

### **Many future telecommunication products (including phones) will be software.**

First of all, we increasingly will see telecommunication products being software in nature. (see Appendix C) That is, individuals will have devices that will connect them to the packet-based national information infrastructure. They may have multiple devices of various sizes. Some they will carry on their person, some they will have at work or at home. These devices will be used for computing and for information and telecommunication services. Often the devices will become telecommunication devices when a piece of software is purchased for them. That is, in the future we may not be buying telephones; we may just be buying telephone functions or software modules that we will use on our multi-purpose devices. Under the current rules these types of telephones (which may be the only telephones in the house and are likely over time to be the only kind of telephones in hotel rooms, etc.) would not be covered under the current interpretation that software products would not be covered.

It is ironic that if you purchased a physical plastic telephone and put it on your desk, it would be covered under the telecommunication act. If you bought a software telephone (which looks identical to the plastic telephone and operated identically to the plastic telephone except that you placed it on your desktop of your computer), it would not be covered under the rules as proposed in the NPRM. There are already such programs available that literally put the image of a telephone on to your computer screen and allow you to make telephone calls. These software packages can be designed so that they are cross disability accessible or they can be designed so that they are not. It is not clear why these types of software based telecommunication products should not be covered when their hardware counterparts are. This leaves us with an unlevel playing field that will only get worse over time.

### **Assembled telecommunication products can evade coverage.**

Increasingly, we are going to see products that are built out of components provided by different companies. That is, software from one company combined with a voice modem from another and a small computer from a third will be used to build a speakerphone. Or a pocket computer coupled with a snap-in telephony module and software will be used to construct a pocket telephone personal computer combination. Already we have palm sized computers that are built by multiple companies with rigid specifications provided by Microsoft into which you can pop a small module from a third company and end up with a telecommunication product.

**Even subcomponents need to be covered or accessible products may not be possible.**

Even when a phone is built entirely by one company, it may not be “readily achievable” to design it to be accessible. If the subcomponents (codecs, modems, etc.) are not designed to support accessibility, the result is that: 1) the subcomponent manufacturers have no motivation since they are not covered, and 2) the final assemblers are not covered since it is “not readily achievable” for them to build the phone when such basic components are not accessible.

It is suggested that...

*... any hardware or software product or component that is marketed as being useful for telecommunication should support accessibility unless it is not readily achievable for them to do so.*

Such a measure:

1. Would provide a bright line for determining whether something is or is not covered. If it is marketed for telecommunication, it is covered.
2. Would avoid the ambiguity that will arise around products that are formed by coupling two products together to form a telecommunication product.

For example, if you have a module, which has all of the workings of the cellular telephone except the keypad and you plug it into a pocket computer so that you can use the keypad on the computer, was the first device a telecommunication product, the second or neither? Is it only a telecommunication device when they are plugged together? If so, then it seems strange that because the telecommunication submodule has no function except telecommunication, it is not covered. Also, of course, the two parts drawn together would not be covered because it is not readily achievable to redesign the whole thing to be accessible when you are just plugging two modules together at the final assembly.

Note that the above discussion does not require that the components themselves be accessible (which would be impossible since they do not necessarily have an interface). It only requires that they support accessibility. This is fairly easily and straightforwardly defined. Is the design of the component such that all products built with them could not be easily made accessible? And was it readily achievable for the manufacture to have designed the component so those accessible products could have been readily designed using it?

3. Avoids the creation of final assemblers just to take components from other manufacturers and assemble them into a product that would be exempt.

## Scope of Section 255 of the Telecommunication Act

In looking at the definition of telecommunication used in the Act, it seems obvious that Congress intended it to apply to more than just phone conversations. In other locations it's been stated that information services were not covered. The question then is, what is or is not covered?

We would suggest that telecommunications be divided into communication and information functions.

We would further suggest that in the future we are going to see a great blurring of the technologies we use to communicate. Even those without disabilities will find themselves sometimes communicating with speech, sometimes communicating visually using text, sometimes text communications will be delivered in voice, and sometimes voice communications will be delivered in text. Someone sitting in a meeting, for example, may have a phone conversation where they do not want to pick up a phone and talk. They would, therefore, have the speech of the person calling them rendered to text and displayed on a screen. They could then type their message back, which could either appear as visual text at the other end of the line or be converted to speech. Thus, the individual could carry on the conversation (using typing and a visual display of the other persons speech) without needing to leave the meeting or to disturb the meeting. We will also have voice communication changed into data packets and transmitted to the far end where they are converted back into speech (in fact, this is how all digital cellular data is done today and much of regular telephony).

What is needed is a bright line to help differentiate between communication and information services. We would suggest that bright line as follows:

If an individual is sending information (voice, TTY, other text, etc.) to another predefined individual or a group of individuals, then what exists between sender and receiver is telecommunication in the communication sense of the word. If the information is posted (on a bulletin board, web page, news group, or database) where the viewers of this information are not known to the poster and completely defined at the time of posting, then it would be an information service.

The bright line comes from the fact that posting things to a web, a news group, a bulletin board, etc., (even though it maybe intended for a particular group) does not in fact necessarily go to the whole group and others may join after the fact. It is seen by those members of the group (and anyone else) who accesses that website/database/bulletin board. On the other hand, voice communications, TTY communications, chat and other text communication (which will eventually replace TTY), e-mail, fax, voice mail, etc., would all constitute communication.

This approach provides a clear bright line that works both with today's technologies and tomorrow's. It also allows the technologies to freely evolve without creating definitional squabbles as particular technologies become obsolete and are replaced by other technologies, and without having the evolving technologies simply walk out from under 255 because of a narrow definition.

## Should Internet-Based Services Be Covered?

This is the wrong question. At one time, the Internet and telephone systems were largely separate. Today Internet services are carried out over phone lines and telephone services are carried out over the Internet. Tomorrow today's telephone system and the Internet system will both be subsumed by a large packet-based data network. All phone calls and all activities we currently think of as occurring on the Internet and cable TV will all be carried out over this global digital information network. At that time, it may or may not still be called the Internet. It could, however, very likely still bear the name Internet or (Internet iii, iv or v). Already we find AT&T seeking to purchase TCI so that it can carry out both Internet and telephone services over the cable TV system.

The discussion, therefore, should not be based upon which "wire" (cable TV, direct satellite link, twisted pair phone wire, DSL, etc.) but rather on the type of activity that is being carried out (e.g., communication or information, etc.). Since the first and maybe even second stages of this convergence of the systems will occur before the discussions on proper interpretation of this law is completed, and the bulk of the transformation will occur under the tenure of this act and its regulations, it is suggested that the use of the term Internet as a distinguishing characteristic of products and services, which are covered, be dropped and that the discussion instead focus on the nature of the activity being carried out over these "wires" whatever form they take.

If regular telephone calls can now be routed over the internet then all things carried out over the "Internet" cannot be exempt from the telecommunication act. To do so would result in the even more rapid movement of all telecommunication activities onto the packet based Internet architecture at which time, they would all be exempt from the telecommunication guidelines. This would, of course, require a sharp increase in the performance of the Internet or the development of the ability to have higher performance "channels" which people or service providers could subscribe to (similar to toll roads). Higher performance NII and higher performance parallel channels are inevitable. In fact, just such a system based on low orbit satellites is already underway by multiple companies/consortia.

### Recommendation:

1. Telecommunication activities carried out over the Internet should be covered since all telecommunication is likely to be carried out over the Internet or its descendants in the future.
2. Information services being carried out over the Internet should also be covered if information services are found to be covered by section 255.

Telecommunication services, whether they occur over the Internet or over the regular phone system, should be treated identically and should be treated as telecommunication services (and or products. If information services are broken off from this, then information services, whether they occur over the Internet or over the current telephone system, should also be treated in the same manner. Otherwise, there is no bright line as these two systems merge and there is certainly no level playing field.

**The ability to order the retrofit of accessibility features into products to achieve compliance - should be preserved as an enforcement option of the FCC.**

The option should not be used, except in more severe cases of non-compliance, but it should be preserved as an option. Otherwise it would create a situation where the most cost effective approach would be to do nothing and just wait until complaints were brought (since the only real enforcement option would be to order them to design subsequent products in an accessible fashion). Among other things, this would create an uneven playing field. Larger companies would, because of their visibility and public relations concerns, have to follow the rules while smaller companies (which are less likely to be the target of complaints) could just ignore the rules and wait 'til the FCC found the time to get around to ordering them to.

## Important Industry Issues

Having critiqued those industry comments that seem to have overstated the case, let us reinforce some of their points which are especially valid and important.

### **1) Industry must have a level playing field.**

The regulations cannot end up enforcing regulations on one implementation of a telecommunication function but not another (e.g., enforcing the rules on a large company that sells integrated products but not those companies which implement the same product function via software, or firmware, or attachments, or by splitting components among collaborating companies so that they come together at the retail outlet; or separating internet telephony from PSTN).

### **2) Industry must be allowed to innovate.**

This is not inherently a problem with the way the regulations are written. But Sec. 1193.39 (Prohibited reduction of accessibility, usability, and compatibility), which reads...

*(a) No change shall be undertaken which decreases or has the effect of decreasing the net accessibility, usability, or compatibility of telecommunications equipment or customer premises equipment.*

...should not be interpreted to prevent the introduction of a significantly different product (for example a much smaller product) where some particular access feature may not be feasible that was present on its larger predecessor. Instead it should be judged independently on whether each access feature (or new access features) is readily achievable.

# SUMMARY

- 1) Retain and use the guidelines
  - 1) they are doable (readily achievable) today for some products
  - 2) they will be widely doable tomorrow "with little effort or expense" due to technology developments
- 2) Make sure that rulemaking keeps future products and technologies in mind - and is not limited to what is available or possible today
- 3) Use "readily achievable" to protect companies from rules that are not yet technically and/or commercially practical (they will be later).
- 4) Access guidelines will not stifle innovation if the FCC applies "readily achievable" properly for new technologies. Instead they will stimulate innovation.
- 5) The product line approach does not work. Companies will be unwilling to do what is necessary to provide equal product diversity, at equal prices and equal availability, under a "separate but equal" approach. Those things that are "easily accomplishable and able to be carried out without much difficulty and expense" for any product should be done on that product. Those that are not readily achievable would not be required.
- 6) Telecom components and software must be covered, or technology and products will walk out from under the guidelines/rules/law as technology progresses.
- 7) Adding access for one group rarely reduces access for another unless it is done improperly.
- 8) The scope of Section 255 should cover all types of "tele" - "communication" including voice and text, realtime and delayed. Thus phone, fax, TTY, text chat, email, voicemail, etc would be included. Basically any interaction where the person is communicating with another person should be covered.
- 9) Information services should also be considered under the law which defines *Telecommunication* as "*the transmission, between or among points specified by the user, of information of the user's choosing, without change in the form or content of the information as sent and received*"
- 10) The FCC should retain the ability to order retrofit of accessibility features to avoid non-compliance and keep a more level playing field for larger organizations. It should be rarely (if ever) used, except in cases of gross disregard.

## Appendix A

A picture of a newspaper ad showing Motorola's StarTac phone as available ON SALE for 1 cent along with a cellular service from Circuit City.

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 **MOTOROLA**

### Motorola's StarTAC™ cellular phone- So small, so light, it's always with you!



- Only 3.7 Oz. and 5.5 Cu. In.
- NIMH Memory Free SMART Battery
- Caller ID Capability
- 60 Minute Talktime and 14 Hour Standby
- Includes Belt Holster

**1¢**  
ACTIVATION  
REQUIRED †

ON SALE!

**Waived  
Activation Fee\***  
A \$40 Value from Circuit City

— PLUS —

**3 Months  
Incoming Calls  
Free\*\***

*Stop by Circuit City  
and try one on for size!*

**CELLULARONE™**

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*Today's technology just keeps getting smaller and smaller! The newest wireless phones are feature-packed like never before. Our sales counselors will make sure you take home exactly what you need — right down to batteries and accessories.*

# **CIRCUIT CITY®**

Lots of Choices, Lots of Answers for the Way You Talk.™

## Appendix B

A picture of a combination Palm Pilot / Cellular Phone put out by Qualcomm, showing the integration of pocket computing and telephony.



## Appendix C

Description of a **software program** that will turn your computer into a deluxe speakerphone.



High Quality Sound Uses your PC's Speakers and Microphone Easy to use It's like getting a 2nd phone line FREE! International calls to U.S. only 10 cents! International calls from U.S. save up to 95% **Dial like a normal phone!**



U.S. Long Distance  
Any Where  
Any Time

per minute

**7c**

### How to get started:

1. Download
2. Install
3. Register to Call

Works over the internet. Connects to Standard Phone System.



"Conversations sounded exactly as they would  
on a traditional telephone"

PC Magazine

## Appendix D

### Intel Katmai chip will give voice to applications

By Ephraim Schwartz  
InfoWorld Electric  
Posted at 7:01 AM PT, Oct 19, 1998

If Intel has its way, every application running on its next-generation processors would automatically be speech-enabled this time next year.

Intel is including the speech technology in its next processor, code-named Katmai, due out in the first quarter of 1999, and experts are predicting that by 2000 the technology will be able to go beyond simple speech-to-text input.

"You will be able to say, 'What were sales for last September and how does that compare for this September?'" said Steven Rondel, president of Conversational Computing, in Redmond, Wash.

Microsoft is also throwing its weight behind speech recognition, and will eventually replace the current GUI with spoken commands. The software giant will put its Whistler text-to-speech engine, for accessing data such as e-mail over voice telephone lines, in Windows NT 5.0 and its Whisper speech-to-text engine in a future OS.

With OS and chip support in place, PCs will soon become personal assistants.

"Users will say, 'Print two copies of my financials, in landscape mode on the network printer,'" said Bob Kutnick, chief technology officer at Lernout & Hauspie, in Burlington, Mass.

Major corporate users appear interested but cautious.

"It will take a better than 95 percent accuracy for a company like Mobil to use speech technology," said Cliff Walters, a laboratory supervisor at Mobil Technology, in Dallas.

Walters sees the benefits of speech technology playing out in niche areas at Mobil, such as in help desk situations when users are already on the phone and talking.

Intel started its project by creating a separate speech team, spun off from its original Katmai development team, to deal solely with speech technology, sources said.

That group developed a new set of Katmai instructions that will work with the "hidden Markov model," algorithms commonly used by speech developers to improve speech-recognition accuracy and the speed of recognitions.

The current speech algorithms are excellent, according to Raphael Wong, manager of worldwide speech programs at Intel. But the stumbling block until now has been the inadequacy of the processors. With the introduction of 450-MHz and 500-MHz processors in 1999, all of that will change.

The new Katmai instruction set from Intel will also improve the capability of voice and data to work over phone lines without distortion, according to Bill

Meisel, president of TMA Associates, a speech-technology consultancy in Tarzana, Calif.

In 1999, voice-enabled applications used over phone lines will make major inroads into corporate services, according to David Nahamoo, senior manager of human language technologies at IBM Research, in Yorktown, N.Y. Users will have their e-mail, contact information, and datebook appointments translated into voice and spoken to them over the phone.

"It will revolutionize how users in large corporations access information and services," Nahamoo said.

Enterprises will be able to remotely support customers around the clock.

Intel is not alone in pushing speech as the next user interface.

A speech consortium headed by IBM and Sun Microsystems will ship the first Java speech API by the first quarter of 1999.

"We are designing this API to accommodate the whole enterprise implementation of applications over different operating systems and different environments," Nahamoo said.

Java's strength as a client/server technology is enabling developers to create applets that work inside browsers. IBM is currently developing a Java-based, speech-enabled Internet search engine.

Intel Corp., in Santa Clara, Calif., can be reached at [www.intel.com](http://www.intel.com).

*Ephraim Schwartz is an InfoWorld editor at large.*