

Perhaps the most successful example of consistency in the transportation business is the interstate highway system. Users of the interstate system have expectations such as controlled access interchanges, high-speed geometric design and consistent signage. Such consistency is based upon consensus design standards that must be followed, standards that were carefully crafted and are periodically evaluated and modified. It is also noteworthy that the consensus that led to the establishment of the 1956 legislation enabling the interstate system took decades to form.

It is difficult to identify other industries in which information is provided nation-wide by a patchwork of organizations. Perhaps television and radio stations offer the closest analogy. There are many regulations governing broadcasters, all of whom operate under an FCC license. Only a few of the areas covered in regulations could be construed as consistency measures, most having to do with things broadcasters cannot do, including airing of obscene or indecent language, some types of lottery information, obtain money under false pretenses, equal access for election candidates, advertising limits on children's TV programming, omit acknowledgement of program sponsorship or underwriting, and advertising of tobacco. Further, as stated by the FCC in a paper titled *The FCC and Broadcasting*, "Under the public interest standard in the Communications Act, the FCC expects its broadcast licensees to be aware of the important problems or issues in the communities their stations serve and to foster public understanding by presenting some programs and/or announcements about local issues, but broadcasters--not the FCC or other governmental agencies--are responsible for selecting all the material aired by their stations."

Thus, what information is provided and how it is packaged is left up to broadcasters. Yet, a remarkable degree of consistency in service now exists. For example, television programs begin on the hour or half hour in most cases, with commercials spread throughout. Admittedly, broadcasting is decades old and quite mature when compared to 511, but it does provide an example where consistency issues were largely left up to the service providers and the feedback of their audience.

(It is important to recognize that the FCC has no plans to license 511 operations. This information provided is purely illustrative, and is not intended to infer FCC rule-making as a method of establishing consistency criteria.)

4. What are alternatives?

For each of the areas listed below, the options available are similar:

- **How detailed?** Recommendation can range from being silent and providing flexibility to implementers to minimum "guidelines" to specific recommendations.
- **How couched?** Can range from "recommended practice" to a standard.

Topic Area: *System Navigation*

This area addresses what is the user interface for phone systems. There are several elements to this topic area, including

- Menu trees: This is the term commonly used to refer to systems that scroll through menu options (“press 1 for transit, 2 for traffic”, etc.). Note that not all systems today have a menu tree, rather a user must listen for their information as part of a single long message. *Should every system have a menu tree? Should there be a standard top-level menu tree? Should the menu tree structure beyond a top-level be consistent (e.g., should systems have a common navigation menu for transit-related information)?*
- Voice Commands: Increasingly, systems are offering callers the option to say “transit” instead of hitting the keypad. In some cases the option is either to press or say the number (“press or say 1 for transit”), in others, the option is to say the category of information desired (“say traffic”). *Should consistent terms for content categories be established? Should those terms be used as voice enabled commands? Should all systems offer voice enabled commands?*
- Shortcuts: Some systems offer the ability to directly access a route, or an agency by using a shortcut command, such as 17# for I-17 in Arizona, or 91* for METRO bus information in Cincinnati. *Should a consistent format for shortcuts be established? Should shortcuts be part of all systems? Should shortcuts be available in voice commands in addition to numerical entry?*

Topic Area: *System Access Quality*

This area relates to the performance of the telephone system. Existing systems vary widely in their access quality. Some systems are designed for peak period usage, reducing or eliminating busy signals. Other systems are designed for average usage and become overloaded in high demand periods. Some systems enable users to quickly obtain information, others take much longer. *Should there be consistent targets for access quality?*

Topic Area: *Initial Greeting*

The initial greeting of each system could vary widely. Greetings could vary in length. Some could indicate their sponsoring organization; others could use the name of the program or the brand of the service. *Should there be a reference to a national service in the greeting? Should there be a statement forwarding people to 911? Should there be limits on the greeting, such as time and content?*

Topic Area: *Advertising/Sponsorship rules*

Advertisements, sponsorships or connections to value-added services (e.g., options could be available to make a taxi reservation, with the taxi firm providing a fee to the phone system operator for the connection) are possible approaches to generate revenue to support the system. However, a scenario could occur in which there is wide variance in the approaches to generating these revenues. Thus, the result could be greetings of widely varying lengths, and an uneven approach to connections to extra services. *Should there be any limitations or guidelines associated with advertising or sponsorship? Should connections to value-added or premium services be encouraged or discouraged?*

Topic Area: *ADA Compliance*

The American with Disabilities Act (ADA) became effective in the early 1990s to provide equal rights and opportunities to disabled citizens in many areas, including employment, access to state and local government services, public transportation services, and telecommunications. While there are specific provisions in the ADA requiring equal access to 911 for the hearing impaired through special devices, called TTY or TDD, it is unclear if the ADA imposes similar requirements on 511-type services. While it is required for transit customer service centers to have TTY/TDD access, it is not common in the other types of traveler information phone systems to date, with only one non-transit centric phone system, TravInfo, having TTY/TDD access. Telecommunications Relay Services are available to the hearing impaired as a means to communicate with other people or services and this method could be used to access 511 services. *Is consistent access via TTY/TDD needed?*

Topic Area: *Hours of System Operation*

Hours of operation of existing phone services vary widely. Many, but not all, automated systems are available 24 hours a day, 7 days a week. However, information may only be updated during a more limited set of hours. Many transit information centers operate extended business day hours. *Should there be consistency associated with hours of operation?*

Topic Area: *Multi-lingual capabilities*

In some phone systems, Spanish services are available. King County (WA) METRO utilizes AT&T interpreters to help people of all languages. In August 2000, President Clinton signed an Executive Order (13166) that was aimed at improving access to government services for people with limited English proficiency that may have some implications for 511 services. *Should there be consistency associated with non-English services?*

Topic Area: *Timestamp information*

Some automated systems in operation today will indicate in the recorded message when the information was created, enabling the caller to determine how old the report is. This timestamping is done in many different ways, some of which could lead a caller to believe information is more up-to-date than it actually is. Some systems provide a timestamp for all information available based upon when the last update of any item occurred. Others timestamp each specific recorded message (e.g. a particular route). Still many other systems do not use timestamping at all. *Should there be any consistency related to timestamping information?*

Topic Area: *Roadside signing*

Roadside signing is one of the methods likely to be used to advertise and promote the availability of 511. At present, no standard practice exists for placing 511 on either fixed or dynamic signage. *Should there be a consistent approach to roadside signing promoting 511?*

5. Policy Recommendation(s)?

The initial recommendation of the Working Group is to ***adopt a philosophy of providing as much flexibility to implementers as possible at this early stage while also maximizing the chance that callers will begin to recognize the services as part of a national system.*** While more detailed investigation is needed, adopting this philosophy leads to the conclusions for each of the aforementioned topic areas as shown in Table 1.

Topic Area	Recommended Detail	Recommended Approach
System Navigation	Top-level menu tree, commands, and short cut format	Recommended Practice/ Guideline
System Access Quality	Identify a few key metrics, set targets and encourage performance measurement against these	Recommended Practice/ Guideline
Initial Greeting	Leave flexibility to implementers, but encourage reference to national system	Recommended Practice/ Guideline
Advertising/Sponsorship Rules	Leave flexible	
ADA Compliance	Leave flexible	
Hours of System Operation	System access 24/7, with system declaring if it is live or recorded mode	Recommended Practice/ Guideline
Multi-lingual capabilities	Leave flexible	
Timestamp information	Encourage timestamp, develop recommended approach	Recommended Practice/ Guideline
Roadside Signing	Establish guidelines, consider inclusion into MUTCD	Recommended Practice/ Guideline

Table 1 – Recommendations

The Working Group proposes the development of guidelines that would provide recommended approach in the above areas where consistency is desired. At present, the Working Group believes that any stronger position vis-à-vis consistency is not yet warranted. Two reasons lead to this thinking:

- We are not yet sure what consumer expectations are towards consistency. Specific consumer research should be conducted to determine stated preferences, then practical user experience should confirm or refine the results.
- Quickly establishing guidelines for use by implementers at their option could lead to consistency just as well as stronger approaches.

The Working Group recommends that once guidelines are established based upon the parameters set forth by the Policy Committee, performance measures should be established and close monitoring should occur on how well this approach is yielding desired results. It is quite possible that mid-course policy modifications will be needed and we should be prepared for that.

511 Cost Issues Overview

This paper provides information to assist the Policy Committee in examining consistency issues relating to 511. The paper contains five sections:

1. What is the issue?
2. Why is the issue important?
3. What is the breadth of experience on the issue?
4. What are alternatives?
5. Policy Recommendation(s)?

Similar papers related to content and consistency issues are also provided. While overlap between content, consistency and cost issues is inevitable, every attempt has been made to separate these issues to promote fruitful discussion of the individual issues.

This paper does not assume either public or private sector delivery of services. The discussion of cost is independent of the organizations that collect the data and provide the services.

1. What is the issue?

The FCC ruling does “not specify parameters for cost recovery,” leaving the issue to be resolved by implementers. However, the ruling clearly recognized that costs will be incurred providing services. So for each state or regional implementation, a principal question to be answered is “who pays and how?” In the national context, it is quite possible that different implementations would reach different solutions for cost recovery.

As will be discussed in this paper, one plausible approach is a pay-per-call solution. However, if callers are expected to pay for a call in one state/region and not another, this could result in confusion and dissatisfaction from the caller perspective. So from a national perspective, a significant issue is for consideration is ***“should the call be free to the user?”***

A supporting issue relates to access to additional revenue raising services that might charge a fee for usage. ***“Should value-added services be offered to users for a fee?”*** Examples of such services could include obtaining information about points-of-interest along a corridor or generating a personalized route based on real-time information. While it is unclear the revenue potential of such services, the question for discussion is should such services be available through 511 at all, if it entails the possibility of a user fee?

2. Why the issue is important?

Funding support for the systems is critical to their success. Lack of funding could lead to reduced information being available and even prevent systems from becoming operational in many states/regions.

Clearly the method of cost recovery will have impacts on overall usage. Simple economics proves that a service free to callers will receive more usage than one in which a fee is charged, all other circumstances being equal.

To date, all traveler information telephone systems sponsored or sanctioned by public agencies have been free to the traveler (though in a few cases local toll charges or long-distance charges apply). At a high level, this has resulted in:

- A relatively few metropolitan area telephone systems that provide real-time information
- 15-25 state DOT operated road condition systems of widely varying quality and content that are often overloaded with demand in peak usage periods, and
- Transit information service centers that are costly to operate and frequently struggle to keep pace with demand.

In all cases, funding is an inhibitor to service improvement and expansion. While 511 offers a unique opportunity for service enhancement, it does not change the underlying fact of funding limitations.

If methods of funding bog down deployment, it could lead to a situation where only a few systems are deployed. This could lead the FCC in 2005 to conclude that we have not progressed as hoped and planned and that we are not using 511 “on a widespread basis for the provision of travel information services,” possibly leading, in the most extreme case, to redesignating the number for another use throughout the country. Thus even successful state/regional systems could fall victim to the consequences if funding limitations prevent enough systems to be deployed.

3. What is the breadth of experience on the issue?

There is a base of knowledge to draw from when examining this issue in many different areas.

Cost Recovery Options

To support a phone service, there are a limited number of viable approaches:

- Caller Pays
 - Per call charge
 - Surcharge on phone bill (could be a government imposed fee, or a subscription)
- Free to Caller
 - Public sector funded
 - Advertising or sponsorship supported
 - Subsidized by other revenue generating opportunities (e.g., value-added services or franchise to exclusively use the same data for other revenue-generating services)

It is possible for these methods of cost recovery to be blended together to support the system as well. For example, an implementation could be funded partially by the public sector and through sponsorship.

Wireless calling adds some complexity to the cost equation. A caller using a wireless phone may accrue air-time charges (this could be either a per minute charge or count as minutes used in a flat-rate plan), although in some cases air-time charges have been waived in existing systems. Roaming, using a wireless phone outside a caller's coverage area, also can add costs. In all cases, the caller bears these costs.

Cost Elements

We also have a reasonable understanding of the types and orders of magnitudes of costs that are associated with these types of services. Costs are of two main types: (1) information gathering and packaging and (2) call routing and communications costs.

Information gathering and packaging is usually the largest cost driver, with the following steps typical regardless of content category:

- Data Collection: Obtaining the raw data such as travel time, parking lot occupancy, schedule adherence.
- Data Fusion: Resolving conflicts from data collection systems and blending data from different content categories together
- Data Dissemination: Packaging the fused data for use, either through automated or human recordings or to support a live operator, as is the case in transit customer service centers.

One of the key points associated with information gathering and packaging is that the information can be utilized for many purposes in addition to supporting 511, including other traveler information services, transportation system management, and supporting long-range planning. Thus, 511 services may not (in fact, should not) bear the entire cost of information gathering and packaging. Also, *costs for establishing the necessary information gathering and packaging process will vary widely by state and region, with the extent of existing infrastructure being a key factor.* Regions that have good infrastructure in place will require much less investment than those that do not.

While the Working Group is attempting to establish a cost template to respond to the question “if we want to do 511, what will it cost?”, circumstances vary widely in how current phone systems have been created, funded and operated. At present, the best we can come up with is a few rules of thumb (note, these costs are independent of the basic data collection):

- Highly automated, limited or no human involvement in operation: These are the least costly systems to establish and operate. In Arizona, such a system was created for roughly \$100,000. Maintenance costs are minimal, roughly \$10,000 annually.
- Automated system, with human recorded information: These systems are typical of the metropolitan traffic/multi-modal services. To establish such a service could cost \$500,000 to \$1 million. A rule of thumb for system operations would be \$1 million annually, with that figure varying due to many factors included size of region, hours of operation, etc.
- Human operator-based system: Typical of transit information services, these systems are the most costly, as many full time staff could be required to provide the service. Many services are paying in the millions to create a trip itinerary planning system that operators can use to more quickly and accurately respond to caller inquiries. An annual operating budget for a large transit information center can exceed \$4 million.
- Telecommunications costs: In all cases, there is a cost to connect callers to the service. While there are variants to this, a good rule of thumb is \$0.25 per call, though of course it varies based on implementation. Calls can have various cost elements depending upon the type of call, as shown in figure 1.

Type of Call	Wireless Carrier	Originating LEC	Long Distance Carrier	Destination LEC	Note
Landline					
Local		x		x	Originating and destination LEC is same carrier
Long Distance		x	x	x	
Wireless					
Local	x	x		x	Originating and Destination LEC is same carrier
Long Distance	x	x	x	x	
Roaming -- Local Call	x	x		x	1. Originating and Destination LEC is same carrier 2. Caller's wireless and roaming carrier eligible for remuneration
Roaming -- Long Distance	x	x	x	x	Caller's wireless and roaming carrier eligible for remuneration

Note: Toll-free can be local, long distance, wireless or wireline; major difference in cost structure is the local toll free calls incur per minute charges

Figure 1 – Carriers Eligible for Payment by Type of Call

Other N11s

As Figure 3 illustrates, other abbreviated dialing services are funded in different ways. Based upon the experience of establishing these cost recovery mechanisms, we can conclude:

- **Funding the service through surcharges on phone bills, as is done for 911, is highly unlikely.** State Regulators receive numerous complaints regarding surcharges, even for life-saving services such as 911. It is extremely doubtful that a surcharge for 511 would be approved by state regulators.
- **Carriers will not assume the cost burden** as they do with 711. The FCC has mandated carriers must provide this service to be in compliance with the American with Disabilities Act. In the ruling for 511, the FCC did not place a similar requirement on carriers.
- **We cannot expect donations and grants to support services,** as is occurring in 211.

N11	USAGE	EXTENT OF USE	HOW PAID FOR
211	Access to organizations providing community information and referral services.	Larger cities in CT, GA, LA, TN, AL, MS, NC, OH, and UT are currently implementing.	Donations to agencies and grants.
311	Access to City or County government services (including non-emergency police). Calls answered by operators and forwarded to appropriate agency.	Larger cities in TX, AZ, IL, CA, MD, MI, NY use this service.	Funded by government providers.
411	Directory Assistance	Local phone companies, long-distance carriers and many independent providers provide this service.	User pays, usually with some calls in basic service and additional calls for fee.
711	Access to nationwide Telecom Relay Services (TRS) for individuals who are deaf, hard of hearing, or have speech disabilities.	DE, HI, MD, ME, MA, NH, NY, PA, RI, VT, DC and WV provide this service.	Costs funded by carriers.
911	Universal emergency telephone number. Connects to Public Safety Answering Point (PSAP)	Widely utilized nationally, though some communities are still using 7 or 10 digit dialing to access emergency services.	Surcharge on customer phone bill.

Figure 3 – N11 Summary

Transportation Industry Experience

In operating phone systems to provide traveler information, we have learned a few key things with respect to cost and cost recovery:

- **Advertising, sponsorship or user fees have yet to sustain a phone system service.** At present, no government sponsored phone service contains advertising. Nor is sponsorship a significant component, though in some systems, wireless carriers that waive air-time charges are recognized in the initial greeting. **Every public sector operated, sponsored or sanctioned telephone service is underwritten largely or exclusively by public sector investment.** What is not clear how increased call

volumes expected with the use of 511 could impact the market for such revenue-generating opportunities.

- ***Information gathering and packaging costs can far outweigh call routing and communications costs.*** Evidence suggests that 80-90% of the cost of a metropolitan area or statewide road conditions service can be in the gathering and packaging the content (this % is highly variable depending on circumstance). For transit information centers, the costs of operating a call center with many live operators and information system to support them could be exceed 90% of the total system cost.

Regulatory Issues

Current Federal law (Section 228 US Code, Title 47) allows only directory assistance calls to charge a per-call fee for interstate calls unless a 900 number is used. It is unclear how this law impacts intrastate calls and the potential of charging a per-call fee for 511, but it could have an impact on both charging for both basic and value-added services.

Conclusions

From this experience, we can draw the following conclusions regarding the viability of cost recovery options (note that our experience is limited to independent regional/state phone services:

- **Caller Pays**
 - Per call charge? – *No indication that this is viable.*
 - Surcharge on phone bill (could be a government imposed fee, or a subscription) – *No indication that a government imposed fee is viable; subscription service is untested, but clearly limits access to services.*
- **Free to Caller**
 - Public sector funded – *Viable, but unless funding increases significantly, is unlikely to fully support the desired service levels of content and quality.*
 - Advertising or sponsorship supported – *No indication that this is viable to completely support 511 services; could provide partial funding though.*
 - Subsidized by other revenue generating opportunities (e.g., value-added services or franchise to exclusively use the same data for other revenue-generating services) – *Has been used in the past, usually in conjunction with public sector support; success varies based on many factors, including the exact business agreement, market demographics and desired content and quality level, as well as macroeconomic factors that could encourage or discourage “risk-taking” by the private sector.*

4. *What are the alternatives?*

The Policy Committee has the following options to consider when addressing the two questions posed at the beginning of this paper:

Issue: *Should the call be free to the user?*

Alternatives:

- *Stay silent.* Leave to implementers to determine.
- *Discourage pay-per-call implementations.* The option of recovering costs by charging for use would be strongly discouraged. Some implications of this alternative are:
 - Ensure maximum usage and impact by eliminating a financial disincentive for use
 - Eliminate the most direct method for generating funds to support service offerings. This could lead to slower roll-out of services, limited content offerings and reduce service quality. While no government operated, sanctioned or sponsored service has charged a fee for information access to date, no other method has proved viable for supporting such services except for complete or largely public agency subsidy (which after all are funds indirectly provided by the public at large through user fees). Taking this option off the table at this stage could be regretted later on.
 - Reduce the possibility of negative consumer reaction to pay-per-call, a realistic outcome particularly if some regions charge for use and others do not.
 - Consumer resistance is strong to charging for something that was previously free. If pay-per-call is eliminated initially, it will be highly unlikely it could be invoked later if it determined the only method for suitable revenue recovery.
- *Openly encourage pay-per-call implementations, either as one or a few test implementations or as the preferred widespread approach.* Some implications of this alternative are:
 - If, for example, a \$0.25 or \$0.50 per call charge is established, economic viability of 511 services could be quite strong.
 - Consumer reaction to pay-per-call could range from open hostility to total indifference. Since the 511 “brand” has yet to be formed, consumer may not have the expectation of it being for free (after all 411 is not thought of as free).
 - It is unclear how the FCC would react to user charges. While the FCC ruling afforded flexibility in cost recovery methods, since no existing telephone service charges users, the FCC may not be expecting this approach to be used.

Issue: *Should value-added services be offered to users for a fee?*

Alternatives:

- *Silent.* Leave decisions and experimentation to implementers.
- *Encourage such services.* Adopting this approach in conjunction with encouraging the basic information available on the service to be free to the caller could afford a compromise in which revenue could be derived to support cost recovery, while the main purpose of the system would still be free.
- *Discourage such services.* If the basic call is free to users and value-added services for a fee are discouraged, then cost recovery will be limited entirely to indirect mechanisms (public agency support, advertising/sponsorship, or partnership models). If the basic call can be charged to the user, then a model based on further extracting fees for premium services may be difficult for users to accept.

5. *Policy Recommendation(s)?*

The Working Group recommends the following:

- *Should the call be free to the user? **Discourage pay-per-call implementations, but take the position that a per-call fee is preferable to not operating a service in a state/region.*** A policy statement that establishes a per-call fee as an option of last resort could convey the desire to lean towards other options first.
- *Should value-added services be offered to users for a fee? **Silent from policy perspective on value-added services, but make implementers aware of this option*** and that they are not being discouraged from offering such services if they so choose.

The Working Group also recommends some additional experimentation to test direct cost recovery options in the real-world. At minimum, two types of tests could be considered:

A test of a per-call fee approach should be considered to assess viability and impact on usage and overall service quality that a direct cost recovery mechanism could afford. Also, a test of charging for value-added services as a method of cost recovery should be considered to assess the viability of the model.



Legislative and Regulatory Issues

This paper on telecommunications legal and regulatory issues affecting 511 implementation presents an initial description of several topics of research and analysis currently under investigation. The topics discussed below are not an exhaustive list of all relevant issues. Any conclusions or recommendations outlined in this document are only preliminary and are subject to revision upon further review.

Telecommunications

FCC's 511 Order. The FCC's July 2000 Order provides significant flexibility for transportation agencies and their partners to determine if, and how, 511 traveler information services are to be deployed. While, on the one hand, the lack of regulatory strictures may be liberating, it also fails to answer several basic questions that all implementers will necessarily confront. For example, transportation agencies will each need to determine how to pay for these services: few, if any, carriers will complete 511 calls at no charge. There is also the cost of collecting and aggregating the traffic data into a form accessible by the public. Moreover, in many states and areas 511 is already in use for other purposes. While these incumbents must vacate the number, the FCC order does not specify the procedures for them to do so. Transportation agencies will request 511 from the carriers. Then, the parties must negotiate as to the terms and conditions by which the carriers will complete 511 calls. The carriers must also perform the necessary network switches, among other technical changes, to route 511 calls, and for which they may insist on compensation. The only role for state PUCs contemplated by the Commission is to ensure that the carriers respond in a reasonable manner to requests for the 511 code. However, some states' laws may give their PUCs additional authority. The FCC Order does not preempt any such requirements.

Specific Telecommunications Issues. A threshold question is whether providers, both public transportation agencies and their private partners, of 511 traveler information services would be considered "telecommunications carriers" under federal and state regulatory regimes. Being judged as a telecommunications carrier would implicate several additional regulatory burdens, such as universal service, carrier interconnection, nondiscriminatory network and service access, number portability, etc. These and other requirements could impose, for example, significant changes in the system architecture for the provisioning of 511 services, thus likely increasing costs and delaying deployment. Individual states may impose additional requirements. Our initial conclusion is that 511 service providers would likely not be categorized as telecommunications carriers under federal or state regulatory regimes.

Similarly, wireless network operators are required to deploy location-identification technologies in order to locate wireless phones when 911 is dialed for emergency assistance (otherwise known as "Enhanced 911"). If 511 service providers were not characterized as telecommunications carriers, this mandate would be inapplicable. Nonetheless, these Enhanced 911 requirements will likely impact how 511 traveler information services are themselves deployed: the ability to locate a wireless phone may enable the provision of more precise and dynamic traveler information.

Another significant issue is incumbent use of the 511 code. In the absence of a national assignment of any three-digit code, the FCC has allowed states and individual carriers to make available unassigned codes for a variety of public and private services. For example, in the Atlanta area callers can currently dial 511 to access to get local, national and international news and information. The FCC's 511 Order did not specify the procedures for acquiring the code from incumbent users except to mandate that sponsoring carrier(s) ensure that such non-conforming use cease upon the code being requested for traveler information services. When in 1997 it allocated 311 for non-emergency police access, the FCC provided a six-month window for incumbents to relinquish the code. The 311 experience should prove to be a valuable precedent for 511 service providers on this and other issues.

A third major topic centers on relations between 511 service providers and telecommunications carriers. 511 calls cannot be completed without carriers – Regional Bell Operating Companies, Incumbent Local Exchange Carriers, new Competitive Local Exchange Carriers, wireless network providers, etc. – routing callers to the appropriate 511 information source in a particular region or area. The 511 Order provides that transportation agencies request the code from these carriers, but the FCC specifically declined to prescribe the terms by which the carriers are to complete the calls. Different carriers will have different technical requirements as well as different interests when responding to the request for the code. For example, an Incumbent Local Exchange Carrier may view the 511 service as a mandate and technical burden; thus motivating it to maximize possible monetary returns for completing these calls or actually making the switches. (However, initial research indicates that the necessary physical switching in existing local exchange networks to route 511 calls should be neither unprecedented nor cost prohibitive, at least for smaller networks.) Wireless carriers, in contrast, may view the 511 traveler information service as a competitive enhancement, thus motivating them to seek revenue associated with the service from their subscriber base rather than from the requesting transportation agencies. These and other interests will affect the approach and terms 511 service providers should adopt upon requesting 511 from carriers.

While we believe that 511 service providers would not be characterized as “telecommunications carriers” for federal or state regulatory purposes, the requirements of individual state Public Service or Utility Commissions (“state PUCs”) may also affect how 511 is implemented. According to the 511 Order, the only stated role for these entities is to ensure that carriers respond in an expeditious manner to requests for the code. However, the FCC Order did not preempt other requirements that state PUCs may impose. For example, before a request for the code can be made to a carrier, a state PUC may first have to allocate 511 on a statewide basis for traveler information services. Agency procedure may mandate a lengthy review and hearings. Moreover, carriers may be required to provide 511 through an approved tariff rather than simply negotiating a contract with the requesting transportation agency.

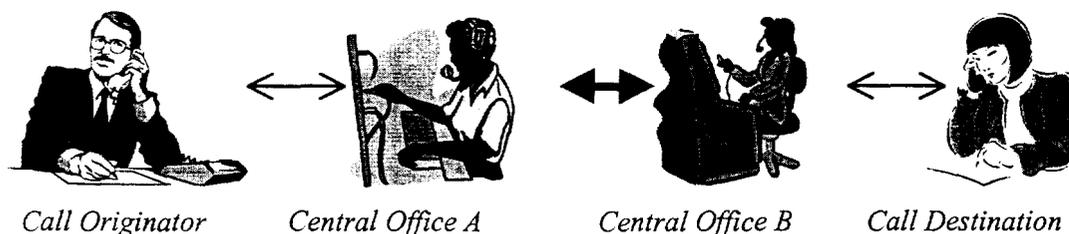
Call Routing and its Implications for 511

This paper describes landline and wireless call routing (or switching) and discuss the possible ramifications as they relate to 511. Call routing in North America typically relies on an architecture that supports call establishment, billing, routing, and information exchange functions of the public switched telephone network. This architecture is very robust and provides a complete call routing platform. The routing infrastructure has undergone a significant upgrade over the past ten years resulting in added value, flexibility, and reduced costs associated with call routing. 511 calls can be routed within the existing framework in much the same manner as existing three digit calls. The right to revenue associated with three digit calls often includes more than one exchange carrier. These costs must be absorbed by the agency receiving the call, the exchange carrier, or by the call originator.

Landline Call Routing

When a call is originated within a home or business using a wireline or landline telephone, a complex routing process is initiated. The routing process revolves around the central office (CO), a facility operated by the telephone company providing service to the customer. Central offices are the core building blocks of the public switched telephone network (PSTN). Numerous central offices form a larger network wherein calls are routed.

Trunks provide signal paths between central offices. When a call is placed that requires routing outside of the central office where it originated, a trunk line is used to establish the link to the destination central office. Figure A depicts a typical call routing scenario wherein a call is routed from an originating central office to a destination central office via a trunk. Trunks can be viewed as a shared resource, in that the ports within trunks are used on an as needed basis. The figure below depicts a typical routing scenario within a small city. When calls are routed within larger cities, states, or multi-state areas, the routing process involves more switches to facilitate the transfer of information between the originating CO and the destination CO.



When a call is placed using the standard seven and ten-digit dialing format (i.e. 555-1212 or 850-555-1212), extensive databases within the routing architecture are utilized to determine the destination of the call. When three digit calls are placed, the databases recognize the use of a three-digit number and translate the three-digit call to a standard ten-digit number. The translated number is used to route the call to the appropriate destination. This explains how a 911 call placed in Chicago has a different destination than the same call placed in New York. **Each central office has the ability to route three digit calls to different destinations.** These databases, in conjunction with databases associated with the routing architecture, must be updated frequently to maintain a properly operating telephone network. The respective telephone companies are responsible for maintaining the databases associated with call routing.

When a landline call is placed, caller identification information is transmitted to the destination. This provides the number of the call originator as well as location information when a properly configured answering device is used. 511 systems could utilize this information to tailor 511 information for the specific geographic area of call origination. The respective telephone companies are responsible for maintaining the databases associated with call routing. Enhanced 911 systems currently deployed across the country have paved the way for this information service.

Wireless Call Routing

Wireless call routing involves an added step, but in many ways resembles the landline call routing process. When a wireless call is initiated by a mobile user, the call is routed to a tower location where a mobile telephone switching office (similar to the landline central office) accepts the call and initiates the routing process. The mobile telephone switching office utilizes a landline connection to the public switched telephone network to route the call to its destination. The process is slightly more complicated when a wireless call is intended for another wireless phone; however, this instance does not relate to 511 services and is not discussed here.

As wireless telephone users leave the geographic area established by their provider and make a call, the user is said to be roaming. The geographic areas vary according to the provider and the service plan selected by the user. The associated charges incurred when roaming also vary according to the provider and service plan. Increasingly, statewide and national wireless calling plans are being introduced, reducing (but not eliminating) the amount of roaming that occurs.

When wireless calls are placed, the location of the mobile user is often difficult to determine. Significant advances have occurred in recent years resulting in the deployment of technology capable of pinpointing a wireless user's location. This issue is of concern to 511 when caller location information is utilized to format the information provided to the caller. One solution to this problem is the assignment of cell sites (towers) to a specific transportation information answering point. By complying with Federal Communications Commission rules for wireless enhanced 911, Phase I, wireless systems have this capability in place for 911 calls. This routing capability may be transferable to 511.

511 Issues

When an organization begins the process of establishing a three-digit presence in a given area, it is recommended that the organization ***establish contact with their respective state telephone associations and public service commissions***. These groups can provide valuable insight into the negotiation of tariffs and associated agreements with the various landline and wireless telephone companies. In multi-state areas, the issues regarding call routing and the associated tariffs become more complex. Many multi-state areas have established organizations within the industry that address telecommunications issues affecting the multi-state area.

Pay phones are often relied upon by the traveling public. Pay phone networks are often operated by competitive local exchange carriers. Negotiations with these carriers, especially those that operate pay phones located at rest areas, should illustrate the benefits they derive from supporting 511. ***The number of pay phone operators is a real issue for 511 call routing.***

When three digit calls are placed that require routing outside of the caller's local calling area, the associated long distance charges must be borne by the caller, call recipient, or the telephone company. ***The issue of long distance calls and their associated cost should be addressed*** by any agency deploying a 511 system.

A similar situation exists when wireless telephone users initiate 511 calls while ***roaming***. The typical wireless user will be less likely to utilize a 511 service if they incur additional cost by making the call. Studies have shown that information service calls from wireless subscribers often result in one or two follow on calls. Wireless providers may waive airtime and roaming charges associated with 511 if they realize the potential for additional calls.

As public agencies begin the process of deploying 511 services, ***careful planning relative to call routing and the associated tariffs, agreements, and cost is vital***. Recent advances relative to the routing of 911 emergency calls will prove helpful when deploying 511 systems, particularly with regard to caller location.

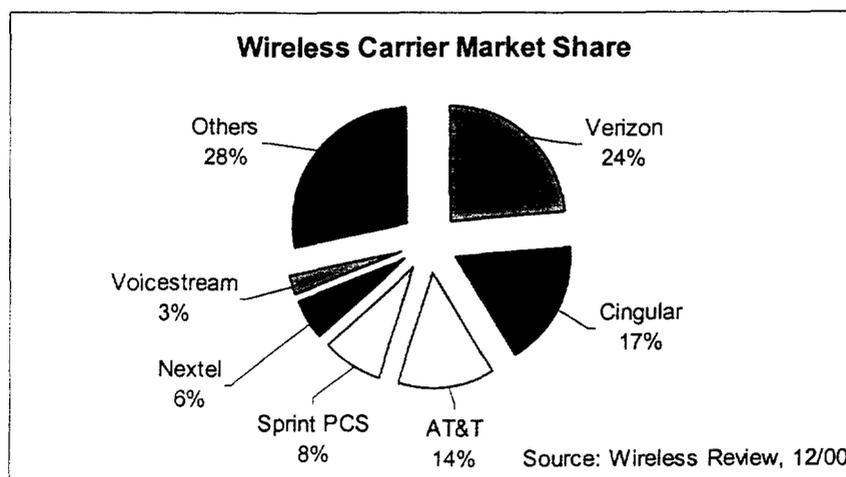
Wireless Telecommunications Carrier Industry Overview

This paper provides an overview of the wireless carriers that will be an essential part of 511 service provision. Industry landscape, business motivations and their possible impact on 511 service provision are addressed.

Conceived in the 1940s and first introduced in 1983, wireless carriers today have roughly 110 million subscribers and nearly \$50 billion in revenues in the United States. There can be up to nine wireless carriers operating in each market, in either the 800 MHz or 1800 MHz band.

Market Segments – There are three carrier segments: National, Regional and Small/Rural.

- *National Carriers* – Six wireless carriers offer their services across a nationwide footprint (each is available to over 190 million people). These six carriers serve approximately 80 million subscribers or, 72% of the market. Verizon, Cingular and Voicestream are all products of mergers in the past year.



- *Regional Carriers* – These carriers are typically associated with an incumbent local exchange carrier, as each ILEC was granted one of the original operating licenses in its service area. Examples include ALLTEL, Qwest Wireless, Cincinnati Bell Wireless, and Century-Tel Wireless. They typically have good market penetration in their service areas, but they can only offer a national service footprint through affiliate or roaming arrangements with other carriers. These arrangements are common.
- *Small/Rural Carriers* – Many of these carriers provide wireless services in small town or rural areas. These carriers are key roaming partners to many of the larger national and regional carriers. Many national or regional customer products (i.e., voice mail, data services, etc) are provided by these smaller carriers to preserve consistency with their larger roaming partners' services and features.

Market Trends and Issues – Several issues and trends are expected to continue in the wireless industry:

- *Consolidation*: Wireless carriers will continue increase their geographic footprint through mergers and acquisitions.
- *Flat rate plans*: The increasing popularity of flat rate, all-in-one calling plans should continue to grow.
- *Reduce churn*: Carriers will continue to seek methods to keep their customers from switching carriers for a better deal. Customer-tailored information services are considered one method to increase customer loyalty.
- *Continued pricing pressure*: With the effective price per minute charged to consumers continuing to drop, the number of wireless customers will continue to grow at significant levels. Thus carriers will seek to provide the network infrastructure at significantly lower incremental costs than delivered previously. Converting their networks to more efficient digital formats is one means of doing this.
- *Maintain or increase monthly bills*: With the effective price/minute and flat rate plans charged to the consumer continuing to drop, carriers are struggling to keep the revenue from each customer from eroding. The average phone bill was \$80 in 1990, \$40 in 1999, and increased to \$45 in 2000. As a result, carriers will continue to find ways to increase the customer usage through new and different incremental services.
- *Internet/Data*: As Carriers increasingly convert their networks to digital formats, internet and other data services are being added to their service portfolio. Some offer these services for an additional fee, others include them in their monthly plans.
- *Capital investment requirements*: Continuing support of federal mandates (E911, 711, Local Number Portability), digital conversion activities, network capacity and build out activities, in addition to Merger/Acquisitions are placing significant demands on carriers for capital investment.

Implications to 511 – The most significant implications are in two areas:

- Carriers view information services as an opportunity for value-added service to increase revenue or reduce churn. Traveler information services are already provided by the six national carriers to their customers, and these services have been tailored for their network, their devices and their customer base. As more wireless devices become internet accessible, these services will increasingly be location-based and customizable by the customer. Generic 511 services will be treated by carriers as just another voice call.
- Increased geographic presence by the wireless carriers will increase the desire for a consistent implementation and cost-recovery model for 511 services. A consistent DOT interconnection and cost recovery model will be helpful in expediting the delivery of wireless 511 calls to the designated service provider.

Wireless Carrier Trends Implications on 511:

- 511: A competitive service? Or just another call?
- Pressure for 511 implementation consistency across boundaries

Wireline Telecommunications Carrier Industry Overview

This paper provides an overview of the wireline carriers that will be an essential part of 511 service provision. Wireline industry landscape, business motivations and their possible impact on 511 service provision will be addressed. Wireline and landline are used interchangeably in the industry and in this paper.

Market Segments – The traditional, landline telephone companies are widely varying in size, focus and motivation. The major segments of the industry are:

- *Local Exchange Carriers (LECs)* – these companies carry traffic within an FCC defined “local access and transport area” (LATA). While occurring in some areas as early as 1983, the Telecommunications Act of 1996 aimed at creating competition within local areas on a national basis.
 - *Incumbent Local Exchange Carriers (ILECs)* – the original monopoly carriers in each LATA. There are essentially two types of ILECs:
 - large carriers such as Verizon, SBC, Qwest, and BellSouth that have evolved from the original “Baby Bells”
 - smaller regional companies or cooperativesGenerally, each state will have many ILECs, with one or two having most of the subscribers.
 - *Competitive Local Exchange Carriers (CLECs)* – carriers that compete with ILECs by either reselling the ILECs capacity or building their own facilities to serve customers. While hundreds of companies are either providing or planning to provide competitive local phone service, the major players are long distance carriers, cable companies, and resellers. Internet-based carriers, such as Net2Phone, also provide competitive local service in some cases.
- *Long Distance Carriers* – defined as Interexchange carriers (IXCs), these companies are authorized by the FCC to provide interstate communications services and by a state to provide inter-LATA services within a state. Major long distance carriers are AT&T, MCI and Sprint. Competitors to the major carriers include companies that offer “10-10-xxx” access or pre-paid phone cards, Internet-based carriers, such as IXTC, that use the internet to route calls, and in increasing numbers, ILECs that have had their local areas deemed to be competitive by state regulators.
- *Pay Phone Carriers* – Though down 15% in the past three years, there are roughly 1.9 million pay phones in the United States. Roughly 75% of those phones are operated by the major ILECs. The rest are operated by roughly 2000 different companies. The Telecommunications Act of 1996 deregulated the cost of using a payphone and sought to encourage competition. However, the expansion in wireless phone usage has led to a decline in the number of pay phones and their usage.

Market Trends – Several major trends are occurring in the wireline phone business:

- Consolidation of major ILECS – major mergers of recent years has left just 4 major ILECs.
- Competition for local service – regulators are encouraging competitors to the ILECs. While it has been slow to emerge, CLECs are beginning to have success, particularly serving businesses. More competition than exists today can be expected.
- ILECS want to offer long distance to their customers – to do so, they must show state regulators that viable local service competition exists in their area, thus ILECs are in essence promoting the establishment of CLECs.
- Carriers are making huge capital investments in broadband technology and converting to internet-protocol based equipment and technology, occupying significant resources and, in many cases, debt. This investment overload has carriers looking to reduce, or offset, capital investment costs in any way possible.
- ILECs that operate under regulatory controls are obligated to make a modest profit on each service they offer – they cannot cross subsidize services.

Implications to 511 – Wireline carriers are in the process of revolutionary changes in all aspects of their business, which will make 511 deployment a challenge:

- 511 is a relatively minor issue to most carriers when compared to other “problems” and “opportunities” – getting their interest will be a challenge.
- ILECs will desire a consistent approach to 511 across their service area, which could span 10-15 states.
- Can expect to see more LECs with market share being diffused; means we will have to work with more carriers to deploy 511.
- The underlying cost structure of telecommunications is changing dramatically. The cost structure of today may be reduced significantly in the near future, which could make 511 service provision more affordable.

Wireline Carrier Trends Implications on 511:

- 511 a minor issue to carriers
- Major carriers will desire consistent approach across operating areas
- Greater carrier competition likely means more carriers to coordinate with
- Cost structure of carriers is changing dramatically, possibly for the better

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