

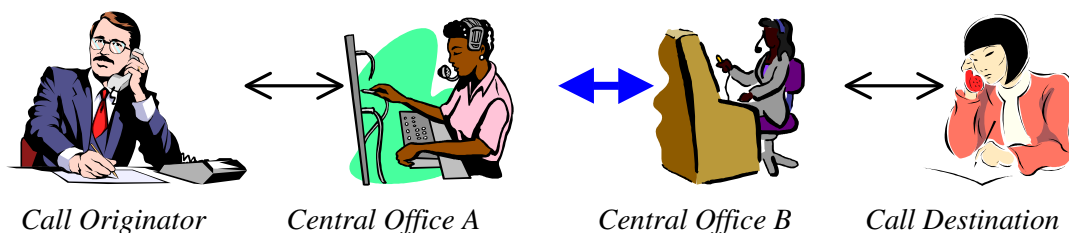
Call Routing and its Implications for 511

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 phones 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.

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.

Intellectual Property and Patents

This paper on intellectual property 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.

Business Method Patents. To date, three patents have been identified for services, systems or processes that appear similar to those contemplated being offered through the 511 code. These patents are not for specific physical items, but for processes or systems characterized as Business Method Patents. It is possible – and, in at least one instance, has already occurred – that holders of these patents may claim that certain 511 deployments infringe their rights. Public and private entities faced with these claims may be forced to pay licensing fees, alter their services or, at worst, stop their deployments altogether. Thus, it is important that those deploying 511 traveler information services be made aware of such patents and how to defend against potential infringement claims.

Section 101 of Title 35 of the United States Code defines the subject matter which may receive patent protection: “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.” Since at least 1972, the US Supreme Court has struggled with the question of whether computer-related inventions are patentable, finding initially for the negative. In 1981, the Court found that the mere incorporation of an equation, program or computer into a claim does not render it unpatentable. The claims should be viewed as a whole during the subject matter patentability inquiry under Section 101.

The patentability of Business Method Patents was first articulated by the Federal Circuit in State Street Bank & Trust Co. v. Signature Financial Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998), cert. denied, 119 S. Ct. 851 (1999). The Federal Circuit established a new test to determine whether computer-related inventions are patentable: claims reciting a series of mathematical calculations performed by a machine to produce a useful, concrete, and tangible result define patentable subject matter. Thus, under the State Street ruling, business methods implemented on a computer are now patentable as long as the method is novel and non-obvious. The decision reversed earlier precedent that specifically held that business methods were generally not patentable. In AT&T Corp. v. Excel Communications, Inc., 172 F.3d 1352 (Fed. Cir. 1999), the Federal Circuit affirmed the rule pronounced in State Street, stating that an invention employing a mathematical algorithm is not invalid when the algorithm is applied in a useful way.

The State Street holding, and the resulting rush seeking patents for business methods, has engendered significant criticism. Many critics have argued that the US Patent & Trademark Office was too quick in granting such patents. On March 29, 2000, the USPTO announced an action plan to enhance the quality of the examination process for business method patent applications.

State Immunity from Patent Infringement Claims The US Constitution’s Eleventh Amendment and the related doctrine of sovereign immunity generally bar any patent infringement suit in

federal courts against a state, state agency, or state officer. Each state is a sovereign entity in the federal system, and it is inherent in the nature of sovereignty not to be amendable to a suit brought by a private interest without the state's consent. In fact, in 1999 the Supreme Court struck down as unconstitutional a federal statute that had abolished state immunity from federal court patent infringement suits. Any such claims against a state would have to proceed, if at all, the Supreme Court held, in accordance with state law. In Florida, for example, aggrieved parties may pursue a legislative remedy through a claims bill for payment in full, or judicially through a takings or conversion claim. Other states may set forth different mechanisms and remedies for these claims.

In contrast, a city, county or other political subdivision of a state is liable for any infringement of a patent arising from its activities. The Eleventh Amendment and the related doctrine of sovereign immunity of states do not extend to such entities.

Specific Business Method Patents As noted above, three existing Business Method Patents have been identified that appear to contemplate systems and services similar to those to be offered through the 511 code. The patents are, in order of their grant date:

- Patent No. 4,812,843 (granted March 1989 to C. Paul Champion, et al.) for "Telephone Accessible Information System," whereby a subscriber receives continuously updated information by way of a telephone, PC and/or personal paging device.
- Patent No. 5,214,689 (granted May 1993 to Next General Information, Inc.) for "Interactive Transit Information Systems," whereby a telephone caller interacts with the system by using a Dual Tone Multi-Frequency (DTMF) type telephone and hears instruction/information over the telephone in response to keypad entries on the telephone.
- Patent No. 5,959,577 (granted September 1999 to Rodric C. Fan, et al.) for "Method and Structure for Distribution of Travel Information Using Network," whereby a system processes position and travel-related information through a data processing station on a data network.

Each patent contains one or more "independent" claims that also include within themselves one or more discrete elements. Generally speaking, if any particular 511 implementation for traveler information services does not include any specific independent claim or one or more elements within such a claim, then the 511 system as implemented would not infringe an existing patent.

We have been informed that, in 1993, patent infringement claims were made against New Jersey Transit by the holder of Patent No. 5,214,689, Next General Information, Inc. ("NGI"), arising from the installation of an interactive schedule information system available by telephone for New Jersey Transit riders. NGI, which had bid on the system installation, actually referred to the New Jersey Transit project in its patent application. New Jersey Transit, along with the winning bidder for the project, negotiated a one-time licensing fee of \$35,000 payable to NGI, split between New Jersey Transit and its project contractor. The fee entitles New Jersey Transit to a perpetual, non-exclusive license to make, sell and/or use an interactive information system having an unlimited number of ports solely for use by the agency. It also entitles New Jersey Transit to any subsequent US patents issued to or acquired by NGI for improvements to the patent. NGI may have alleged, and settled, similar claims against other rail and transit agencies.