

Emerging Wireless Technologies

Priority Access Services in the Mobile Environment

Foreword: The Public Safety Wireless Network (PSWN) Program is conducting an ongoing assessment of advancements in the wireless communications industry. The scope of this assessment is to identify emerging wireless services and technologies for potential public safety use in the near future and beyond. This document is the sixth and final article in a series of studies on emerging wireless technologies. This particular study concentrates on wireless priority access services, concentrating on the general concepts, FCC policies, and vendors developing such services.



Introduction

Wireless telecommunication has grown significantly since its inception in the early 1980s. Wireless subscribers presently enjoy the availability of seamless, economical wireless access throughout the United States. Commercial wireless services, particularly cellular and personal communications services (PCS), are becoming more prevalent in protecting lives and responding to emergencies. As a result, wireless users have become more dependent on wireless communications, and more insistent on features that provide value-added functionality to their basic service.

NS/EP Communications

Private citizens are not alone in recognizing the value of wireless devices. Subscribers in the federal, state, and local

governments are increasingly using commercial wireless services in public safety, particularly for national security and emergency preparedness (NS/EP) communications. NS/EP telecommunication services are services used to maintain a state of readiness or to respond to or manage any event or crises, which causes or could cause injury and harm to the population, damage or loss to property, or degrade and threaten the posture of the United States.

NS/EP responders often provide communications in a mobile environment and require wireless connectivity when responding to disasters such as earthquakes, hurricanes, floods, etc. Instead of developing a private network for emergency communication, commercial wireless services provide a cost-effective capability for NS/EP communications that leverage the use of the public switched telephone network (PSTN). This minimizes the development costs and deployment time of such a capability, as well as providing the broadcast accessibility and furnishing NS/EP responders with crucial PSTN access.

Due to heavy traffic demands placed upon surviving cellular communication systems in the after effects of a disaster, severe network congestion has been experienced resulting in high call blocking in wireless and wireline communications to the vital disaster relief officials when their services are most needed. This became apparent during and in the wake of the terrorist attacks against the World Trade Center and the Pentagon on September 11, 2001.

Consequently, priority access methods that will provide NS/EP are being considered. Currently, priority access exists in the wireline PSTN via the Government Emergency Telecommunication Service (GETS). Wireless priority access is a

natural progression from the wireline GETS. The wireless augmentation of priority access service will provide mobile users with the same capability as their wireline counterpart.

Background

The Priority Access Service (PAS) program was developed by the Federal Communications Commission (FCC), and is managed by the Office of the Manager National Communication System (OMNCS). OMNCS is a federal government organization established to perform NS/EP telecommunications functions among its 23 member organizations. OMNCS' primary mission is to develop a responsive, survivable, and enduring national telecommunication infrastructure to support the NS/EP telecommunication needs of the federal government. As a first step in satisfying the mission requirements, OMNCS developed and deployed GETS. GETS is designed and maintained in a state of readiness that makes use of available PSTN resources, should outages occur during an emergency or crisis. In general PAS is intended to provide authorized personnel priority access to telecommunications (both wireless and wireline). For the purposes of this article, PAS will be used to refer to all priority access, particularly the wireless component of PAS.

Wireless PAS

Wireless PAS, designed to mirror the government emergency telecommunication service, is a program that would be able to provide priority access to designated emergency workers through the use of special phone numbers and personal identification numbers. The establishment of PAS will allow designated military and civilian personnel, as well as state and local emergency crews to access cell channels ahead of the general public in times of crisis.

The PAS capability leverages the use of existing commercial wireless networks to provide NS/EP users priority treatment of calls in the event that network congestion is blocking call attempts. PAS provides the means for qualified and authorized NS/EP users to obtain priority access to the next available radio channel in a wireless call path when emergency calls are placed. Wireless PAS is activated on a per call basis and is capable of mobile-to-wireline, wireline-to-mobile and mobile-to-mobile links.

When an NS/EP user places a PAS call and the service is activated, the mobile handset requests a radio channel via the control channel messaging. In non-congested environments a radio channel is allocated to the mobile set and the call is connected. In congested environments a radio channel may not be available, so the network will not be able to grant one. In this situation PAS is invoked. Conversely, when network congestion is not present, PAS is not activated. When congestion is encountered at call origination, the NS/EP caller is placed in a queue and will be given the next available radio channel. PAS does not preempt calls in progress and is intended for use in emergency situations where network congestion is blocking call attempts. In addition, channels are not held in reserve in anticipation of an NS/EP event requiring PAS.

FCC Policy

The FCC requires service providers to adhere to a set of uniform operating protocols concerning the number of priority levels and their associated NS/EP users. Further, the FCC established five priority levels, which limits PAS to key personnel and those in leadership roles. The FCC retains oversight of PAS but is looking to the National Communications System (NCS), the executive agent and day-to-day manager for the PAS program, to administer it. In Table 1 below, PAS will provide five

levels of priority, with each level having a distinct class of users.

Table 1 – Priority Levels and Associated NS/EP Users

Priority Level	NS/EP User
1	Executive leadership and Policy Makers
2	Disaster Response, Military Command and Control
3	Public Health, Safety, and Law Enforcement Command
4	Public Services, Utilities and Public Welfare
5	Disaster Recovery

Vendors Developing Wireless PAS

The Federal Communications Commission (FCC) issued a Report and Order on July 13, 2000, establishing the regulatory, administrative, and operational framework that enables commercial mobile radio service (CMRS) providers to offer Wireless PAS to NS/EP personnel. CMRS providers include cellular licensees, broadband PCS licensees, and specialized mobile radio (SMR) licensees.

During emergencies, CMRS providers can experience congestion in their networks. Such congestion can severely limit the ability of personnel with NS/EP responsibilities to use wireless services. To facilitate the completion of critical calls during these high usage events, PAS enables NS/EP personnel with a PAS assignment priority access to the next available wireless channel before subscribers who are not engaged in NS/EP functions. Priority calls will not preempt calls in progress and PAS will not and cannot guarantee the completion of priority calls.

The FCC rules do not require CMRS providers to offer Wireless PAS. Therefore, CMRS participation in the PAS Program is achieved on a voluntary basis. True wireless PAS has not yet been realized, and only two

service providers are working towards solutions to provide PAS on commercial wireless networks.

Verizon, the largest mobile telephone carrier in the United States, was selected by the government to provide the priority access in New York City, Washington, DC, and Salt Lake City, the host of the 2002 winter Olympics, by December 10, 2001. However, emergency and national security officials may have to wait a bit longer to receive priority access to wireless networks in the event of a crisis. Verizon Wireless has withdrawn its waiver request that would have allowed the establishment of a wireless priority access system in the three locations. Verizon's original request was submitted on November 2, 2001 and the carrier has been working with the NCS to establish an immediate wireless solution. Globalstar, Mobile Satellite Service (MSS) provider, will provide additional connectivity via satellite in addition to Verizon's cellular coverage. PAS is planned to be included on all Globalstar handsets thereby providing priority service and full satellite service. Now Verizon says the better course of action is to work with the NCS and other wireless carriers to develop a more comprehensive, industry wide solution that does not require FCC approval.

Voicestream Wireless has requested a waiver of the FCC's rules to offer immediate priority access in the same three locations. Voicestream said that it could provide emergency and national security officials a system that queues up calls to be connected when using mobile telephones, called Enhanced Multi-Level Precedence and Preemption (eMLPP)¹. Voicestream claims that eMLPP does not require any special activation, it is always active, and provides the five levels of NS/EP priority.

When the Voicestream wireless network is congested in cities where eMLPP

¹ eMLPP is the PAS solution specifically for Global System for Mobile communications (GSM) networks.

is available, an NS/EP user's call attempt is placed in queue for the next available resource based on the priority level assigned. Therefore, in reference to Voicestream's request, the Secretary of Defense, as Executive agent of the NCS, urges the FCC to grant this waiver so that Voicestream can initiate wireless priority access. Currently, there are not any other wireless providers that have indicated PAS initiation nor have they requested waivers by the FCC.

PAS Program Goals

The overall goals of PAS are that the service should:

- Provide access using commercially available mobile sets in area where PAS is offered
- Transparently operate in the system
- Be interoperable among wireless infrastructures and available uniformly across the nation
- Perform effectively under conditions of up to eight times call overload and provide a PAS user with a high probability (90% or greater) of radio channel access at the origination or termination cell
- Perform effectively regardless of origination or termination
- Should ensure service continuity during handoff and roaming conditions to the extent technically and economically feasible.

In addition, the PAS will be implemented via two concurrent programs. The first phase is the immediate solution, which will be based on current features and technology. This phase addresses the major problem of air interface congestion, but has limitations such as limited market coverage, special handsets, and requirements for service activation. Additionally, this service does not conform to the FCC rulemaking

pertaining to wireless priority access and waivers are now being sought after for immediate solution. Implementation of the immediate solution will be focused on three markets, Washington DC, New York, NY, and Salt Lake City, UT. The first implementation market will be Washington, DC within the initial 60 days (by December 10, 2001), and in an additional 30 days (by January 10, 2002), Salt Lake City, and New York City metro areas. The service providers for the immediate service solution would have been Verizon and Globalstar, but since Verizon has withdrawn its priority access waiver and Globalstar has filed for bankruptcy, it is currently unknown who the service provider will be or what timeline will be set. The most likely candidate to continue the efforts to provide the immediate wireless PAS solution is Voicestream Wireless.

The second phase of PAS will involve the development of standards-based capabilities, and will provide an end-to-end solution fully integrated with GETS. Initial operational capability (IOC) of this phase is anticipated by the end of CY2002, and is planned to provide nationwide coverage, be continuously available, and conform to the FCC rule making.

Final Thoughts

Wireless telecommunication services are increasingly vital to the ability to coordinate and respond to crises. Several recent disasters in the United States have shown the applicability and usefulness of cellular telephony in providing emergency telecommunications for local, state, and federal officials having operational responsibilities at disaster sites. However, during emergency situations and natural or manmade disasters, and when wireline network outages occur, heavy traffic demands are placed upon surviving systems, thereby preventing NS/EP personnel from gaining access. This need has resulted in the FCC's Notice of Proposed Rulemaking,

which was the establishment of rules and requirements for wireless priority access service.

Wireless priority access systems will allow designated military and civilian personnel, as well as state and local emergency crews to access cell channels ahead of the general public in times of crisis. As a result, NS/EP telecommunication users will be able to obtain priority access to available wireless radio channels when necessary to initiate emergency calls, thereby supporting public safety by helping to save and protect lives.

Postscript: The purpose of this article is to further educate the reader regarding wireless priority access services, particularly the general concepts, FCC policies, and vendors developing such services. This is the final article in a series of studies on emerging wireless services and technologies of interest to the public safety community.

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