

NATIONAL COMMUNICATIONS SYSTEM (NCS) PRIORITY TELECOMMUNICATIONS SERVICES AND THE NEXT-GENERATION NETWORK

The National Communications System (NCS) is responsible for coordinating restoration and maintaining emergency communications services to all levels of government in the event of a regional or national disaster. To this end, NCS offers a wide range of national security and emergency preparedness (NS/EP) communications services including two popular priority services, Government Emergency Telecommunications Service (GETS) and Wireless Priority Service (WPS). GETS and WPS ensure that emergency callers can get their calls through when the public telephone network is overly congested. These two services support Federal, State, and local government, certain private industry, and other authorized users in performing their NS/EP missions.

"With GETS currently serving over 148,000 users and WPS serving over 42,000 users, it is evident that these services are vital to the emergency response community," said Vernon Mosley, Acting GETS/WPS Program Director. "However, the telecommunications industry is migrating to a packet-switched Internet Protocol (IP) infrastructure, and this raises concerns of many first responders as to whether the priority services will remain available in the future."

Engineers within the NCS Technology and Programs Division recognize the need to evolve their priority capabilities to the packet-network environment of the next-generation network (NGN) to maintain these capabilities for NS/EP users. As a result, the NCS staff is embarking on an effort to address not only voice telephony (thus extending the GETS and WPS features into the new infrastructure) but also take advantage of the high bandwidths offered by the NGN to offer additional priority telecommunications services, such as video, data, and other broadband and mobile multimedia services over the IP networks.

According to Frank Suraci, GETS Technical Director, "The NCS has been prototyping and analyzing alternative network configurations designed to achieve these objectives. These prototypes, based on existing and emerging national and international standards and on commercially-available networking equipment, have been used to demonstrate proof of concept and assess various methods of user authentication and several priority mechanisms in next-generation, IP-based networks."

Last fall, the NCS continued its efforts toward upgrading priority services. As a member of the communications industry's MultiService Forum (MSF), NCS staff participated in MSF's two-week-long global interoperability test event ("GMI2006") where NCS engineers

had an opportunity to test the feasibility of priority access in the NGN.

"The NCS considers the MSF global interoperability event an important step and proof-of-concept in the development of priority services in the next-generation network (NGN) environment for NS/EP users," said Suraci. "In addition, the NCS has demonstrated that priority capabilities can be extended from voice communications to multi-media sessions, that sophisticated techniques can be used in the NGN to authenticate NS/EP users, and that voice priority features can inter-operate between the circuit-switched PSTN and the NGN."

Priority communications in the packet-switched NGN will share some features with the circuit-switched GETS and WPS. Suraci said the GETS access number will still be recognized, for example, and will cause the caller to be authenticated via a PIN entry. However, he said the capabilities inherent in the digital network elements of a packet-switched network also make possible additional, more convenient authentication schemes.

During the transition from circuit-switched public telephony to the IP-based NGN, which is likely to last for a number of years, Suraci said the NCS recognizes that the two technologies must co-exist and interoperate. In this hybrid environment it is imperative that NS/EP priority services function seamlessly on calls between circuit-switched and IP domains. Interoperability implies that priority sessions that span more than one network type maintain their priority status across the networks' boundaries. Signaling and transport gateways between the networks must perform appropriate protocol mappings, including the priority indicators. Such interoperability, including the bi-directional mapping of priority indicators between the PSTN and the NGN, was demonstrated successfully during GMI2006.

For the past decade, the GETS program provided priority in placing telephone calls via the PSTN. More recently, the WPS program provides priority access to radio channels for voice calls and end-to-end priority in cellular systems. The ongoing migration to the NGN infrastructure provides the NCS with an opportunity to develop and implement additional priority telecommunications services.

"Successful participation in the 2006 MultiService Forum Interoperability event was an exciting step forward for NCS in determining the feasibility of migrating GETS and WPS to next generation networks," said Suraci.

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He added that NCS is more committed than ever to working closely with the telecommunications industry as they make technological advances, to evolve the priority service capabilities to meet NS/EP requirements, ensuring that they are sustained throughout these evolutions.

Sidebar:

GETS and WPS enable key NS/EP personnel to have their wireline and wireless calls get "priority" status over calls from the general public during an emergency or crisis situation when the public telephone network is overly congested.

Priority service calls are easy to invoke for authorized users. In the circuit-switched telephone network, a caller initiates a GETS priority call by dialing an NCS-specific access number. Local exchanges in the U.S. recognize this access number and route the call to one of three inter-exchange carriers (AT&T, Sprint, or Verizon Business/MCD). The caller is then prompted to enter a personal identification number (PIN), similar to a calling-card number. If the PIN is found to be valid then the call is routed to its destination with priority features, which include priority in accessing available circuits, routing around damaged or congested network segments, queuing the call when no circuits are immediately available, and exemption from certain network management control restrictions. The signaling associated with the call carries a marker which identifies it as an NS/EP call, and the signaling messages themselves are also treated by the signaling network with priority over normal calls.

For WPS, a caller does not need to enter a PIN as the network recognizes the caller's mobile handset as having been pre-authorized to initiate priority calls. WPS can be invoked by dialing the Feature Code *272, followed by the destination number, and pressing SEND. If all radio channels in the user's cell are busy, the user's call will be queued for access to the next available radio channel. Furthermore, WPS provides queuing to congested Public Switched Telephone Network (PSTN) interfaces for calls originated at a Mobile Switching Center (MSC) and traversing another carrier's network. Regardless of whether or not a WPS call traverses the PSTN or simply connects within the same MSC, queuing also is applied when terminating an NS/EP call into a cell where all radio channels are busy. WPS and GETS integration provides an end-to-end priority treatment for NS/EP calls, including calls that originate, and/or terminate in wireless and/or landline networks.

"GETS and WPS have been instrumental in maintaining essential communications during many di-

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sasters," concluded Mosley. "Over 32,000 GETS calls were completed during the first 12 days of Hurricane Katrina. And, in the aftermath of that hurricane, over 6000 WPS phones were distributed to first responders and emergency workers and thousands of WPS calls were successfully placed into and out of the affected regions."

"The preceding was written and released by the National Communications System as a public service."

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hot line and a path to ground.

The scheme represented by the second specification is in violation of the National Electric Code. There are good reasons for the code requirement that these systems be bonded together. As a practical matter, the equipment bonding conductors to all intersection poles can also serve as a portion of the lightning grounding system. In a properly bonded system, where each pole has bolts and foundations in contact with earth (Such poles are incidentally impossible to completely insulate from a connection to ground), and (in our case) a driven ground rod, as well as driven grounds at the cabinet pull box and utility power supply, all bonded together, low impedance paths are provided. Lightning events are shunted to earth's ground with parallel paths that are as low impedance as is practical. Arcing to unconnected "separate grounds" is reduced. The single connection point concept is likened to a boat rising with the tide as it is tied to the dock, rather than being firmly attached to the harbor's bottom.

There are a number of excellent references and articles at Mike Holt Enterprises : <http://www.MikeHolt.com> Look for articles about "bonding and grounding" Mike co-wrote a couple of IMSA article a couple of years back on this subject. His point was that merely driving a ground rod at the base of each pole does not replace the NEED for adequate bonding conductors between each pole. We use # 6 AWG between all poles, the cabinet, service and driven ground rods at all pull boxes carrying more than 24 volts.

Hope this is useful, Bob

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