# NEXT-GENERATION 9-1-1

## Research Overview

The nation's current 9-1-1 system is designed around outdated telephone technology and cannot handle the text, data, images, and video that are common in personal communications and critical to future safety and mobility advances. In addition, 9-1-1 call centers cannot transfer calls from one call center to another when call volume exceeds the available resources. The nation's 9-1-1 system is in need of a significant overhaul. By capitalizing on recent technology advances, the U.S. Department of Transportation (DOT) has produced a design and transition plan for a next-generation 9-1-1 (NG9-1-1) system. The NG9-1-1 Initiative has established the foundation for public emergency communications services in a digital, Internet-based society.

## The Problem For Emergency Communications

The nation's 9-1-1 system has been an unqualified success for more than 40 years. However, changes in the public's use of technology—the growing market for both wireless and voice-over-Internet protocol (VoIP) telephony (*e.g.*, Skype or Vonage) and the nomadic world they reflect—contribute to greater expectations than the existing 9-1-1 system can deliver. The spread of highly mobile, dynamic communications requires capabilities that do not exist today for 9-1-1 emergency call centers. When people call for help during emergencies, it is critical that emergency call centers have the ability to:

- Easily interface with a wide range of communication devices on the market
- Identify the location of the caller
- Recognize the technology generating the call in order to route the information (*e.g.*, a photo or video) to the appropriate responder in a timely manner.

Emergency call centers, or 911 public safety answering points (PSAPs), face challenges that prevent easy transmission of data and critical sharing of information that can significantly enhance the decision-making ability, response, and quality of service provided to emergency callers. Technology challenges include:

- Use of an older, analog-based infrastructure and equipment by PSAPs
- Use of local 9-1-1 networks that cannot:
  - Process calls using new communications technologies such as Internet Protocol (IP) access networks
  - Efficiently transfer calls from one PSAP to another when the call volume exceeds the available resources.

NG9-1-1 is a system comprised of hardware, software, data and operational policies and procedures to:

- Process all types of emergency calls including non voice (multimedia) messages
- Acquire and integrate additional data useful to call routing and handling
- Deliver the calls/messages and data to the appropriate PSAPs and other appropriate emergency entities
- Support data and communications needs for coordinated incident response and management
- Address operational changes that will occur within the PSAP
- Examine options for addressing implementation issues such as governance, privacy, and funding.

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## The ITS Opportunity

Emergency communication models developed through intelligent transportation systems (ITS) offer innovative technology solutions that can enable the existing 9-1-1 system to deliver the next generation of capabilities and services. By capitalizing on recent technology advances, the USDOT's ITS program has delivered a design and a transition plan for the NG9-1-1 system that, when implemented, will:

- Enable 9-1-1 calls from a variety of networked device.
- Provide quicker delivery and more accurate information to responders and the public alike. Delivery will incorporate better and more useful forms of information (*e.g.*, real-time text, images, video, and other data).
- Establish more flexible, secure, and robust PSAP operations with increased capabilities for sharing data and resources, and more efficient procedures and standards to improve emergency response.
- Enable call access, transfer, and backup among PSAPs and between PSAPs and other authorized emergency entities.

## Research Approach

The NG9-1-1 Initiative focused on the research required to produce a design and a transition plan for a next-generation 9-1-1 system. The goal was to design a system that is capable of voice, data, and video transmission from different types of communication devices into PSAPs and on to emergency responder networks. Working closely with a wide range of stakeholders, the initiative's efforts focused on two areas—technical/engineering and institutional/transitional. Specifically, the initiative focused on delivering an NG9-1-1 system architecture, or a technological framework, that can accommodate today's stakeholder interests and existing market-based solutions as well as future technological advances. Technical activities centered on:

- Engaging a wide audience of stakeholders required for successful NG9-1-1 design and implementation
- Developing an NG9-1-1 concept of operations to establish the vision
- Documenting system requirements and developing a system architecture
- Conducting a proof-of-concept (POC) demonstration
- Assessing the cost, value, and risk of an NG9-1-1 system and developing a transition plan that will identify and evaluate all non-technical factors (*e.g.*, stakeholders, impacts, benefits) that need consideration for a successful nationwide transition.



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## Research Findings and Test Results

The NG9-1-1 Initiative produced one of the first research products that defines and documents a comprehensive future vision for the existing 9-1-1 system. The initiative validated the NG9-1-1 architecture through a POC test that showed the new design is capable of accommodating calls from a wider range of devices. PSAPs were able to receive cellular calls, instant messaging, legacy 9-1-1 calls (wireline), telematics (automatic crash notification) data directly from the vehicle, VoIP calls, and live video feeds. Importantly, the prototype system allowed PSAPs to identify the caller's location and to route the call to the most appropriate response center based on the caller's location. And for the first time, calls were transferred from one PSAP to another, along with all digital data received during the call.

The public awareness generated by the initiative has alerted 9-1-1 stakeholders that it is essential to undertake a timely and fundamental transformation of the way 9-1-1 calls are originated, delivered, and handled. In addition, the results of the NG9-1-1 effort have helped communities become more engaged in finding options to address the issues and challenges that face the existing 9-1-1 system and to discuss and plan for a future system. The NG9-1-1 tests and demonstrations created a sense of urgency and movement within the community to get more people involved and start discussing the issues as a community.

The NG9-1-1 Initiative has developed a broad set of resources that will facilitate national transition and inform other 9-1-1 services on how to move to the next generation of capabilities.

For more information, please visit
www.its.dot.gov/ng911/index.htm
www.911.gov/

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