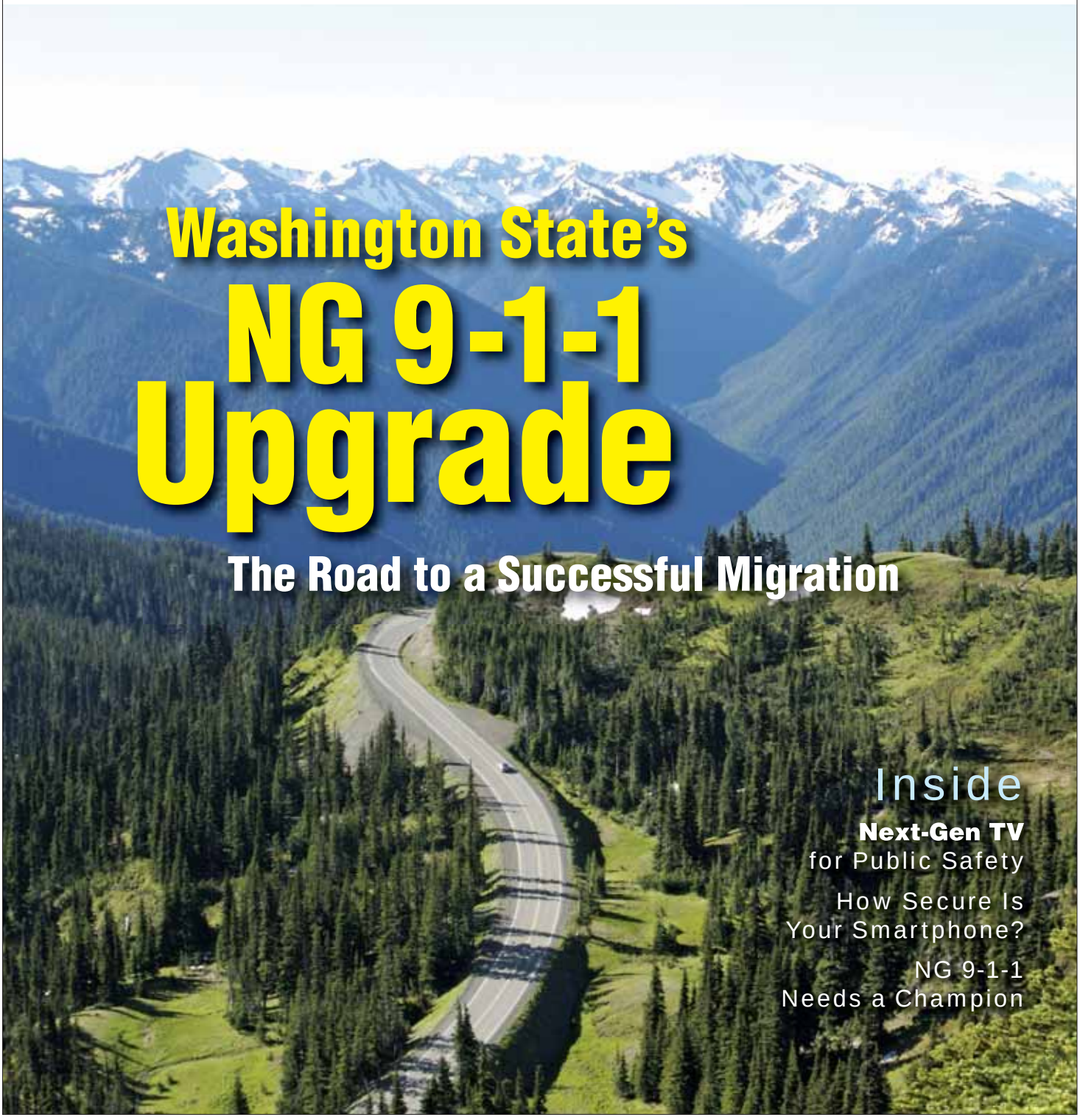
SPECS SURVEY: Voice Logging Recorders | WHAT'S NEW: Radio Consoles

RadioResource
June 2017 | MCCmag.com

MissionCritical™
COMMUNICATIONS



Washington State's NG 9-1-1 Upgrade

The Road to a Successful Migration

Inside

Next-Gen TV for Public Safety

How Secure Is Your Smartphone?

NG 9-1-1 Needs a Champion

Washington State's NG 9-1-1 Upgrade

The state's upgrade shows how established processes can help manage a successful next-generation 9-1-1 (NG 9-1-1) upgrade.

By R. Scott Peabody

The Spokesman-Review newspaper headline read, "Windstorm pummels Spokane, killing two people and causing widespread blackouts." The brutal storm, packing near hurricane-force winds, toppled hundreds of trees, blew off roofs, grounded airplanes, and caused more than 206,000 customers to lose power in Spokane, Washington, in November 2015. The next-generation 9-1-1 (NG 9-1-1) telephone switch, installed just 28 days before this major event, underwent its first stress test and performed well, a testament to everyone involved with the telephone switch upgrade. By applying a few best practices, NG 9-1-1 telephone switch upgrades can be accomplished routinely to enable the new technologies in the next-generation pipeline.

New Capabilities, Challenges

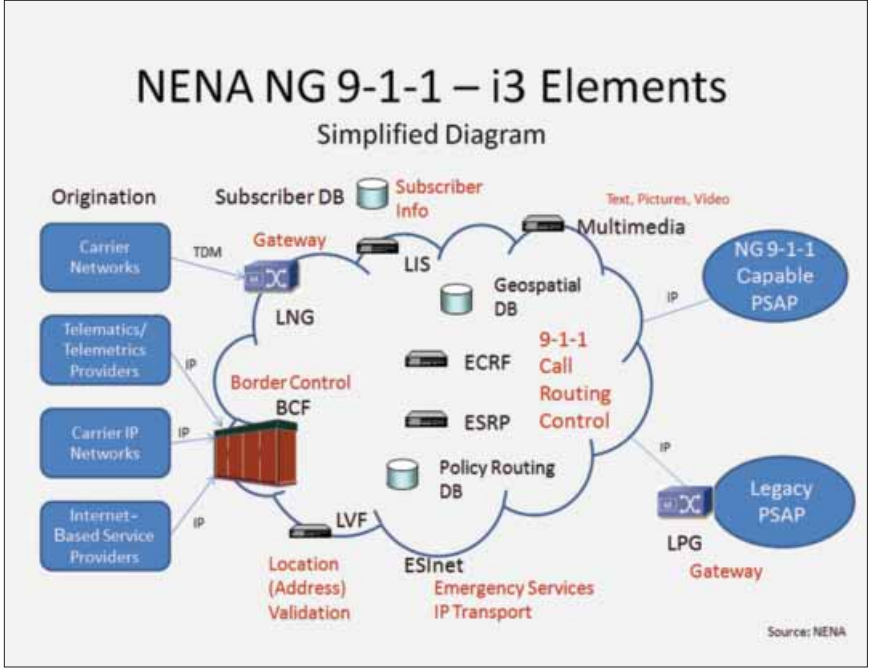
Traditional telephone systems are becoming obsolete. The world has moved to IP telephony systems, and anyone still operating old systems needs to begin the process of replacement as good used parts become increasingly rare. This technical obsolescence is amplified by the emergence of Emergency Services IP networks (ESInets) and the transition to the i3 architecture, a complex eye chart of interconnections to functional elements (FE) for meeting user requirements.

In July 2016, the state of Washington signed an agreement with Comtech Telecommunications to provide one of the first statewide i3-based ESInets with capabilities beyond IP-based call delivery. The network featured enhanced call-routing functionality, text to 9-1-1, call logging with reporting and geographic information systems (GIS)-based location validation while still supporting legacy systems. Similar to mobile phone services or broadband internet services, NG 9-1-1 telephone systems will need more frequent upgrades to add features and keep up with the evolution of the ESInet components. In the early years, the NG 9-1-1 environment will experience persistent change as software releases occur every six months. What will not change is the public's expectation of always-on 9-1-1 services.

Lessons Learned

Prior to NG 9-1-1 systems, the telephone was the focus of 9-1-1 systems. Data services for location, dispatch and callback were integrated with telephone systems under the umbrella of computer telephony integration (CTI). NG 9-1-1 changes this paradigm with computers in the center and telephone capabilities implemented as an application. A better way to think about NG 9-1-1 systems is computers with limited telephone features (CLTF). This fundamental shift has far-reaching consequences in unexpected areas such as traffic management, call flows, issue resolution and change management.

In the circuit-switched world, traffic management was accomplished by the telco network providers limiting the number of



circuits to the 9-1-1 switches and configuring the telephone network to deal with the traffic mix between wireless, wireline and VoIP call types. The telco networks addressed overflow routing and busy network conditions.

The IP circuits to the NG 9-1-1 telephone switches can often handle many more calls, so the switches are configured for the various call types, call treatments and traffic conditions rather than the telco network. The NG 9-1-1 switch is where the traffic limit is, not the ESInet feeding the switch. Traffic reports are different too. The NG 9-1-1 switch, called the customer premises equipment (CPE), has become more responsible for logging and reporting the traffic statistics.

Processes for Frequent Updates

One of the benefits of network virtualization — the systematic migration from specific hardware to software-defined networks running on generic hardware — is the ability to easily add capacity and capabilities. Unfortunately, persistent change impacts day-to-day operations and elevates risk. Key tasks to undertake before an upgrade include:

- Review and understand vendor release notes. Ask for clarification if proposed features or changes are not clearly understood.
- Develop an assessment to understand the impact of the changes to people and processes.
- Develop a detailed upgrade plan with a method of procedure (MOP) and share the plan with all stakeholders.
- Implement the plan during the upgrade/cutover and avoid shortcuts.

A MOP is a step-by-step sequence of actions to perform a change. All major telecom service providers use MOPs when upgrading their networks, but the practice is not consistently applied by IT groups. A good MOP lists everything — equipment, cables, software licenses and specific input commands — needed to perform the upgrade and dramatically improves outcomes by leaving nothing to chance.

In the early years, the NG 9-1-1 environment will experience persistent change as software releases occur every six months.

For entire system replacements, such as replacing a legacy telephone system with an NG 9-1-1 system, assessing impacts will be more complicated. Start with detailed written documentation of existing call flows to help the vendors configure the new system, trainers develop curriculum and evaluators compare objective acceptance criteria. Hold meetings with vendor technical staff and dispatch center operations staff to go through the call flow documents in excruciating detail. The call-taker and administrative call flows will not be exactly the same in the new system so decisions must be made. Training will ease the transition to the new system.

A report from the Project Management Institute titled "The High Cost of Low Performance: The Essential Role of Communications" states, "highly effective communicators are more likely to deliver projects on time (71 percent vs. 37 percent) and within budget (76 percent vs. 48 percent)." For network upgrade projects, the detailed upgrade plan distributed to the stakeholders is the ultimate planning deliverable, answering important operational questions on resource scheduling and the length of any outages if applicable.

NG 9-1-1 upgrades are surprisingly complicated because of the number of stakeholders. People directly and indirectly involved in the upgrade, such as vendors' remote technical support, telco network operation centers, on-site technicians, testers, call-takers, dispatchers, supervisors, first responder agencies, neighboring jurisdictions and governance board members, should be informed. The detailed upgrade plan provides structure for the planning efforts and the actual upgrade so nothing is missed.

Test, Test and Test

Put simply, testing reduces risk. Software is tested to reduce the risk of bugs; hardware is tested to detect failures. NG 9-1-1 tests reduce the risk of problems in these complex, integrated systems with customized configurations. Vendor test labs check interoperability, upgrade procedures, system performance under simulated call loads, and system stability, but they cannot test every field configuration, and it is "risky business" to assume that vendor testing is sufficient for each field

Collaborative testing, a form of stakeholder engagement, is a great way to involve call-takers, supervisors and other users most impacted by the change. Users are encouraged to interact with the system and find problems before the system goes live.

implementation. NG 9-1-1 testing is the responsibility of the customer, not the vendor, and a collaborative effort produces the best outcomes.

Collaborative testing, a form of stakeholder engagement, is a great way to involve call-takers, supervisors and other users most impacted by the change. Users are encouraged to interact with the system and find problems before the system goes live. Fixes or parameter changes can then be changed and tested again prior to live traffic being on the system. The inclusion of many hands finds more problems more quickly, reduces test durations, and prepares the organization for the technological changes rather than producing a hostile environment reacting to unwelcome changes forced on users.

Hierarchical test checklists along with the upgrade plan provide structure to the testing during the upgrade. Anyone involved in upgrades knows how quickly things can devolve into chaos without a plan, especially when tasks take longer than expected or issues crop up. Each tester is issued a test checklist with steps to confirm proper workstation behavior, expected call flows, call holds, transfers, instant recall recording, callback and the long list of other tasks performed by the call-takers. The individual checklists roll up to system checklists for testing overflow behaviors, call recording and playback, and other system features. Each console position should be tested to verify that it is fully functional. Do not be fooled by the "they are all the same" argument. The rollup of test results allows management to make informed decisions about the readiness of the system.

Track Issues and Changes

In the middle of the night during an NG 9-1-1 system upgrade, issue tracking allows for recording, prioritizing and confirming resolution of problems. Whiteboards or virtual whiteboards based on collaboration software for remote users are successful during the upgrade, but eventually, the remaining open issues need to be transferred to an issue tracking/trouble ticketing system. While it is tempting to rely on vendors' trouble ticket systems, this approach inevitably leads to problems. In multivendor environments, which vendor system is used? How are internal (not vendor) issues reported and resolved? Who has access to the system for ticket creation, reporting, analysis and resolution? There may be data retention issues and differences between the vendors' desire to close the ticket and the customer's need for resolution.

After the system goes live, another challenge is change management. In the bygone days of hardware solutions, systems were documented with engineering drawings, and changes were shown with as-built drawings. Today's systems still have drawings for equipment layouts and configurations, but these documents do not suffice for restoring configurations in disaster recovery scenarios. The manuals, software versions, patches, and settings for each element need to be documented and updated, preferably in soft copy for off-site storage.

With a little creativity, a single system can be used to track issues and record configuration changes. Several web-based trouble ticket systems capable of tracking and reporting issues are available at reasonable rates. Open a ticket for the upgrade and close the ticket with attachments for the updated documentation. The open ticket will remind administrators to complete this often-forgotten step of the upgrade.

Unprecedented Change

The technology road map for public safety in the next decade is marked with transformational systems including ESInets, the First Responder Network Authority (FirstNet) nationwide public-safety broadband network (NPSBN), massive amounts of photographs and video content, and ubiquitous sensors enabled by the internet of things (IoT). Many of these new technologies must integrate with NG 9-1-1 switches through upgrades. Using established techniques borrowed from the larger telecommunications industry and other 9-1-1 agencies, NG 9-1-1 upgrades can be successfully managed to keep the storms outside the organization and energies focused where they belong — on the public we serve. ■

R. Scott Peabody is a senior consultant for ADCOMM Engineering and a registered professional engineer (PE) with more than 25 years of experience in telecommunications, electrical power systems and IT. He speaks regularly at national and regional technical conferences and has authored a number of technical articles focusing on the practical applications of technologies to address real-world problems. Email feedback to s.peabody@adcomm911.com.