NEXT GENERATION FIRST RESPONDER CASE STUDY

Situational Awareness

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Homeland Security
Science and Technology

EXECUTIVE SUMMARY

The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) launched the Next Generation First Responder (NGFR) Apex program in January 2015 as a strategic initiative to develop and integrate next-generation technologies with the goal of expanding first responder mission effectiveness and safety. The NGFR Apex program seeks to help tomorrow's first responders be better protected, connected and fully aware.

NGFR has conducted three integration demonstrations to assess how prototype technologies integrate to support the NGFR Apex program. The first demonstration in January 2016 was primarily a tabletop demonstration, and the second in May 2016 was a combined tabletop and field demonstration in a large urban area. For the third NGFR integration demonstration, the NGFR Apex program wanted to collaborate with a more rural community where cutting-edge technologies face a unique set of deployment challenges.

NGFR partnered with first responders in Grant County, Washington, to assess the capabilities of numerous NGFR technologies to support their public safety operations. This effort, known as the *Grant County – DHS Science and Technology Directorate Next Generation First Responder Apex Program Technology Experiment* (TechEx), involved deploying a suite of technologies. This case study identifies and explains the technologies used in the TechEx. Public safety agencies can use this case study as an example of how to implement situational awareness systems.

Initial discussions with Grant County identified the following five areas as priority needs:

- Geo-location of first responder vehicles and personnel on map displays at the Grant County Multi-Agency Communications Center (MACC), command posts and on smartphones.
- Wireless data service at the Gorge Amphitheatre concert venue, campgrounds and along the Columbia River valley using various broadband technologies, including cellular broadband [Long Term Evolution (LTE)], Wi-Fi and digital television datacasting.
- Ability to view real-time video at the MACC, command posts, emergency management centers and other destinations when captured and streamed from small Unmanned Aircraft Systems (sUAS) or first responder smartphones.
- Capability to monitor first responders' physiological conditions and send the data wirelessly to the MACC and command post(s) for viewing using a visual "dashboard" on a monitor.
- Support for communications and information dissemination using a combination of county-owned, land mobile radios (800 MHz P25), commercial mobile networks and a deployable government-band public safety broadband network (Band 14 LTE) for data communications.

After further discussions, extensive planning, site visits, an integration and testing event and a dry run of the experiment, NGFR and Grant County conducted the TechEx June 6 and 7, 2017. More than 50 first responders from multiple Grant County first responder agencies, as well as 15 S&T NGFR staff and support contractors participated.

The scenario-based event used three operational scenario vignettes, illustrated in Figure 1:

- **Vignette A** functioned as a systems check of the new technologies. Each technology was tested for the corresponding responders and vehicles (as applicable).
- **Vignette B** involved tracking down two notional lost hikers who wandered down into the Columbia River gorge, one of whom fell off a cliff and broke a leg. Sheriff's deputies were sent down into the gorge to find the victims with an sUAS used to assist in finding the hikers. Once the hikers were located, the fire district responders were dispatched to perform a ropes rescue to transport the victim up the cliff to be treated by responders.
- **Vignette C** involved the report of a notional brush fire, which was located by the sUAS. Fire Districts 3 and 5 personnel were dispatched to fight the fire. Soon after, a notional altercation occurred at the nearby campground and deputies pursued the perpetrator.

Figure 1: Grant County Responders during the NGFR TechEx

The TechEx scenario provided sufficient realistic opportunities to assess the various technologies' utility and integration with existing systems (technical and human). The scenario also provided opportunities for participating first responders to identify gaps and required enhancements for future NGFR events. The evaluation team was able to verify the NGFR system architecture implemented and configured in Grant County was easy to install, easy to use and provided capabilities that were valued by the first responders.

The NGFR Apex program and their partners provided multiple systems for the TechEx to demonstrate situational awareness to Grant County. These systems include deployable communications, location tracking, video sharing and physiological monitoring. These four topics are discussed in previous Case Studies. This Case Study addresses the actual situational awareness applications used as part of the TechEx to provide better information to responders, incident commanders and county leadership, enabling better-informed resourcing decisions.

INTRODUCTION

Next Generation First Responder Apex Program

The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) launched the Next Generation First Responder (NGFR) Apex program in January 2015 as a strategic initiative to develop and integrate next-generation technologies with the goal of expanding first responder mission effectiveness and safety. S&T's NGFR Apex program seeks to help tomorrow's first responders be better protected, connected and fully aware. When firefighters, law enforcement officers and emergency medical services have enhanced protection, resilient communications and advanced situational awareness, they are better able to protect communities and make it home safely. The NGFR Apex program develops, adapts and integrates cutting-edge technologies using open standards, increasing competition in the first responder technology marketplace and giving responders more options to build the systems they need for their mission and budget.

NGFR Integration Demonstrations

NGFR has conducted three integration demonstrations to assess how prototype technologies integrate to support the NGFR Apex program. The first demonstration in January 2016 was primarily a tabletop demonstration, and the second in May 2016 was a combined tabletop and field demonstration in a large urban area. For the third NGFR integration demonstration, the NGFR Apex program reached out to a more rural community where cutting-edge technologies face a unique set of deployment challenges.

The NGFR Apex program is both modular—meaning responders can select different components that will easily integrate via open standards and interfaces—and scalable—meaning responders can build a large and complex system or a small and streamlined system, depending on their mission needs and budget. Throughout the course of the NGFR Apex program, it is essential to test both the modularity and scalability of the system with first responders, so that by the end of the program, responders will be able to build their own NGFR system from tested, integrated and demonstrated components that have already been proven in real-world environments.

NGFR Technology Experiment in Grant County

The DHS S&T NGFR Apex program partnered with the Grant County, Washington, Sheriff's Office to assess how NGFR technologies could improve the mission capabilities of Grant County public safety. The county, comprised of more than 2,700 square miles of river valleys, rolling hills and agricultural farmland, is decidedly rural, and Grant County responders have frequently struggled with poor communications coverage when supporting major events, managing wildland fires and coordinating multi-agency responses to large incidents.

The overarching objective for the event was to conduct a Technology Experiment (TechEx) in Grant County, Washington, in collaboration with Grant County public safety officials and first responders. The TechEx integrated several NGFR technologies to support an operationally-relevant, mission-based scenario centered on law enforcement and emergency response operations. TechEx goals included demonstrating various technologies, assisting Grant County in incorporating them into their daily operations and gathering responder feedback to help improve both individual NGFR technologies and the program as a whole.

Purpose of This Case Study

This case study describes NGFR's recent efforts as part of the Grant County TechEx to provide a situational awareness application to display the location of first responders and first responder units on maps for use in maintaining situational awareness. This study identifies and explains the technologies used in the TechEx and presents a case study that can be used by public safety agencies as an example of how first responder agencies can implement situational awareness systems.

TECHEX OVERVIEW

Background

The NGFR Apex program and Grant County partnership resulted in the *Grant County – DHS S&T NGFR Technology Experiment*. The two-day experiment was held in and around Grant County's Gorge Amphitheatre, a popular music venue and campsite surrounded by open farmland and canyons. The venue draws crowds that increase the county's population by 30,000—a 30 percent increase from Grant County's regular 93,000 residents—on weekends during summer events, and poses a strain on existing responder communications capabilities. This particular venue provided the optimal environment to test various NGFR technologies during the TechEx.

Objectives

The TechEx's main objective was to collaborate with Grant County public safety officials and first responders and integrate pre-identified NGFR technologies into a law enforcement and emergency response operations scenario.The goal of this TechEx was to demonstrate the various technologies and assist Grant County in incorporating them into their daily operations and existing systems. By gathering feedback from first responders on the technologies and how they did or did not augment Grant County emergency response capabilities, the NGFR Apex team sought to improve the program's alignment with rural and urban responder needs.

Requirements

Initial discussions with Grant County in December 2016 resulted in the identification of the following technology requirements for the TechEx:

- **Extended and Increased Communications:** Provide a broadband ([Long Term Evolution (LTE)] communications infrastructure that works with both existing commercial LTE providers and with a temporary public safety Band 14 LTE system to provide connectivity for the various technologies being demonstrated.
- **Video Capture, Storage and Distribution:** Capture video from responders' smartphones, sUAS (also known as drones) and other devices to forward to a centralized video storage service; and distribute captured video from the centralized service to responders, incident commanders (IC) and the Grant County Multi-Agency Communications Center (MACC).
- **Location Tracking:** Track the locations of first responder vehicles and smartphone-equipped first responders on map displays at the MACC, command posts and on smartphones.
- **Responder Physiological Monitoring:** Monitor first responders' heart rate and respiration rate data to send to the MACC and/or command post.
- **Situational Awareness:** Share first responder location, physiological data and captured video to the MACC, command posts, emergency management and other destinations for display on dashboards and maps.

TechEx Activities

Site Survey

NGFR and their primary support partners, Johns Hopkins University Applied Physics Lab (JHU APL) and the U.S. Department of Commerce National Institute of Standards and Technology's (NIST) Public Safety Communications Research (PSCR) division, performed a site survey of Grant County in February 2017, which specifically focused on the technology currently in use by the Sheriff's Office, the fire districts and at the Gorge concert venue. This survey enabled the NGFR TechEx team to identify the types of technologies that would fulfill the requirements and objectives of the TechEx. As part of the survey, the NGFR TechEx team developed an "as-is" configuration of Grant County's communications infrastructure and capabilities for use as a baseline.

Integration Testing

Once the technologies were identified and preliminary development and integration was complete, NGFR and their partners met at PSCR in Boulder, Colorado, in April 2017 to perform further integration testing. This three-day session enabled technical participants to connect all technologies in both laboratory and radio transmitter test-range field locations to test the integration of the components as a system of systems.

Dry Run

Soon after the Boulder integration testing, the team reassembled at the Gorge concert venue in Grant County to install antennas, test coverage and perform a dry run of the scenario vignettes. This testing assisted the participants in finalizing the systems, testing the new capabilities in the actual event setting and preparing for the actual TechEx.

Technical Experiment

The TechEx was conducted June 6-7, 2017 using an operational scenario with three vignettes:

- **Vignette A** functioned as a systems check of the new technologies. Each technology was tested for each of the corresponding responders and vehicles (as applicable).
- **Vignette B** involved tracking down two notional lost hikers – one who fell off a cliff and broke a leg – who wandered down into the Columbia River gorge. Sheriff's deputies were sent down into the gorge to find the victims with an sUAS used to assist in finding the hikers. Once the hikers were located, the Fire District responders were dispatched to perform a ropes rescue to transport the victim up the cliff to be treated by responders.
- **Vignette C** involved the report of a notional brush fire, which was located by the sUAS. Fire Districts 3 and 5 personnel were dispatched to fight the fire. Soon after, a notional altercation occurred at the nearby campground, and deputies pursued the perpetrator.

The TechEx scenario provided sufficient realistic opportunities to assess the various technologies' utility and integration with existing systems (technical and human). The scenario also provided opportunities for the first responders to identify gaps and required enhancements to be addressed in future NGFR events and technical development. The evaluation team verified the architecture implemented and configured in Grant County was easy to install, easy to use and provided capabilities that were valued by the first responders.

Communications Architecture

Based upon the site visits, the baseline assessment and ongoing collaboration with Grant County, a notional architecture was developed to establish the foundation for the architecture for the TechEx, as well as to ensure consistency with Grant County first responders' expectations and needs as shown in Figure 2.

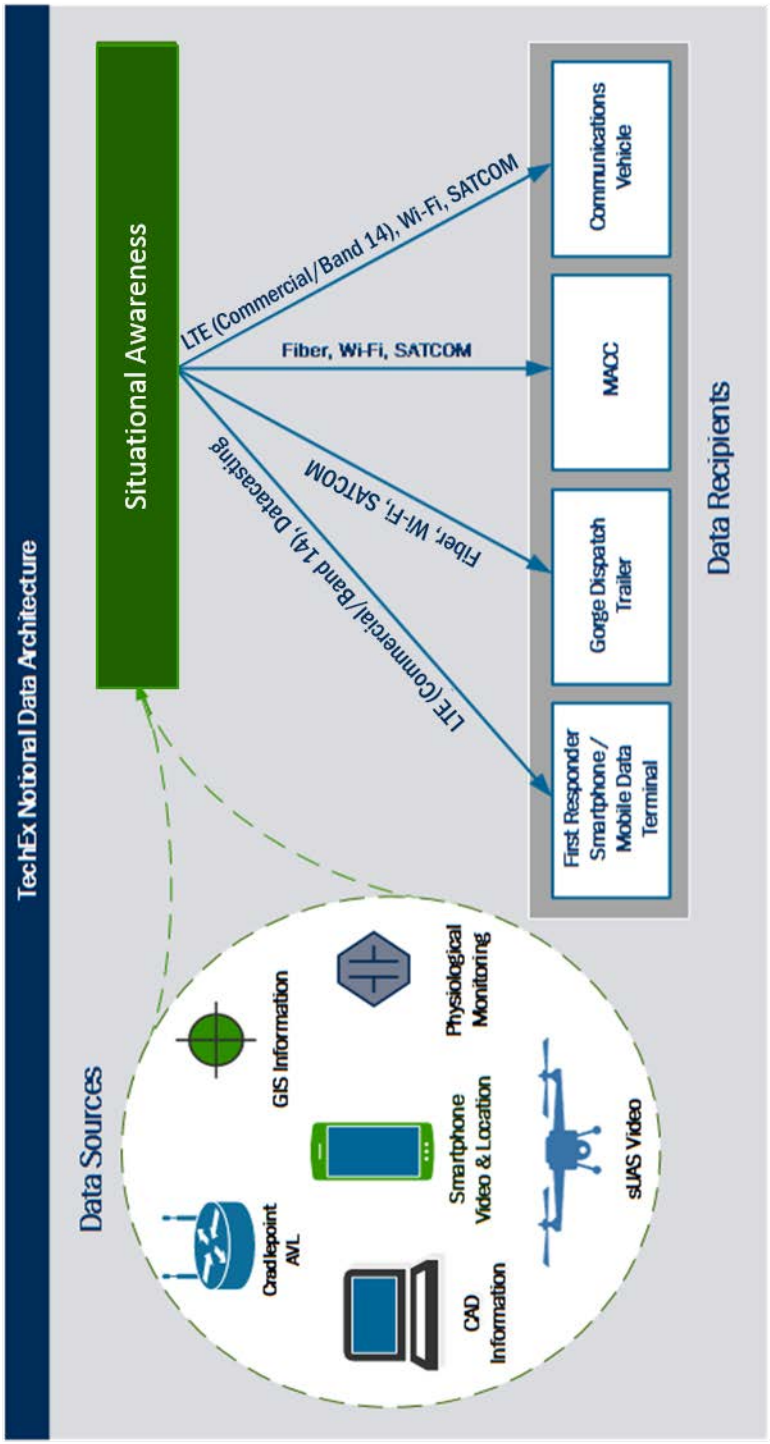
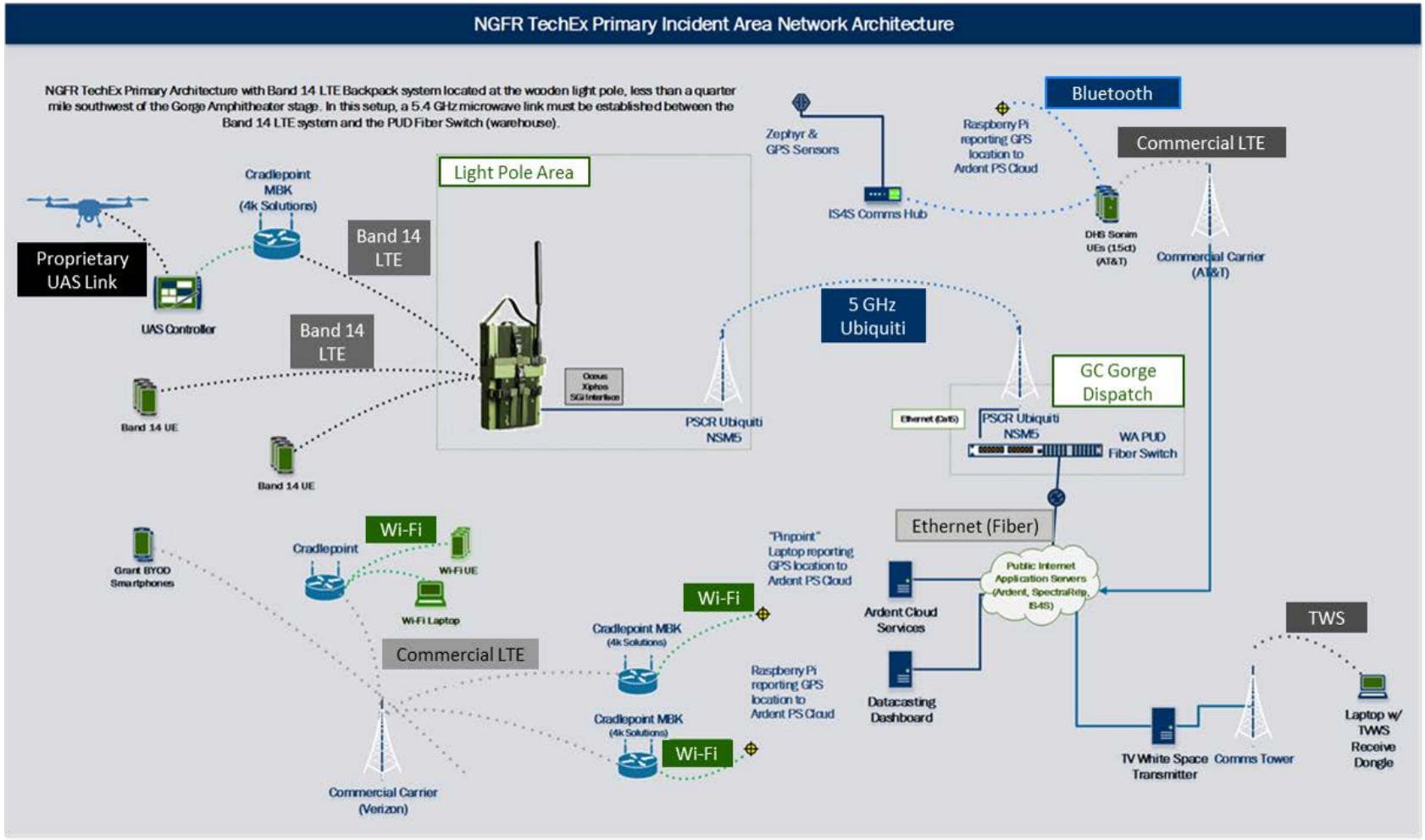


Figure 2: TechEx Notional Data Architecture

After the integration testing and the dry run, additional refinement occurred before the design was finalized as depicted in Figure 3.

Figure 3: Overall TechEx Architecture



Constraints and Limitations

The identified constraints and limitations for the TechEx event include:

Cost – NGFR had a limited budget for the TechEx. This precluded purchasing mobile situational awareness applications for all of the first responders. It prevented Grant County's ability to connect to their own fixed security camera systems and Washginton State's traffic camera system. It also prevented adding Computer-Aided Dispatch (CAD) functionality to mobile phones.

Staffing – The number of NGFR and partner support staff was limited due to both staff availability and the cost of travel. This resulted in a limited ability to provide on-site assistance, and required support from some of the technology developers who assisted in the configuration and training of their systems prior to and during the TechEx.

Technology Maturity – Neither Grant County nor NGFR had the necessary situational awareness environment for the event, so NGFR contracted ArdentMC to provide a "Public Safety (PS) Cloud" consisting of a REST message switch server (the ArdentMC "Vortex" switch), as well as Esri ArcGIS and Esri Ops Dashboard servers to receive location messages. ArdentMC also provided the Watchtower smartphone application to provide situational awareness to responders.

LTE vs LMR – Because of the agreed-upon requirements (as identified above), the solutions NGFR provided did not rely on or affect Grant County's existing Land Mobile Radio (LMR) infrastructure or system. LMR was only used during the TechEx for standard Responder–Responder and Dispatch–Responder communications.

Situational Awareness Solutions Implemented

It is crucial for public safety agencies to maintain effective real-time situational awareness (SA) in the execution of their various law enforcement, emergent care and fire safety missions. Having the ability to view multiple types of information consolidated into one application is a valuable capability for any agency. The combination of event, responder, infrastructure, map and other data into one screen greatly supports first responder operations.

The DHS S&T NGFR Apex program presents the following information regarding the implementation of a situational awareness system for tracking individual responders and responder units as implemented for the Grant Count Technical Experiment.

Grant County Situational Awareness Requirements

In order to develop and implement an effective situational awareness environment, NGFR and Grant County assessed their requirements for situational awareness and evaluated the existing capabilities of Grant County's internal and commercial infrastructure to support collection, transmission and display of situational awareness information.

What situational awareness information to provide – Grant County determined they wanted to track the location of individual responders and units, display the physiological data coming from first responders and display video being captured and transmitted by first responders.

Who receives / views situational awareness information – Grant County requested situational awareness capabilities be provided to the MACC, incident commanders and first responders. They also indicated a need to display the situational awareness information on maps of the local area.

How to provide situational awareness – NGFR determined that using a geographic information system (GIS) would provide situational awareness for the MACC and incident

commanders, and using a situational awareness solution on smartphones would provide the capability to first responders.

Baseline Grant County Situational Awareness Environment

Once Grant County determined their situational awareness requirements, NGFR and Grant County evaluated the existing environment, including the communications infrastructure, vehicle and responder equipment and any constraints/limitations that would hinder delivering a situational awareness solution.

Existing Situational Awareness Infrastructure

The MACC had a Spillman CAD system installed; however, it did not have the necessary modules to receive and display location data from responders and units. It showed the event location on a map of the area, but units were not tracked as they traveled to the scene of the event.

Existing GIS Technology

An analysis of the GIS environment in Grant County determined their Esri ArcGIS system was not capable of receiving and displaying location information unless it was upgraded. Grant County's long-term plan included upgrading their Esri ArcGIS system to accommodate the location information, so efforts were undertaken by NGFR and ArdentMC to assist the county in upgrading their Structured Query Language (SQL) and Esri servers. The final upgrades were not completed until after the TechEx, so the TechEx used the ArdentMC Public Safety (PS) Cloud for situational awareness. However, there was no desire on the part of the MACC to integrate dispatch information from the Spillman CAD into the ArdentMC PS Cloud, so the Esri ArcGIS did not display any CAD information.

Responder Equipment

Grant County responders used two types of smartphones for hosting situational awareness applications:

1. Firefighters and Sheriff's Deputies used their personal smartphones; and
2. Sheriff's Deputies used agency-issued iPhones.

Grant County Vehicle Equipment

Grant Count Deputies had laptops and LTE modems installed in their vehicles, so they were able to access the GIS hosted by the ArdentMC PS Cloud and the IS4S and SpectraRep dashboards.

Grant County Incident Commanders / MACC

Incident commanders and the MACC had tablet computers, laptops and workstations with access to the Internet and/or the Grant County network. All of these devices were able to access the GIS hosted by the ArdentMC PS Cloud and the IS4S and SpectraRep dashboards.

Grant County Constraints and Issues

Several constraints/issues influenced the situational awareness solutions for Grant County:

1. Grant County's CAD system was not configured to receive and display unit and responder locations. Grant County did not want to send CAD information to the ArdentMC PS Cloud.
2. Grant County did not have a message switch capable of receiving, processing and transmitting location messages. As a result, ArdentMC provided a message switch–named "Vortex"–to receive unit and responder identification and location information, and to pass that data on to the display system.
3. Grant County's GIS was not capable of receiving and displaying location messages in its original configuration. ArdentMC provided a GIS-enabled situational awareness tool using the Esri Ops Dashboard application for the County to use to display location and identification information on a map.

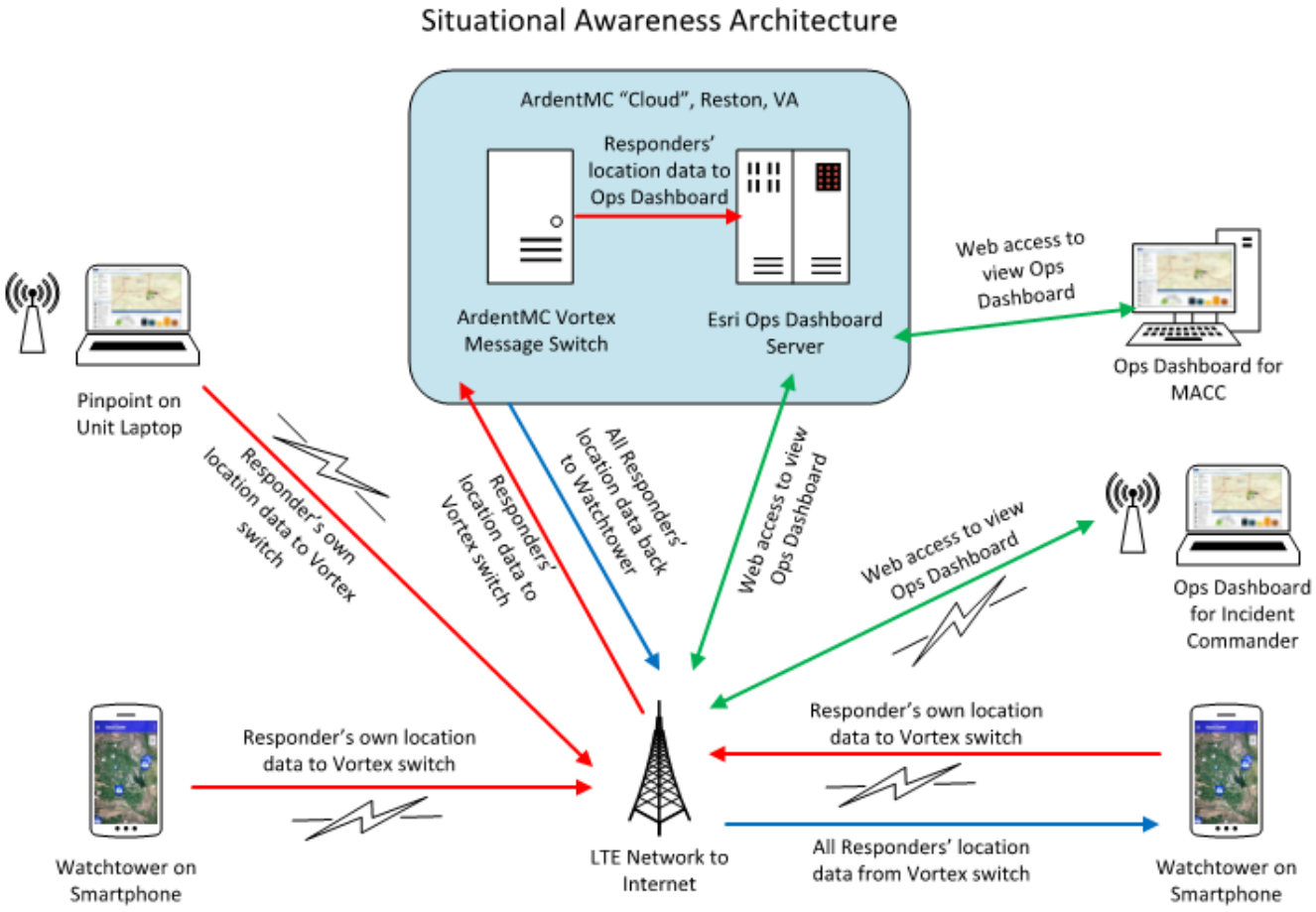
Situational Awareness Solutions Tested During the TechEx

No single situational awareness solution was available that would meet the full situational awareness requirements (e.g., video capture, responder/unit location, responder physiological monitoring). Instead, the TechEx delivered three separate solutions, each fulfilling one or two of the requirements, as presented below.

ArdentMC Cloud / GIS

One situational awareness GIS solution was provided by ArdentMC in their PS Cloud, which incorporated a REST message switch–their "Vortex" switch–to receive location messages from units and responders, and an Esri ArcGIS event server using Esri Ops Dashboard as the display application. The switch converted messages (received from units and responders) from their native format to the National Information Exchange Model (NIEM) standard. Those reformatted messages were then forwarded to the Esri Event Server, which fed the Esri Ops Dashboard system, and also to all the Watchtower applications on responder smartphones. In this manner, all responders and units were able to view the locations of location-transmitting responders and units. The PS Cloud and ArdentMC situational awareness architecture are shown in Figure 4.

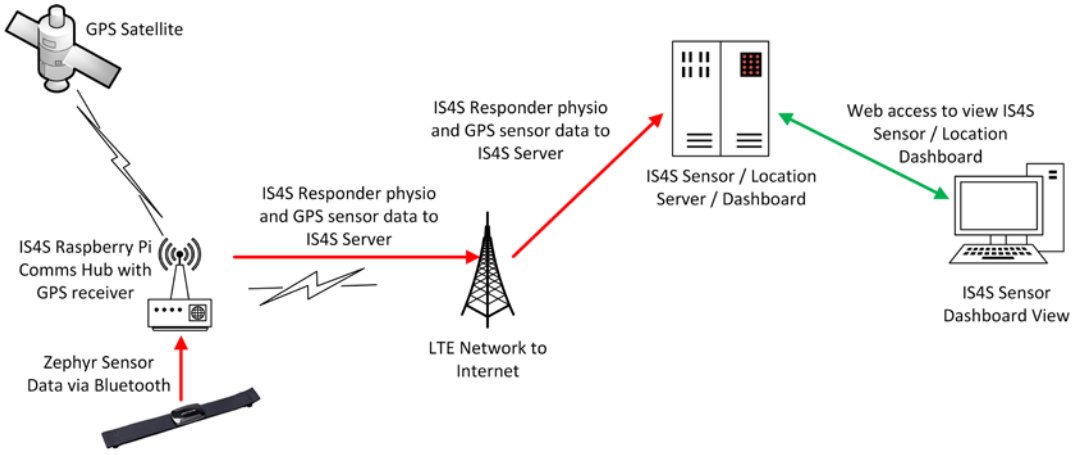
Figure 4 : ArdentMC Public Safety Cloud Situational Awareness Architecture



IS4S Dashboard

Separate from the ArdentMC PS Cloud, IS4S provided location and physiological-monitoring devices that were carried by several of the first responders. These devices transmitted first responder location and physiological data and displayed that information on a map on the IS4S dashboard. The IS4S situational awareness architecture is shown in Figure 5.

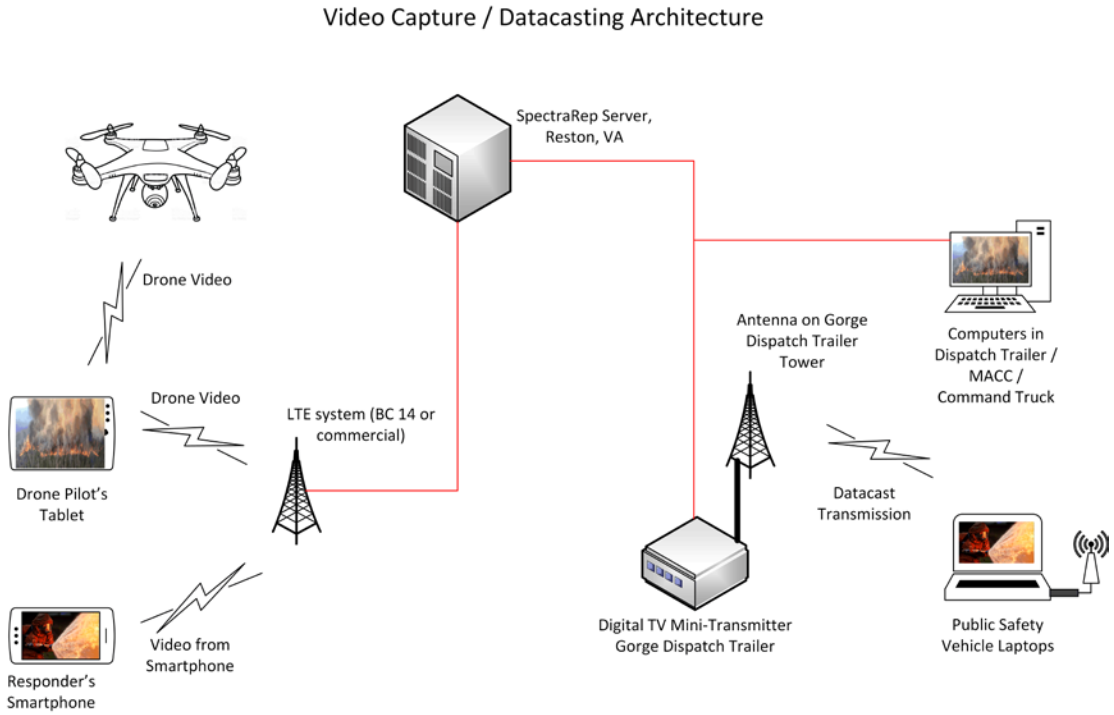
Figure 5 : IS4S Situational Awareness Dashboard Architecture



SpectraRep Dashboard

Neither of the two solutions detailed above provided for the transport or display of video captured by first responders. For the TechEx, a third system was implemented to capture, transport and display video. The architecture is shown in Figure 6, and a separate video case study provides additional information about the solution. That case study can be obtained from: NGFR@hq.dhs.gov.

Figure 6 : Video Capture / Display Architecture



Implementation Limitations to Consider

Responder Situational Awareness Display

Providing the first responder with a situational awareness application is of value, but the current display options (or lack of options) can be detrimental to a first responder's performance of duties. If a first responder is required to refer repeatedly to a handheld smartphone to view his/her situational awareness display, use of the situational awareness tool will be a hindrance instead of an asset. Development of a heads-up display, head-worn display or helmet-worn display would allow the responder to view the display while keeping his/her hands free.

Integration of the CAD System

The value of the situational awareness application used by first responders, incident commanders and dispatchers is directly proportional to the amount of information that can be accessed and displayed. Situational awareness applications that are interfaced with the CAD system and can display CAD data represent the desired state for agencies. Combining CAD, GIS, video capture and situational awareness data onto one "screen" reduces the workload on the incident commander and dispatchers, and shows the entire situation and all its facets on one map.

Integration of Existing Video

Being able to incorporate video feeds into the situational awareness display–providing a "one stop shop" for all event information–greatly assists first responder leadership in monitoring an event. If video from fixed video sources (e.g., traffic cameras, security cameras) and mobile cameras (e.g., dashcams, bodycams) can be presented to the dispatcher, incident commander and first responder leadership, they can monitor the conditions being experienced by first responders and provide better operational direction and guidance.

RESULTS

S&T's TechEx proved to be successful in demonstrating both the advantages of the systems and their shortfalls as currently implemented. The requirements were fulfilled with the delivered capabilities, but with varying degrees of success. The input from Grant County first responders was overwhelmingly favorable. The first responders were very pleased to be able to maintain situational awareness of the operational scenarios as they unfolded. In addition, the deputy who provided dispatcher duties for the event was able to monitor the progress of the first responders across the event response area and direct their movements in searching for/rescuing the downed hiker and fighting the brush fire. A complete TechEx After Action Report is available upon request from NGFR at: NGFR@hq.dhs.gov.

Additional sources are found in the References and Recommended Reading section.

Case Study Scenario

This scenario is provided as an example of how an agency can implement and use situational awareness applications to monitor the activities of first responders and maintain awareness of an overall event situation. The setting is a medium-sized agency in a mixed rural/suburban area, currently having only their CAD system as a situational awareness tool.

Determine Location Requirements

The first step for the agency is to assess their situational awareness requirements. These would include:

1. Who – What users will be accessing the situational awareness application?
2. What – What situational awareness inputs do you want to incorporate into the situational awareness environment?
3. Where – From what types of devices and in what locations will responders be accessing the situational awareness system?
4. When – During what periods will the various users access the situational awareness application? Only during major events, or at all times?

Identify Current Location Capabilities

The second step is for the agency is to determine their current situational awareness capabilities. These would include:

1. Telecommunications Infrastructure – To what commercial telecommunications infrastructure does the agency have access that would support transporting situational awareness data?
2. LMR Capabilities – Can the agency's LMR network transport situational awareness data?
3. Vehicle Equipment – What equipment is installed on agency vehicles that would support situational awareness?
4. First Responder Equipment – What equipment is issued to or available to first responders that will support situational awareness?
5. Agency CAD – Can the agency's CAD system support situational awareness, and, if so, to what degree?
6. Agency GIS – Can the agency's GIS support situational awareness, and, if so, to what degree?

Identify Solutions

Once the agency has determined their situational awareness requirements and current capabilities, they need to identify the solutions to fulfill those requirements. The agency would have to evaluate the costs of and functionality provided by each solution to determine which one(s) to select. Alternatives could include one or a combination of the following:

1. CAD-based situational awareness solution. This would involve upgrading the agency's CAD, infrastructure, and:
    a. Upgrade the CAD system to provide additional map layers;
    b. Upgrade the units' and responders' equipment to provide GPS locations to CAD;
    c. Upgrade the CAD system to accept and display physio data from first responders;
    d. Upgrade the CAD system to accept and display video feeds from first responders and other sources; and/or
    e. Upgrade the CAD system to accept data from outside sources.
2. GIS-based situational awareness solution. This would involve:
    a. Upgrade the GIS to provide additional map layers;
    b. Upgrade the units' and responders' equipment to provide GPS locations to CAD;
    c. Upgrade the GIS to accept and display physio data from first responders;
    d. Upgrade the GIS to accept and display video feeds from first responders and other sources; and/or
    e. Upgrade the GIS to accept data from outside sources.

Implement Solutions

Once the agency has selected the solution(s), they develop an implementation plan for the system(s). The plan would include processes for:

1. Procurement of the software and hardware;
2. Installation of the components;

3. Configuration of the devices and associated applications;
4. Training support personnel on the maintenance of the devices and applications; and
5. Training the first responders in the use of the systems.

Summary

After implementation and testing of situational awareness capabilities, the agency will be able to improve their situational awareness of first responder operations. Dispatchers, incident commanders and first responders would be able to assess the events, identify locations of resources and manage operations, thereby maintaining a higher level of situational awareness for events.

IMPLEMENTATION FOR YOUR AGENCY

The S&T NGFR TechEx deployed responder and vehicle tracking devices and situational awareness platforms to provide augmented capabilities at the incident site. The NGFR Apex program has developed the following checklists to assist agencies with planning the implementation of location tracking for vehicles and first responders.

Situational Awareness Implementation Checklist

- ☐ Identify current situational awareness capabilities:
  - ☐ CAD system:
    - ☐ Is the CAD system capable of displaying unit and responder location information in real time?
    - ☐ Is the CAD system capable of importing and displaying video?
    - ☐ Is the CAD system capable of importing and displaying physiological data from first responders?
    - ☐ Is the CAD capable of displaying map layers?
    - ☐ Is the CAD capable of displaying data from external sources?
  - ☐ GIS:
    - ☐ Is the GIS capable of displaying geo-events in real time, or will it require upgrades?
    - ☐ Is the GIS system capable of importing and displaying video?
    - ☐ Is the GIS system capable of importing and displaying physiological data from first responders?
    - ☐ Is the GIS capable of displaying map layers?
    - ☐ Is the GIS capable of displaying data from external sources?
    - ☐ Is the GIS capable of interfacing with the CAD system?
  - ☐ Video systems:
    - ☐ Are fixed camera systems (e.g., security cameras, traffic cameras) capable of exporting video to the CAD/GIS?
    - ☐ Are first responder cameras (e.g., smartphones, dash-cams, body-cameras) capable of sending video to the CAD/GIS?
  - ☐ Physiological data:
    - ☐ Are responders equipped with physiological sensors?
    - ☐ Does the agency want to monitor that data from a central location?
    - ☐ Is the CAD/GIS capable of integrating with physiological sensors to display the physiological data?

- Message switch – Does the agency have a message switch capable of routing situational awareness messages / data from their sources to the CAD/GIS?

- Identify desired capabilities:
  - Capture and display CAD event location and data for situational awareness.
  - Capture and display responder and unit location for situational awareness.
  - Capture and display video from responders and other cameras.
  - Capture and display physiological data from responders.

- Identify necessary upgrades/configuration changes:
  - GIS upgrades/configuration:
    - Does the GIS system require an upgrade to the SQL Server?
    - Does the GIS system require an upgrade to the ArcGIS server?
    - Does the GIS system require an upgrade to network/server capability/capacity?

  - CAD upgrades/configuration:
    - Does the CAD require an upgrade?
    - Is there a CAD client that needs to be installed on vehicle computers?

  - Message switch:
    - Does the agency have a message switch capable of receiving, converting and retransmitting messages as needed to support situational awareness?

  - Video systems:
    - Are existing agency video systems able to export real time video?

  - Unit (vehicle) software:
    - Are agency vehicles capable of transmitting video and location information back to the CAD or GIS?
    - Are agency vehicles capable of receiving CAD event data, location data, video, etc., and displaying to the operator?
    - What changes are necessary to be able to track vehicles and transmit/receive CAD data, location data, video, etc.?
  - Responder (smartphone) software:
    - What capabilities currently exist on first responder smartphones to interface with sensors and transmit data?
    - What applications need to be installed on first responder smartphones to enable situational awareness?

SUMMARY

This S&T NGFR case study provided an overview of the TechEx in Grant County, with a focus on the implementation of applications to improve situational awareness and officer safety. In addition, the case study reviewed best practices for planning and implementing situational awareness services for public safety agencies.

If your agency finds S&T's NGFR case study useful for improving your agency's situational awareness capabilities, the NGFR Apex team would greatly appreciate your feedback. Please email us with stories from the field, questions or comments at NGFR@hq.dhs.gov.

REFERENCES & RECOMMENDED READING

- *Attention and Situational Awareness in First Responder Operations*, January 2016, PNNL-25158
http://nwrtc.pnnl.gov/PDFs/RTAs/RTA_Situational_Awareness.pdf

DHS Science and Technology Directorate

- *Grant County – DHS Science and Technology Directorate Next Generation First Responder Apex Program Technology Experiment (TechEx) After Action Report*

https://www.dhs.gov/publication/st-frg-grant-county-dhs-st-ngfr-apex-program-techex-after-action-report

- *Incident Management Information Sharing*

https://www.dhs.gov/publication/incident-management-information-sharing-imis-internet-things-iot-extension-engineering

- National Urban Security Technology Laboratory (NUSTL) *LifeRing OpEx Report*

https://www.dhs.gov/publication/st-frg-nustl-lifering-opex-report

- *Next Generation First Responder Case Study Series:*
    - Deployable Communications:

https://www.dhs.gov/publication/st-frg-ngfr-case-study-deployable-communications

    - Location Services:

https://www.dhs.gov/publication/st-frg-ngfr-case-study-location-services

    - Video Services:

https://www.dhs.gov/publication/st-frg-ngfr-case-study-video-services