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SYNC⁵ Interoperable Communications for Emergency and Disaster Response

Whitepaper
Version 2.0

Our blueprint for your success



The U.S. House of Representatives estimates that over 70% of public safety communications equipment is still analog, outdated, and incompatible with communications systems in neighboring local jurisdictions. Several major incidents over the past four decades have demonstrated that traditional narrowband emergency communications infrastructure that supports only local emergencies is quickly overloaded by regional or national catastrophes.

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The physical magnitude of the geographic boundaries of our nation, in conjunction with its infrastructure and population, present a unique set of challenges during times of emergency which require the execution of fully coordinated and well-planned strategic, operational, and tactical responses from multiple tribal, state, and federal agencies, counties and parishes, local municipalities, and non-governmental and private organizations that directly impact the quality of life and delivery of essential services to U.S. citizens in their time of need.

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The Sync⁵ system is designed to integrate real-time voice, video and data information in a collaborative roles-based access control environment. The Sync⁵ system provides robust support for on-site event and incident coordination; emergency response planning; while maintaining synchronized command and control capabilities both local to the incident and remotely to headquarters operations. Sync⁵ is scalable and robust enough to actively integrate federal interagency voice, video and data technologies; state response systems, and local emergency responder solutions, while synchronizing communications, video information, and data among other deployable mobile command centers.

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ICS for First Responders

The public safety community is under constant pressure to meet immediate needs within their jurisdictions. Faced with the responsibility of meeting the demands of the present, it is challenging to plan for future catastrophes and establish working plans to coordinate with neighbor communities.



The pair of incidents revealed the limitations of the narrowband communications systems used by state and local first responders. Individual narrowband radio networks used by each agency were not interoperable. Public safety personnel from Virginia, Maryland, and the District of Columbia could not coordinate recovery and rescue operations because they could not talk. The lack of inter-agency communications was further hampered by the area wide gridlock caused by the simultaneous closings of the bridge and the subway. Interoperability became a more urgent issue after September 11, 2001 revealed the weaknesses in the voluntary P25 program. Then, in the summer of 2005, hurricanes caused major disruption and damage along the Gulf Coast of the U.S. and again the issue of interoperable communications was highlighted as an operational weakness for the first responder community.

Interoperable Communications Systems

The challenge of interoperable communications for first responders was first addressed in 1970 when the FIRESCOPE Incident Command System was developed in Southern California as a result of a catastrophic wild fire. The firefighting community recognized that long term planning and coordination are essential to inter-agency communications. The need for planning and coordination was driven home twelve years later, on Wednesday, January 13, 1982 in Washington D.C. An Air Florida passenger jet crashed on the Fourteenth Street bridge. The crash closed one of the busiest roads in the Washington D.C. area. Thirty minutes after the passenger jet crashed, a Washington Metro subway train derailed and closed the subway line running from the District of Columbia to Virginia.

As a result of two unrelated disasters in a single day, the state and local public safety community was severely tested with the effort needed to coordinate a very complex recovery. Operations were severely impaired by the traffic gridlock and the inability to communicate between agencies.

Approximately 50,000 local first response agencies are responsible for emergency services across the U.S. Because each agency makes independent decisions about their local communications systems, the goal of interoperability has not yet been achieved. The U.S. House of Representatives estimates that over 70% of public safety communications equipment is still analog, outdated, and incompatible with communications systems in neighboring local jurisdictions.

Roadmap to Interoperability

Several major incidents over the past four decades have demonstrated that traditional narrowband emergency communications infrastructure that supports only local emergencies is quickly overloaded by regional or national catastrophes. First responder communications systems will ultimately be based on advanced fourth generation wireless broadband technology that is scalable regardless of the scope of an incident. The path forward requires a focus on achieving interoperability across all communications subsystems by using IP-based applications.

The Situation and Challenge

Provisions must be made for the availability and redundancy of critical communications capabilities at alternate sites in order to support connectivity between and among key government leadership, internal elements, other executive departments and agencies, critical partners, and the public. – **The National Continuity Policy, Appendix F, Task 5**



The physical magnitude of the geographic boundaries of our nation, in conjunction with its infrastructure and population, present a unique set of challenges during times of emergency which require the execution of fully coordinated and well-planned strategic, operational, and tactical responses from multiple tribal, state, and federal agencies, counties & parishes, local municipalities, and non-governmental and private organizations that directly impact the quality of life and delivery of essential services to U.S. citizens in their time of need. Potential emergencies may result from both natural (i.e., hurricanes, flooding, earthquakes, wildfire, etc.) and man-made (i.e., terrorism, criminal acts, etc.) disasters and other incidents of national significance.

The utilization of current disparate voice, video and data communications systems has proven to be cumbersome, time-consuming and extremely costly to integrate to deliver the type of real-time, robust communications necessary to coordinate diverse emergency response resources; provide damage assessment reporting; and relay onsite activity to remote headquarters to synchronize strategic and tactical response coordination.

Recent studies have demonstrated the critical need to provide a solution that is scalable, adaptable, mobile, and secure enough to integrate legacy systems while providing interoperability standards for current and future solutions at all levels of government and the private sector. Life safety issues require the implementation of a globally scalable solution that addresses the needs of the disaster response and first responder community as they provide support for special events, disaster assistance, logistical support, and assistance to local leadership during life threatening situations that occur in both metropolitan and rural areas.

Sync⁵ for Interoperable Communications supports onsite and remote synchronized coordination, planning, and execution through the delivery of integrated voice, video and data transmissions to gather business intelligence (i.e., asset tracking, sensor data fusion, identity management, event-driven business processing, real-time notifications) to successfully manage emergency or disaster related events.

DHS should establish and maintain a deployable communications capability, to quickly gain and retain situational awareness when responding to catastrophic incidents. – **The Federal Response to Hurricane Katrina, Lessons Learned, Feb 2006, Recommendation 37**

A Solution - Sync⁵

The Sync⁵ system is designed to integrate real-time voice, video and data information in a collaborative roles-based access control environment. The Sync⁵ system provides robust support for on-site event and incident coordination; emergency response planning; while maintaining synchronized command and control capabilities both local to the incident and remotely to headquarters operations. Sync⁵ is scalable and robust enough to actively integrate federal interagency voice, video and data technologies; state response systems, and local emergency responder solutions, while synchronizing communications, video information, and data among other deployable mobile command centers.

Sync⁵ Overview & Modules

Sync⁵ provides the information infrastructure (voice, video and data) necessary to deliver a “common” operational picture of the events associated with an emergency or planned response. Sync⁵ is a mobile operational command center that is independent of traditional geographic barriers and boundaries and is transportable via air, land and sea.



Overview

The Sync⁵ solution is capable of delivering full functionality within 4 hours after reaching its designated destination. This includes all the voice, video and data capabilities detailed in this white paper. The time to achieve voice, video, and/or voice integration and interoperability with local and state authorities can be affected by these entities.

The Sync⁵ solution provides both short and long term business value by delivering an immediate cost savings and cost avoidance by eliminating the need to design, build and deploy multiple non-compatible solutions among state agencies, counties or parishes, and local municipalities that increases the cost and complexity to achieve interoperable communication and data sharing. The Sync⁵ solution is capable of leveraging industry communication standards and can be leveraged as a global model for data, video and voice collaboration and information sharing among the emergency first responders community. This solution leverages the technologies and solutions currently in use, as well as those under development by the U.S. Department of Defense and the Department of Homeland Security – First Responders Passport Project and other federal and state mandated initiatives to further extend the value and cost savings of the overall effort.

Sync⁵ Description

Sync⁵ is a build-once, deploy-anytime, anywhere, modular command center design that delivers the flexibility to operate communications and computing resources where and when needed globally for planned special event support and emergency incident support. The robust command center functionality listed in this white paper serves to optimize both the efficiency and performance of Sync⁵ in standby, transit, and full operational modes.

Sync⁵ delivers a consolidated and configurable end-to-end solution with complete ownership, service, and support functionality.

Sync⁵ is comprised of modular components that are capable of operating in stand-alone mode (i.e., isolated voice, video or data) or as an integrated system. This flexible architecture is achieved due to the strategic design of each major function (i.e., voice, video and data) as a self-contained solution with extensible architectures to provide the capability to integrate as a complete mobile communications operational system. The functional DoD, DHS or FEMA Sync⁵ systems require customization, integration and extensibility to accommodate their special needs and requirements. The following description of the technical functionality of the integrated Sync⁵ systems will provide a means of validating the core components and their scalability to meet the Agencies' needs.

The Deployable Joint Command and Control Center requires the design and build of robust mobile communications systems that provide voice, video and data communications with minimum operations while in transit and the capability to deliver full operational mode within (4) hours of onsite deployment. The limited operational mode of the Sync⁵ Mobile Command Center provides low-power office communications and collaboration functionality and does not include full data center operational mode while in transit due to the restriction of power, fuel and chilled water sources during mobile transition (i.e., Air, Land or Sea).

Sync⁵ Modules “Info-tainers”

Sync⁵ is a build-once, deploy-anytime, anywhere, scalable, modular, and self sustainable command center designed to deliver the flexibility to operate communications and computing resources where and when needed globally.

Sync⁵ Power Info-tainer Baseline

The Sync⁵ Power Info-tainer provides the physical and environmental resources necessary to operate voice, video and data communications equipment and resources. This module provides the capabilities required to install power and transport communications equipment used to support onsite command and control operations. The technical specifications and baseline configuration are as follows:

- Provides power, cooling and environmental controls and equipment for rapid site deployment and configuration
- Delivers energy and environmental operational resources to the Data Center and Command Center modules
- Dual synchronized diesel generator sets to provide autonomous, stand-alone operation
- Self-contained, drainable fuel systems for diesel generator sets (tanks may be drained for air transport)
- AC power conditioning equipment to allow use of local, site provided power of most known voltage and frequency regimes (i.e., air, land, sea)
- Transfer switch for auto switching between local power source and on-board generators
- Individual, breakered circuit distribution panels for Data Center and Command Center modules
- Dedicated, closed loop chilled water generator for data systems cooling
- Chilled water hook-up provisions for auxillary cooling
- Heat rejection remotely mounted (storage position on top of Info-tainer during transit)
- Secure front access doors, full width of Info-tainer for maintenance
- Generator removal via over-sized removable air intake louvers
- External dimensions: 20'(L)x8'(W)x8.2'(H)
- Weight: <25K lbs, fully populated

Sync⁵ Data Center Info-tainer Baseline

The Sync⁵ Data Center Info-tainer is configured with eight full height 38U racks within the container. Included in the mobile data center is a rack that contains network switches, a dehumidifier, thermal management systems, and alarm and EPO controls. The technical specifications and baseline configuration are as follows:

- Complete virtualized mobile data center housed in a standard 20-foot shipping container
- Rack-mountable space allocation delivers traditional data center high availability and space management capabilities within a confined mobile environment
- Integrated, centralized, state-of-the-art cooling, networking, and power distribution with a cooling system 20 percent more efficient than that of a traditional data center to address geographically diverse operations requirements
- Provides external hookups for water, AC power, and networking connections with specifications for advanced planning and configuration
- Provides integrated sensors, alarms, and GPS capabilities
- Includes shock absorption for easier transport using standard shipping methods (i.e., air, land or sea)
- Secure front and rear doors; central service aisle; and slide mechanism to support operational maintenance, and upgrade procedures and requirements
- Contains up to (240) CPU cores supporting Solaris, Red Hat Enterprise Linux, Microsoft Windows, and VmWare server configurations
- Provides up to (1.4) Petabytes of high performance, highly available Fibre Channel Mass Storage locally
- Provides up to (256) 1GB network ports in core switches
- Housing for the Voice, Data and Video Communications Systems
- External Dimensions: 20'(L)x8'(W)x8.2'(H)
- Weight: <20K lbs, fully populated

Sync⁵ Command Center Info-tainer Baseline

The Sync⁵ Command Center module provides the working environment for a staff of up to 10 manned workstation operators per Info-tainer, as well as video projection capabilities for command and control to gain on-site situational awareness. The technical specifications and baseline configuration are as follows:

- Scalable solution providing up to (10) call and command center operational station/cubicles with voice, video and data communications capabilities per module
- For larger events, multiple Command Center Info-tainers can be docked together with virtually unlimited potential for expansion based on individual requirements
- Each station has an individual desk, ergonomic chair and lockable two drawer filing cabinet
- Provides data and video presentation capabilities via built-in digital projectors and overhead double-sided projection screen
- Pre-wired structured cabling system for single point hook-up to Data Center Info-tainer and Power Info-tainer
- Self contained environmental (i.e., heat/cool) control units
- Secure access doors
- Central aisle for full length of command center
- Adjacent storage available in deployed configuration
- Insulated assembly for environmental control (i.e., hot and cold)
- External dimensions: 20'(L)x8'(W)x8.2'(H)
- Weight: <25K lbs, fully populated

Our team of Sync⁵ Specialists is available to consult you on your mobile interoperable communications needs.

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Conclusion

Sync⁵ has been architected as a scalable n-tier solution with master servers and components residing within designated areas of the Agencies' computing facilities to provide national and global communications capabilities with the deployed Mobile Emergency Response Centers via a myriad of available communications protocols and transmission mediums in compliance with Federal requirements. This translates into a solution that is capable of segregating access and information based on the "role" of the total emergency responder community. In addition, an "executive dashboard" via secure web interface is provided to disseminate pertinent and key information of interest on an executive level. This n-tier deployment model allows the Central Command Center to receive, as closely as possible, real-time communications of available information via voice, video and data and also provides a means of streamlining the decision making process and workflow procedures. The high-level Sync⁵ architecture is delivered as a web-based portal to collect and disseminate information as designated by role and function to formulate a Collaborative Information Environment (CIE). The ultimate functionality of key voice, video and data solutions delivered by Sync⁵ depends extensively on the required integration of existing technology and systems (i.e., NIMS, EMS solutions, LMR technology, etc.) and the functional design specifications of the overall program. The Sync⁵ system meets design requirements to house mobile data center technology and the spacing and equipment required to accommodate 10-20 operator positions aboard a fixed-wing aircraft (i.e., C130J or C-17). The program usage of these mobile resources is based upon the height and weight capacity of the aforementioned fixed-wing aircraft. The final usage of the Sync⁵ depends primarily on the limitations of existing systems, solutions and transport resources currently in operation by DoD, DHS, FEMA and their key stakeholders.