Capital Wireless Integrated Network (CapWIN): Building a Bridge in Transportation and Public Safety Communications

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CATEGORIES AND SUBJECT DESCRIPTORS

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ABSTRACT

The Capital Wireless Integrated Network (CapWIN) program is a partnership between federal agencies, States of Maryland, Virginia, and the District of Columbia to develop an integrated first responder communication and information sharing network. This unique and challenging program has created the first multi-state and multi-discipline interoperable public safety wireless system in the United States. CapWIN is a single, open, shared, and secure system for the public safety and transportation community at all levels of government.

The program is governed by an Executive Leadership Group The Leadership Group places emphasis on the importance of local jurisdiction participation in CapWIN's voting and deliberation structure. The governance option selected has a strong and complete role for each and every local jurisdiction as well as the state and federal department/agencies who are currently members of CapWIN.

CapWIN is in its third year of a planned five-year initial development cycle. Milestones achieved to date are described (See figure 1.).
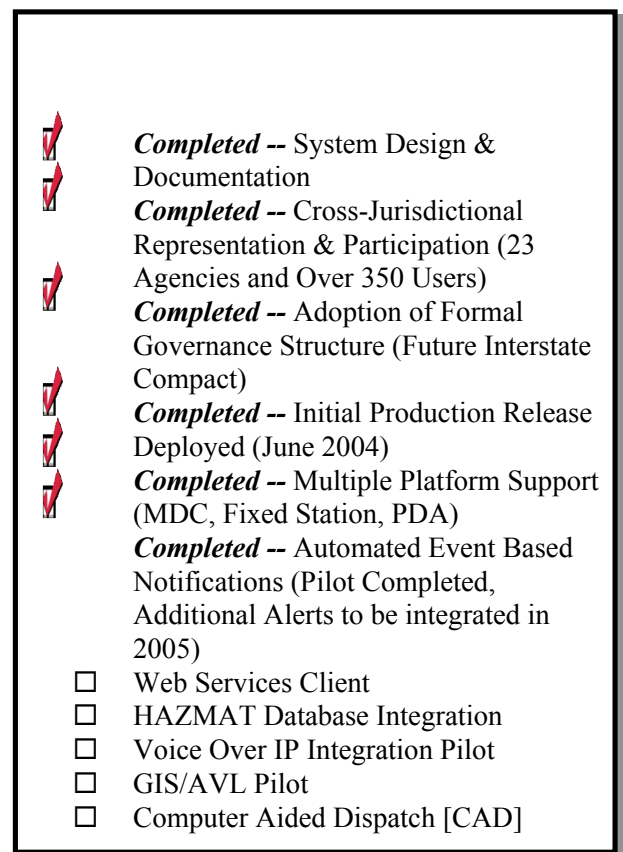
☑ ***Completed --*** System Design & Documentation
☑ ***Completed --*** Cross-Jurisdictional Representation & Participation (23 Agencies and Over 350 Users)
☑ ***Completed --*** Adoption of Formal Governance Structure (Future Interstate Compact)
☑ ***Completed --*** Initial Production Release Deployed (June 2004)
☑ ***Completed --*** Multiple Platform Support (MDC, Fixed Station, PDA)
☑ ***Completed --*** Automated Event Based Notifications (Pilot Completed, Additional Alerts to be integrated in 2005)
☐ Web Services Client
☐ HAZMAT Database Integration
☐ Voice Over IP Integration Pilot
☐ GIS/AVL Pilot
☐ Computer Aided Dispatch [CAD]

Figure 1. CapWIN Development and Deployment Status

The CapWIN system connects first responders through a secure information hub using a variety of wireless technologies currently available. Using "open" standards, CapWIN has been designed to grow and adapt to changing and evolving technologies as they are deployed throughout the region. CapWIN has been developed with constant input from a coalition of public safety and transportation agencies.

1. CapWIN Vision, Goals and Objectives

CapWIN maintains a unique vision in the effectively differentiates it from related initiatives:

A secure, easily accessible, standards-based data network hub that provides interoperability by seamlessly connecting individual first responders across jurisdictions and disciplines through state-of-the-art communication, incident management, and database access capabilities.

This vision is realized through CapWIN's specific near and long-term goals and objectives:

- Identify alternatives for the development of a public safety and transportation information network that will enable a properly authorized user to access and use information from national, state, or local databases, regardless of location

- Educate transportation, law enforcement, fire, emergency medical services, and legislative leaders on the benefits of developing partnerships and cooperating in technology research efforts to help solve the problems communications non-interoperability

- Create a wireless and wired network hub that provides critical information to public safety and transportation officials regarding life-threatening situations. (Pre-fire plans, HAZ-MAT, NBC/WMD, traffic stops, wanted persons, etc.)

- Identify and deliver appropriate data in a meaningful, relevant, and understandable form, whenever and wherever it is needed, including wireless delivery through multiple platforms and traditional wired networks

- Improve the reliability, timeliness, and quality of shared data among first responder organizations

- To identify methods, based on evolving voice and data communications technology, for enhancing response capabilities of transportation, fire/emergency medical services, and law enforcement first responders involved in traffic or other critical incident responses

- Identify architectures and standards appropriate to the integration of CapWIN technology into existing and future-planned law enforcement, transportation, fire, and emergency medical services systems

- Develop a network infrastructure that is expandable to serve more agencies in Virginia, Maryland, District of Columbia and other states.

- Provide a model and documentation so the project can be replicated in other areas of the United States and other countries

- Develop a governance model that institutionalizes CapWIN in MD, VA, and D.C. as a legal entity codified in State/District law

- Secure remaining CapWIN development funds in order to complete initial system capability

- Develop and implement a formal Business Plan to transition CapWIN from its initial development phase to a self-sustaining, user fee-based model

- Develop and implement a formal marketing plan to facilitate implementation of the CapWIN Business Plan

CapWIN's goals and objectives are significant and require a true, collaborative effort from regional and Federal leadership. However, CapWIN's focus on individual first responders is an important distinction from related efforts that compete for public safety grant money. As a result, for CapWIN to be successful, it must solicit and ensure support from its participating users and agencies.

2. Cross-Jurisdictional Oversight & Support

Establishing a working coalition of police, fire/EMS and transportation agencies across Maryland, Virginia, and the District of Columbia to oversee CapWIN planning, design, implementation and operations required a tremendous effort. Under the initial leadership of Chief Charles Samarra of the Alexandria Police Department and current leadership of Chief Ed Plaugher, formerly with the Arlington Fire Department, a formal Executive Leadership structure has been created with key stakeholders representing all public safety disciplines and jurisdictions, including Federal and local levels. CapWIN's success to date can be attributed to the unique partnership that has been established. This partnership has resulted in key milestones in public safety coordination, such as a pending agreement to share *regional* data across multiple jurisdictions through CapWIN.

3. Technical Architecture

3.1 Open, Scalable, and Reliable Web-based Architecture:
The CapWIN system builds on the huge private sector investment in Web technology, allowing CapWIN users to take advantage of future technology advancements with minimal retrofit costs. The system's underlying architecture is highly scalable and reliable. It incorporates a core COTS middleware platform that has been demonstrated as highly reliable in very large commercial applications.

This open approach provides the CapWIN team with the capability to perform future system modifications and configuration, without depending on the proprietary software development resources of any particular vendor. Finally, the Web-based approach to delivering the CapWIN wireless client to agencies without an existing system offers significantly reduced application deployment and support costs, when compared to other alternatives.

3.2 Efficient Use of Limited Bandwidth:
Limited radio frequency spectrum, or wireless bandwidth, is another key issue addressed by CapWIN. CapWIN enjoys the capability of maximizing the utility of existing bandwidth. At the heart of the

CapWIN "message switch" is a COTS wireless gateway that can simultaneously support multiple radio frequency (RF) networks at no additional COTS software cost. The gateway also utilizes data compression and TCP/IP header reduction techniques that effectively maximize the wireless network capacity, and provide other advanced features like automatic reconnection as a mobile unit travels in and out of wireless coverage or RF range.

3.3 Technology Standards Used Where Available:
Technology standards are an important concern of the CapWIN consortium and its sponsors. CapWIN established a clear requirement for an open, standards-based architecture. The CapWIN solution implements open technology standards, such as TCP/IP, HTTP, HTML, WML, XML, SSL, SQL, LDAP, SNMP, IEEE 1512-2000, NTCIP, SOAP, JAVA, UDDI, NCIC security standards, 2PKDP, FIOS 46-3, and RC5. These standards form the basis of a broadly understood and productive environment for developing, deploying, and integrating wireless Internet and intranet applications. This standards-based approach maximizes vendor independence, enables interoperability, and provides long-term investment protection for the CapWIN team.

3.4 Extensive COTS Use:
The CapWIN solution strives to avoid the long-term costs – financial, political, and technical – of closed, proprietary solutions to resolve transportation and public safety communication problems. To avoid unnecessary development risk and cost, the CapWIN design incorporates widely adopted, proven commercial-off-the-shelf (COTS) systems where appropriate.

4. Conclusion
Building durable political, administrative, and operational partnerships across Maryland, Virginia and the District of Columbia is the most significant achievement of the CapWIN experience. The deployment of an operational technical solution support infrastructure is the ultimate example of the Program's verifiable achievements. However, this was relatively simple when compared to the overwhelming task of engaging all the potential "players" to effectively form partnerships, share resources and basically agree to formulate a united effort to resolve a universal communications problem affecting them all. As a consortium, all participants had to readily agree that partnerships were necessary. Respect and trust had to be developed between the participants

Key community leaders and a program "champion" had to be identified and placed in positions to drive the initiative. A commitment to key interests was developed through a clear understanding of what CapWIN was attempting to achieve and an open process for making decisions. CapWIN program agendas were readily shared with key participants. Focus groups including steering committees, technical committees, and operational committees had direct input to program development. Compatible ways of working together and flexibility were built into processes for the design, development and implementation of CapWIN. Good communications, collaborative decision-making, and a total commitment to achieving consensus enabled an effective and efficient program management environment and paved the way for successful implementation of the CapWIN Program. Evidence of this achievement is cited in a case study on CapWIN developed by Jerry Mechling at the John F. Kennedy School of Government at Harvard University. This communication and partnership effort is ongoing and continues to be a high priority to the program. In April 2005, our leadership group will re-visit our priorities and set the direction for the program for 2005. CapWIN looks forward to sharing our lessons learned with other regions and government agencies throughout the United States. The ultimate goal of the program is **"No man, woman, or child should lose his or her life because public safety or transportation officials cannot communicate with each other or share critical data."**