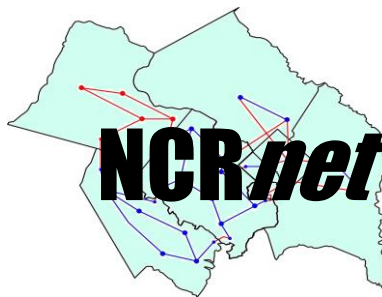# National Capital Region Interoperability Program

The Requirements and Potential for an Inter-Jurisdictional Network:
An NCRnet Needs Assessment

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1.   Executive Summary

This Report presents the results of a Needs Assessment of the requirements and potential use of an inter-jurisdictional fiber-optic and microwave communications network (NCRnet) in the National Capital Region (NCR) of the United States. This Report documents and discusses the outcome of interviews of over 100 first responders and emergency support personnel in the NCR regarding the need for inter-jurisdictional and inter-functional communications.

NCRnet is an emerging communications infrastructure designed to support the existing and future public safety and first responder communications requirements between the following entities:

- Local governments in the NCR, including both counties and municipalities
- The State of Maryland
- The Commonwealth of Virginia
- The District of Columbia
- Regional first responder groups
- Regional first responder applications
- Regional first responder databases
- Federal first responders, coordinating authorities, and databases

The Report addresses some of the technical needs and requirements articulated by the potential users and stakeholders of NCRnet. Specifically, this Report:

- Summarizes findings regarding the overall need and requirements for a robust, reliable communications network in the NCR (Section 1).
- Summarizes the methodology used in the Needs Assessment process and describes the Stakeholders and potential users who were interviewed (Section 2).
- Presents and analyzes the results of the I-Nets Team's interviews with NCRnet Stakeholders (Section 3). This analysis is organized according to Emergency Support Function (ESF), the Federal organizational framework adopted in modified form by the Metropolitan Washington Council of Governments (the COG) and utilized in the COG's Regional Emergency Coordination Plan (RECP). [1]

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[1] For purposes of this project, the NCR is comprised of 19 jurisdictions, all of which operate independent and autonomous agencies addressing both routine and emergency public safety needs. The scope of responsibilities these agencies have is diverse and complex. FEMA has developed a structure for describing, supporting, and managing emergency operations and created classifications in terms of various ESFs, or Emergency Support Functions. This report is organized around a subset of these ESF domains in accordance with the COG's Regional Emergency Coordination Plan. Local community agencies are not necessarily organized according to these FEMA ESFs. Generally, multiple community agencies work together to provide the required public safety and emergency support activities. The ESF classification does provide a structure for discussing and analyzing the community and regional emergency support requirements, processes, and gaps.

- Presents the results of the I-Nets Team's interviews with NCRnet Stakeholders in Table form (Section 4). This analysis is organized according to jurisdiction.

This Report was prepared by the I-Nets Team of the National Capital Region Interoperability Program (NCRIP). This Report was researched and prepared in the latter half of 2005 and early 2006.

1.1. Key Finding: Need for Wide Range of Communications Interactions

The results of this Needs Assessment suggest that the NCR jurisdictions in the aggregate are in agreement that they and their ESFs need to communicate in an interoperable way – with local, regional, state, and federal colleagues – over an interoperable, regional, interconnected communications infrastructure. The jurisdictions universally recognize that providing adequate and efficient response to emergency conditions requires efficient collaboration between the multiple responsible parties that could be separated jurisdictionally and not used to collaborating. The Chief Information Officers (CIOs) of the jurisdictions, in particular – who are responsible for communications facilities and capabilities under the ESF structure -- are united in their belief that the region requires a modern, reliable communications network to fulfill the emergency support functions on a local and a regional level.

The results of the I-Nets interviews demonstrate that many emergency support activities begin at the local community level but usually have ramifications in adjoining communities and could also affect the region as a whole. Similarly, different ESF domains within a single jurisdiction collaborate to provide the appropriate emergency response for the community. Local ESF personnel may also need to collaborate with their peers in other jurisdictions to provide a unified response to larger scale emergencies. This Needs Assessment demonstrates that all these interactions require interoperable communications on a community-wide and region-wide basis.

The interviewees/Stakeholders who participated in this process described requirements for a wide range of applications and technologies. From a communications-structure standpoint, these requirements tend to fall into one of a number of forms of interaction/collaboration, either within a jurisdiction or among jurisdictions.

First are the possible interactions/collaboration between ESFs that occur locally within a jurisdiction (Figure 1). Two modes of collaboration are illustrated in Figure 1 – distributed and centralized. For example, during routine public safety activities the police, fire, and transportation departments may collaborate directly (in a distributed model) to efficiently evacuate residents in buildings threatened by fire. The blue lines in Figure 1 represent such inter-ESF collaboration while the green lines represent the activities within a single ESF domain such as, for example, the local police force coordinating a response to an Amber alert sighting.

Figure 1 also shows a centralized collaboration approach that is more applicable during, for example, disaster response and recovery. For example, collaboration may occur through the

centralized Emergency Operations Center (EOC) where all responsible parties for a particular jurisdiction gather and coordinate response activities. The orange lines in Figure 1 depict interactions between the central EOC and various other emergency response facilities and first responders (such as fire stations, police stations, traffic cameras, on-site crew, fire-engines en-route to the site, and so on.)

Figure 1: Intra-Jurisdictional Collaboration Between ESF Providers
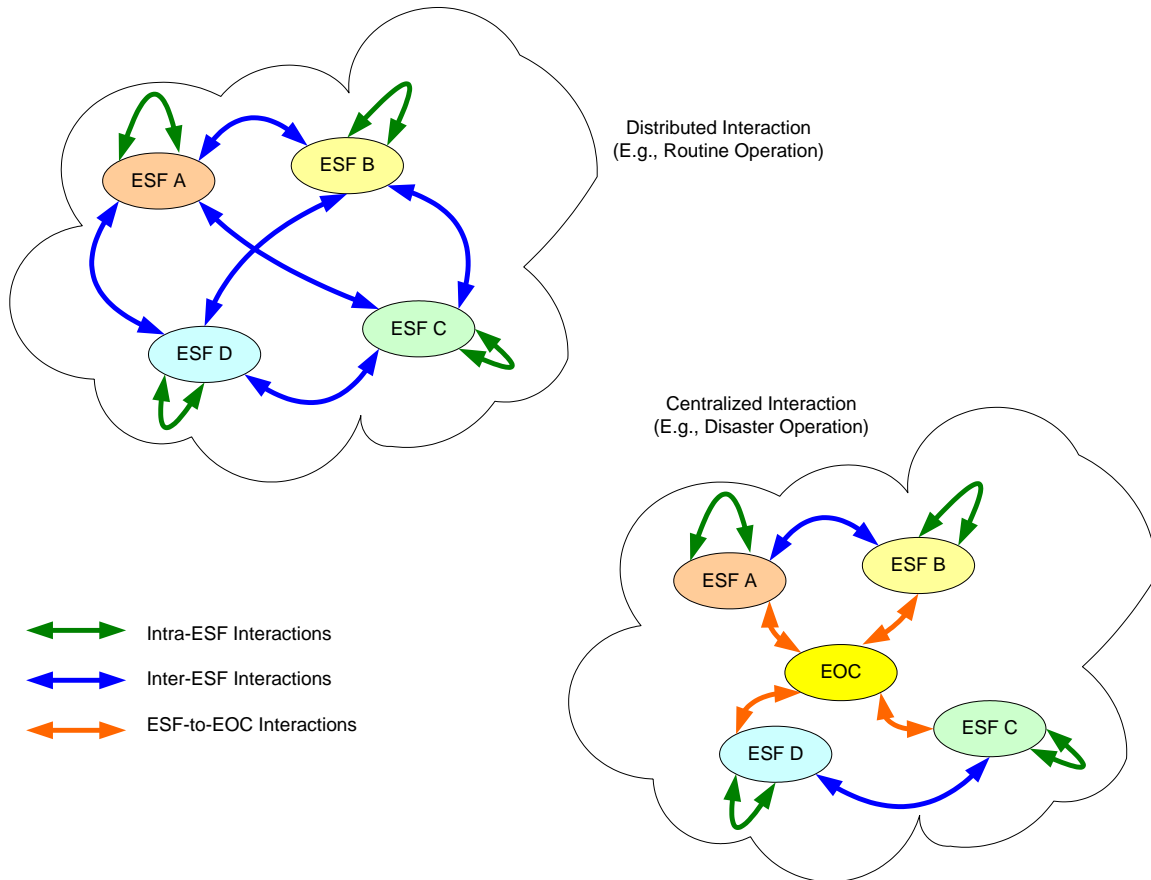
The interviewees note that, in addition to the intra-jurisdiction interactions discussed above, emergency response activities frequently have to be coordinated over a wider geographic area covering multiple jurisdictions. Based on the communications requirements noted by the interviewees, such inter-jurisdictional regional interactions are depicted in Figure 2. For example, a centralized model is illustrated to show how all inter-jurisdictional collaborations can be coordinated through the EOC of each jurisdiction. As the interviewees frequently note, this model also needs to accommodate interaction not only among local communities but also with state agencies, federal agencies, or even private sector entities such as the Red Cross.

Figure 2: Inter-Jurisdictional Collaboration
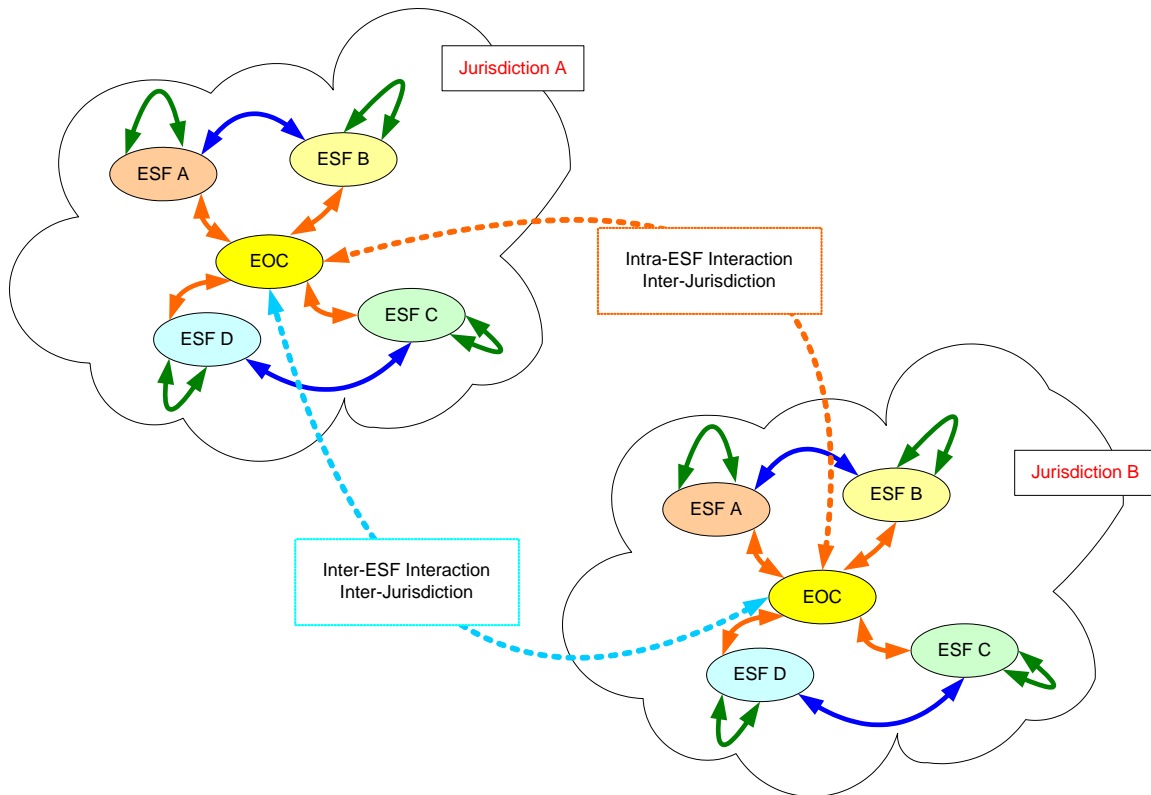
Many of the interviewees describe communications requirements that could take place in a distributed, inter-jurisdictional manner as well. For example, fire departments frequently aid neighboring jurisdictions under mutual aid agreements – and they require reliable, dedicated communications infrastructure to support that interaction. This distributed collaboration may arise more commonly during routine public service operations -- while a region-wide emergency such as a weather-hazard or bio-hazard would warrant more centrally-coordinated operations, possibly through one or more EOCs. Such coordination might warrant a regional operations center (ROC) or backup center (another key requirement noted by the participants in the Needs Assessment) that has reliable communications with each local EOC—and is survivable in the event that any of those EOCs becomes inoperable. In any event, the interviewees note requirements for a communications infrastructure that can support all of these models.

One of the local EOCs could be augmented to take on the ROC role or an independent location could be commissioned. The ROC would be the nucleus for centrally coordinating activities within areas that are directly or indirectly affected by the incident or are assisting in the response and recovery.

The range of communications interactions that the interviewees require suggests that the region's communications infrastructure needs to accommodate, at a minimum, four broad categories of systematic interactions in order for effective emergency response. These four categories of

interactions could take place in a distributed or centralized manner or a combination of both. The four interaction categories are summarized in the following chart.

Table 1: Four Interaction Categories

		Geography	
		Intra-Jurisdiction	**Inter-Jurisdiction**
ESF	**Intra-ESF**	**A**	**B**
	Inter-ESF	**C**	**D**

Category A represents local, intra-jurisdictional interaction within a single ESF responsible for a single jurisdiction (such as routine local activities of the local fire department). Category B represents regional, inter-jurisdictional interaction within a single ESF domain (such as regional collaboration between police departments). Category C represents local, intra-jurisdictional interaction between multiple ESFs responsible for a single jurisdiction (for example, collaboration between the local fire and police departments). Category D represents regional, inter-jurisdictional interaction between different ESF providers (such as collaborative operation of police and fire departments in different jurisdictions).

One mandate of NCRIP is to create a communications infrastructure that enables all inter-jurisdictional interactions required for efficient and effective response and recovery to regional emergency incidents. This emphasis implies that NCRnet is focused on Categories B and D above. However, the data collected in preparing this Report suggest that local jurisdictions also would like improved communications among ESFs on an intra-jurisdictional (Categories A and C) as well as inter-jurisdictional basis. In fact, a robust interoperable framework for communications and data exchange is likely to address problems of interoperability on an intra-jurisdictional basis as well. A fire chief who wants to be able to reach local resources (persons or data) from social services or public works and does not currently even have a contact database he can access will be able to use the system for information exchange just as well for local resources as for inter-jurisdictional ones.

As a result, the outcome of this Needs Assessment suggests that NCRnet will benefit the participating jurisdictions by facilitating intra-jurisdictional as well as inter-jurisdictional communications – this represents a significant benefit to public safety and a significant return on the investment the jurisdictions are making (offering their infrastructure, sites, and fiber optics) in NCRnet. In this sense, NCRnet will offer immediate returns in the form of "domestic" benefits -- added functionality for secondary use and improved intra-jurisdictional communications and coordination, and communications.

1.2. Key Finding: Need for Wide Range of Applications

The interviews conducted as part of this Needs Assessment process suggest that the region's jurisdictions and ESFs have growing requirements for inter-communications, particularly in the

areas, among others, of video and videoconferencing, interoperable voice, and data recovery and backup. The extent of these needs are in some cases surprising: one would expect, for example, to find wide-ranging communications needs on the part of ESF 5 (EMA) because of that ESF's core information-gathering/disseminating role. It is less expected to find that, as this Needs Assessment demonstrates, ESF 1 (Transportation) has similarly wide-ranging needs. The communications-intensive nature of transportation departments may come as a surprise and serves to illustrate how the region's ESFs evolving functions are increasing their regional communications requirements.

The following is a brief summary of findings with regard to needs for applications, organized by ESF. Detailed discussion of these findings is below in Section 3 and a summary can be found in table form in Section 4.

1.2.1. ESF 1: Transportation

The I-Nets Team's interviews of this ESF suggest that the primary, key needs for regional communications among ESFs and jurisdictions include essential traffic information, particularly over traffic camera video. There is an ever-expanding use of streaming video from traffic cameras and a need for sharing of traffic feeds across the region and with state agencies for emergency and traffic management. There is also a need for field communications, for which this ESF is heavily reliant on Nextel service and for direct, high-capacity links to state authorities as well as other jurisdictions. Finally, this ESF requires improved regional sharing capabilities for GIS, and alternatives to GIS bottlenecks (such as, for example, the problems caused by access over the Internet where GIS data is stored on external servers on private or state networks).

1.2.2. ESF 2: CIOs

Perhaps the most substantial finding regarding this ESF arises not from what the CIOs said, but what they did not say. In no jurisdiction did a CIO express any reservations about NCRnet as a project. Several CIOs worried about a variety of issues including interoperability of applications and security. Yet none stated that this would or should prevent or delay interconnection. It is all the more impressive that the CIOs did not view NCRnet with skepticism considering the scope of the project and the intimate knowledge the CIOs have of the technological and institutional challenges involved.

Video and backup/recovery are the CIOs' most requested communications application. The CIOs recognize significant needs for videoconferencing for emergency communications, training, and regional meetings, as well as for video streaming from cameras. They recognize significant needs for backup, recovery, and mirroring facilities for their key data and personnel.

1.2.3. ESF 4: Public Works

Generally, this ESF sees critical needs to secure and monitor critical, terror-vulnerable assets (such as power and water plants) and to work closely during emergencies with public and private

utilities and contractors. Unlike many of the other ESFs, it sees a primary communications requirement of communication with non-governmental partners. Many of the interviewees thus note a requirement for high quality communications systems and robust communications links, such as dedicated fiber links, to utilities. They also note the need for high quality wireless voice communications with contractors and private utilities. Related to this requirement for basic communications link is the emerging need to develop and integrate applications to allow sharing with public and private utilities.

For the moment, this ESF is focused on developing data-sharing capabilities with utilities to monitor and coordinate emergency response. The interviewees note an emerging need for resource tracking (using GPS and AVL) of this ESF's assets such as trucks, cranes, and skilled personnel, as well as for GIS-sharing, by which this ESF can aid other ESFs (such as Fire, EMS, Hazmat, and EMA) with resource-tracking and coordination.

The representatives of this ESF cite an emerging need to communicate (over radios or Nextel phones) with contractors for purposes of such public works functions as snow and debris removal. They also cite an emerging need for cross-jurisdictional coordination for such functions.

1.2.4. ESFs 4, 9, and 10: Fire, Technical Rescue, and Hazmat

For this ESF, there is a great reliance on 800 MHz radio communications and a general sense that the technology works adequately, but a concern that there is a need for supplementary coverage when outside the home 800 MHz service area. There is also a common understanding of video as a significant delivery device for a number of key applications including conferencing, training, meetings, and live video at HAZMAT sites and for EOCs.

Multiple jurisdictions recognize inter-jurisdictional CAD integration as a significant priority, while many of the jurisdictions see multiple emerging needs for NCRnet, including resource tracking; sharing of GIS and preplanning data; data sharing among existing and developing Automated Vehicle Location (AVL) systems; and data sharing among mobile data terminals.

1.2.5. ESF 5: EMA

Generally, the emergency managers are concerned about meeting their needs for information for appropriate emergency planning, anticipation, coordination, and response. They see a regional communications infrastructure as useful to meet their requirements to communicate within the ESF. Specifically, they see growing requirements for monitoring of events across the region, in part by integrating CAD systems; sharing of GIS data to understand spillover effects and resource location/allocation; sharing of other data as new applications emerge; ensuring EOC backup options with full communications capabilities; capability to mirror, backup, and recover critical data; and coordination with other EOCs over a reliable and secure network.

1.2.6.   ESF 6: Mass Care

Given this ESF's coordinating and interactive mission, many of the core functions of Mass Care are critically dependent on coordination of a variety of different agencies and organizations, public as well as private, and of local government assets. Intra-ESF communications therefore constitute one key priority for ESF 6 that impacts its ability to perform its mission. The Mass Care interviewees note that they project future needs to contact other jurisdictions to coordinate emergency services, though they have not had that capability in the past. It is likely that Mass Care's interest in inter-jurisdictional communications will grow dramatically as time passes, given the stated requirements of other ESFs for applications that are also of interest to Mass Care, including the tracking of victims and service support. The interviewees of this ESF recognize that such applications will be most effectively applied to Mass Care social services if there is a maximum of communications with other jurisdictions as well as with such organizations as the Red Cross, Salvation Army, and other support agencies. Given that schools and stadiums often serve as shelter and therefore as key Mass Care distribution sites, the NCRnet communications infrastructure, which includes both of these types of sites, can facilitate communications among these sites and between these and government locations.

1.2.7.   ESF 8: Health Care

ESF 8 includes public health officials, hospitals, EMS, and even physicians -- affiliates that do not always fit neatly into jurisdictional boundaries. This creates some unique challenges for this ESF, one of which is integration into the jurisdictionally-based ESF structure within COG, including the requisite IT support that often sits outside normal jurisdictional hierarchies.

Generally, the Public Health interviewees see requirements for integrated communications with other ESFs as well as within their ESF; improved voice and data communications solutions to reach field support staff at mass dispensing sites and shelters; and enhanced and shared GIS data.

To meet these needs, ESF 8 also requires IT support to help bridge the organizational and institutional boundaries that characterize this group and integrate federal, state, local, and regional communications. An NCRnet backbone connecting the different actors should go a long way to help in this regard and overcome complex firewall, security, and institutional barriers.

1.2.8.   ESF 13: Law Enforcement

Most of the members of this ESF use 800 MHz as well as cell-phone service, primarily from Nextel, extensively. They access a variety of different federal databases, but regional data sharing is more limited and is a growing need. The members of this ESF are beginning to use video conferencing more extensively and video camera feeds are a growing need and one that is likely to expand. This ESF uses a range of different wireless providers and protocols for Mobile Data Terminals (MDT) and sees PSAP, CAD, and RMS integration as a common need. The ESF also recognizes a need for "hot phones" or other direct communication between key sites (such as PSAPs). The interviewees note that data sharing has been required for a while, but has run

into security barriers and complicating federal requirements. GIS is an emerging and growing need but security is a problem area of data exchange.

1.2.9. ESF 14: Media Relations

The Public Information Officers need the communications capabilities to communicate both with the media and with the public under certain circumstances. Each jurisdiction's PIO also needs the capability to support and supplement resources of the agency-level PIOs such as DOT, Health, or the Mayor/Executive's office. The interviewees all note a particular interest in videoconferencing as a means of inter- and intra-jurisdictional communications.

2.   Methodology: Design and Goals

This Section presents a summary of the methodology used by the I-Nets Team in preparing survey instruments, initiating contact with Stakeholders to set up meetings, and collecting information through the interview process.

The I-Nets Team conducted 36 separate interviews with a total of 111 interviewees, representing all nine ESFs identified by NCRIP as Stakeholders for NCRnet. As these numbers demonstrate, the response rate for both the region's CIOs[2] and all other designated ESFs was quite high – reflecting a remarkable spirit of cooperation and commitment to this project on the parts of the region's CIOs and other ESFs.

2.1.   General Approach

The intent of this Needs Assessment was to develop a nuanced view of regional needs based on discussion, anecdote, and elaboration -- rather than a comprehensive tabulation of requirements. To this end, the Team focused on in-person interviews and follow-up discussions rather than surveys or questionnaires.

The I-Nets Team developed an interview/assessment methodology that took as its starting point the following basic principle for the network: at a minimum, the network must be redundant, scalable, and cost-effective. In light of this central need, the Needs Assessment process was designed to elicit and evaluate information regarding:

1) Potential impediments to establishing NCRnet.
2) Likely usage in terms of types of applications and application partners.
3) Intercommunications needs.[3]

This strategy required a particular interview process and format, namely a problem-oriented (or "frustration centered") approach. The advantage of focusing on problems and frustrations is that these identify not only existing processes, but also impediments to intercommunication that the network design should address. For example, organizational, legal, or jurisdictional obstacles can point to particular governance models with implications for network design.

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[2] The abbreviation "CIOs" is used throughout this Report to refer collectively to the 19 Chief Information Officers, IT Directors, and Chief Technology Officers and/or their deputies who met with the I-Nets team as part of this Needs Assessment.

[3] The interview methodology did not, for the most part, seek to identify fiber infrastructure and suitable sites for potential interconnection, as the I-Nets Team had already established much of this information in earlier efforts. The interview methodology also did not focus on issues of required throughput and applications usage because it was assumed that any assessment of estimated throughput requirements will be out-of-date in very short-order; that data and video exchange is still at a very early stage, and that NCRnet is partially intended to make such exchanges practical; and that even the best projections of future needs for applications likely cannot anticipate all future needs or the range of applications that are likely to be developed or enhanced in the future.

Moreover, the problem-oriented methodology can also identify future needs that can currently be articulated, but that may not currently have any communications or applications exchange conduits.[4]

An additional advantage of the problem-oriented approach is that one key Stakeholder group, the region's CIOs, are in a unique position to assess possible obstacles and opportunities both for their individual jurisdictions and for NCRnet as a whole. As this report will show, such problem-oriented feedback was crucial to identifying important governance and interconnection issues.

2.2. Interviewees/Stakeholders

Two key groups of NCRnet Stakeholders were identified for interviews as part of this Needs Assessment process. First, the CIOs provided access to end users as well as the feedback needed in terms of the broader issues and obstacles to NCRnet. Second, the local ESF representatives constituted the user groups and addressed relevant issues from an end-user perspective.

2.2.1. CIOs

The CIOs filled a dual role in providing both the conceptual and technical leadership for the project. Their unique position enables them to:

a. Provide a bird's eye view of current operational, technical, and organizational issues that need to be addressed as well as knowledge of future plans, projects, and needs that have to be incorporated into the design.

b. Provide the access and authority to help identify ESF representatives and facilitated access and scheduling to interviews with these representatives.

c. Have access to and authority over available optical fiber as well as knowledge of potential obstacles to interconnection of I-Net fiber.

An interview protocol was developed to reflect these issues.[5] The interviews typically included the CIO and/or a Deputy CIO. In addition to the questions in the protocol, specific questions about fiber availability were added as needed.

The interview protocol was typically structured as follows:

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[4] For example, there exist frustrations surrounding the refusal of the Red Cross to provide patient tracking information crucial to monitoring emerging public health issues in a crisis. Identifying these frustrations through this needs assessment may enable development of new conduits between public and private mass care officials and eventually applications that allow for the transfer of relevant information without compromising privacy guarantees in the non-profit sector. This in turn raises the need for developing proper communications channels by which to transfer such information with agencies that are typically not integrated into an emergency response communications network (especially in terms of data).

[5] The interview protocol used in the CIO interviews is attached to this Report as an Appendix.

Assess needs for the NCRnet interconnection network with particular attention to:

- Primary needs for interoperability of emergency service functions
- Secondary intra- and inter-jurisdictional communication needs
- Assessment of potential obstacles to fulfilling the needs identified
- Verbal request for points of contact and information (followed up by email, if desired by CIO), including:

  1. Local ESFs
  2. Local fiber resources (such as cable administrator, public works, traffic)
  3. Fiber maps (if applicable)
  4. Interconnection points (if applicable)
  5. Fiber hub site access (if applicable)
  6. Emergency communications center access (for microwave network planning)

The interview format was kept loose and semi-structured to allow the CIOs to guide the interviewer to the most relevant issues and avoid setting the agenda for them unnecessarily.

Following the initial meeting at the CIO level, a follow-up email was sent to the CIO or Deputy to facilitate the scheduling of interviews with local ESF agencies, with encouragement to the CIO to revise the list based on their own jurisdiction's agency boundaries and relevance. The follow-up email also included a copy of the interview protocol used for ESFs as well as an introduction to NCRnet and NCRIP. This document was supplemented in some of the later interviews with an electronic presentation introducing NCRIP.

2.2.2. ESFs

The ESFs provide a useful unit of observation at the end-user level through which to address issues of regional intercommunication, in part because the NCR has organized itself to encourage coordination, and because interoperability at the regional level occurs through the ESFs. In addition, the ESFs provide a useful unit of analysis for Needs Assessment because agency boundaries and responsibilities vary across jurisdictions.

The Needs Assessment methodology was crafted to reflect and accommodate the diversity of local jurisdictional organizational structures. To that end, the I-Nets Team asked the CIOs to determine which agencies and individuals should be interviewed based on a preliminary list of ESF groupings.[6]

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[6] The Team occasionally encountered confusion in the interview setting because some local agency representatives were not familiar with the ESF structure or were uncomfortable with application of this classification system at the local level. As a result, the I-Nets Team sought to avoid references to such terminology in the interview setting except where explicitly addressing ESF-related issues at the regional level.

The I-Nets Team left to the discretion of the CIOs the determination of whether interviews would be agency-specific (usually with one or two interviewees) or larger focus groups (ideally with four to six people).[7] This approach resulted from an effort to minimize the time burden on the CIOs who were responsible for making ESF personnel available. While suggesting ideal clusters of ESF representatives, the I-Nets Team left the actual selection to the discretion of the CIO or the person he or she designated for this task.

The I-Nets Team asked the CIOs to provide interviews with end-users at the highest operational level possible, ideally agency heads, in order to facilitate information regarding operational intercommunications problems and needs, and not simply technical issues. Some ESF representatives chose to bring along a senior technical support person.

The interview protocol, which was sent to the ESF participants in advance along with a brief agenda and introduction to the project, targeted three distinct areas:

- Applications and data – current and planned use
- Communications and interoperability gaps
- Views on how NCRnet could address needs[8]

Each set of questions was designed to be "prompted" by the previous area, so needs could be articulated with reference to practical needs and gaps. Moreover, the questions were framed using a "problem-centered" approach to encourage the identification of such needs and gaps.

The meetings typically took one to two hours, depending on how many representatives were present.[9] In many cases, the representatives would go longer than the scheduled time allotment to allow the interviewee(s) the discretion to end the meeting when they felt they were done. This was done to preserve the integrity of the goal of the interview: to capture needs as fully as possible as seen from the vantage point of the end-users interviewed.

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[7] The methodological justification for adopting either framework was briefly explained to the CIOs: the individual agency interview provides for more in-depth agency-specific discussion of issues, while the focus group format encourages a broader inter-agency focus. As the goal of the Needs Assessment is to identify as broad a range of issues as possible, the flexibility of jurisdictions to choose format based on convenience served to broaden the range of the results.

[8] The interview protocol used in the ESF interviews is attached to this Report as an Appendix.

[9] Toward the end of the Needs Assessment data collection process, members of other NCRIP teams would occasionally participate in the meetings. While allowing these team members the opportunity to ask their own questions, the I-Nets Team sought to preserve the general outline and format of the interview process in each case.

3. NCRnet Needs as Expressed by the Region's ESFs

This Section contains a summary and brief analysis of the needs articulated by the interviewees during the interviews conducted as part of this Needs Assessment. The discussion is organized by ESF (beginning with ESF 1: Transportation; continuing with ESF 2: CIOs, and so on through the list of ESFs designated by NCRIP as participants in this project). Within each ESF Section, we discuss current usage and requirements in three categories: video, data, and voice, as well as particular areas of concern or need for that ESF.

3.1 ESF 1: Transportation

The I-Nets Team conducted seven interviews with 10 individuals from the Transportation ESF, primarily with senior Transportation officials such as Division Directors or Division Chiefs, as well as additional technical or operational support personnel.

The region's transportation agencies are responsible for, among other things, coordinating communications on, in, and among transportation infrastructure and for coordinating management of transportation in the event of an emergency. These responsibilities can range from providing information to other ESFs to region-wide emergency transportation planning and implementation to coordination among local, state, and Federal transportation entities. This ESF's responsibilities also include management of sophisticated traffic centers and regional initiatives such as RITIS and CapCOM that are designed to coordinate, manage, and plan – as well as to serve as clearing houses for transportation data.

The interviews conducted with this ESF reveal a general and growing need for interconnected, interoperable communications. The Transportation ESF is increasingly using sophisticated tools to *anticipate* emergencies as well as to plan and coordinate appropriate response. As a result, this ESF is increasingly in need of accessing and exchanging video and GIS data, and is in need of direct channels to other transportation agencies, at all levels of government, for better communication and coordination. In addition, communication between Transportation and the other ESFs grows more important in light of the important role of Transportation as a critical support function for other ESFs.

The I-Nets Team's interviews of this ESF suggest that the primary, key needs for regional communications among ESFs and jurisdictions include:

- Essential traffic information, particularly over traffic camera video
    - Ever-expanding use of streaming video from traffic cameras
    - Sharing of traffic feeds across the region and with state agencies for emergency and traffic management
- Field communications, for which this ESF is heavily reliant on Nextel service
- Direct, high-capacity links to state authorities as well as other jurisdictions

- Improved regional sharing capabilities for GIS, and alternatives to GIS bottlenecks (such as, for example, the problems caused by access over the Internet where GIS data is stored on external servers on private or state networks)

As one transportation official noted about the expanding, regional role of his ESF:

> We need to have more than just roadway traffic information in an emergency: We need to know about road closures in other municipalities; we need to know about dangerous conditions for personnel at emergency sites; we need route directions for going to an emergency site, particularly when certain routes have been cut off by traffic or emergency personnel. We need to be able to monitor each other's emergency situations to anticipate imminent needs.

3.1.1 Video

3.1.1.1   Traffic Camera Video

The Transportation ESF interviewees see sharing of video from traffic cameras as a primary and growing need that could be facilitated by a regional communications infrastructure. The use of cameras at key locations enables transportation departments to enhance one of their key functions: monitoring and control of traffic flow, both public and private. Nearly all the jurisdictions in the NCR are using traffic camera video for this purpose – either from their own cameras, those of their neighbors, or those belonging to their respective state's transportation agencies.

The region's existing I-Nets are already key to this function, as images are typically transmitted over fiber optics, frequently using the local I-Net. Older systems using leased phone lines have either been replaced or are in the process of being phased out in favor of fiber optic cable.

The jurisdictions recognize that interconnecting their I-Nets will serve to enable sharing of traffic video, many of them having the opportunity to make use of their traffic control centers, where they can easily scale to view more camera feeds. Interconnection will also enhance the supply of local camera feeds to state authorities as well as to publicly-available sources such as www.trafficland.com. The use of interconnected I-Nets would also enable access to high-quality video from state-owned cameras; this innovation would give many of the jurisdictions a far more useful product than they can currently get from the states using the Internet for access.

All the jurisdictions expressed interest in better access to video from neighboring jurisdictions' cameras to facilitate a multitude of transportation management and safety goals:

- Monitor incidents and accidents, the primary motivator for deployment of cameras on the roadways.
- Monitor spillover risks from other jurisdictions.
- Provide traffic information to the public.

- Anticipate the need for changes in signaling to aid flow of traffic in response to any traffic problems.
- Serve as support function to other agencies. This is an emerging function, in which transportation agents increasingly recognize a role for themselves as support to incident and emergency response.
- Make even greater use of the state-of-the-art traffic management facilities that have been implemented in some of the larger communities.

3.1.1.2   Videoconferencing

The interviewees recognize growing future needs for video-conferencing, though they report that video-conferencing is not currently widely used among transportation officials. Multiple communities note interest in this application with the proviso that the video and audio quality be high. The interviewees note multiple applications of interest: Alexandria, for example, has interest in such a system for coordination purposes, and is particularly interested in having a direct channel to transportation officials in other jurisdictions. The City of Fairfax expresses interest in using videoconferencing for regional meetings. Prince George's County sees its usefulness in coordination, for example for snow-removal conference calls.

3.1.2 Data

3.1.2.1   GIS

The interviews of this ESF suggest that Geographical Information Systems (GIS) is currently used within jurisdictions -- and that there is little sharing of GIS data among jurisdictions within the Transportation ESF. A number of the jurisdictions do note potential benefits and future needs for shared GIS – particularly over a shared, high-capacity infrastructure -- and one notes a need to share GIS with the US Department of Homeland Security and FEMA.

Prince George's County, for example, notes its need for sharing GIS regionally and with the Federal Government – and notes its current problems sharing GIS over the existing Internet connection: GIS data received from the State of Maryland, CHART, and EMMA sometimes display very slowly or freeze given the inadequacies of receipt of high-bandwidth data over the Internet. Prince George's believes that connecting its traffic management center over NCRnet to networkMaryland could solve this problem and would allow sharing of large GIS files among Maryland State stakeholders. A similar possibility exists for Virginia jurisdictions interested in connecting to and sharing resources with VDOT, potentially over an NCRnet fiber connection.

3.1.2.2   Messaging Alert Applications

The interviewees from this ESF agreed that improved emergency alert notification would be helpful to augment and enhance current systems, which are generally considered adequate. The interviewees expressed interest in enhanced alerts that would provide:

- Greater content
    - For example, not just information that there is an accident, but the exact location and the impact on traffic; not just information about the emergency, but also information about conditions for personnel at the emergency site.
    - Though the problem of filtering – too much irrelevant information – was mentioned by other ESFs, it was not mentioned as a concern for transportation representatives.
- Timeliness
- Further information from the states regarding traffic conditions and emergencies on state roads

3.1.2.3   WebEOC

A number of the jurisdictions are using or are in the process of implementing WebEOC for emergency purposes. As with GIS, the interviewees from this ESF are concerned about the limitations of WebEOC if it is accessed over the Internet with all the resulting limitations of speed and capacity. Some interviewees expressed interest in the region using a shared infrastructure to host WebEOC and thereby increase its speed and reliability.

3.1.3 Voice

3.1.3.1   Wireless

The most common mode of daily communications throughout this ESF includes:

- From and within jurisdictional facilities -- telephone communications (and email).
- From and in the field -- trunked radio communication (primarily in the 800MHz range) and Nextel Push-to-talk/DirectConnect. The radio system enables communications with all field personnel simultaneously while the Nextel system allows communication one-on-one.

For emergency communications within the ESF, the primary mode is the trunked radio system, with the Nextel service as backup.[10] Dead spots in Nextel's coverage are of concern to a few of the interviewees.

3.1.3.2   Wireline

A few of the interviewees note the benefits of a phone system (Voice over Internet Protocol or otherwise) that is not dependent on commercial telephone carriers. They express interest in the increased reliability of phone services that are transmitted over a regionally controlled (rather than commercially-controlled) infrastructure, which would allow this ESF to communications

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[10] According to other interviewees from other ESFs, many jurisdictions adopted Nextel as backup because it was the only wireless communication system that worked on 9/11

with neighboring jurisdictions, other ESFs, and potentially with state and federal transportation agencies.

3.1.4 Communications with State Agencies

Representatives of this ESF express a pressing need for communications with their respective states (less so in the case of the District of Columbia, for the obvious reason that it functions both as a local and a "state" entity and is not incorporated into a larger state body).

In Maryland, for example, Prince George's TRIP Center and Montgomery's Traffic Management Center work in close cooperation with Maryland's Chesapeake Highways Advisory Routing Traffic (CHART) to coordinate traffic management. Smaller Maryland jurisdictions tend to look to the larger counties in addition to state authorities for guidance and data. The emerging CapCOM system also suggests the need for state-local interconnection. CapCOM is envisioned as a regional center for incident management and information exchange to be housed at the University of Maryland and possibly integrated into the CapWin executive structure. Interconnection among the State of Maryland and any of the jurisdictions on NCRnet would create a fiber route for CapCOM to and among all the NCR jurisdictions. According to the Transportation interviewees, even such simple systems as variable message signs (VMS) would be improved by enhanced communications links. Prince George's County, for example, is interested in pursuing VMS integration with the State of Maryland so as to be able to post County and local messages on State VMS.

In Virginia, many of the jurisdictions rely on VDOT for data and camera feeds because VDOT is primarily responsible for traffic management. As a result, information and incident response is coordinated at VDOT and the jurisdictions feel a need for the best possible communications links between themselves and VDOT.

3.2   ESF 2: Communications Infrastructure (CIOs)

The I-Nets Team conducted 14 interviews of the communications infrastructure ESF, interviewing a total of 19 Chief Information Officers, IT Directors, and Chief Technology Officers and/or their deputies (collectively, "CIOs"). The CIOs interviewed represent a wide variety of jurisdictions, ranging from large communities with dispersed infrastructures and complex divisions of labor within the technology department to smaller jurisdictions with small and centralized structures.

As discussed in the methodology section above, the objective of the interviews with the region's CIOs was to facilitate meetings with the ESFs, map available fiber infrastructure for interconnection purposes, and to receive input regarding the gaps the CIOs would like to see NCRnet address.

CIOs, in addition to sponsoring the project and facilitating access to ESFs, are also the lead agency in ESF 2. As ESF agents, CIOs serve as communications support for the other ESFs. However, as CIOs they also take into consideration their broader role serving their own jurisdictions' IT and communications needs. The interviews therefore reflected these dual responsibilities.

3.2.1   Video

Video emerges as the CIOs' most requested communications application. The CIOs recognize significant needs for videoconferencing for emergency communications, training, and regional meetings, as well as for video streaming from cameras.

3.2.1.1   Videoconferencing – Emergency Communications

Many of the CIOs confirmed the need (echoed in numerous ESF interviews) for videoconferencing as an application well suited for NCRnet. Unlike many other first responder applications, the more challenging latency and bandwidth requirements of video streaming make it unsuitable for current lower-speed communications and make it costly over leased circuits.

Arlington and Alexandria are operating videoconferencing across the fiber optic link between their jurisdictions, an application that is also being explored for the new NCRnet fiber optic link between Montgomery County and the District of Columbia. The Arlington-Alexandria pilot application creates a videoconferencing link between their EOCs, and they are exploring other options as well, including linking Alexandria to a shared payroll server and video arraignment of prisoners.

Alexandria and Arlington's initial efforts focus on EOC linkage and thus emergency management uses. Charles Wilson, CIO of Prince George's County, also notes that videoconferencing will be an important capability for EOC/ECC communications between

jurisdictions, and also for regular COG/Metro CIO meetings. The benefit of using videoconferencing for emergency communications was also echoed by other jurisdictions.

3.2.1.2 Videoconferencing – Meetings and Training

The need for videoconferencing for meetings is evident to a number of jurisdictions, including Prince George's, Falls Church, Loudoun, Rockville, and Prince William.[11] This is a theme that also emerged in the ESF interviews. According to John Pumphrey of Loudoun County, the County views videoconferencing as a key inter-jurisdictional application for purposes such as meetings with Fairfax County. This application is not currently available. Mr. Pumphrey notes that a seven-site videoconferencing system is operational within the County. Notably, only one percent of capacity is used for emergencies and 99 percent is used for training.

3.2.1.3 Video Streaming/Camera feeds

The CIOs identified substantial needs for camera feeds, primarily of traffic (a similar theme emerged in the ESF interviews, particularly those of the Transportation and Law Enforcement ESFs). Arlington County notes a need for access to security access video from within the Metro stations. The City of Fairfax notes that law enforcement would be enthusiastic about any video surveillance done by the jurisdictions (in areas such as the Metro system and major malls); as this would help to better coordinate first response.

Several jurisdictions are building fiber to traffic signals and cameras so as to provide video that they can share over the Internet or by other means.[12]

Other CIOs also note the need to carry the feeds over NCRnet. For example, Masood Noorbakhsh, CIO of Prince William County, suggests that any non-emergency communications over NCRnet should include VDOT traffic cameras.

3.2.2 Data

3.2.2.1 GIS

Arlington County notes the major concern that currently CAD/GIS is not interoperable because the layers do not match up with each other. Prince William's Mr. Noorbakhsh specifically mentioned GIS as an important non-emergency application that should be shared over NCRnet. Larry Bates of Manassas mentions security concerns as limiting the "shareability" of some GIS layers, particularly with respect to confidential, security-related public works and utilities information.

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[11] A few had also mentioned savings on fuel costs as an additional benefit, but time saving appears as the benefit most on the minds of our interviewees.

[12] Besides the City of Fairfax, Prince George's and Alexandria mentioned such initiatives. The City of Fairfax plans to put the video feeds on its website. But in ESF interviews, transportation officials focused on sharing initiatives with state agencies.

Rockville and Gaithersburg are both interested in sharing GIS with Montgomery County over a live connection, rather than by exchanging tapes, as is currently done, but did not mention either emergency usage or broader regional exchange.

3.2.2.2   CAD and EOC Integration

The integration of EOCs is a COG priority and has therefore been discussed in various COG contexts. As a project it falls with NCRnet under the broader NCRIP framework. The issue arises in the EMA interviews and is also raised by some of the CIOs.

Arlington County, for example, points out that CAD integration would be very helpful in providing mutual aid, assuming resolution of the interoperability problems of CAD/GIS. Falls Church and Loudoun County also note a need to link CAD applications.

A broader vision of EOC integration is offered by Prince William CIO Mr. Noorbakhsh and Deputy CIO Dennis Gardner, who suggest multi-level integration, including integration of CAD applications, sharing pre-planning data, sharing information from the field, and mutual dispatching. They see a need for regional sharing of a broad range of information, including resources such as maps of schools, shelters, and roadways, as well as also small databases and spreadsheets of incoming information from the field. They also note the need for sharing of CAD data – and note the challenges to such sharing. These challenges include lack of commonality of dispatching processes, and the need to scale dispatch systems to enable jurisdictions to take over dispatching for each other in the event of an emergency.

3.2.2.3   WebEOC

Some of the issues surrounding EOC integration will be addressed by the roll-out of WebEOC across the region. Some jurisdictions are already using WebEOC and the CIOs are familiar with the WebEOC rollout. However, the CIOs report that they are not able to achieve the full benefit of regional WebEOC use without sufficient inter-jurisdictional network capacity.

Mr. Bates, CIO of Manassas, notes some frustration with the slow performance of WebEOC absent a network of the capacity of NCRnet. According to Mr. Bates, the DMIS exercise project demonstrated the limitations of the application over a slow connection. Mr. Bates notes the need for NCRnet to make WebEOC viable. This concern about speed also arises in a number of the other ESF interviews.

3.2.3   Voice

VoIP is the only voice application that arises consistently in the CIO interviews. Although none of the CIOs mention it as a pressing technology, some note its value for NCRnet, including Falls Church, Frederick County, Prince William County, and Rockville. Dale Spangenberg and Leigh

Fields of Frederick County mention that the VoIP system they use allows connection from any network site, including schools.

3.2.4   IT Backup and Recovery

Most of the CIOs cite IT Recovery and Backup as key requirements that can be facilitated by a regional communications infrastructure. Indeed, this is a need that each jurisdiction is currently addressing to some degree—though all the interviewees who discuss this subject feel a need for ever-improved means of recovering and backing up data, systems, and personnel.

In the few years before the commencement of the NCR Interoperability Program, the Northern Virginia CIOs commissioned a study regarding a regional IT recovery center.[13] The Northern Virginia jurisdictions are seeking the ability to recover operations in the event of loss of their network operations centers or data storage. Some would like "hot site" operations for their most critical resources, others only a "cold site" in the region where staff can restore tapes and servers and remotely operate a jurisdiction network.

While regional IT recovery remains a priority, one of the most important outcomes of the study was that the regional CIOs and the Northern Virginia Regional Commission (representing the Chief Administrative Officers of the Northern Virginia jurisdictions) resolved to pursue interconnection of the jurisdiction networks, one of the goals recommended by the study as a necessity for establishing and operating a regional recovery center.

3.2.5   Control and Governance Considerations

3.2.5.1   Control

Most CIOs express enthusiasm for interconnection and are helpful in identifying existing fiber routes to facilitate the process. However, most CIOs are unwilling to "sign over" their fiber to an external agency. In other words, while they were willing to *provide* fiber to NCRnet, they may not want to cede control over it. In addition, some CIOs raised questions about who will own the equipment to be installed and fiber to be constructed between I-Nets for inter-jurisdictional interconnection.

3.2.5.2   Security

There are only two cases brought up in our CIO interviews in which formal arrangements exist for data sharing over fiber.[14] As mentioned earlier, Arlington and Alexandria have interconnected their I-Nets, and have developed an MOU governing the interconnection and a

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[13] *A Regional Approach to IT Recovery in the Event of Disaster: A Northern Virginia Demonstration Projec*t, Prepared for the City of Alexandria, Arlington County, City of Fairfax, Fairfax County, Loudoun County, City of Manassas, Prince William County, Town of Manassas, February 20, 2004.

[14] Other cases of data exchange were brought up in our ESF interviews, although not over fiber between jurisdictions.

standing committee to revisit other opportunities for data sharing on an ongoing basis. Issues of security are spelled out in the MOU by stipulating the responsibility of each jurisdiction to secure its own network and allowing traffic via a particular protocol ("IP services"). In addition, the standing committee is charged with resolving security issues.

The only other existing connection with an MOU discussed in our interviews is between Rockville and Montgomery County. In this case it provides the City of Rockville point-to-point access to Montgomery's financial data application. The MOU has only limited reference to network security and instead focuses on user access issues (authorized users granted by the County to the City). Mike Cannon, Rockville's CIO, notes a need to expand the agreement to access other data as well.

In contrast, Mr. Bates, CIO of Manassas, notes that it has been difficult for Manassas and Prince William County to overcome issues of security and "sovereignty" to enable employees working in the other jurisdictions to access email by using the network of the host jurisdiction. According to Mr. Bates, each jurisdiction is justifiably concerned about exposing its systems and the integrity of its own control over its network.

Several CIOs expressed concern about how to balance the security of their local intranet with allowing non-public safety users access to NCRnet, and indicated that governance and network security needed to be designed to reflect that balance.

1.2.9.1   Network Design

A number of CIOs note that the network must be scalable and flexible so other applications can be added in the future. Such scalability would also apply to scalability of users. Lou Michael of Arlington County suggests that the NCR network should use a Class A private Internet Address to make the internetworking simpler to manage. Indeed, simplicity of governance and network management was mentioned approvingly by several CIOs.

Most jurisdictions prefer that NCRnet sit logically *outside* local I-Nets, and some suggested using DWDM[15] to segregate traffic.

John Pumphrey of Loudoun, for example, suggests that the network should either be a solely-first responder intranet where secondary uses are precluded, or a pipe that can be used for other purposes as well. He personally prefers the second solution, but notes that it would necessitate that secondary users be taken off the network in time of emergency.

Isolating NCRnet from local networks emerged as the single most important issue in terms of network design. This means walling NCRnet off from the local I-Net, so that NCRnet traffic does not intrude on the local I-Net.

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[15] Dense Wavelength Division Multiplexing is a technology that transforms a fiber optic backbone into multiple virtual fibers by combining and transmitting multiple signals simultaneously at different wavelengths on the same fiber.

Additionally, unlimited access emerges as another concern. Larry Bates of Manassas notes that his community needs a direct "on-ramp" onto the rail, direct access, rather than having to negotiate access through other jurisdictions.

The principle here is that if NCRnet is not separated from local I-Nets, any jurisdiction could effectively close down traffic for other jurisdictions by shutting the traffic off in their own I-Net.

In keeping with NCRnet isolation, Mr. Bates suggests building an IP network and giving access to everyone. Then each jurisdiction will firewall their part. Regional data centers should host servers. Each jurisdiction should control what data to share.

The impetus behind having regional data centers on NCRnet comes from the issue with WebEOC mentioned earlier: if applications and data were instead on externally hosted servers linked to private networks, access to such data would only be as reliable as the private network or networks that one needs to go through to access them. Thus if the private network or networks are clogged during an emergency, it does not matter how much bandwidth NCRnet can boast — they would not be accessible.

Rockville suggests being able to shut NCRnet down in case of a worm or attack or isolate particular jurisdictions. However, whether this would be done by local jurisdictions and whether that shutdown would only affect the interconnection between NCRnet and their own I-Net, or whether it refers to a centralized network managements' shutdown of the entire NCRnet network would presumably depend on the network design and governance structure.

3.2.5.3   Administration

Several CIOs mention the administration of NCRnet as a potential problem. A frequently expressed concern is that one jurisdiction may take over the network and not act in a mutually beneficial manner. This is an issue that was not only frequently raised by the CIOs, but also arouses strong convictions. "Trust" was in fact mentioned several times by the CIOs around the topic of NCRnet management.

A number of CIOs express apprehension of a single jurisdiction dominating the network. Smaller jurisdictions, for example, fear that a jurisdiction with great resources and staff-power can take over and dictate use of the network. For these communities, uneven distribution of resources leads to concern about centralization of control by a single jurisdiction.

Some propose that the power be balanced by distribution of management control to a few key jurisdictions. Other communities suggest a segmentation of the network to minimize the risks of control by one or two jurisdictions or any one region. One jurisdiction suggests that the network should be able to operate in three distinct segments: Northern Virginia, Maryland, and the District of Columbia.

Mr. Pumphrey of Loudoun County notes another concern centered on the understandable inability of jurisdictions to appreciate the way regional incidents affect other jurisdictions. Mr. Pumphrey points out that the region is not homogenous. For example, there is a vast difference between Loudoun and the District of Columbia. Snow emergencies affect outer suburbs in different ways than they do the District. Hurricanes can hit areas differently with different impact. Mr. Pumphrey notes that the District often takes the lead, but that its sense of urgency is not always appropriate for other communities. In his opinion, it is essential that the NCRnet governing system reflect the diversity of communities.

The issue of trust is cited by Mr. Cannon of Rockville. He notes that it took four years to negotiate an MOU with Montgomery County over basic access to a few resources. However, he points out that once trust had built up, the MOU itself was pretty simple.

3.2.5.4 Management

The comments of most of the CIO interviewees suggest that they favor a centralized system for management – but with diffused decision-making. Many of their concerns and suggestions suggest they assume a multi-lateral arrangement where one or more jurisdictions "step up" to assume leadership.

Several different options are suggested by the CIOs with regard how to manage NCRnet. The most frequently mentioned option is with a "trusted third party" managing the network on behalf of the jurisdictions. Mr. Pumphrey of Loudoun County notes a preference for using outside contractors because there is a potential for conflict if the jurisdiction are dependent on each other's service people. Mr. Pumphrey would like to see the COG or some other such entity contract with a third party.

Montgomery County CIO Alisoun Moore also offers a third party contractor model: she notes that the best recipe for success is a governance structure that relies on a "trusted" third-party to perform the network operations and support. This scenario is comparable to that used by other jurisdictions, including the State of Maryland, which contracts Computer Science Corporation for MDOT and networkMaryland. Ms. Moore also suggests that the pilot serve as a proving ground for the third party model, if the contractor performs to the satisfaction of the Stakeholders and builds an institutional knowledge of the infrastructure.

Prince William County states a preference that maintenance and management be addressed by a third party entity or by an NCR organization with its own dedicated staff.

Indeed, the logistics of managing the network is viewed as requiring a full time dedicated staff solution that would not be practically possible to draw from existing jurisdictional staffs. For example, Charles Wilson, CIO of Prince George's County, notes that full-time resources are absolutely necessary for NCRnet initiatives, including project managers that can report to the MetroCIO group. Mr. Wilson notes that his staff consists of 49 employees and 62 contractor staff-people, many fewer than some other jurisdictions. He believes that many of the communities simply do not have the resources to dedicate full-time personnel to NCR initiatives.

Wanda Gibson, Fairfax County Department of Information Technology Director, offers one vision of a multilateral MOU-based governance model, noting the importance of a streamlined governance structure. Connections between jurisdictions should be simple so governance agreements can be easily administered. Ms. Gibson suggests a system where different jurisdiction "piggy-back" onto services – or service management contracts - others have. The governance logic would be modeled on and expand existing mutual aid agreements. Under this vision, COG riders on existing and future service contracts could be leveraged for use by other jurisdictions.

3.2.5.5   Cost

A few of the jurisdictions express concern about cost. Gail Bohan, CIO for the City of Fairfax, framed the problem, noting that negatives and challenges for NCRnet may include cost and complexity, but these have to be overcome because of the need for the network.

The main concern is with ongoing operational costs, which is noted by multiple jurisdictions. This concern was expressed by Captain Harry Reitze at the combined CIO-ESF interview in Falls Church:

> The problem is with recurring costs that come with supporting all the equipment we get from Congress and the Feds. If it means draining our budget, I will personally go to the firehouse and cut the cable [connecting Falls Church to the network]. This is can become a problem of unfunded mandates.

A concern about cost is also implicit in the concerns discussed above regarding the availability of staff to operate the network.

3.3 ESF 3: Public Works and Engineering

The I-Nets Team conducted seven interviews of ESF 3, Public Works and Engineering, interviewing a total of 11 representatives of this ESF. Most of the interviewees were Directors or Deputy Directors of public works departments, in some cases accompanied by ESF 3 representatives from other departments such as the water and sewer utilities.

According to the COG's Regional Emergency Coordination Plan definition, this ESF bears responsibility for handling "public emergencies concerning regional water supply (including potable water and ice), wastewater (including wastewater treatment), and solid waste and debris management." On routine incidents, then, Public Works has a limited role and enters into emergency response in a greater capacity with larger regional events.

However, Public Works controls and maintains significant public assets that require coordination with other ESFs on a more regular basis. Such resources may include trucks and other heavy equipment as well as skilled engineering capabilities. Additionally, public works departments often either control or serve as government liaison for power utilities, thus also supporting ESF 12.

Public Works departments typically have few current intercommunications partners regionally or intra-jurisdictionally. Unlike Transportation, there are neither plans for elaborate regional coordination nor state agencies that public works departments are oriented towards for incidence response, with the exception of some reporting requirements to the Federal Government on water quality and other utility oversight issues. The result is that this ESF has traditionally felt less need to implement applications such as video and resource sharing, with some exceptions.

Generally, this ESF sees critical needs to secure and monitor critical, terror-vulnerable assets (such as power and water plants) and to work closely during emergencies with public and private utilities and contractors. Unlike many of the other ESFs, it sees a primary communications requirement of communication with non-governmental partners. Many of the interviewees thus note a requirement for high quality communications systems and robust communications links, such as dedicated fiber links, to utilities. They also note the need for high quality wireless voice communications with contractors and private utilities. Related to this requirement for basic communications link is the emerging need to develop and integrate applications to allow sharing with public and private utilities.

For the moment, this ESF is focused on developing data-sharing capabilities with utilities to monitor and coordinate emergency response. The interviewees note an emerging need for resource tracking (using GPS and AVL) of this ESF's assets such as trucks, cranes, and skilled personnel, as well as for GIS-sharing, by which this ESF can aid other ESFs (such as Fire, EMS, Hazmat, and EMA) with resource-tracking and coordination.

The representatives of this ESF cite an emerging need to communicate (over radios or Nextel phones) with contractors for purposes of such public works functions as snow and debris removal. They also cite an emerging need for cross-jurisdictional coordination for such functions.

3.3.1 Video

The Public Works interviewees note that they currently have limited video applications. Manassas, for example, uses surveillance cameras at water plants for security reasons and plans to expand use of such cameras. Rockville also uses video cameras in public buildings for security purposes. Those public works departments that oversee or incorporate transportation departments do use extensive video for their transportation functions but this is generally considered a function of ESF 1.

There is significant interest in future use of videoconferencing among jurisdictions, which is currently not in widespread use. One jurisdiction, for example, expressed interest in adding video capabilities to RICCS. The Loudoun County representative notes that videoconferencing would assist the various members of this ESF to get to know their counterparts in other jurisdictions. More interaction would enable these personnel to interact more smoothly and efficiently to filter the tremendous amount of information that would be exchanged and to get to the important information in an emergency.

Prince William County's representative notes a need for video conferencing and video streaming, full motion camera feeds from state agencies such as VDOT, and regional public safety training capabilities over videoconference.

Despite the level of interest, a number of the jurisdictions are wary of the technical support issues involved and the need for experienced on-hand staff to operate the videoconferencing system.

3.3.2 Data

As critical infrastructure, water and power utilities are likely future sources of data exchange with federal and state authorities. Although several taskforces and committees coordinate water resource planning in the region, the discussion concerning data exchange and operational coordination is at best still in its infancy. However, the importance of data sharing is beginning to emerge. Thus, some interviewees express a need for access to databases of other local jurisdictions because of time delay in relay of local information to state and federal databases. This need is likely to increase if coordination at the level of mutual aid, GIS, or resource tracking improves.

3.3.2.1   Emergency Alert System

Within this ESF as with most of the others, RICCS provides the primary means of regional notification regarding emergencies and is used by most of the jurisdictions for communicating such critical Public Works information as water supply and quality.

3.3.2.2   SCADA

Supervisory Control and Data Acquisition (SCADA) systems are "used to monitor and control a plant or equipment in industries such as telecommunications, water and waste control, energy, oil and gas refining and transportation".[16] Most of the NCR jurisdictions managing water resources have some kind of SCADA implementation and have either upgraded or are in the process of upgrading such systems. The jurisdictions use SCADA for water management and monitoring. Reporting of water data is sent to a variety of state and federal agencies, such as, in Virginia for example, the Virginia Department of Health and Virginia Department of Environmental Quality.

One potential complication to sharing of this ESF's data results from its rigorous security requirements that are designed to protect data regarding this critical infrastructure. Frederick County, for example, adheres to Federal guidelines regarding data security for utility systems for SCADA including such precautions as no dial-in to a central computer. As a result, Frederick does not share data, or want to share data, with other jurisdictions. Manassas reported using its SCADA system for its power utility and was also not sharing the data outside the utility or other public works contexts.

3.3.2.3   GIS

Several jurisdictions report active use of GIS. The District of Columbia, for example, requires GIS for emergencies as well as in snow and leaf removal seasons. Frederick provides a mapping service and Loudoun accesses and updates GIS layers as needed. In the interviews conducted for this Report, only Rockville reports accessing GIS from another jurisdiction, in this case GIS is transferred from Montgomery County to the City using CDs.

3.3.2.4   AVL/GPS

A few jurisdictions have experimented with AVL. Montgomery County's Michael Hoyt reports that his jurisdiction installed GPS on snowplows. He added that his drivers did not like this and that the GPS devices "somehow all got broken." And further offered that intercommunications projects "need to keep things low tech for my men." While DC's Mark Brown similarly noted the low educational credentials of his staff ,[17] AVL equipment has been successfully deployed on many of his assets.

AVL technology is making inroads in the public transportation area with many buses either already having or getting AVL/GPS equipment. Since this is a fertile area for fleet management,

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[16] NATIONAL COMMUNICATIONS SYSTEM. TECHNICAL INFORMATION BULLETIN 04-1 "Supervisory Control and Data Acquisition (SCADA) Systems" October 2004

[17] He estimated that 25-27% of his employees are illiterate.

emergency management, and resource management and response at a regional level, data and applications needs tied to AVL/GPS system will likely grow in the near future. It is, however, also likely to lead to challenges as many resources are contractor derived raising the needs for integrating private contractors within such resource management systems.

3.3.2.5   IT Backup and Recovery

The interviewees from this ESF were not uniformly focused on data backup. They also varied in their backup policies -- some jurisdictions perform periodical off-site backup in addition to daily on-site backup, while at least one agency claimed to do no backup at all.[18] Only Frederick County reports a backup system of both data and operational capabilities on its SCADA system: "The SCADA system has backup hot stand-by system and currently requires a second person at the secondary site to trigger the take-over manually."

Only one jurisdiction, Prince William, mentioned IT recovery capabilities as a need: "We would want to offer cold sites to other jurisdictions, for space for IT recovery, but not hot sites, since the private sector is better at offering hot sites."

3.3.2.6   Communications with Backup Facilities

A variety of different arrangements exist for emergency command and control centers for public works departments, but all require robust communications. Loudoun County, for example, reports that its administrative facilities are kept separate from the shop, but in case of an emergency, the shop has backup power and offices to be used for administration and command if needed, all in addition to the EOC. In both Montgomery County and Rockville, Public Works is integrated into the EOC as necessary. Similarly, Manassas reports that its separate command center for the electric utility can be shifted to the EOC in an emergency.

3.3.3 Voice

Most of the jurisdictions report using 800 MHz systems. The District of Columbia, on the other hand, reports only limited and recent usage of 800 MHz, relying instead on Nextel phones.

Even those who use 800 MHz also use some Nextel services. The reliance on Nextel service has concrete implications for emergency response functionality in this ESF. Several jurisdictions complained about spotty coverage or about prioritization of Nextel calls. As the representative from Loudoun County noted: "We can't overstate comfort level of having all of Northern Virginia on 800 MHz. But it is a problem that there is no prioritization of Nextel calls in case of emergency."

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[18] As some agencies have all their IT support handled by the IT department under the jurisdiction's CIO, it is likely that this representative was simply unaware that all servers are backed up by the IT department. If no data is saved on local hard drives, this would essentially back up everything.

Rockville reports trouble communicating over Nextel phones from the field to report downed power lines to PEPCO. Indeed, Rockville's representative suggests the need for a national Public Works frequency, so other jurisdictions can send personnel to the site of an emergency and can use their own communications equipment.

Mark Brown of the District of Columbia notes the need for this ESF to have a simple, usable communications system: "What we need is an accepted, tested, reliable communication system. It would need to determine who has access, who doesn't have access, who should be on this frequency, and who shouldn't. Anything else will not do in an emergency. It is simply too cumbersome."

A number of jurisdictions note the importance of inter-jurisdictional coordination in event of emergencies such as snow and ice storms. The District's Mr. Brown, for example, notes that for a range of Public Works functions such as snow and leaf removal, there is no coordination with neighboring jurisdictions. According to Mr. Brown, "it would be nice to have common demarcation point, for example for de-icing: the Eastern Avenue and Western Avenue boundaries are in the middle of the road, yet there are no conference calls with Prince George's County or Montgomery County on such issues."

Similarly, the Manassas representative notes the importance of that agency having communications with Prince William County, Manassas Park, and Fairfax County, because any of these communities may require a supply of water. During Hurricane Isabel, for example, Manassas supplied other jurisdictions with water because of contamination issues.

3.3.4 Communications with Non-Government Entities

The need for coordination on snow or debris removal raises another challenge: Several counties rely on contractors for such public works functions. A solution for coordination and mutual aid would therefore have to incorporate private contractors. Putting aside the policy and organizational concerns, this situation also presents a communications challenge because private contractors would need to be integrated into the communications system.

The jurisdictions also recognize a requirement for information from a variety of external agencies, especially private agencies. A number of them note that they need high quality communications with non-local government entities, including power utilities, gas utilities, and state agencies.

Because this ESF needs to communicate with private utilities, much effort at intercommunication and coordination is placed in this area, including building fiber optics to water and power plants. Some of the interviewees note that it might be useful to allow such critical facilities to be tied into the emerging regional communications infrastructure to facilitate communication and add a critical layer of redundancy. DC, Alexandria, and Rockville all mention a need to form joint teams with power utilities after emergencies such as snow storms to effectively coordinate the interdependent tasks of tree removal and power line reattachment. Such increased coordination

will likely create greater need to integrate such private partners into intra- and inter-jurisdictional communications systems.

3.4 ESFs 4, 9, and 10: Fire, Technical Rescue, and HAZMAT Operations

The I-Nets Team conducted eight interviews of the fire, technical rescue, and HAZMAT operations ESFs, interviewing a total of 10 individuals. In keeping with the COG's 2002 Regional Emergency Coordination Plan, these ESFs were combined for purposes of this Needs Assessment. In practice, this usually meant interviewing a high-level Fire Department representative.

These ESFs are among the most visible first responders. These ESFs also have significant practical insight into issues of interoperability in part because they are accustomed to mutual aid and with roaming in and out of multiple jurisdictions. As a result, their interest in interoperability tends to focus on efforts to make such inter-operational capabilities easier, including voice interoperability and the availability of preplanning data and GIS.

The following represent major themes, concerns, and needs shared among many of the members of this ESF in the region:

- There is a great reliance on 800 MHz radio communications and a general sense that the technology works adequately, but a concern that there is a need for supplementary coverage when outside the home 800 MHz service area
- There is common understanding of video as a significant delivery device for a number of key applications including:
    - Conferencing
    - Training
    - Meetings
    - Live video at HAZMAT sites and for EOCs
- Multiple jurisdictions recognize inter-jurisdictional CAD integration as a significant priority
- Many of the jurisdictions see emerging needs for multiple uses of NCRnet, including:
    - Resource tracking
    - Sharing of GIS and preplanning data
    - Data sharing among existing and developing Automated Vehicle Location (AVL) systems
    - Data sharing among mobile data terminals

3.4.1 Video

As with the other ESFs, these interviewees view video as a significant communications need of the ESF that could be served by NCRnet. Mr. Murray of Frederick County, for example, expresses the need for video conferencing for meetings and training, and also interest in transmitting live video feeds from an incident site – such as a HAZMAT spill. This latter need is

echoed by Chiefs Donald Homan and Richard Boyd who would particularly like to have video from the field available at the EOC at all times to anticipate needs.

3.4.2   Data

3.4.2.1   Messaging Alert

Many of the fire chiefs use RICCS, and some also use RoamSecure. They express satisfaction with the functionality of both applications. Chief Murray of Frederick does express concern with the security of the RICCS system.

3.4.2.2   CAD and Resource Tracking

The interviewees all cite CAD interoperability as a primary communications need – this uniformity reflects the frequency with which the region's fire departments cross jurisdictional boundaries under mutual aid agreements. Chief Schwartz of Arlington notes that no resource currently exists to provide regional "situational awareness" and "resource status" information – such as, for example, a resource to determine where another jurisdiction's fire trucks are located and if they are available for dispatch. Currently, many of the jurisdictions use pagers connected to the CAD system to "work around" CAD interoperability problems with other jurisdictions, but that solution is considered insufficient because it requires waiting for a response before dispatch, according to Chief Schwartz.

Deputy Chief Whitmore of Alexandria notes the same concern and offered an illustration:

> Currently there exists a system of seamless response among Alexandria, Arlington, and Fairfax County. The CAD systems are not linked and therefore [we] dispatch mutual aid unit[s] 'blindly' unaware of the actual status of these units. As such much time is lost transferring call information between centers by telephone and many calls are re-dispatched due to units committed to other incidents.

The lack of CAD integration spills over into resource tracking and management as an issue of concern to the fire chiefs. Chief Owens of Fairfax City notes the delays in dispatch caused by the need to manually check if another jurisdiction has available resources near an incident. Chief Schwartz of Arlington also sees a link between CAD interoperability and resource tracking. For example, at the time of the 2001 Howard Street Tunnel CSX train wreck as an illustration, one of the primary difficulties was determining from where resources had been taken.

3.4.2.3   Preplanning Data and GIS

Some of the fire chiefs also mention the need to continue and increase sharing of preplanning data including text and GIS-based data. For example, Manassas, Manassas Park, and Prince William County share a HAZMAT database of Tier 2 reportable materials and fire pre-planning information. NCRnet would facilitate sharing of this data over a far greater geographic area.

3.4.2.4   AVL

A number of chiefs note a requirement to make available to dispatchers regional AVL information.

3.4.2.5   Handheld EMS Reporting Tools

Arlington's Chief Schwartz mentions the desirability of offering hand-held EMS reporting tools to improve communications between incident command and EOCs, improve resource tracking, and to make incident data immediately available to health agencies.

3.4.3   Voice

3.4.3.1   Radios and Cell Phones

Fire officials express general satisfaction with performance of 800 MHz radio systems but express concern about operating the radios out of range of their home communications center, and about scarcity of capacity or channels in some situations.

Most fire departments also use Nextel wireless phones. They rely on the push-to-talk feature, primarily for non-emergency purposes. However, the interviewees tend to doubt that the phones could be relied upon in a regional emergency, when potential exists for the network to be overwhelmed with service demands.

The level of reliance on the Nextel service varies among jurisdictions. One chief relies on the Nextel service as backup in the event of occasional saturation of his department's 800 MHz communications.

While this ESF demonstrates general satisfaction with the level of radio interoperability, there exists concern that systems can only speak with a particular communications center when in range of that center; when out of range, systems need to be switched to the channels of neighboring centers and speak only via that center. Many of the interviewees in this ESF would prefer if neighboring centers are linked together externally to the radio system, and programmed so that a first responder can reach his or her home center by way of the neighboring center. This concern is summarized by Deputy Fire Chief Whitmore of Alexandria:

> While the region enjoys a robust 800 MHz radio system, the independent systems are not linked. Units operate today by switching into and out of the independent systems controlled by each communication center. These leave units still dependent on the range of their own home radio system coverage area in order to talk back to that communication center.

Chief Schwartz of Arlington also notes the difficulty of operating 800 MHz radios too far off home base and relying on the local infrastructure. Chief Schwartz suggests repeaters as one potential solution to the problem.

Chief Whitmore remarks on another problem that surfaced in joint exercises: the dissimilar programming of radios made them difficult to use for personnel not acquainted with a particular radio with a particular configuration. This becomes especially relevant when portable radios are loaned out to incident staff.

As with other ESFs, many fire officials also use BlackBerry devices and make frequent use of them to email when mobile.

3.4.3.2   VoIP

VoIP appears to have seen limited implementation in this ESF to date, though there is significant interest in the technology. There are efforts in a variety of NCR jurisdictions to use VoIP, as well as an RESF 2 sponsored project to roll out VoIP pilots, but the fire chiefs seem to have adopted a wait-and-see approach until then. Fire and Rescue Director Walter Murray reported that Frederick County is using VoIP and that it is possible to connect via laptop anywhere on the network, including schools.

3.4.4   Control and Governance Considerations

In terms of broader issues related to NCRnet, two issues emerge from the interviews with representatives of this ESF:

Chief Schwartz expresses concern about any approach that would rush and build an infrastructure independent of the actual needs and policies of the region:

> The notion that if you build the infrastructure, the applications will come, is wrong. I prefer the approach of first determining policy, then defining applications, and only then building the infrastructure to support them.

Another issue is raised by Chiefs Homan and Boyd who also point to the regional institutional level as a necessary foundation for interoperability:

> We need to be able to set up mutual aid agreements without the impediments of bureaucracy – it would be useful to have some sort of 'carte blanche' mutual aid agreement for the region.

3.5 ESF 5: Information Planning (EMA)

The I-Nets Team conducted 11 interviews in 10 jurisdictions with emergency managers – primarily at the Director or Deputy Director levels – representing ESF 5, interviewing a total of 11 individuals.

ESF 5 coordinates planning and information flow during emergencies and, when needed, assists in managing response. As a result, this ESF is focused on the twin goals of information access and information exchange. Many of the smaller jurisdictions do not have extensive, dedicated EMA staff and therefore rely on RICCS' alerting capabilities.

Generally, the emergency managers are concerned about meeting their needs for information for appropriate emergency planning, anticipation, coordination, and response. They see a regional communications infrastructure as useful to meet their requirements to communicate within the ESF. Specifically, they see growing requirements for the following functions:

- Monitoring of events across the region, in part by integrating CAD systems
- Sharing of GIS data to understand spillover effects and resource location/allocation
- Sharing of other data as new applications emerge
- Ensuring EOC backup options with full communications capabilities
- Capability to mirror, backup, and recover critical data
- Coordination with other EOCs over a reliable and secure network

3.5.1 Video

3.5.1.1 Videoconferencing

Most of the jurisdictions interviewed see a requirement for reliable videoconferencing capabilities. Many of them are already using video conferencing; the District of Columbia, for example, uses secure video conferencing to communicate with local and federal authorities over ISDN circuits. A number of the jurisdictions mention training as a primary requirement driving their interest in video-conferencing. The other key uses include real-time communications in the event of an emergency and both routine and emergency meetings from disparate and remote locations.

3.5.1.2 Traffic Camera Video

Many of the emergency managers recognize a need for sharing of traffic camera video. A number of the jurisdictions use www.trafficland.com to monitor traffic video provided by VDOT, MDOT, DDOT, and Montgomery County. Some of the representative of this ESF would like to see such basic capabilities expanded. Reggie Parks of Prince George's County, for example, noted that his County is collecting real-time video from its police helicopter and would like to share the video streams with other jurisdictions over the appropriate communications link.

3.5.2 Data

3.5.2.1   WebEOC

WebEOC is being rolled out throughout the NCR. The interviewees in this ESF were generally enthusiastic about this application but concerned about such issues as:

- Security
- Integration with the respective states
- Slow speeds, particularly when many users are logged in at once
- Lack of VPN access
- Occasional failure to run seamlessly, such as automatic lock-out after multiple failed log-in trials

3.5.2.2   GIS

Many of the emergency managers regard GIS-sharing as one of the key requirements for their ESF. Jeff Fletcher of Loudoun County, for example, notes that GIS data is a significant resource that should be shared, particularly in the context of real-time emergency events.

Douglas Bass of Fairfax County sees a region-wide need for extensive and ambitious GIS-sharing over a common platform: "We need police helicopter video overlaid with regional GIS, including possible layers for traffic control points, command center locations, and state DOT cameras.

Like many of his colleagues, Mr. Fletcher notes the complexity of addressing the compatibility issues, or "marrying the data points." Some emergency managers point out that even *within* some jurisdictions, there is not compatibility or sharing of GIS data, and the complexity of sharing regionally will be even greater.

3.5.2.3   CAD Integration

Several of the emergency managers view CAD integration as one of the key needs of their agencies. Douglas Bass of Fairfax, for example, sees a requirement for CAD interconnectivity with GPS/AVL interaction to automatically identify available emergency response resources closest to an emergency, regardless of jurisdiction, and without the delays inherent in manual dispatch-to-dispatch communications. Mr. Fletcher of Loudoun echoes this requirement: "We need to have CAD systems integrated, so fire resource availability can be checked among jurisdictions. The CAD system should blast out across borders and broadcast quickly."

3.5.2.4   IT Backup and Recovery

The interviewees in this ESF are already backing up their data to varying degrees, and agree that greater data backup capability over secure and reliable communications circuits is desirable. In

Loudoun County, for example, Mr. Fletcher reports that his local ESF backs up all data, including local PC data, nightly -- however, he still sees a need for a data recovery/backup EOC facility because the data backup system is not redundant. The other jurisdictions would also like to have data recovery options for their EOCs, including remote mirroring capabilities.

3.5.2.5   Emergency Alert Systems

All the jurisdictions in the region have purchased and deployed emergency alert systems for receipt of text alerts over mobile devices. All have Roam Secure and a few jurisdictions have other, additional alert systems such as Wide Area Rapid Notification.

3.5.2.6   Redundant Access

Many of the emergency managers note the requirement for redundant access to the Internet to allow them access to both web-based data and applications. Some note that a fiber connection is optimal. Redundant Internet access over a regional infrastructure would meet this need and alleviate the need for a leased carrier option.

3.5.2.7   Email

Email is a heavily-used applications and many of the interviewees note that they would like to have secure email communications with other jurisdictions.

3.5.3 Voice

3.5.3.1   800 MHz Radio

The 800 MHz radio band is used by all the jurisdictions interviewed, other than Prince George's County, though not by all members of this ESF.

The interviewees regard regional coverage as an urgent need. Bob Griffin of Arlington, for example, suggests that the need merits construction of a regional tower system for radio communications.

3.5.3.2   Nextel Push-to-Talk

As not all ESFs are equipped with 800 MHz radios, Nextel phones are often the best or only means for this ESF to reach representatives of other ESFs in the field. Mark Brown of DC, for example, reports that District Public Works field personnel are only accessible over Nextel phones.

As with many of the other ESFs, emergency responders increasingly view Nextel services as an important backup in case of communications failures over landline or other carriers' cell phones.

For example, Mr. Fletcher reports that Nextel serves as a key backup communications system for Loudoun County. Mark Penn of Alexandria reports using the Nextel push-to-talk with Direct Connect feature to communicate with Federal authorities, including the US Marshals Service and the Federal Courthouse located in Alexandria. According to Mr. Brown, the District has issued Nextel phones to its entire EMA staff of about 40 people.

3.5.3.3 Satellite Phones

Most EOCs have portable satellite phones to meet their need for backup voice communications in the event of emergency. However, a number of the smaller jurisdictions note that the cost of activating satellite phones has limited their use—in some cases, the phones have been purchased but never used.

3.5.3.4 Teleconferencing

All the jurisdictions use teleconferencing extensively and recognize growing needs for greater quality and capability to add more attendees.

3.5.3.5 Broadcast Radio

Both Alexandria and Arlington see a need to broadcast emergency information to the public. Arlington's Bob Griffin reports that Arlington is seeking FCC approval for a license to broadcast Countywide. In additionally, Mr. Griffin reports providing RoamSecure alerting over satellite to XM radio subscribers.

3.5.3.6 Amateur Radio

Alexandria reports actively integrating amateur radio (ARES/RACES) into response planning. A local amateur radio club provides backup communication in certain eventualities using its production van, which has both generator and transmitter. Among other functions, amateur radio enthusiasts connect public safety agencies with emergency shelters by setting up and operating point-to-point radio equipment.

Although there are local amateur radio chapters in almost all the jurisdictions, no other jurisdiction mentioned amateur radio services as communications backup.

3.5.4 Communications with Backup Facilities

3.5.4.1 Backup EOCs

The interviewees from this ESF recognize a significant requirement for reliable, high-capacity communications links to their backup EOCs. Most of the larger jurisdictions have permanent EOCs as well as backup locations.

High-capacity links to the backup EOC are necessary for voice, video, and data communications, according to the interviewees, including such emergency applications as CAD, 911 dispatch, communications with mobile command vehicles, and other emergency services. These capabilities become particularly essential during emergencies when jurisdictions may share backup EOCs, either because they don't have one of their own or because the emergency has rendered their own EOC unusable.

According to some of the interviewees, they require backup EOCs not only to have CAD backup and mirroring but also to evolve beyond the latency problems sometimes faced at backup EOCs. Gordon Aoyagi of Montgomery County, for example, notes the need for backup, redundancy, and swift communications.

3.5.4.2   Mobile Command Units

Some jurisdictions also maintain Mobile Command Units that operate as command posts with limited capabilities. In emergencies, all or part of EOC functionality can be transferred to these units. Prince William, for example, has a designated backup EOC, but in case the EOC becomes inoperable, EMA staff can switch to a Mobile Operations Center or Field Operations Center. Arlington is converting a former police vehicle to be retrofitted as a Mobile Command Vehicle for fire, police and EMA use, utilizing microwave communications for backhaul. DC-EMA maintains two communication vans, each of which can be staffed by six employees of the EOC, that can deploy to the scene of an emergency and provide onsite video. The vans are equipped with wireless broadband and satellite communications capabilities. The vans can also hotwire into the Comcast network.

Andrew Jackson of the District of Columbia notes that portable EOCs are a functional and flexible option for emergencies. He and other emergency managers interviewed note that these facilities require robust wireless options as well the capability to link to a fiber backbone.

Mr. Bass of Fairfax also notes the need for a regionally-integrated communications infrastructure that would connect EOCs and provide the ability to "plug" in to any of the jurisdictions: "I would want to have interconnection points in other jurisdictions for physically – or wirelessly – connecting mobile command vehicles when dispatched to other jurisdictions."

3.5.5 Control and Governance Considerations

The emergency managers interviewed identify some challenges they believe must be addressed for a regional communications program to succeed.

3.5.5.1   Security

Many of the emergency managers note the complexity of sharing data with the states or that requires clearance of user authorization and access. A number of interviewees note that some data is classified or confidential data and that particular agencies (such as law enforcement) will

not or cannot share it unless it can remain classified. State stakeholders may also not want to share data with local ESFs. In the opinion of Mr. Parks of Prince George's County, resolving security issues to allow information sharing is the number one concern of establishing a region-wide communications infrastructure.

3.5.5.2   Control

Some of the interviewees from this ESF raise a concern that echoes other ESFs regarding the potential for large jurisdictions to dominate decision-making and operations of the regional network. Smaller jurisdictions note that they have less influence, in part because they have fewer resources, and so cannot participate in planning and other functions to the same extent as the larger jurisdictions. They recognize that the large jurisdictions may have to do more work—and are not necessarily deliberately exercising control—but that the disparate levels of power regarding the network are nonetheless likely to result.

3.5.5.3   Regional vs. Local Structures

A further complication that is worthy of note was raised by Mr. Aoyagi of Montgomery County regarding the different structures used by the various communities. According to Mr. Aoyagi, Montgomery County does not use the ESF structure at its EOC. Rather, it uses the NIMS (ICS) structure – organized by (1) Command, (2) Operations (fire, police, public works, and public health), (3) Logistics (mass care), and (4) Finance/Administration. Mr. Aoyagi notes a concern regarding how to fit the regional ESF structure into the EOC-level NIMS structure on a practical basis. He cites, for example, a recent event in which there was disagreement among regional ESFs as to who was managing a situation. Mr. Aoyagi points to the importance of recognizing that regional interoperability efforts will still need to work from the local level and respect jurisdictional institutional arrangements and command structures.

3.6   ESF 6: Mass Care

The I-Nets Team conducted three interviews with Mass Care representatives of three different jurisdictions. All three were social service representatives who had been requested by the CIO of their respective jurisdictions for interviews. This Report does not attempt to generalize conclusions regarding this ESF's requirements from the few interviews that were possible, but does attempt to supplement that data with information gained from other ESFs about the interactions with, and need for, Mass Care.

The COG's Regional Emergency Coordination Plan defines Mass Care's mission as provision of "mass care assistance to victims that have been impacted by a regional incident or regional emergency." This ESF's responsibilities include handling of shelter, food, and emergency first aid assistance, and other activities associated with helping victims. Mass care is also mandated to work closely with private relief agencies such as Red Cross, and to assist ESFs 4 and 8: Fire, EMS, and Public Health.

3.6.1   Current Communications

ESF 6 representatives report that most communications are conducted over email and landline phones. Limited assets exist for communications among jurisdictions for such purposes as tracking resources, coordinating contacts, tracking victims, or exchanging information and data with Red Cross or Salvation Army. There is also limited coordination with public health officials who may have patient tracking data, or RMS data from Fire/EMS calls that could be plotted to identify hotspots for mass care intervention.

3.6.2   Communications Needs

Given this ESF's coordinating and interactive mission, many of the core functions of Mass Care are critically dependent on coordination of a variety of different agencies and organizations, public as well as private, and of local government assets. Intra-ESF communications therefore constitute one key priority for ESF 6 that impacts its ability to perform its mission.

The Mass Care interviewees note that they project future needs to contact other jurisdictions to coordinate emergency services, though they have not had that capability in the past. Other ESF representatives agree: one EOC Manager, for example, points to the importance of inter-jurisdictional communications in the event that an emergency requires his jurisdiction to seek shelter for evacuees in neighboring jurisdictions.

It is likely that Mass Care's interest in inter-jurisdictional communications will grow dramatically as time passes, given the stated requirements of other ESFs for applications that are also of interest to Mass Care, including the tracking of victims and service support. The interviewees of this ESF recognize that such applications will be most effectively applied to Mass Care social services if there is a maximum of communications with other jurisdictions as

well as with such organizations as the Red Cross, Salvation Army, and other support agencies. Given that schools and stadiums often serve as shelter and therefore as key Mass Care distribution sites, the NCRnet communications infrastructure, which includes both of these types of sites, can facilitate communications among these sites and between these and government locations.

3.7   ESF 8: Health, Mental Health, and Medical Services

The I-Nets Team conducted eight interviews with ESF 8, speaking with a total of 22 individuals representing that ESF. Most interviews included one or two officials, although in one case nine participants were interviewed in a focus group format.

For purposes of planning and communications, ESF 8 is a particularly complex entity at both the institutional and organizational levels. For example, the ESF includes public health officials, hospitals, EMS, and even physicians. In addition, ESF 8 affiliates do not always fit neatly into jurisdictional boundaries. Many of the smaller jurisdictions in Maryland receive health department services from their surrounding counties. In Virginia, many of the health officials interviewed were in fact state employees, assigned to particular "health districts" by the Virginia Health Department. Thus, Prince William Health District also covers the Cities of Manassas and Manassas Park. Similarly, the Fairfax Health District includes the County of Fairfax, the City of Fairfax, the City of Falls Church, and the towns of Clifton, Herndon, and Vienna.

In addition, some of the ESF's hospitals are private or state institutions and do not fit neatly into jurisdictional lines. Many also maintain their own EOCs and emergency planning. Even the county officials conduct much of their data sharing, emergency preparedness, and communications with state and federal authorities, rather than local ones. This creates some unique challenges for this ESF, one of which is integration into the jurisdictionally-based ESF structure within COG, including the requisite IT support that often sits outside normal jurisdictional hierarchies.

Generally, the Public Health interviewees see requirements for:

- Integrated communications with other ESFs as well as within their ESF
- Improved voice and data communications solutions to reach field support staff at mass dispensing sites and shelters
- Enhanced and shared GIS data

To meet these needs, ESF 8 also requires IT support to help bridge the organizational and institutional boundaries that characterize this group and integrate federal, state, local, and regional communications. An NCRnet backbone connecting the different actors should go a long way to help in this regard and overcome complex firewall, security, and institutional barriers.

3.7.1 The Need for Inter- and Intra-ESF Communications

The interviewees from this ESF frequently note the need for institutional communications, not only with other ESFs, but also internally within ESF 8.

This ESF includes a large number of dispersed entities, many of which have similar functions within their own realms. The Counties, for example, have public health and emergency

management departments – as do the hospitals, which frequently are equipped with their own emergency management, EMS, and public health facilities.

A number of the interviewees note the difficulty of communicating with such institutionally dispersed actors and see a requirement for facilitating that communications through an appropriate communications infrastructure:

The Montgomery County representative, for example, sees a requirement for two-way radio communication with other jurisdictions. The Alexandria representative notes that, to meet the needs of public health and human services, there is a need to have public health integrated into the system of other responders. The ESF within Alexandria requires a system for interactive communications between Public Health and the police and fire ESFs. In the view of Alexandria, communications have to go beyond the phone as the only two-way communications device currently available.

A number of the interviewees also raise the requirement to connect to Federal and mass care supporting agencies. They point out that there should also be connectivity to schools, which serve as shelters in case of emergency and often are the site of health personnel work. They see a need for a regional network to help support communications among the dispersed members of ESF 8 such as, for example, traditional mass dispensing sites such as schools, many of which are already connected to jurisdictional I-Nets and could be bridged onto NCRnet.

3.7.2 The Need for Integrated Local/State Communications

Many of the interviewees from this ESF see a need for integrated communications among their ESF, the local jurisdictions, and their respective states, partially because many of their functions are overseen and coordinated by the states rather than the localities. In Virginia, for example, the public health ESF tends to be oriented towards the State in all its communication and reporting requirements. On the Maryland side, the health departments are county agencies though some of the health department communications infrastructure is still separate from jurisdictional one. For example, the Prince George's Health Department uses an 800 MHz radio system, coordinated with the local hospital system. The County public safety radio system, however, currently uses the 450 MHZ band. Video and VoIP are provided (will shortly be provided) by the State and initially installed as closed communications systems that do not interface with the County. Finally, a number of the key applications used by this ESF are hosted by the State with State-oriented reporting requirements.

3.7.3 Video

All the health departments report using videoconferencing currently or are expecting to have that capability shortly. The systems tend to be State-based or oriented and are used only in limited fashion for regional communications. The interviewees express a need for greater regional videoconferencing capabilities, including with other jurisdictions and ESFs.

The District of Columbia's Dr. Winter, for example, believes the ESF requires capacity to receive high-quality video from the field to examine incident sites:

> Let's take as an example an overturned tanker on Southwest Highway. Emergency Operations gets on the scene. There is no live, streamed video yet. Now, that would be good to have. You would then be able to zoom into the hazards plate and determine content. The visual image is very important: for example, is there a school in the background? It could capture important information around the incident site.

The Virginia health departments received their videoconferencing systems from the State. According to Alexandria, their system works over a State network and they leave the connection running during an emergency. The video system is used only for emergency use with the Virginia Department of Health and is not used for routine meetings or for the broader region. The interviewee also reports that the system does not currently support inter-agency videoconferencing.

Prince William reports similar use of its system—videoconferencing is used primarily to communicate with the State in Richmond, with the Centers for Disease Control, and to receive educational programming.

Arlington County does use its system to conference with state and local health officials. Loudoun County connects with other health departments in addition to the State. Barbara Rosvold of Frederick County reports using a bi-directional satellite videoconferencing system funded by state of Maryland.

3.7.4 Data

3.7.4.1   Email

Email is a staple of health personnel, and is accessed over desktop and laptop computers. Many of the Virginia officials have email systems provided by the State's health department. Both Dr. Konigsberg and Dr. Goodfriend, of Alexandria and Loudoun County respectively, have access to local and State email systems, but reported that they don't work well together. Blackberries, for example, are limited on dual email use. And State email access -- as well as State and Federal databases through VPN -- is difficult or impossible from jurisdictional EOCs. Email is also a preferred mode of communication to volunteers, according to Alexandria, and along with regular telephone the most common form of coordination for this ESF.

3.7.4.2   Emergency Notification Systems

For emergency alert notification to the public, Arlington and Alexandria reported using SWAN, which unlike RICCS' Roam Secure notification system has document attachment capabilities. Prince George's is using Roam Secure as a redundant system to WARN. SWAN is a Virginia

state system, while Roam Secure is sponsored by COG's RICCS, and WARN is Prince George's County's own notification system.

In terms of receiving alerts and conducting conference calls through RICCS, our interviewees complain of a "Tower of Babble" syndrome, in the words of Montgomery County. The problems are overabundance of information, and lack of well-defined roles and responsibilities for information flow, according to the representative of both Montgomery County and Alexandria. Being able to "see" who is on the call would help, but the dispersed nature of ESF 8 may make for confusing conference calls even if users and participants are transparent and credentialed.

Indeed, mere filtering to ESF 8, would not solve the problem according to one interviewee:

> RICCS has too much unfiltered information without sufficient detail, though the technology appears to be good. We get a lot of information we don't need. Traffic information from far away may not be very useful to us in an emergency, but we may be very interested in drinking water. How do we filter this information? And we cannot simply filter to ESF-8, since sometimes we also need to hear from other ESFs.

3.7.4.3   Data Access and Tracking

The interviewees report the need to access a variety of public health databases including the ESSENCE II Syndromic Surveillance System, State communicable disease databases, NEDSS, Maryland's FRED (which catalogs bed and staff availability), and local databases monitoring over-the-counter drug sales. Patient records are also typically accessed over a variety of databases at County or hospital levels.

Patient tracking is put front and center by many of the interviewees who see it as the primary need of regional intercommunication. Some require patient tracking not only in the event of emergency but also on a routine basis to enable tracking of where patients go after treatment. Prince George's County Health Department, which is leading an NCR initiative to tie patient tracking into FRED and CHATS (tracks county hospital capacity), reports that the emerging application will be able to track equipment, human resources, beds, and victims to assign each to appropriate place.

The interviewees note that a regional network would assist them in gaining high-quality access to disaster management tools such as ESSENCE, FRED, and patient tracking.

Some interviewees see a critical need, in the health sphere especially, for a secure channel over which to share data and applications. Tom Miller, Director of Communications for the State of Maryland's MIEMSS network, regards NCRnet as a potential, secure alternative to the public Internet for FRED, CHATS, and other applications.

3.7.4.4   GIS

The interviewees from this ESF see a requirement for increased access, as well as increased utilization, of GIS in order to further operational capabilities for mapping and managing such emergencies as natural disasters, and biological and chemical hazards.

For example, Alexandria's representative reports that Alexandria Public Health can access City GIS layers, but need ever been access and data, such as that associated with the Mosquito surveillance program. Montgomery County's representative would like to see more data in GIS format. Reginald Winter of the District of Columbia is also interested in instant access to regional GIS data such as, for example, sewer data in case of a chemical spill. The District's interest in regional GIS layers ranges from sewer data to weather service information to incident topographical maps—all of which will assist in understanding the dispersal of biological or chemical agents.

3.7.5 Voice

3.7.5.1   Landline and Wireless Phones

Health officials typically use regular or cell phones to communicate. Bill Kelly and Richard Helfrich of Montgomery County note that they are "are telephone and cell phone dependent." Several jurisdictions report limited use of Nextel phones and more frequently of pagers. A few jurisdictions also mentioned access to priority access to phone lines in the form of GETS cards.[19]

3.7.5.2   Radio

Most of the ESF representatives reported access to 800 MHz radio, but without a dedicated channel or talk group. A number of the interviewees note a need for greater reliability, better quality, and more capacity. They note also that their ESF is highly distributed—containing hospitals, EMS, public health officials, and even physicians—such that there can be no central "operator" to route calls.

3.7.5.3   Satellite

The District of Columbia, Alexandria, and Montgomery, Loudoun, and Frederick Counties all report that they have or shortly will have satellite phones. Most note, however, that the phones are either unreliable or too expensive to use.

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[19] There was some confusion between GETS which gives priority over landline and WPS which is the wireless counterpart, this confusion likely stemmed from the fact that no exercises had been conducted in which this type of access was tested.

3.8   ESF 13: Law Enforcement

The I-Nets Team conducted 11 interviews of the law enforcement ESF, interviewing a total of 24 individuals. Most of the jurisdictions made senior officials, such as police chiefs, available for our interviews, and several of these brought technical support staff with them for the interviews. Interviews with staff at senior operational levels offer insight into future operational needs as well as current operational problems and opportunities.

Law enforcement officials are heavily concerned about issues of data security, data sharing, and regional coordination. They are also concerned about CAD and PSAP integration.

The interviewees see a need for a regional communications infrastructure that can not only interconnect jurisdictions but also improve inter-jurisdictional communications. One police chief noted that:

> A major challenge is designing an infrastructure that provides coverage and capacity throughout all areas of the region so officers or first responders can communicate from any location in the region. Also, we must design the system so current agency equipment can access and use the NCRnet with minimal cost and disruption of current systems. Among the things fiber links need to address are: throughput, redundancy, and multi-path routing.

The following represent major themes, concerns, and needs shared among the members of this ESF:

- Most jurisdictions use 800 MHz as well as cell-phone service, primarily from Nextel, extensively
- A variety of different federal databases are accessed, but regional data sharing is more limited
- The members of this ESF are beginning to use video conferencing more extensively
- Video camera feeds are a growing need and one that is likely to expand
- Use of MDTs and MDCs is extensive, but not all data can be accessed because of firewall issues
- MDTs use a range of different wireless providers and protocols, depending on the jurisdiction
- PSAP, CAD, and RMS integration is a common need
- There is a need for "hot phones" or other direct communication between key sites (such as PSAPs)
- Data sharing has been required for a while, but has run into security barriers and complicating federal requirements
- GIS is an emerging and growing need
- Security is a problem area of data exchange

3.8.1   Voice

3.8.1.1   Mobile Radio

The most important form of communication for the law enforcement ESF is the mobile radio system. Most jurisdictions are using bandwidth in the 800 MHz band and are fully interoperable with other NCR jurisdictions on this band. However, other jurisdictions operate on other bands and need to be cross-patched for intercommunication. For example, the City of Frederick's Police Department and the County Sheriff's Office have separate radio systems and need cross-patching.

Despite some commonality in the 800 MHz band, some frustrations regarding interoperability remain. A number of jurisdictions noted the inability to communicate via voice with non-800 MHz voice radio users at the local, state, and federal levels. Some jurisdictions expressed concern that they will not be able to communicate by radio with their own officers responding to events outside the jurisdiction.

3.8.1.2   Cell Phone Service

All the jurisdictions interviewed reported using Nextel phones, many as their primary form of communication. Like other ESFs, law enforcement representatives reported significant ongoing coverage problems. Many also expressed concern about Nextel's capacity potentially failing to meet growing needs in the event of emergency.

Nextel phones are used mostly within jurisdictions rather than on an inter-jurisdictional basis. Manassas, for example, noted that their police share Nextel Direct Connect numbers on an ad-hoc basis with other jurisdictions' personnel, but there is no formal sharing policy. Indeed, most jurisdictions reported not even having the phone numbers of their counterparts in other jurisdictions. Prince George's mentioned one exception to this insularity: officers at the FBI communicate with the County over Nextel phones, and they also receive text messages from the Joint Terrorism Task Force (JTTF), including warrants.

A number of jurisdictions also noted a concern about the viability and capacity of Nextel's system in emergencies: given that Nextel's Push-to-Talk was the only system that worked on September 11, 2001, many additional jurisdictions adopted Nextel, leading to a fear that the system will be overloaded in next emergency.

In addition to Nextel's phones, other cell-phones and Blackberries were reported in wide use. Manassas, for example, uses Blackberries for email and cell-phone service, and Loudoun plans to obtain Blackberries and to make them interoperable with NCIC and CAD status.

3.8.1.3   Teleconference Meetings

Law enforcement officials reported frequent participation in regional meetings. Face-to-face meetings as well as teleconferences are used for regional meetings in both COG/NCR as well as state-specific and federal forums. Montgomery County's Police Department, for example, reported participation in COG, regional groups, and national groups as needed. The Department participates in meetings on interoperability, data sharing, standards, and mutual aid across ESF lines.

Regular telephones are heavily used for teleconferencing. In Fairfax City, for example, conference calls are conducted at least weekly. In Prince William County, September 11, 2001 led to regular conference calls.

3.8.1.4   Hot Phones/PSAP Connectivity

The interviewees from ESF universally expressed a need for connectivity between jurisdictions, though they had a variety of ideas for forms of connectivity. For example, representatives from Fairfax County expressed a desire for "hot phones" between key regional locations to keep key personnel connected.

While many of the jurisdictions mentioned the Direct Tie Lines connecting PSAPs, Prince George's County raised the need for direct data connectivity to support dispatching, as well. According to Prince George's County police, phone lines at the 911 Center (CCF) enable mutual aid speed-call to 911 centers in neighboring jurisdictions, but there is no direct data connectivity for coordination of dispatching. Unsuccessful attempts have been made over a number of years to facilitate data interconnection between some of the 911 centers.

3.8.2   Video

3.8.2.1   Remote Video of Traffic

A number of law enforcement interviewees note a need for remote video, generally to view traffic cameras set up by their transportation departments. A minority expressed a need to view traffic cameras from all the jurisdictions in the region.

3.8.2.2   Video Conferencing

The representatives of this ESF unanimously affirmed the importance of inter-jurisdictional video conferencing. Although a few of the jurisdictions have only limited video conferencing experience, all are planning greater use of video conferencing and are enthusiastic about the need for such conferencing among law enforcement personnel of different jurisdictions.

Regional video conferencing within the law enforcement community also received high priority among interviewees. Some jurisdictions consider video conferencing to be the pinnacle communications goal. One notes, for example, how helpful regional video would have been in the sniper case. Such a system could be used for regular Police Chief Wednesday meetings between all chiefs from Baltimore to Stafford County.

Video conferencing would enable personnel to remain on-site and yet still increase attendance at meetings. Interviewees noted that the deficiency of voice-only calling is uncertainty about whether the call is secure and who is on the line. Regional video conferencing would allow attendees to stay where they have all of their resources at their fingertips, Video conferencing also adds an element that voice calls cannot offer: a view of the participants and a visual understanding of context and cues.

A number of communities noted the importance of video conferencing, between commanders as well as between field personnel and commanders. Fairfax County, for example, compared the importance of video conferencing with that of voice, noting that basic voice and video communications in the field is the most critical aspect of emergency communications. Field personnel must be able to communicate verbally, and preferably over video, and ideally should be able to transmit large data files such as photographs and video.

This greater capability of video conferencing relates to in-field communications as well as executive-level conferences. Interviewees note that communications from the field to commanders would be enhanced by video's capability to communicate instructions and descriptions of situations more effectively than by voice alone.

3.8.3   Data

3.8.3.1   Wireless Data

Law enforcement, more than any other ESF, relies on mobile data capabilities to access data from police cruisers with MDTs or MDCs. Each jurisdiction has found different communications solutions for their MDTs. For example, Frederick and Montgomery Counties use various commercial CDMA protocols. Montgomery County also uses 800 MHz RD data. Manassas is migrating mobile data from its 450 MHz digital radio system to Sprint's CDMA network. Prince George's is migrating from analog CDPD to CDMA.

Both Frederick and Loudoun Counties report deploying Wi-Fi hotspots at select locations to upload data and download images and system updates. Loudoun reported having a Mobile hotspot unit with backhaul connectivity via satellite. Other jurisdictions also have mobile command vehicles that can serve as hotspots providing a range of different communications options.

The representatives of this ESF expressed a strong need for robust and reliable wireless options; cost is a consideration too. For example, the City of Fairfax is seeking a cost-effective alternative to their primary CDMA/wireless mobile communications.

3.8.3.2   Backhaul for Wireless

The interviewees were highly concerned with their wireless communications, for both voice and data. They believe that one of the key goals of regional efforts should be to ensure that they can rely on their wireless communications.

All wireless systems require robust and redundant backhaul. Considering the importance law enforcement officials placed on backup communications and the lack of cost-effective backup solutions for wireless data, NCRnet-provided backhaul could fill an important gap for law enforcement.

3.8.3.3   CapWIN

CapWIN was mentioned only in a few of the interviews conducted for this Needs Assessment. Of the 11 interviews conducted, only Montgomery and Prince George's Counties volunteered that they use CapWIN and then only in limited circumstances. Loudoun County expressed interest in CapWIN as a vehicle to access the PAWN System. Prince William County stated that it does not use CapWIN because additional manual data entry is required and there is no time in an emergency to type in information. State and local police departments in the NCR are the main users of CapWIN. CapWIN may become a more familiar application, since the most recent version of the software can act as a routine portal for accessing data in routine events and accessing basic criminal databases, rather than its current role as primarily an emergency application.

3.8.3.4   Incident Notification

Our interviewees report relying on text pagers receiving teletype from VCIN and NCIC, as well as NAWAS/WAWAS, NLETS Teletype, and PMARS. And all the jurisdictions receive and use RICCS as well.

However, multiple jurisdictions report problems with reliability. Loudoun uses Metrocall pagers that reportedly have poor coverage in the western parts of the County and easily overload. Prince William believes its pager reliability problem is indicative of a national paging system in which pagers are becoming obsolete and companies are not monitoring their systems. This reliability problem has unpromising implications in a context where many of these jurisdictions rely on teletype information and use these systems as backup for other systems.

3.8.3.5   Email

All the interviewees in this ESF consider email essential for internal as well as regional communications. Email is used among all employees as well as jurisdictional, regional, and COG partners. Users have developed and use specialized address groups to quickly generate and send information to and between agencies.

3.8.3.6   CAD/RMS Integration

The interviewees in this ESF describe a strong need to share CAD/RMS data for crime analysis and prevention purposes. All the law enforcement agencies interviewed use some form of Computer Aided Dispatching (CAD) system to maintain and track important data on all calls for service. CAD systems keep track of calls and can show a variety of information, including time, geographical locations, and nature of calls, that can be used to discern patterns. This information is frequently fed into a Records Management Systems (RMS) that captures information submitted on incident or arrest reports. Additional supplemental reports are also often maintained in this RMS system. These data are then analyzed to detect crime patterns and evaluate police response.

The jurisdictions agree that CAD and RMS are essential public safety applications. They note, however, that each COG community appears to have a different RMS, as do other entities such as WMATA and WMAA. Many of the jurisdictions called for interoperability between the different jurisdictions, including federal and state authorities.

3.8.3.7   GIS

The interviewees in this ESF do not stress GIS sharing as a key area of need, but recognize that the need is likely to grow as jurisdictions increasingly integrate and develop GIS into their own operational practices, such as within CAD/RMS systems.

GIS data is used by law enforcement for a variety of purposes. While traffic is an obvious use, GIS is also increasingly used for crime and incident analysis to identify hotspots –geographic information captured in CAD/RMS is plotted onto GIS; GIS provides visual aids to understand the landscape around incidents (such as potential escape or evacuation routes from schools or chemical plants); GIS supports mobile/in-vehicle mapping; GIS supports resource tracking via integration with AVL to support fleet management and track the motion of an officer; GIS and AVL enables dispatching via the actual location of a responder, instead of the location of the police or fire station.

Currently, there is very limited GIS sharing within this ESF. Layers may be exchanged with neighboring jurisdictions on an ad hoc basis, although GIS base map information is shared throughout the Washington COG region by sneaker-net[20] according to Assistant Chief O'Toole. Prince George's also reports having begun to share some GIS data with Montgomery County and DC.

3.8.3.8   Access to Databases

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[20] Sharing data by copying it onto disks or tapes.

The results of this Needs Assessment suggest that law enforcement has a greater need for access to databases than most ESFs. Depending on the database, access is via the Internet or other dedicated network connections. A few databases are regional (such as Pawn, Gang and RAFIS), but most are either local or from a variety of state and federal services. Montgomery County's police department maintains a Web Board that is used internally and shared with other county law enforcement agencies. Inter-agency boards are maintained for specialized operational areas (such as Pawn or Gang), and general informational boards are maintained across ESF lines by associations such as APCO, IACP, and federal offices such as DOJ (JUSTNET) and FBI (LEO). These are accessed through, for example, CapWIN, Maryland Traffic Records Forum, or Regional Data Sharing Initiative.

A jurisdiction's I-Net frequently provides the internal jurisdiction network link for accessing the database, whether the final connection is over a dedicated line or via the Internet. Others use leased T-1 lines and other types of direct, non-shared lines from the database users to the database—these can be within a jurisdiction's fiber network or provided by a separate service provider. As an example, Prince William County is connected via direct fiber connection to Manassas Judicial Center, at which location the police department is connected to the state network. This route provides the county's access to criminal databases such as the mug shot database.

A regional initiative is exploring LInX. The LInX program has the potential of integrating many of the databases law enforcement personnel access through a common search engine. This program is sponsored by Naval Criminal Investigative Service (NCIS) and a few of the interviewees mentioned keen interest in this program.

3.8.3.9   Data Sharing

Law enforcement interviewees listed a broad range of areas where they would like to see more data sharing. Local databases are sometimes shared with other law enforcement partners. Thus Loudoun reported that all of their in-house databases are available to other authorities via dial-up phone lines (such as a gang database and crime investigation records).

However, individual ad hoc efforts toward data sharing can be hampered by lack of standards, according to some jurisdictions, who noted that, with the exceptions of NCIC and state criminal justice databases, data sharing between local agencies and between local and federal agencies often lack definition, standards, and scope.

Mutual aid agreements and MOUs at the local level, although cumbersome and *ad hoc*, can enable some sharing, but become more complicated for regional data sharing. Even *ad hoc* access to local databases can be fraught with risks, according to some jurisdictions. They are concerned that they may incur liability if a shared database is not complete, for example if suspect is armed and dangerous. They believe that legal limitations may underlie these bars to sharing of data.

Fairfax County law enforcement argues for better regional communications to improve regional crime analysis. They note that analysts currently share information across jurisdictions by phone or email – there is no central repository of crime information. But these ad hoc mechanisms for data sharing may be insufficient for analysts to truly benefit from inter-jurisdictional communications. For example, cars stolen in one jurisdiction may be taken into another; analysts need to be able to more effectively study all of the regional data together to identify patterns. Bank robberies are another example: notifications typically occur across jurisdictions manually between detectives, usually by distribution of a flyer, then are pushed down to the local police department level – this can be a slow and cumbersome process.

Jurisdictions express interest in sharing the following types of local data:

- *Emergency planning database*: Jurisdictions express interest in having a catalog of regional emergency planning documentation available, as they are concerned that plans would not be accessible when needed.
- *POCs for hazards and evacuation:* They note that when responding to a regional emergency, such as HAZMAT contamination, it would be helpful to have the ability to tap into local databases for preplanning data and up-to-date local contacts.
- *Mug Shots/Fingerprint Records*: Some interviewees report that this data already exists at a state and federal level, but that regional data sharing would be helpful.
- *Intelligence Sharing*
- *Risk Assessment Data*
- *Reporting of border crimes*: Some interviewees indicate that knowing about crimes committed on borders of jurisdictions would enable them to deal with and anticipate the "spillover."
- *Real-Time GIS sharing*: Multiple jurisdictions see a need for sharing of GIS mapping data layers, including geo-referenced imagery, and that it should be shared real-time between all jurisdictions in the region.

3.8.4   Backup and Recovery

3.8.4.1   Transfer of Command and Control/Mobile Command Vehicles

Many jurisdictions have means of transferring command from their normal location to emergency and backup locations. Jurisdictions typically transfer command to an activated emergency operations center in the event of an emergency. In jurisdictions where fire and police dispatch are performed in different locations, there is the capability for the different locations to provide a backup role for the other. Some jurisdictions have the ability to perform dispatching for neighboring jurisdictions

Some jurisdictions additionally operate mobile command vehicles with various levels of functionality. Some command vehicles serve as backup ECCs and can handle dispatching. Others also serve as backup EOCs with command transferred to officials in the vehicle.

Other communities, on the other hand, are concerned that if their ECC fails, there would be significant downtime to move to another location. In terms of dispatch, there would be a major staffing and system capacity problem if emergency calls had to be transferred to another jurisdiction. These and other interviewees report a need for shared facility for disaster recovery/management.

3.8.4.2   Communications Backup

Several jurisdictions express interest in the added redundancy and backup solutions that might become available through connection with the other jurisdictions. In this regard, simply interconnecting the I-Nets would be of great value in and of itself, a number of jurisdictions mentioned.

Jurisdictions report using a patchwork of different backup options, although most did not have complete backup of all communications. Nextel phones provide a backup option for radios. Many of the 800 MHz land mobile radio systems have redundant design paths and can cut over to a failsoft non-trunked mode in the event of failure.

Fairfax County operates a VoIP system, which provides some redundancy to the circuit-switched telephone system but does not have the capacity to provide full backup of the primary system.

Some jurisdictions operate parallel leased communications circuits to their fiber networks between key facilities, if those facilities do not have redundantly routed fiber connections. Rockville was interested in establishing a backup connection to other networks in the region—to construct a fiber link to Gaithersburg to provide redundancy to the existing connection to Montgomery County.

Jurisdictions identified wireless data as a critical area where there was generally no backup to the primary service (generally commercial CDMA services). Montgomery County has some data capability within its 800 MHz network, but this system relatively limited in data capacity.

Rockville suggested an emergency cell phone system, potentially using mobile cell phone towers (COWS), primarily for first responders, but possibly also for the general public.

3.8.4.3   Data Backup

Data backup is done via tape as well as via network. Tapes of police data are typically transported off-site – often to another police station. Prince George's and Fairfax Counties both report using the Sungard service for disaster recovery, but report situations where recovery was needed but not available because other users took priority and there was no capacity available at the time to support the counties.

3.8.5   Network Security

Respondents identified data security as a key challenge for NCRnet. Prince William County, for example, noted that the method and standards of connection are regulated at the state and federal levels. Fairfax City, Montgomery County, Alexandria, and Prince William interviewees similarly note that security must be the primary concern when designing NCRnet.

Besides data security – storing and exchanging data in a format that complies with state and federal requirements specific to the type of data exchanges – the law enforcement officials also worried about the security of the NCRnet communications medium. In terms of the network design, Montgomery County raised the issue that any communications system will need to incorporate intrusion detection. Prince William County additionally notes the need for secure, authenticated conference call communications.

Law enforcement has one of the most extensive communications systems among the ESFs. However, the fact that the systems directly serve public safety leads some interviewees to be reluctant to grant others access – even in order to add additional redundancy or functionality.

3.9   ESF 14: Media Relations (PIOs)

The I-Nets Team conducted four interviews with representatives of ESF 14: Media Relations and Public Outreach, interviewing four individuals representing four jurisdictions of varying sizes. These interviews were designated and set up by the jurisdictions' CIOs.

ESF 14 is the Public Information Officer, or PIO, who serves as the jurisdictions' contact with the media and with the public under certain circumstances. Each jurisdiction's PIO also frequently supports and supplements resources of the agency-level PIOs such as DOT, Health, or the Mayor/Executive's office. According to Jo'Ellen Gray Countee of the District of Columbia, for example, her agency has frequent contact with her counterparts in the fire and police agencies and is a key contact with media and the public in the event of emergency.

3.9.1 Video

The interviewees all noted an interest in videoconferencing as a means of inter- and intra-jurisdictional communications. Current use of videoconferencing is limited in this ESF, though Ms. Gray Countee noted that the DC Mayor has that capability. The mayor has secure video conferencing equipment in the control center that was implemented to enable participation in FEMA's regional exercises over video. Ms. Gray Countee notes a need for expanding that capability to enable videoconferencing with other participants. Jim Barnes of Loudon County notes that getting to regional meetings is difficult and time-consuming given the size of the region—he sees a need for regional videoconferencing capabilities.

3.9.2 Data

The interviewees for this ESF require instant and alert messaging capabilities, both on a routine basis and in event of emergency. Their jurisdictions, through the COG, have implemented Roam Secure. Some jurisdictions use Stargazer, an online emergency communication preparation tool (www.stargazer.org), according to Ms. Gray Countee. Some also use the Emergency Management Network (EMnet), a satellite-based emergency warning and communications system that enables interoperable, text-based messaging, according to Merni Fitzgerald of Fairfax County. In the case of a major emergency, this ESF stands up the Joint Information Center (JIG), a mobile "room" with four TV screens and network connections for laptops, according to Ms. Gray Countee.

The representatives of this ESF also see a need for a regional infrastructure for purposes of email (both individual correspondence and dissemination of information broadly using an email distribution list) and to improve Internet access and access to their informational websites.

3.9.3 Voice

This ESF makes extensive use of landline phones, including inter-jurisdictional teleconferences within the ESF, according to Mr. Barnes and Ms. Gray Countee. Generally, this ESF does not use emergency mobile voice capabilities, such as 800 MHz systems, in part because it does not go into the field as much as other ESFs, according to Ms. Gray Countee.

4. Summary Table of Needs

The following is a summary table of requirements, by jurisdiction and ESF, for inter-jurisdictional and inter-ESF communications over a regional communications infrastructure such as NCRnet. The tabulation is based on the interview process undertaken as part of this Needs Assessment. As is described in the Methodology section above (Section 2), the interviews were designed to elicit information and anecdotes regarding communications problems and needs, rather than to catalogue all needs in the aggregate. As a result, many of the areas left blank in the table below are blank because the issue did not arise during the interview, not because the interviewee stated that there is no need for that application. The table therefore does not present a tabulation of objective needs as collected from standardized surveys. It is instead a tabulation of stated needs (existing, planned or desired) used to elicit 'frustration-based' obstacles used to identify future operational needs.

Table 2: Summary Table of Needs

ESF, by Jurisdiction	Video		Data				Voice			
	Two way video	One way video	Email	GIS	Database Access	Emergency Alert	Wireless	Wireline	VoIP	Satellite Phone
City of Alexandria, VA										
ESF 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
ESF 2	Yes									
ESF 4			Yes	Yes			Yes	Yes		
ESF 5	Yes	Yes	Yes	Yes	s	Yes	Yes	Yes	Yes	Yes
ESF 8	Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes
ESF 13	Yes	Yes			Yes					
Arlington County, VA										
ESF 2		Yes		Yes					Yes	
ESF 4	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes
ESF 8	Yes	Yes	Yes		Yes	Yes		Yes		
District of Columbia										
ESF 5	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
ESF 8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
ESF 14	Yes	Yes	Yes		Yes	Yes	Yes	Yes		
City of Fairfax, VA										
ESF 1	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
ESF 2		Yes			Yes					

ESF, by Jurisdiction	Video		Data				Voice			
	Two way video	One way video	Email	GIS	Database Access	Emergency Alert	Wireless	Wireline	VoIP	Satellite Phone
ESF 4				Yes			Yes			
ESF 13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Fairfax County, VA										
ESF 2					Yes	Yes			Yes	
ESF 5				Yes						
ESF 13	Yes	Yes	Yes	Yes	Yes			Yes		
ESF 14	Yes	Yes			Yes					
Frederick County, MD										
ESF 1			Yes	Yes	Yes	Yes	Yes			
ESF 2								Yes	Yes	
ESF 3			Yes	Yes	Yes	Yes	Yes	Yes		
ESF 4	Yes	Yes			Yes	Yes	Yes		Yes	
ESF 8	Yes	Yes	Yes		Yes	Yes	Yes	Yes		
ESF 13				Yes			Yes	Yes		
Loudoun County, VA										
ESF 1			Yes		Yes	Yes	Yes	Yes		
ESF 2			Yes				Yes	Yes		Yes
ESF 3	Yes	Yes	Yes		Yes	Yes	Yes	Yes		
ESF 5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
ESF 8	Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes
ESF 13				Yes	Yes	Yes	Yes	Yes		
ESF 14			Yes			Yes		Yes		
City of Manassas, VA										
ESF 2				Yes	Yes		Yes	Yes	Yes	
ESF 3			Yes		Yes	Yes	Yes	Yes		
ESF 4	Yes	Yes	Yes		Yes	Yes	Yes			
ESF 5			Yes					Yes		
ESF 6			Yes		Yes			Yes		
ESF 13	Yes	Yes		Yes	Yes	Yes	Yes	Yes		
Montgomery County, MD										
Montgomery County, MD										
ESF 1			Yes		Yes	Yes	Yes		Yes	

ESF, by Jurisdiction	Video		Data				Voice			
	Two way video	One way video	Email	GIS	Database Access	Emergency Alert	Wireless	Wireline	VoIP	Satellite Phone
ESF 3			Yes		Yes	Yes	Yes	Yes	Yes	
ESF 5				Yes	Yes	Yes				
ESF 8	Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes
ESF 13			Yes	Yes	Yes	Yes	Yes	Yes		Yes
Prince George's County, MD										
ESF 1	Yes	Yes		Yes	Yes	Yes	Yes		Yes	
ESF 2	Yes									
ESF 5			Yes		Yes	Yes	Yes	Yes		
Prince William County, VA										
ESF 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
ESF 2	Yes	Yes	Yes	Yes	Yes	Yes			Yes	
ESF 3	Yes	Yes	Yes		Yes	Yes		Yes		
ESF 5						Yes		Yes		Yes
ESF 6			Yes			Yes	Yes	Yes		
ESF 8	Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes
ESF 13	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
City of Rockville, MD										
ESF 1	Yes	Yes		Yes	Yes			Yes	Yes	
ESF 2	Yes			Yes					Yes	
ESF 3			Yes	Yes	Yes	Yes	Yes	Yes		
ESF 13			Yes	Yes	Yes	Yes	Yes	Yes		

Appendix A: Table of Interviews by ESF and Jurisdiction

The following is a Table of the jurisdictional and ESF-affiliations of the interviewees who met with the I-Nets Team as part of the Needs Assessment process. As is discussed in the Methodology Section above, the interviewees were generally identified by the CIOs of their respective jurisdictions and then invited by the I-Nets Team to meet to discuss regional networking requirements.

Jurisdiction	Transp. ESF 1	Comms. (CIOs) ESF 2	Public Works ESF 3	Fire/EMS ESF 4	EMA ESF 5	Mass Care ESF 6	Health Care ESF 8	Law Enforcement ESF 13	Media Relations ESF 14
Alexandria	M	M	M	W	M		M	M	
Arlington County		M		M	M		M		
Fairfax County.		M			M			M	M
Fairfax	M	M		M				M	
Falls Church		M							
Frederick County.	M	M	M	M			M	M	
Loudoun County.	M	M	M		M		M	M	M
Manassas		M	M	M	M	M		M	
Montgomery County.	M	M	M		M		M	M & W	
Prince George's Cty.	M	M			M		M		
Prince William Cty.		M	M	M	M	M	M	M	
Rockville	M	M	M					M	M
District of Columbia		M			M		M	M	M

M   In-Person Meeting
W   Response to Written Survey

Note: ESF 12 (Energy) attended a Frederick County meeting

Appendix B: Partial Table of Interviews

The following Table lists the initial set of interviews conducted by the I-Nets Team to collect data to develop this Report. Subsequent telephone interviews and other follow-up/verification activities are not recorded here.

Date	Interviewer(s)	Interviewee(s)/ESF
July 12, 2005	Andrew Afflerbach	Steve Brundage (ESF 2/IT) Wanda Gibson (ESF 2/CIO)
July 13, 2005	Andrew Afflerbach	John Pumphrey (ESF 2/IT)
July 13, 2005	Andrew Afflerbach Matthew DeHaven	Larry Bates (ESF 2/CIO)
July 14, 2005	Andrew Afflerbach Matthew DeHaven	Masood Noorbakhsh (ESF 2/CIO)
July 18, 2005	Andrew Afflerbach David Doulong Ziggy Rivkin-Fish	Mike Herway (ESF 2/CIO)
July 19, 2005	Andrew Afflerbach David Doulong	Robert Jenkins (ESF 2/CIO)
July 19, 2005	Andrew Afflerbach David Doulong	Jack Belcher (ESF 2/CIO) Lou Michael (ESF 2/IT)
July 21, 2005	Andrew Afflerbach	Dale Spangenberg (ESF 2/CIO)
July 22, 2005	Andrew Afflerbach Matthew DeHaven	Charlie Wilson (ESF 2/CIO)
August 8, 2005	Matthew DeHaven Ziggy Rivkin-Fish	Nancy Gourley (ESF 1) John Pumphrey (ESF 2/IT) Don McGarry (ESF 3) Jim Barnes (ESF 5)
August 8, 2005	Matthew DeHaven Ziggy Rivkin-Fish	John Pumphrey (ESF 2/IT) Joe Pozzo (ESF 4) Jeff Fletcher (ESF 5) David Goodfriend (ESF 8) Bob Brendel (ESF 13) Bill Wendeworth (ESF 13)
August 8, 2005	Matthew DeHaven Ziggy Rivkin-Fish	Eugene Troxell (ESF 2/CIO)
August 8, 2005	Andrew Afflerbach Ziggy Rivkin-Fish	Bill Kelly (ESF 8) Richard Helfrich (ESF 8)
August 9, 2005	Matthew DeHaven Ziggy Rivkin-Fish	Steve Mason (ESF 5)
August 10, 2005	Andrew Afflerbach	Gail Bohan (ESF 2/CIO)
August 10,	Matthew DeHaven	Bret Sweeney (ESF 1 & 3)

2005	Gerd Fischer Ziggy Rivkin-Fish	Doug McCobb (ESF 1 & 3) Bob Garbacz (ESF 1 & 3)
August 10, 2005	Matthew DeHaven Gerd Fisher Ziggy Rivkin-Fish	Charles Konigsberg (ESF 8) Sorin Cetina (ESF 8) Mike Gilmore (ESF 8) Carol Layer (ESF 8) Mike (ESF 8) Ken Loss (ESF 8) Michael Wiener (ESF 8) Debbie Smith (ESF 8) Cathy Williams (ESF 8) John Clizbe (ESF 8)
August 16, 2005	Andrew Afflerbach Matthew DeHaven Gerd Fischer Ziggy Rivkin-Fish Eric Wirth	Tom Meunier (ESF 1) Leigh Fields (ESF 2) William Adams (ESF 2) Don McGarry (ESF 3) Walter Murray (ESF 4) Brett Bowman (ESF 4) Anthony Spada (ESF 5) Dennis McFeeley (ESF 6)
August 16, 2005	Matthew DeHaven Gerd Fischer	Chris Welte (ESF 13) Mark Landahl (ESF 13) Steve Haller (ESF 13)
August 16, 2005	Andrew Afflerbach Ziggy Rivkin-Fish Eric Wirth	Charlie Deane (ESF 13) Daniel Taber (ESF 13) Tom Pulaski (ESF 13) James Carr (ESF 13)
August 16, 2005	Andrew Afflerbach Gerd Fischer	Bob Rappoport (ESF 13)
August 19, 2005	Andrew Afflerbach Ziggy Rivkin-Fish	Christine Hobbs (ESF 3) Bernie Osilka (ESF 3) Thomas Smith (ESF 3)
August 19, 2005	Andrew Afflerbach Ziggy Rivkin-Fish	Dr. Alison Ansher (ESF 8)
August 24, 2005	Matthew DeHaven Ziggy Rivkin-Fish	Alex Verdosa (ESF 1) Gail Bohan (ESF 2/CIO) John Veneziano (ESF 3) John Boryschuk (ESF 3) Tom Owens (ESF 4) Rick Rappoport (ESF 13) Bob Sisson (ESF 14)
August 25, 2005	Matthew DeHaven Gerd Fischer	Tom Meunier (ESF 1) Alan Hudak (ESF 3) Mike Marschner (ESF 3)

		Kevin Demosky (ESF 3)
		Robin Santangelo (ESF 5)
		Jack Markey (ESF 5)
		Barbara Rosvold (ESF 8)
August 26, 2005	Andrew Afflerbach	Mike Cannon (ESF 2/CIO)
August 29, 2005	Self-Reported	Richard Rappoport (ESF 13)
August 29. 2005	Matthew DeHaven Ziggy Rivkin-Fish	Steve Sellers (ESF 13) Larry Moser (ESF 13)
August 30, 2005	Gerd Fischer Ziggy Rivkin-Fish	Nate Archey (ESF 2/IT) Damon Cooper (ESF 2/IT) Sidney Clemens (ESF 8) Delaine Yates (ESF 8)
September 2, 2005	Self-Reported	Vince Whitmore (ESF 4)
September 7, 2005	Matthew DeHaven Ziggy Rivkin-Fish	Randy Buzzard (ESF 2) Larry Bates (ESF 2/CIO) Nathan Teodoro (ESF 2) Jim Johnston (ESF 3) John Hewa (ESF 3) Gene Jennings (ESF 3) Donald Homan (ESF 4) Richard Boyd (ESF 4) Marie Aylesworth (ESF 6) Jerry Burke (ESF 7) Tom Lusk (ESF 10) Brett Massey (ESF 12) Don McKinnon (ESF 13) Lt. John Barnes (ESF 13)
September 8, 2005	Andrew Afflerbach Matthew DeHaven Ziggy Rivkin-Fish	Mike Hoyt (ESF 3) Gordon Aoyagi (ESF 5) Bill O'Toole (ESF 13) David Linn (ESF 13)
September 8, 2005	Matthew DeHaven Ziggy Rivkin-Fish	Steve Brundage (ESF 2) C. Douglas Bass (ESF 5) Merni Fitzgerald (ESF 14)
September 9, 2005	Andrew Afflerbach Ziggy Rivkin-Fish	Paul Taylor (ESF 2/CIO) C.D. Collier (ESF 5)
September 27, 2005	Andrew Afflerbach Gerd Fischer Ziggy Rivkin-Fish	Andrew Klee (ESF 1) Craig Simoneau (ESF 3) Scott Ullery (ESF 14)
September 29, 2005	Gerd Fischer Ziggy Rivkin-Fish	Pete Cottrell (ESF 2/CIO)

October 7, 2005	Gerd Fischer Ziggy Rivkin-Fish	Rick Gordon (ESF 1) Vincent Fulks (ESF 1) Robert Myers (ESF 1 & 3)
October 7, 2005	Gerd Fischer Ziggy Rivkin-Fish	Reggie Parks (ESF 5) Nate Archey (ESF 2) Damon Cooper (ESF 5) John Woods (ESF 5) Stephan Papadopulos (ESF 5)
October 12, 2005	Andrew Afflerbach Gerd Fischer	Ernie Shepherd (ESF 13) Alan Lee (ESF 13)
October 13, 2005	Matthew DeHaven Gerd Fischer Ziggy Rivkin-Fish	Jim Schwartz (ESF 4) Bob Griffin (ESF 5) Ruby Brown (ESF 8) Jane Burr (ESF 8) Donna Caruso (ESF 8) Reuben Varghese (ESF 8)
October 20, 2005	Gerd Fischer Ziggy Rivkin-Fish	Mark Penn (ESF 5)
October 27, 2005	David Doulong Ziggy Rivkin-Fish	Andrew Jackson (ESF 5) Bill Curry (ESF 5) Brian Heanue (ESF 13)
November 8, 2005	Gerd Fischer Ziggy Rivkin-Fish	Mark Brown (ESF 5)
November 9, 2005	Gerd Fischer Ziggy Rivkin-Fish	Reginald Winter (ESF 8)
November 9, 2005	Gerd Fischer Ziggy Rivkin-Fish	Dale Johnson (ESF 13) Philip Antonucci (ESF 13)
November 9, 2005	Gerd Fischer Ziggy Rivkin-Fish	Jo'Ellen Gray Countee (ESF 14)
November 15, 2005	Gerd Fischer Ziggy Rivkin-Fish	John Harney (ESF 9/10)

Appendix C: CIO Interview Instrument

Date:
Interviewers:
Interviewee Name:
Title:
Jurisdiction:
Other Organizational Affiliations and titles:
Email:
Phone:

Lead-in framing: The objective of this interview is to assess needs for the NCRnet interconnection network. We are interested in assessing current needs and uses as well as other needs that could be addressed by NCRnet. We also want to get a picture of intercommunications issues that you have run into so that we can determine how NCRnet might address such issues.

We are particularly interested in
- Primary needs for interoperability of emergency service functions.
- Secondary intra- and inter-jurisdictional communication needs.
- Assessment of potential obstacles to fulfilling the needs you identify.

Verbal request for points of contact and information (followed up by email, if desired by CIO)
- Local ESFs
- Local fiber resources (cable administrator, public works, traffic)
- Fiber maps (if applicable)
- Interconnection points (if applicable)
- Fiber hub site access (if applicable)
- Emergency communications center access (for microwave network planning)

Appendix D: ESF Interview Instrument

Date:
Interviewers:
Interviewee Name:
ESF Title:
ESF Name:
Jurisdiction:
Other Organizational Affiliations and titles:
Email:
Phone:

Lead-in framing: The objective of this interview is to assess needs for the NCRnet interconnection network. In particular we are interested in assessing needs within the framework of intercommunication between emergency support functions. We are interested in assessing current needs and uses as well as other needs that could be addressed by NCRnet. We also want to get a picture of the intercommunications problems with other ESFs or first responders that you have run into so that we can determine how NCRnet might address such issues.

First we would like to get a sense of what emergency service intercommunication applications you currently use and with whom:

1. What forms of communication with other ESF members or other regional ESFs do you utilize for the purpose of alerting, coordinating, or communicating?
   - Video
   - Internet:
     - Email
     - Bulletin boards
     - Instant messaging
     - Website
   - Radio
   - Mail
   - In-person meeting
   - Telephone
     - Regular telephone
     - Cellular telephone
     - Nextel Push-to-talk
   - VoIP
   - Other

2. What core intercommunications applications do you use (examples are CAD and records management)?

3. Do you have information resources that you produce, control, or maintain that you share with other ESF members or other regional ESFs? Examples are video production facilities for training, public safety databases, GIS information, or video surveillance feeds.
Please note the form of communication you use for sharing each resource, such as Internet, leased communications circuits, wireless communications, etc.

4. What resources do you *access* from other ESFs?
Please note form of communication for each resource.\

5. Do you backup or store critical information off-site?
If so, please describe the type and amount of data, how it is backed up, and where it is stored? Via network/via manual removal of tape, etc.

6. Do you have the capacity for transferring decision and command functions from your location(s) to other sites in case of impaired capabilities in emergency? Please give details and describe the communications technology involved.

7. When a primary mode of communication fails do you have the desired backup modes of communication you need?
Please describe.

8. Can you think of any other regional interconnection communication applications you use that have not been mentioned yet?

Now that we have mapped out your current uses, we would like to address interoperability problems and needs in the next series of questions. Please feel free to expand on your answers to describe needs – current or future – as regards your ESF's use of NCRnet.

9. Please tell us what you see as some of the communications interconnection gaps, needs, and problems within the areas you discussed before.

10. Within the context of joint exercises or simulations with other ESFs or emergency responders in your area, what emerged as problems of regional communication? Please give illustrative examples if possible.

We would like to wrap up with one last question and ask you to reflect on how NCRnet can contribute to ESF intercommunications functionality.

11. What do you consider as some of the most important challenges that NCRnet could possibly address?