Department of Justice

Strategic Spectrum Plan
2007

Executive Summary

In May 2003, the President established the Spectrum Policy Initiative to promote the development and implementation of a U.S. spectrum management policy for the 21st century. In response to the President's Spectrum Policy Initiative, the existing legal and policy framework for spectrum management was examined with a goal of assisting the U.S. in meeting the demands created by dramatic changes in technology and spectrum use. This examination resulted in the issuance of a Presidential memorandum that directed the heads of Executive departments and agencies to provide a strategic spectrum plan to the Secretary of Commerce. This DOJ Strategic Spectrum Plan was developed in direct response to that Presidential memorandum.

Consistent with DOJ Order 2422.1A (Radiocommunication Policy, Responsibilities, Standards, and Procedures) the Justice Management Division, Wireless Management Office (WMO) coordinated the development of this plan with the DOJ components that utilize radio spectrum. The primary purpose of the plan is to broadly identify the DOJ's vision and requirements for spectrum use, as it deems necessary in direct support of both current and future national law enforcement operations. It is based upon specific responsibilities tasked to the DOJ, and its associated component organizations, to enforce the law, and protect and defend the interests of the citizens of the United States of America.

The plan is orchestrated to clearly identify DOJ mission responsibilities and all associated spectrum dependent requirements, activities, and applications, as specified in the March 2007 Agency Specific Strategic Spectrum Planning format provided by the National Telecommunications and Information Administration (NTIA). In accordance with that format, the DOJ's Strategic mission and vision is provided and includes both its current uses and future spectrum requirements as they relate to Federal and commercially based spectrum-dependent applications. In addition, an overview of the DOJ's spectrum management organization and associated capital planning processes is provided, as well as current DOJ efforts to evaluate new technologies as they apply to spectrum-dependent systems. The plan concludes with DOJ recommendations to NTIA that would support DOJ in achieving the most effective and efficient use of the Nation's overall spectrum resources, and be consistent with the department's strategic spectrum vision.

In recognition that spectrum is both a limited and valuable National resource, this plan demonstrates the DOJ's appreciation of the overall importance of proper planning, management, and use of spectrum to ensure its availability in support of present and future law enforcement operations.

Table of Contents

Charts & Figures

Chapter I
Introduction, Agency Missions, and Agency Strategic Vision for Spectrum Management

I.A Introduction to the Strategic Plan

In May 2003, the President established the Spectrum Policy Initiative to promote the development and implementation of a U.S. spectrum management policy for the 21st century. The purpose of the initiative was to foster economic growth; promote our national and homeland security; maintain U.S. global leadership in communications technology; and satisfy other vital U.S. needs in areas such as public safety, scientific research, Federal transportation infrastructure, and law enforcement. In response to the President's Spectrum Policy Initiative, the existing legal and policy framework for spectrum management was examined with a goal of proposing changes to assist the U.S. in meeting the demands created by dramatic changes in technology and spectrum use essential in supporting the introduction of new technologies and protect current critical uses. This examination resulted in the issuance of a Presidential memorandum dated November 29, 2004, that directed the heads of Executive departments and agencies to provide within one year, a strategic spectrum plan to the Secretary of Commerce within one year. This DOJ Strategic Spectrum Plan was developed in direct response to that 2004 Presidential memorandum.

Consistent with DOJ Order 2422.1A (Radiocommunication Policy, Responsibilities, Standards, and Procedures) the Justice Management Division, Wireless Management Office (WMO) coordinated the development of the DOJ's plan with the DOJ components that utilize radio spectrum. The primary purpose of the plan is to broadly identify the DOJ's vision and requirements for spectrum use, as it deems necessary in direct support of both current and future national law enforcement operations. It is based upon a solid foundation of specific mission responsibilities that are tasked to the DOJ, and its associated component organizations, to enforce the law, and protect and defend the interests of the citizens of the United States of America.

With clear identification of the mission of the DOJ established, the plan then outlines the operational requirements and spectrum dependent activities the department currently employs in the accomplishment of that mission. Because the national spectrum regulatory framework differs between federal and commercial, as well as licensed and unlicensed spectrum environments, the DOJ's activities are divided and addressed according to the regulatory environment they operate in. The plan also identifies strategic pursuits which potentially optimize the overall effectiveness and efficiency of DOJ's current and future mission dependent spectrum use. The department's spectrum management and capital planning processes are then identified which are designed to help posture the DOJ for not only modernizing its operational capabilities, but to ensure access to the required spectrum resources in direct support of those new and existing mission essential operations. This overall effort is then used to substantiate recommended actions for NTIA in support of short and long term National Spectrum Planning efforts.

The DOJ recognizes that spectrum is both a limited and valuable National resource. Therefore, this plan is intended to demonstrate the importance of proper planning, management, and use of

that resource to ensure its availability in support of present and future law enforcement operations, and its availability and continued benefit to the nation as a whole.

I. B Agency Mission Statements

The Department of Justice (DOJ) is comprised of 40 separate components headed by the Attorney General of the United States. Its mission is:

> **"To enforce the law and defend the interests of the United States according to the law; to provide federal leadership in preventing and controlling crime; to seek just punishment for those guilty of unlawful behavior; to administer and enforce the nation's immigration laws fairly and effectively; and to ensure fair and impartial administration of justice for all Americans."**

Although headquartered in Washington, D.C., the DOJ conducts much of its work in offices located throughout the country and overseas.

There are also several primary components within the DOJ that have their own spectrum dependent equities. They have their own complementary, yet independent mission statements, and are engaged in unique activities that drive their own requirements for spectrum use. These components include:

The Executive Office for United States Attorneys (EOUSA). The mission of EOUSA is to provide general executive assistance to the 94 Offices of the United States Attorneys, and to coordinate the relationship between the United States Attorneys and the organizational components of the Department of Justice and other Federal Departments.

The Federal Bureau of Investigation (FBI). The mission of the FBI is to protect and defend the United States against terrorist and foreign intelligence threats, to uphold and enforce the criminal laws of the United States, and to provide leadership and criminal justice services to federal, state, municipal, and international agencies and partners; and to perform these responsibilities in a manner that is responsive to the needs of the public and is faithful to the Constitution of the United States.

The Drug Enforcement Administration (DEA). The mission of the DEA is to enforce the controlled substance laws and regulations of the United States and to bring to the criminal and civil justice system of the United States, or any other competent jurisdiction, those organizations, and principal members of organizations, involved in the growing, manufacture, or distribution of controlled substances appearing in or destined for illicit traffic in the United States; and to recommend and support non-enforcement programs aimed at reducing the availability and demand of illicit controlled substances on the domestic and international markets.

The Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). The mission of ATF is to conduct criminal investigations, regulate the firearms and explosives

industries, and assist other law enforcement agencies in order to suppress and reduce violent crime as well as protect the public in a manner that is faithful to the Constitution and laws of the United States.

The United States Marshals Service (USMS). The mission of the USMS is to enforce federal laws and provide support to virtually all elements of the federal justice system by providing for the security of federal court facilities and the safety of judges and other court personnel; apprehending criminals; exercising custody of federal prisoners and providing for their security and transportation to correctional facilities; executing federal court orders; seizing assets gained by illegal means and providing for the custody, management and disposal of forfeited assets; assuring the safety of endangered government witnesses and their families; and collecting and disbursing funds.

The Bureau of Prisons (BOP). The mission of the Federal Bureau of Prisons is to maintain secure, safe, and humane correctional institutions for individuals placed in the custody of the U.S. Attorney General; to develop and operate correctional programs that seek a balanced application of the concepts of punishment, deterrence, incapacitation and rehabilitation; and provide, primarily through the National Institute of Corrections, assistance to state and local correctional agencies.

The Office of Inspector General (OIG). The mission of the Office of the Inspector General is to promote economy, efficiency and effectiveness within the DOJ. The Inspector General also enforces criminal and civil laws, regulations and ethical standards within DOJ by investigating individuals and organizations that allegedly are involved in financial, contractual or criminal misconduct in DOJ programs and operations.

I.C Department of Justice Spectrum Vision for the 21st Century

The follow is the Department of Justice Spectrum Vision for the 21st Century:

"To be secure in the ability to leverage spectrum, as a finite national resource, to effectively and efficiently meet the technical requirements demanded by our operational mission of enforcing the laws, and protecting and defending the citizens of the United States"

The DOJ Spectrum Vision reflects not only the primary purpose of the department, but also a recognition and commitment to responsibly use the nation's spectrum resources in the fulfillment of that mission. As depicted in the diagram below, through strategic pursuits outlined by this document in the areas of policy, technology, commercial applications, economy, and special purpose functions, the DOJ plans to build upon a core foundation of mission purpose, requirements, and existing operational capabilities in order to improve its future capabilities in service to the nation.

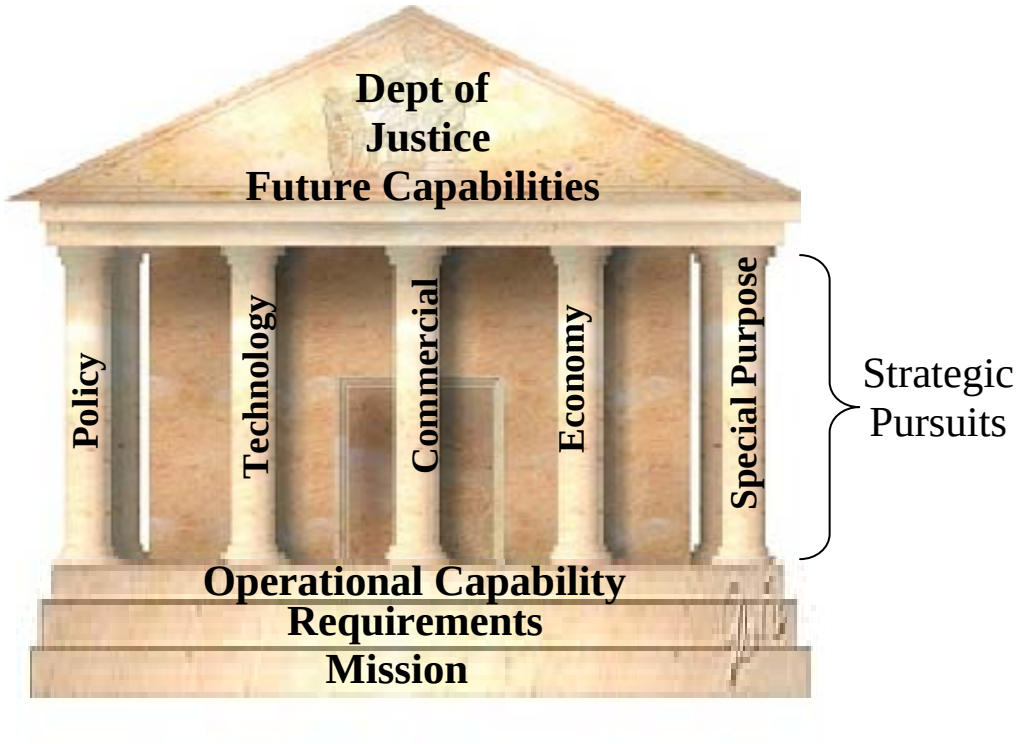

Figure 1-1, Building DOJ's Strategic Spectrum Plan

Chapter II
Current Spectrum Use

The use of wireless systems, and their associated spectrum requirements, is an organic necessity to the most basic law enforcement operation. In most cases, wireless applications provide the sole means of connectivity and information that is crucial to the conduct of the overall operation.

II.A Spectrum Use

With just under 26,000 frequency assignments on record, spectrum use within the Department of Justice is as diverse as the activities the organization conducts in support of global law enforcement operations. From High Frequency (HF) assignments, to assignments in the Super High Frequency (SHF) band, the DOJ's access and use of the spectrum is based in many cases on the type and amount of spectrum that is capable of satisfying select mission requirements. For instance, because of propagation characteristics that make HF (2-30 MHz) ideal for supporting long haul communication requirements, DOJ operations in this band are typically used to support emergency, back-up, and contingency communication operations between distant geographically dispersed areas. To support functional activities involving detection, tracking, search, robotic use and control, surveillance, and high data rate communications, assignments within the mid to upper Ultra-High Frequency (UHF; 300 – 3000 MHz) and the Super-High Frequency (SHF; 3 – 30 GHz) band areas are typically used.

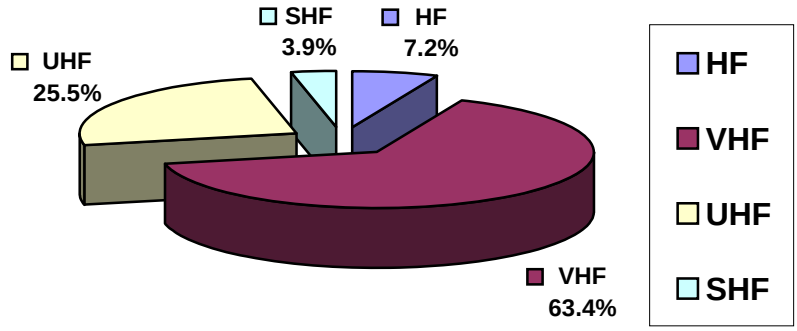

Figure 2-1, DOJ Spectrum Band Assignments
(Based from July 2007 Government Master File Records)

The most significant requirement for spectrum assignments within the DOJ however, is in direct support of tactical communications. This requirement is predominantly satisfied within the two Federal government land mobile frequency bands of 162-174 MHz and 406.1-420 MHz as shown in the above Figure 2-1. As will be addressed later in the plan, the DOJ also uses a myriad of diverse spectrum assignment resources throughout many of the Government and non-Government frequency bands in order to support unique mission operations and interoperability requirements between the DOJ and various other Federal, state, and local law enforcement and emergency response activities. Typical examples include:

- Channel sharing and cooperative use of the 150.8 - 162 MHz and 420 - 870 MHz bands for interoperability with non-Federal public safety users.
- Cooperative use of VHF, UHF, 700 MHz and 800 MHz radio systems belonging to other federal, state and local law enforcement agencies to bridge the lapses in repeater coverage and for interoperability.
- The conduct of tactical audio and surveillance activities in the 1755-1850 MHz, 2200-2290 MHz, and 4400-4940 MHz Federal bands.
- Creating wireless network extensions in support of tactical surveillance activities in the 900 MHz, 2.4 GHz and 5.7 GHz commercial bands.
- Commercial cellular services such as services at 400, 800, 900, 1800 and 1900 MHz.
- Tracking activity support through commercially provided equipment and services such as the Search and Rescue Satellite (SARSAT) which operates at 406 MHz, the Argos Satellite which operates at 401.65 MHz, Inmarsat, Iridium and the GlobalStar satellites networks, and commercially provided RF down loaders at 2.4 GHz.

As law enforcement activities increasingly become more complex, diverse, interdependent on other associated activities, and more geographically disbursed, the use of spectrum dependent commercial devices and services are becoming commonplace for providing important augmenting services and communication capabilities that support day-to-day law enforcement operations.

II.B Operational Capabilities

The capabilities of the DOJ are evolutionary in their development and implementation in order to meet present and future challenging operational demands. This requires the ability to effectively predict, identify, monitor, preempt, counter, control and/or neutralize the capabilities of a criminal adversary. Therefore, DOJ spectrum access is driven primarily by the functional capabilities that will satisfy the operational requirements. For example, voice communication requirements can be supported through various spectrum allocations that have already been made available for Federal use. However, the expectations for future communications demand capabilities such as text messaging, type 1 encryption, over-the-air re-keying, traffic statistical capture and management, call grouping, prioritized usage, user and location identification, instantaneous availability, etc, and all within a reduced spectrum channel bandwidth. More complex operations involving the functional activities of detection, tracking, surveillance, remote control, and high data rate capabilities for real time information transfer are now commonplace within most of the DOJ's component organizations and offices. These types of activities increase the demand for data or information, and are thus driving an increasing requirement for wider operating bandwidths and access to spectrum to support these activities. In addition, in the areas of detection and tracking, certain frequencies are necessary for use due to their propagation and penetration characteristics within the atmosphere and other environmental substances (vegetation, building walls, etc.). The requirements for spectrum use within the DOJ are a direct

reflection of their functional requirements and how technology can translate those requirements into specific operational capabilities. These capabilities are necessary in support of typical law enforcement operations, and are required in "real time" in order to adequately serve the on-going requirements of law enforcement activities. Capabilities that are organic to basic law enforcement operations include:

- **Communications.** Although High Frequency (HF) and Satellite communications capabilities support operational needs over long distances and between the U.S. and other countries, the Land Mobile Radio (LMR) serves as the backbone of wireless communications in the field. LMR is used during virtually all law enforcement operations. These operations include: surveillance, undercover operations, currency, arms, and drug trafficking and seizures, international border seizures, clandestine laboratory and criminal investigations, Special Weapons And Tactics (SWAT), Search warrant executions and arrests, Bomb Squad operations, counter terrorist, and organized crime investigations just to name a few.

- **Detection, Tracking and Surveillance**. Specialized devices designed to perform wireless direction finding, identification, monitoring, and audio/video capture and recording functions are routinely use in support of investigative operations. These capabilities in many instances are in direct support of undercover operations and may involve a variety of concealments specifically adapted for both fixed and mobile applications.

- **Command, Control and Telemetry**. Wireless capabilities are increasing being incorporated into remote and robotic applications, especially when their supporting activities involve operations within potentially dangerous or hazardous environments.

- **Data Acquisition, Exchange, and Transfer**. Investigative and reporting capabilities can be very data intensive and the use of wireless devices are commonly used for the expedient transmission and receipt of data files or records critical to the overall investigative and reporting function.

DOJ operational capabilities must, and will continue to evolve in order to effectively and efficiently conduct its mission functions and respond to unknown adversaries.

II.C Projects and Programs

The most significant program currently on-going within the DOJ involves efforts to become compliant with the National Telecommunications and Information Administration (NTIA) mandate that all Federal spectrum users narrow, by one half, the bandwidth used to transmit radio signals by the year 2005 for Very High Frequency (VHF) and the year 2008 for Ultra High Frequency (UHF) allocations. The genesis of this effort is from Title 47, U.S.C. 903 (d)(1) where Federal government agencies were required to make more efficient use of the radio spectrum. Although the DOJ yet to complete these effort in accordance with the mandated milestones, it has initiated and is implementing plans to transition existing Land Mobile Radio (LMR) systems to a system employing narrowband emissions. Under these plans, the DOJ LMR systems will

evolve into an integrated wireless network concept, to accommodate all DOJ components into a single network. As applicable, newer technologies are being considered for potential use within the Federal Law Enforcement communities in support of growing tactical, operational, and administrative requirements. It is anticipated that the Integrated Wireless Network (IWN) will be the prominent instrument within the VHF band that will support the tactical wireless communications needs of all three Federal departments. The September 2001 terrorist attacks on New York and the Pentagon have changed the focus of land mobile radio from compliance with the NTIA narrowband mandate to improving the DOJ's mission effectiveness of the communications system, which further benefits interagency communications. The IWN system is estimated to be able to serve approximately 80,000 law enforcement users throughout the United States, with 2014 as the current estimated date of implementation. The primary delays in overall program implementation are all related to the lack of funding availability which is necessary to complete the effort.

Complementary to the IWN program, the DOJ has also partnered with state and local officials in 25 cities across the country to augment or implement multi-agency emergency communications capabilities. The 25 Cities Interoperability program has sought to achieve interoperable communications by connecting existing federal, state, and local agency systems together. The DOJ has made concerted efforts to coordinate across each of these two initiatives, and also with the SAFECOM program managed by the Department of Homeland Security.

With the FCC public auction of the 1710-1755 MHz band, which took place between 9 August and 18 August 2006, the DOJ along with all other Federal Agencies where faced with having to relocate any and all systems they had been currently operating in that band. For the DOJ, that meant relocating a total of 129 fixed microwave and 7,903 tactical surveillance systems across three of its component organizations on a nationwide. A unique factor associated with this auction however, was that the proceeds raised from the spectrum auction (almost $14 Billion) could be used to directly offset the costs associated with Federal Agency efforts to relocate their impacted systems. Under the rules of reimbursement, all costs required to make those relocated systems and capabilities "whole" again within their new operating environment are eligible for full reimbursement. As a consequence, this included not only the actual systems that must be replaced, but also any associated systems that were required to interoperate with that equipment. Capitalizing on this opportunity to not only relocate, but modernize its capabilities in the tactical surveillance arena, the DOJ has identified modern, spectrally efficient, digitally based equipment and processes to which it plans to migrate over the course of this relocation effort. The DOJ currently estimates it will take 3 years to complete this overall migration effort at a cost of just under $691 million.

II.D Continuity of Government

The DOJ plays a critical role in the support of Continuity of Government (COG) and Continuity of Operations (COOP) activities. COG, defined as *"A coordinated effort within each branch of the Federal Government to fulfill minimum essential responsibilities in a catastrophic emergency to ensure the capacity to maintain an enduring constitutional government"* is an inherently Federal function and responsibility that concentrates on maintaining a consistent government

hierarchy or structure. COOP on the other hand is defined as "*An internal effort within individual components of the Executive, Legislative, and Judicial branches of government to assure the capability exists to continue essential component functions across a wide range of potential emergencies, including localized acts of nature, accidents, and technological and/or attack-related emergencies"* and is more government operations focused. The very nature of COG/COOP encompasses the ability to provide an immediate mobilization response in meeting the critical demands for reconstitution of both government, and essential civil support functions, in real time. Since there is no specific spectrum allocation dedicated to COG/COOP activities per se, all communications capabilities, regardless of frequency band, that are currently designated, shared, or used by the DOJ would be leveraged as necessary in support of the COG/COOP. In addition, since the instantaneous nature of COG/COOP does not allow for detailed system development or spectrum coordination, all existing DOJ system assets are candidates for use. This will demand comprehensive network and capability preplanning to ensure that any and all infrastructure assets would be considered to meet the overall mission requirements. From a spectrum use perspective, any DOJ spectrum dependent communication capability or asset would be potentially exercised for direct COG/COOP support as needed. Interoperating with other levels of government and the community would also be necessary to ensure not only government continuity but the orderly conduct of a civil society. In general, the DOJ will continue to assess communications capabilities to ensure that there are redundancies in wireless system capabilities, across all bands that support existing operations, so that they can be leveraged as necessary to support COG/COOP.

Chapter III
Future Mission Requirements

The conduct of overall DOJ, as well as specific component missions, requires active engagement within a wide variety of law enforcement operations, activities, and functions. Spectrum dependent wireless capabilities are not only essential to being able to successfully meet most mission requirements, but many times constitute ***the*** direct lifeline capability during the actual conduct of these missions. Spectrum dependent technologies are crucial to the effectiveness of law enforcement and investigative activities often in unpredictable and hostile environments where the lives of federal agents and the public are involved. Most of these situations are created instantaneously and thereby require a forward thinking level of communication system planning. A thorough review of overall DOJ wireless mission requirements, however, necessitates a detailed assessment of DOJ organizational requirements from both an internal and external perspective.

III.A Internal Requirements Assessment

The DOJ established an order that outlines the roles and responsibilities for managing the radio spectrum within the DOJ. The core theme of this order establishes a centralized management authority at the department level for all components. In order to effectively carry out this order, each component is responsible to identify a designated spectrum coordinator that evaluates and subsequently provides spectrum requirements to the DOJ. Because management of the radio spectrum requires skills not easily obtained, a priority is placed on establishing a combination of government employees and contractor support that is capable of filling the DOJ's spectrum needs in a timely and effective manner. The DOJ needs to maintain a trained team that works with each component in meeting their spectrum needs. This is an essential priority to ensure that real-time spectrum needs are met, and subsequently that mission goals are achieved.

Spectrum dependent wireless capabilities also constitute core requirements in support of most DOJ operational activities. By their very nature, law enforcement and the administration of justice are predominantly "field" activities, and successful field activities typically cannot tolerate the physical tether associated with traditional landline support. To be effective, an agent must be able to operate independently, maintain operational flexibility, be mobile, at times even covert, and yet still maintain a "connection" to other activities essential to the command, control, coordination, and support of the operation. Wireless capabilities are the only media available that can make these types of operations possible. As law enforcement operations necessarily become more integrated within American and global societies, their dependencies on wireless capabilities are also expected to increase dramatically.

The dynamics of modern society also present increasingly complex challenges to departmental operations. At one time, providing spectrum support for agent or organizational activities used to involve little more than providing frequency assignments in support of local voice communications. The requirements of today's law enforcement operations however, demand unencumbered access to spectrum resources that far exceed the variety, amount, and availability typically associated with voice operations over Federal Exclusive frequency bands.

These sophisticated demands further require advanced analytical tools, training and the human resource skills to effectively design and use compatibly within the existing electromagnetic environment. To this extent, the DOJ has invested in computer modeling tools, and human resource training on the use of these tools, in order to maximize the effectiveness of spectrum when applied within real world environments. The goal is, and continues to be, providing spectrum resources to current and new technologies that demonstrate reliable system integrity.

Effective spectrum planning can only be accomplished when it is based on a thorough understanding of mission requirements. The requirements that accurately characterize the internal demand and tempo of Department of Justice operations include:

III.A.1 Robust Wireless Communications. Wireless communication requirements encompass a wide variety of functions and purposes in their support of departmental operations. They provide the "connection" necessary to satisfy the need for critical interfaces that must exist between multiple activities where local proximity or hardwire and physical support is not possible. This includes requirements for the transmission and reception of both voice and data, over narrowband and wideband channels, between resources operating via mobile and/or fixed profiles, secure or unsecured, and at distances ranging from a very close proximity to across the globe. Due to the diversity and general unpredictability of daily communication requirements, DOJ operations cannot be frequency band or assignment limited or restricted. As a consequence, communication operations are necessarily spread across the High Frequency (HF) to Extremely High Frequency (EHF) ranges depending on the type, conditions, distance, and capacity of each communications requirement. Access to this type and quantity of spectrum must not only be preserved, but also expanded in order to keep pace with the evolving complexities associated with modern operational requirements. In addition, intensive investigation of new techniques to combine non-contiguous spectrum to form a single wideband channel is beginning. This could allow for digitally combining individual 12.5 or 25 KHz allotted channels across the band to function as if it were a contiguous allocation of spectrum. This is a planned, unfunded, extension of the Software Defined Radio program already under way.

III.A.2 Data Access and Sharing. Requirements for data access and sharing are increasingly driving requirements for more spectrum use. As law enforcement operations become more tactical and information intensive, the requirements for improving and exploiting wireless capabilities for such applications as data collection, information queries, data dissemination, are also dramatically increasing. Typically, the spectrum requirements to support these types of operations necessitate the use of wider bandwidth channels, and in some instances, moving the operations to higher frequency bands. In addition, most data access and sharing operations also necessitate the simultaneous use of various types of wireless media. Since the requestor, coordinator, and provider sources are typically derived from separate and disparate activities, data access and sharing can involve complex interactions between various wireless systems. For instance, an agent in the field might initiate an information request on a particular suspect's identification or credentials. The actual request may originate over a portable VHF voice radio system, be translated onto a long distance SHF satellite link to some remote data processing facility, and then the information eventually transmitted back to the agent via a wideband UHF data connection to his vehicle. All of these different spectrum bands have

inherent propagation differences that must perform in a complementary manner. Furthermore, the future linking of data is expected to migrate to different spectrum bands as new application technologies advance in development. In order to satisfy increasingly complex and diverse requirements on future audio and video surveillance operations, various law enforcement activities are starting to incorporate the use of emerging narrow band transmitters, wireless mesh networks, Video over IP, 3G cellular, and future long term evaluation (LTE) technology.

III.A.3 Interoperability. Interoperability involves communications between different federal law enforcement users as well as with state and local public safety officers. This involves addressing national, regional and local communication system capabilities to provide the solutions to link these users together when needed. While the DOJ can address the federal government's national perspective to communications solutions, interoperability, especially as it pertains to public safety law enforcement is essentially a local issue. Many incidents that require a federal law enforcement response typically involve a large variety of first responder and follow-on activities within potentially widely disbursed and disparate areas. Because every region has a unique mix of government structures and communications resources in their base communication system, no single solution can be applied uniformly across the country. This requires development of multiple solution sets that can be applied in varying combinations to address the specific communications needs in any given area. An additional complexity to developing these solution sets is that there are typically several different spectrum bands supporting local communication systems. Since expedient interoperability is best achieved through direct spectrum access, the ability to effectively interoperate is then dependent on the activity's ability to either translate to, or directly access a frequency band or assignment that is common to the other users. Complicating this situation even further is the fact that due to classification issues of mission, technology, and operational techniques, the sharing of systems and spectrum can be prohibitive. When or if these types of technical difficulties are eventually addressed and assured, the DOJ may then require supplemental operating authority to access spectrum that is allotted to its use (situational dependent). Once interoperability is achieved, it must then be able to effectively provide joint communication and sharing of information, guidance, and direction in supporting the requirements in any given situation. As a consequence, the spectrum use in support of interoperability is projected to vary widely and grow exponentially.

III.A.4 Rapid Response. The capability for rapid response is a crucial operational requirement, and relies on DOJ's organic ability to achieve and maintain "real time" situational awareness, operational management, and control. It is one of the single most important quality factors in direct support of public safety, protection, and life saving operations. Short of preemptive measures, a reaction to crisis is never fast enough, and the synergistic effect of all the above requirements (Robust Communications, Data Access and Sharing, and Interoperability), are key determinates in establishing overall reaction time capabilities. This rapid response capability further requires reliable wireless services anywhere and within unpredictable environments. Due to this unpredictability factor, rapid or high surge responses can quickly saturate resident technical infrastructures that many communication system features depend.

The ability for the DOJ to be responsive anywhere, anytime, as situational requirements dictate, requires the exploitation of wireless systems and unfettered spectrum access. Another key

requirement for real time response is simplex for peer-to-peer capabilities without the necessity for embedded infrastructure throughout the area.

III.B External Requirements Assessment

Law enforcement as a function involves being prepared for, and dealing with situations that are many times beyond the anticipation and control of the activity providing that service. As a consequence, strategic planning must not only look to assess and characterize requirements based on the organization's internal resources, processes and direction, but also attempt to characterize requirements that may be driven by external influences that impact operational roles of the organization.

Within law enforcement, the two primary external forces that dramatically influence the DOJ's strategic requirements are the "adversary" from which law enforcement provides public protection, and the "environment" which dictates many of the spectrum dependent capabilities that law enforcement requires to be effective.

III.B.1 Counter Adversary Role. The DOJ needs to keep pace with the highly technical aspects and capabilities of the modern world if it is expected to provide viable law enforcement support in service to the American people. Just as modern society is becoming more complex and "wireless" driven, the criminal element within that society is also dramatically progressing in wireless sophistication and technique. Wireless capabilities are becoming instrumental in the ability of the criminal element to improve and expand their presence, tactics, mobility, speed, and impact. They can be well funded which gives them access to the latest technologies, and they recognize no bounds in the regulated or unregulated use of spectrum dependent systems. The DOJ must continually evaluate and develop countermeasures that have access to the same spectrum resources in order to remain, as a minimum, in lockstep with adversarial uses and associated operational situations.

Developing capabilities for countering the criminal adversary also requires that law enforcement personnel be adequately trained in the use of sophisticated tools that maximize the effectiveness of spectrum applications. Training programs are essential to use these tools to their full potential and intended purpose. Continuing to provide management training in how to effectively apply available technologies within the strategic requirements of the components and the entire DOJ is essential.

The relationship between what the users require technologically and what is authorized from a spectrum regulatory perspective are typically very complementary. In some instances however, counter adversary operations might necessitate a requirement for special use of the spectrum. These types of actions represent isolated actions intended to prevent the potential or occurrence of grievous harm to public figures, critical resources, and the general populace. As a valid requirement of law enforcement operations, these types of applications are conditional and temporary in nature, and conducted under special authority that is specifically acquired within the existing spectrum management regulatory framework.

III.B.2 Operational Environment. The requirements for certain operational capabilities dictate the type and amount of spectrum that is needed. An integral portion of law enforcement operations involves the ability to conduct surveillance and detection activities, which necessarily involves the exploitation of specific frequency bands that exhibit the proper propagation and material penetration characteristics. As technology identifies and improves the ability to perform detailed surveillance and detection activities through the exploitation of new or existing frequency bands, the DOJ and its component organizations will require ready access to this technology and associated spectrum use.

From an infrastructure perspective, most major metropolitan areas have some basic and limited capability to link agency communications systems together to communicate in emergency situations, but unfortunately this capability does not necessarily meet the requirements for effective performance under all circumstances. Furthermore, most of the nation's infrastructure that supports system capabilities is more abundant within major metropolitan areas. Much of the non-urban areas of the country have little interagency communications capabilities and extremely limited technical infrastructure. In addition, most of our public safety wireless communications systems (federal, state and local) are highly dependent on commercial or public infrastructure (e.g., electric utilities, telecommunications services, etc.). When these core infrastructure systems fail or are overwhelmed during catastrophic or national emergency events, agency communication systems are badly degraded or fail as well.

Chapter IV
Current Use of Commercial Spectrum-Dependent Licensed Systems

Commercial devices are increasingly becoming standard issue within the full suite of wireless devices being made available in direct support of law enforcement operations. Some of the advantages of using commercial devices under certain conditions include a more economical, robust, redundant, and flexible capability than could ever be achieved under a Federal exclusive systems deployment approach. Historically, technology refresh, upgrades, and modernization of commercial systems also occurs more frequently, often more economically, and within a much shorter timeframe.

In general, there is an increasing trend to capitalize on the availability of commercial spectrum-dependent licensed systems to *complement* existing federal wireless systems and applications. The broadest application is typically in the areas of cellular telephone, personal document assistance device type services, and satellite service applications. In many cases these commercial systems are used because their expanded features capabilities are not currently available on federal wireless systems, such as text messaging and voice recording. For example, commercial cell telephone and PTT capabilities allow for easy, readily available, ubiquitous, and reliable 24 hour a day direct communications between investigative personnel and supervisors, law enforcement counterparts, undercover personnel, confidential sources of information, tactical intelligence centers, and prosecutors. In addition, the broad area and long distance coverage capabilities, such as satellite radio applications, may be the only means available under certain operating conditions. Another major use of commercial wireless systems is in the form of wireless bridges or link extenders which permit increased distances between an initial staging area and a remote monitoring or network access location. For instance, the uses of WiFi technology have demonstrated great utility in being able to provide ancillary support particularly in surveillance type operations. Not only is WiFi readily available and quick to deploy, its components provide an economical means of connecting an isolated network to a nearby location where other wired network services are available.

Chapter V
Future Planned or Anticipated Use of Commercial Spectrum Dependent Licensed Systems

As the infrastructure for commercial spectrum dependent licensed systems becomes more robust and abundant, their use is anticipated to increase in support of DOJ law enforcement operations.

V.A Trends and Impact

With the exception of "high end" performance based systems, commercial spectrum dependent licensed systems are generally more cost efficient than that which can be achieved with federal based system applications. As a consequence, the trends to off-load applications that are generally administrative in nature are expected to increase. Recent and anticipated continuing advancements in internet services and cellular options will also perpetuate expanded use of those avenues for providing complementary support capabilities to federal wireless systems. The expense associated with the development, testing, operation, and maintenance of specialized systems with extended reach or broad area coverage, especially those capable of handling high capacity service requirements, will have to leverage commercially based satellite systems as much as possible.

V.B Challenges

Despite some of the advantages associated with the use of commercial dependent licensed systems, these systems can present some serious problems or liabilities when considered in support of tactical law enforcement operations. Secure communication is the major concern. As a commercial entity, almost any employee associated with operations and maintenance within the industry would have access to the monitoring of law enforcement systems, intercepts, and could even intentionally interfere with law enforcement operations. This could prove both a detriment to the operations and present a potential safety of life situation for the agents. Another foreseeable challenge is the lack of control of maintenance, and the maintenance schedule, which could contribute to a break in service at in opportune times. Furthermore, commercial entities will always be inclined to service and provide improved infrastructure based upon the commercial needs and not upon law enforcement requirements.

Chapter VI
Agency Current and Anticipated Use of Unlicensed Systems and Devices

In the last several years, there has been a dramatic increase in the use of unlicensed systems and devices in support of a variety of law enforcement missions. Advancements of internet services and cellular related technologies that are complementary to unlicensed systems will continue to perpetuate the development and use of these devices.

VI.A Trends and Impact

The DOJ has deployed unlicensed spread spectrum microwave to support the linking of two-way radio system infrastructure devices since 1998. These systems typically operate in the 2.4 GHz and 5.8 GHz unlicensed bands. The use of these systems are limited, and predominantly occur when other connectivity types (i.e.: telephone company leased lines or licensed microwave) are either unavailable or cost prohibitive. Often the use of unlicensed systems occurs due to mission requirements for rapid deployment where time for either frequency coordination or installation of commercial telephone circuits does not exist, or is not possible. It is this quick deployment capability of off-the-shelf spread spectrum microwave equipment that makes it a valuable tool for supporting mission requirements. It is anticipated that the use of such devices will increase.

The use of commercial frequencies to support surveillance missions has also seen a dramatic increase. By exploiting the use of 802.11 encrypted devices and air cards, the ability to "stand-off" and "reach back" in support of covert operations has expanded the options available for the conduct of these delicate operations. These devices allow ready access to the internet, which then provides a high capacity means of transporting data from a point to multi-point locations simultaneously.

VI.B Challenges

Again, within commercially dependent licensed or unlicensed devices, secure communications is a major concern. Without reliable, secured encryption and control of any unlicensed link, the possibility compromising an operation will always be present. In addition, congestion in the bands (2.4 and 5.8 GHz) presents serious problems in the reliability of continuous services. As these types of devices become wider spread within the public domain, the reliability and integrity of their use is expected to decrease.

Chapter VII
Evaluation of New Technologies for Potential Use by Federal Agency Spectrum-Dependent Systems

The DOJ is working toward digital RF solutions in order to conserve spectrum resources and to be able to take maximum advantage of what digital enhancements can offer in improved features and capabilities.

VII.A Trends and Impact

The DOJ continues to look towards the roll out of the IWN in order to digitize their primary tactical voice Land Mobile Radio (LMR) systems and comply with the more efficient narrowband transmission standard. When completed, these radios will be P25 and AES compliant, and the network as a whole can serve as a consolidated platform for interoperability between other Federal, State and Local law enforcement activities. Development and fielding of the overall IWN infrastructure will include a mixture of trunking, vote scan, simulcast and stand-alone repeater technologies as a hybrid solution to achieve the most efficient and effective methodology for spectrum application throughout the network.

The DOJ is also currently evaluating the operational viability of 802.11a/b/g mesh networks for encrypted voice traffic interoperability with LMR systems. Voice over IP (VoIP) and Radio over IP (RoIP) applications are beginning to show great promise. If successful, this technology would add additional tools to standard law enforcement deployment toolkits, and allow local incident responders to rapidly set up secure (limited range) communications where LMR infrastructures don't exist.

Software Defined Radio technology is being designed to function as both a subscriber unit and infrastructure support. The primary purpose would be to combine interoperability with current legacy systems, with an overlay of type-1 security, to provide covert and secure communication. The current prototype hardware lends itself to the role of test-bed for advanced modulation techniques, but a study of combining disparate narrowband channel allocations from across the spectrum is also planned. This technique would allow separate non-contiguous channels from within the same band to be used collectively, allowing for higher data rates within a band and the potential for increased spectrum efficiencies. The direct goal of the evaluation of the channel combination technique is to allow for wide bandwidth covert communications techniques to be applied in areas of the country where current allocations of contiguous bandwidth do not exist. The same technique could also be applied to facilitate higher data rate communications than can be carried on a 25 or 12.5 kHz channel.

VII.B Challenges

The challenges to implementing new technologies include the entire array of integrating legacy equipment, test and evaluation of new technologies, and budget costs. New technology on the

whole is typically much more expensive than the legacy technology it replaces, and includes the associated risks that the technology has not yet been proven. As technologies become more sophisticated, there is an increase in capability that requires additional training of the technicians and operational end users. Operations & Maintenance challenges can include communication egress leasing agreements, the development of encryption techniques, as well as networking and data storage maintenance. The recurring yearly requirement for research, testing, procurement, operation, and maintenance funding is expected to consistently be problematic and inconsistent.

The software defined radio research program currently leverages available technology, but at a component, not systems level. This type of functionality does not yet exist in a commercially available system that could fit DOJ needs. In addition, although there are advanced systems that have been built that operate on software defined principles, none of the prior research has included the constraints inherent in the Federal channelized spectrum. Studies will continue, but at a greatly reduced pace due to the lack of funding resources.

Chapter VIII
Spectrum Management Organization and Integration with Agency Specific Planning and Capital Planning

VIII.A Spectrum Management Organization and Funding

Spectrum management within the DOJ is accomplished by a dedicated office organized under the Wireless Management Office (WMO) of the DOJ Chief Information Officer (CIO). Situated within the WMO Engineering Division, it is afforded a broad perspective on all DOJ projects and planning efforts as they relate to wireless (spectrum dependent) system applications.

WMO Organizational Structure

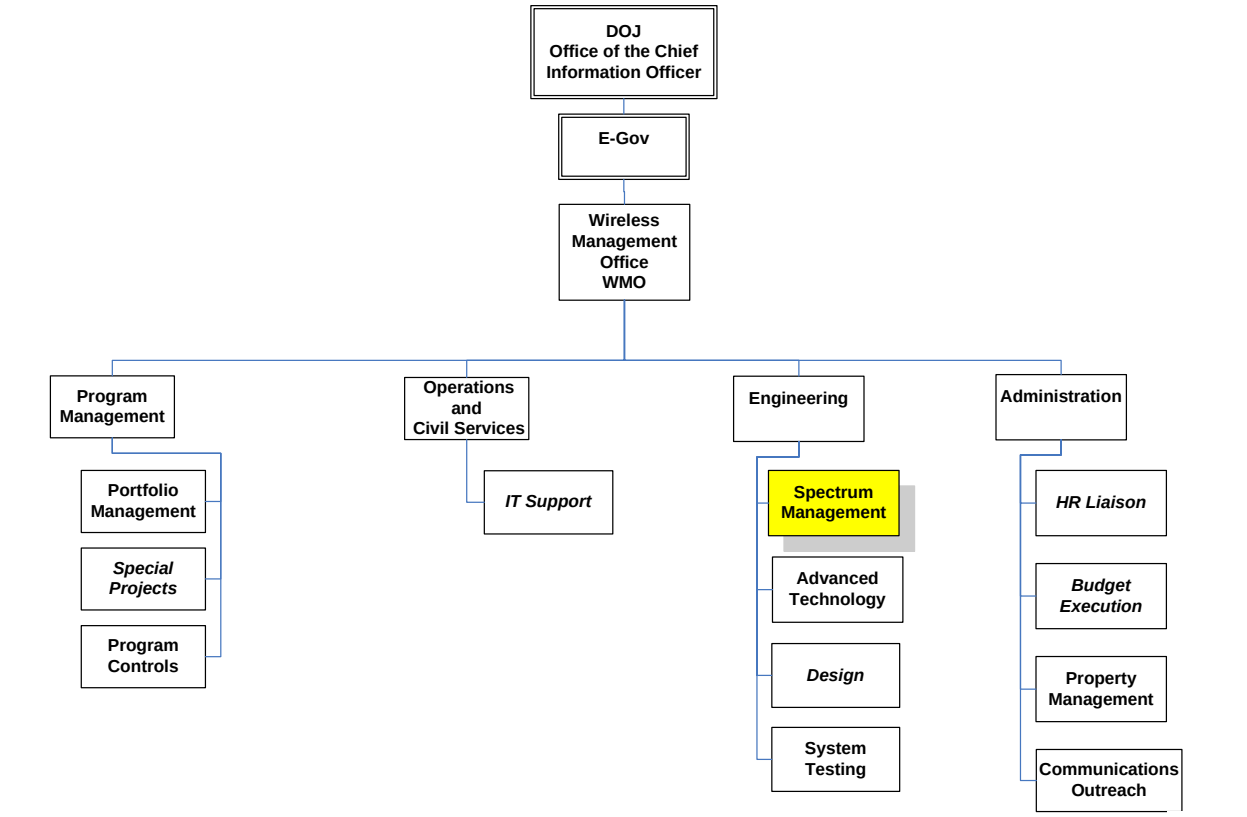

Figure 8-1, DOJ WMO Organizational Chart

Overall DOJ capital planning and funding to date is only loosely tied to spectrum requirements as they relate to wireless system modernization, productivity, and/or efficiency improvement efforts. Direct funding lines to spectrum related DOJ activities currently include the funding resources required to pay the yearly NTIA Agency Reimbursable Spectrum Fees, and those resources necessary to staff and equip the DOJ Spectrum Office. As mentioned above, although the Spectrum Office has wide exposure to project and planning efforts within the Engineering

Division of the Wireless Management Office, spectrum requirements are predominantly addressed according to priority operational requirements as defined by DOJ's multi-faceted mission. Although not formally documented in the DOJ's Performance and Accountability Report, the Department's Spectrum Office is actively involved in project planning efforts to best utilize available resources for its program activities. Part of DOJ's efforts include planning and managing activities related to funding made available from the Spectrum Relocation Fund after passage of the Commercial Spectrum Enhancement Act. Most requirements are predominantly addressed as a function of determining what spectrum resources will be required to produce specified functional capabilities or results. The prime driver for the DOJ remains to be based on mission effectiveness. As a consequence, typical DOJ projects and programs are mission oriented in their funding processes and profile, and do not necessarily include specific funding lines for associated spectrum research, considerations and planning.

VIII.B Spectrum Primary Points of Contact

The Office of Spectrum Management within the DOJ is comprised of four (4) dedicated Civil Service positions and a parallel complement of contractor personnel. Although the larger DOJ Component organizations (ATF, BOP, DEA, FBI, and USMS) also encompass personnel specifically identified to manage spectrum specific issues within their component organization, all spectrum related workload that impacts or requires National Level processing and documentation is centrally managed through the DOJ Spectrum Management Office. The primary point of contact for DOJ spectrum related matters is:

Merri Jo Gamble
Spectrum Manager
DOJ Spectrum Office
12801 Fairlakes Parkway, Suite 100
Fairfax, VA 22033
Email: Merri.Jo.Gamble@usdoj.gov
Phone: 202-598-2100
Fax: 202-598-2171

VIII.C Areas of Strategic Pursuit

To meet the spectrum challenges of today’s operating environment, as well as posture for the spectrum requirements of tomorrow, the DOJ is taking a multi-faceted approach on several strategic fronts to ensure it has the appropriate spectrum access and authority to accomplish its increasingly complex mission requirements. In this pursuit the DOJ will continue to focus on producing the results necessary in carrying out the collective missions of the DOJ as well as each individual component. Within these efforts, the cost and efficiencies associated with optimized spectrum use will be important considerations. For example, the DOJ’s implementation of the IWN is exploiting modern system and trunking technologies to not only narrowband DOJ VHF assignments, but allow spectrum sharing and reuse between all DOJ components. Based on its IWN implementation in the Seattle, Washington area, the DOJ alone achieved a 50% reduction

in the use of spectrum resources, a 65% reduction in VHF frequency assignments, and realize over $14,700 a year in savings on spectrum fees. The prime driver for the DOJ, however, is to achieve results in their mandated missions. Therefore, the focal point of decisions in support of the DOJ missions, and in particular strategic spectrum planning, is based on an ability to effectively produce results. When applying spectrum resources, our primary goal is effectiveness, not efficiency. Efficiency is a measure of application in that it determines how well the DOJ uses resources in our overall efforts to achieve results, not a result unto itself.

Addressing spectrum challenges, both present and future, will include strategic pursuits in the areas of spectrum policy, technology, commercial applications, economy, and special purpose functions.

VIII.C.1 Spectrum Policy. The DOJ plans to closely monitor and actively participate in processes that impact the national regulatory framework as it pertains to spectrum management and use. The DOJ's primary interest is to ensure the protection of existing spectrum equities as necessary in support of current and future critical law enforcement operational mission requirements. In support of expanding spectrum dependent operations, the DOJ has and will continue to endeavor to meet its expanding mission requirements through the application of new technologies, as demonstrated by the IWN, which operate within the existing National Table of Frequency Allocations and service classes. In accordance with current planning efforts however, the DOJ does not foresee any significant changes in mission, technology, or the environment that would allow it to relinquish any of its access or rights to currently authorized spectrum resources. All indications in fact, demonstrate increased requirements for spectrum use in support of expanding missions and technical applications. In addition, the DOJ does not anticipate any proposals to change the allocation table in the foreseeable future. The DOJ does however, plan to actively advocate and pursue modifications to the existing spectrum regulatory framework with the intention of:

- Improving the regulatory authority and means to support the expeditious exploitation and application of emerging spectrum dependent technologies.

- Fostering an environment that allows improved spectrum sharing and interoperability between Federal and Non-Federal activities.

- Creating more flexible access rights to spectrum resources as real time requirements, capabilities, and spectrum availability dictate.

- Ensuring in the budget process that policymakers take into consideration any new spectrum related directives for modernization and include the required capital resources and funding for actual implementation.

Regulatory modifications are deemed necessary in order to improve overall access to spectrum by essentially fostering a paradigm shift from perceived spectrum "ownership" to actual spectrum "management." Traditionally, spectrum has been managed by establishing strict and relatively inflexible rules which did little more than restrict what frequency each individual activity can use, as well as specifying where, when, and how the spectrum can be used. This

approach served the community well in the days of fixed equipment capabilities, static mission requirements, and an abundance of available spectrum resources. Modern times however, have dramatically changed the character of operational requirements, system technical capabilities, environmental applications, and availability of spectrum resources. Spectrum policy needs to consider the actual use of spectrum in light of the requirements, capabilities, flexibilities, and controls now possible with modern day applications. This includes developing and implementing the tool sets necessary to monitor and enforce spectrum regulatory requirements. When the regulatory use of spectrum is structured so that it inhibits law enforcement operations, it only works to the advantage of the criminal adversary the DOJ is charged to defend against.

VIII.C.2 Technology. Short of acquiring access to new spectrum resources, it is believed that technical innovation holds the greatest promise for being able to expand wireless applications and capability in the support of overall DOJ operational requirements. The emphasis on technical improvements will predominantly be directed towards increasing operational efficiencies and capacities without the necessity for having to acquire additional spectrum resources. In addition, there is a strong need for commercial services to provide strong encryption capabilities in order to increase DOJ use of their services. Technology advancements have also allowed spectrum bands above the UHF range, which previously were unusable for mobile and fixed applications, to become useful in providing optimum results. Exploiting the higher spectrum bands to support critical law enforcement needs requires continued spectrum analysis, research, and development efforts by industry to ensure technological availability. In addition, "smart" technologies will be pursued that demonstrate the potential for adaptively exploiting available spectrum resources. Through the development of intelligent systems, available spectrum will be dynamically accessed to support real time operational requirements within the immediate environment. By moving toward a technical state where radio frequency systems are no longer frequency or band dependent, it is anticipated that the DOJ will not only be able to expand its operational capabilities, but improve overall operational flexibility, service options, and security in the support of its mission requirements. This overall capability is not expected in the near-term, but rather in incremental phases, where it can be exploited to enhance law enforcement only when it matures and can be applied on a nationwide scale.

VIII.C.3 Commercial Applications. Commercial applications are, and always will be a standard and integral portion of the DOJ wireless capability toolset. As law enforcement operations expand in both quantity and complexity, the DOJ reliance on commercial applications is expected to increase. This is due to the fact that it is the commercial activities that possess the more robust and available nation-wide wireless infrastructures. The government can neither afford, nor continue to justify the creation of vast parallel services and infrastructure support capabilities that would be exclusive for government use. Rather, DOJ will continue to leverage commercial services where they can more effectively and efficiently complement unique tactical communication needs. In addition, commercial entities are typically "leading edge" in their research, development, application, and deployment of large-scale modern spectrum dependent technologies. Through the use of commercial services, the DOJ can easily expand their wireless capabilities, and demonstrate continued progress towards achieving increased spectrum efficiencies, conservation, and sharing. The DOJ will continue to capitalize on the availability of commercial services, to include the associated spectrum access rights, usage, and other privileges that are commensurate with any other paying customer. However, for the use of commercial

systems to provide the level of service needed by law enforcement, the ability to provide encryption capabilities is essential.

VIII.C.4 Economy. The DOJ can improve its posture in regards to spectrum use by establishing a viable economic approach that supports the continuous modernization of spectrum dependent systems. This effort must start at the Federal level, and the pace of achievable modernization is reliant on the amount of funding which is made available for that purpose. To support modernization, the need for technology refresh on spectrum dependent systems will be identified and based on the degree of improvements expected in spectral efficiency, capacity, and performance. This is achievable in association with any particular modernization effort. System improvements that promise increased spectrum efficiency and performance will undergo a detailed cost-benefit analysis to determine its feasibility for implementation under reasonable time and investment profiles. A cost-benefit analysis will also be used to establish the best equities for future spectrum use when viable alternatives exist between an investment in internal infrastructure upgrades and the adoption of commercial service applications. Both of these alternatives however, must satisfy the DOJ mission requirements.

VIII.C.5 Special Purpose. Post September 11, 2001, the DOJ operational mission and the spectrum requirements that support the mission have been forever altered. There has been a significant growth in the number of users and changes in who the DOJ is required to communicate with, and where. The mission venue has changed to include investigations of terrorists in foreign lands. These investigations require close interaction with the U. S. military forces. Close coordination with the military leadership is crucial to ensure there are no communication conflicts and there is interoperability when needed. The growth in this area has somewhat stabilized but could easily grow if there are future successes in terrorism.

Unpredictable adversarial capabilities and intent will always be a prominent element in law enforcement operations. In addition, the mission of public protection is increasingly emphasizing the development of a capability for disaster *prevention*, versus one of disaster response. This also applies to the critical nature of the DOJ mission that requires extraordinary efforts to prevent, through sophisticated investigative means, any terrorist acts and use of weapons of mass destruction against the United States. To meet these challenges, the DOJ will continue to research, develop, and apply select systems that support the ability to provide rapid response operations commensurate with the criticality of real time threat situations. These special operations and activities, in conjunction with their associated spectrum requirements, will be processed in accordance with special procedures for system assignment, registration, and approval within the existing regulatory framework. Furthermore, the DOJ will continue to establish and work avenues for the expeditious and specific coordination of very focused, isolated, and abbreviated special operational use of spectrum on an as-needed basis.

Chapter IX
Recommended Actions for NTIA

The DOJ's strategic vision for implementation of its spectrum requirements and use will take an evolutionary approach derived from its existing spectrum applications and equities. NTIA support will be pivotal to the DOJ's success in being able to achieve that vision. In the short term (1-5 years), the DOJ and NTIA must work to protect and complement the Federal Department's spectrum requirements, predominantly within existing federally allocated and commercially accessible spectrum resources. In the long term (5-20 years), NTIA and the Federal Departments should not only continue to protect existing Federal spectrum equities, but also work to expand Federal spectrum access rights and usage as evolving Federal mission requirements, commercial technologies, and national policies dictate the requirement for more demanding and complex Federal operational capabilities.

IX.A Short Term Planning.

The National strategic spectrum vision and implementation in the short term should predominantly encompass planned activities that support near term Federal spectrum requirements. It should address the immediate and documented spectrum needs of the Federal Departments, and work from a baseline of currently allocated spectrum resources, existing spectrum regulatory standards, and existing wireless system capabilities and applications. The primary areas of emphasis for NTIA and the Federal Departments planning and implementation along this timeframe should include:

- The protection of existing Federal spectrum allocations and resources. The DOJ does not anticipate any change in mission, technology, or the environment that would allow the Department to significantly reduce any of its frequency resource allocations, access, or authorization of current spectrum use.

- Regularly review of the current allotment plan in the VHF (162-174 MHz) and UHF (406-420 MHz) bands to support the Federal Departments. The allotment plan should be updated to better reflect the actual requirements and use of spectrum by the Federal Departments. Also, the plan should consider the important factors such as geographic and demographic demand, the pervasiveness of agency national mission requirements, border considerations, and anticipated growth in tactical control, monitoring, and surveillance communications requirements. This reassessment should be taken in view of applicable technologies that are capable of more effectively using the existing spectrum.

- Continue active involvement in the International Telecommunication Union (ITU) Study Groups and World Radiocommunication Conference processes to protect Federal Agencies and spectrum requirements.

- Develop and initiate simplified procedures for Federal use of the 150-162 MHz, 450-470 MHz, and 800 MHz bands in order to support interoperability and sharing operations between Federal law enforcement and State and Local law enforcement officials.

- Expand and improve the ability of the Federal Departments to simply and effectively leverage commercial services, particularly in long haul, tracking, wide area, and high capacity transmission service areas.

- Improve and maintain staffing levels and appropriate training programs to ensure that NTIA staffing is both effective and proficient in providing the necessary service and support to all Federal Departments in meeting their spectrum needs.

- Developing greater proficiency in the use of analytical and modeling tools that effectively apply spectrum resources in support of Federal Agency requirements. This includes updating the tools as needed, as well as providing training to personnel on the use of these tools.

IX.B Long Term Planning.

Strategic vision implementation in the long term will encompass anticipated operational capabilities, activities, and requirements that are based on evolutionary and revolutionary developments in overall spectrum policy, applications, and technology. It is this area that a concerted effort will be required by NTIA and the Federal Departments to establish and foster evolutionary progress in the efficient and effective management of the nation's spectrum resources. The primary recommended areas of emphasis for NTIA planning and implementation within this timeframe include:

- The advocacy, modification, and refinement of the existing spectrum regulatory framework in order to improve the overall access and use of spectrum as a shared National and International resource. In general, the concept of spectrum management and use from a perceived posture of individual ownership needs to be shifted to reflect one that affords sharing between users, where technically and operationally feasible, in support of real time requirements and usage.

- Advocacy for the research, development, acquisition and deployment of "intelligent" spectrum dependent systems which are not limited or restrictive in their ability to exploit specific frequencies, channels, and bands. The ability for sharing between certain spectrum users will be dependent on systems that automatically detect and adjust their spectrum use, to include the ability to vary operating frequency, bandwidth, modulation, etc., in accordance with the real time operational requirement and environment.

- Influence and incorporate commercial strengths on the research, development, and deployment of spectrum dependent technologies in order to complement and expand wireless operational capabilities in the best interests of the nation.

- Institutionalize a formalized funding process that reviews, plans, and programs the necessary capital resources for implementing wireless system technology refreshment that supports the efficient and effective use of spectrum in conjunction with evolving operational requirements.

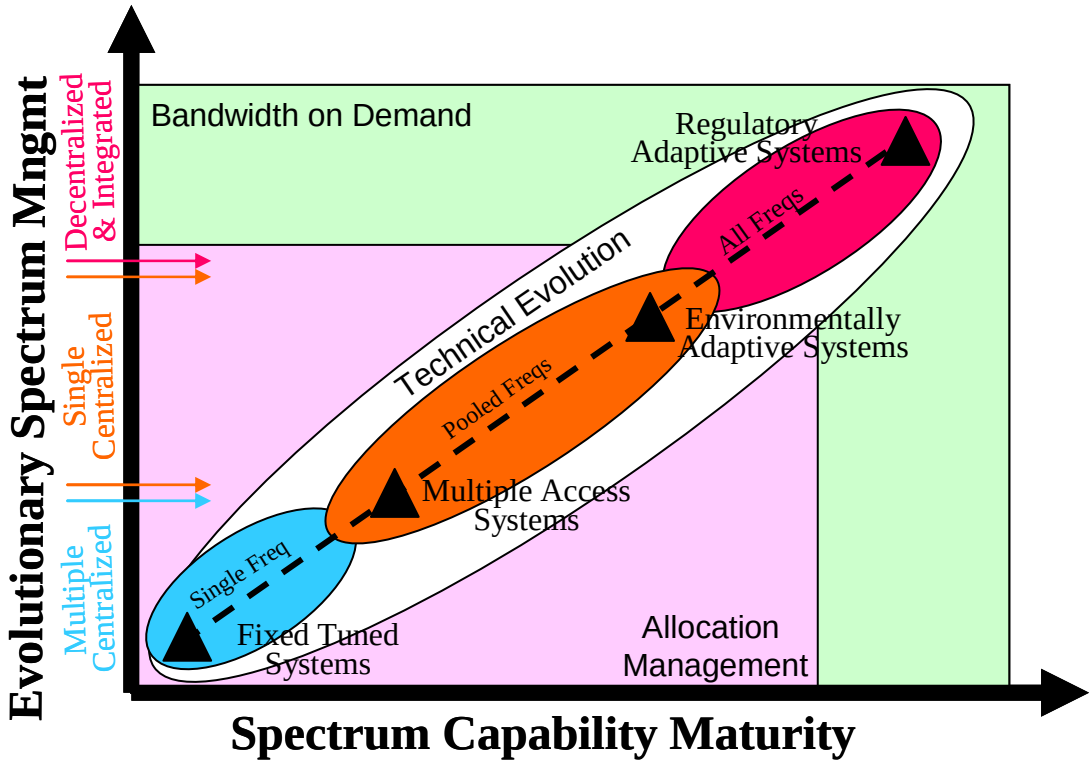

Figure 9-1, Long Term Spectrum Evolution

The DOJ believes that through specific strategic long term planning efforts, NTIA can better manage and enable the effective exploitation of the Nation's limited spectrum resources to the benefit of all potential users. As the above figure 9-1 depicts, **evolutionary** progress in technology and spectrum management will result in **revolutionary** improvements in spectrum availability in direct support of real time operational requirements.

Chapter X
Conclusions

Current Department of Justice law enforcement operations are heavily dependent on the capabilities afforded through the application of wireless systems, and these capabilities inherently demand extensive use of National spectrum resources. As operational capabilities evolve and improve, their performance is expected to intensify in their reliance on spectrum resources. It is only through improved management and use of the Nation's limited spectrum resources, that spectrum access and use can be assured well into the future for all potential wireless users.

In recognition of the high demand on limited spectrum resources, the Department of Justice has developed a strategic approach to its current and planned spectrum use to ensure the right spectrum resources are accessible at the right time, in sufficient quantity, to effectively support its present and future operational requirements. This plan documents and articulates that strategic approach through a process of specifically identifying the DOJ's mission requirements and operations, and how they are satisfied through the current application of spectrum dependent systems. Strategic areas of interest are then addressed through efforts to stimulate research, change, and modernization to offer the greatest potential for improving the capability, effectiveness, and efficiency of spectrum use essential to support the DOJ's overall critical mission. Efforts within these strategic areas of interest are then articulated into short and long term planning activities, which through NTIA's assistance, can be realized by the DOJ as well as by all other Federal Departments. Integral to the effectiveness of this strategic planning approach however, is the close coordination and mirroring of evolving operational requirements and strategic planning.

In summary, the short-term spectrum planning efforts of the DOJ are predominantly focused on preserving its current equities in spectrum access, allocation, and use, as well as expanding its opportunities to exploit commercial spectrum dependent applications. To the greatest extent possible the DOJ has and will continue to endeavor to meet its expanding mission requirements through the application of newer and more efficient technologies. Due to the increasing amount and complexity of its mission requirements, however, the Department of Justice demands continued protection of its current spectrum use to ensure legacy system integrity. As a result of these efforts, the DOJ does not foresee any relinquishing or diminishing of its use of current spectrum resources within the near future. In the long term, the DOJ intends to pursue improvements in the areas of National Spectrum Management Policy, technical innovation, and commercial applications to help mitigate its growing requirements for spectrum access and use.

Table of Acronyms

3G	Third Generation
4G	Fourth Generation
802.11	Set of standards for wireless local area network computer communication
AES	Advanced Encryption Standard
ATF	Bureau of Alcohol, Tobacco, Firearms and Explosives
BOP	Bureau of Prisons
CDMA	Code Division Multiple Access
CIO	Chief Information Officer
COG	Continuity of Government
COOP	Continuity of Operations
DEA	Drug Enforcement Administration
DOJ	Department of Justice
EHF	Extremely High Frequency
EOUSA	Executive Office for United States Attorneys
FCC	Federal Communications Commission
FBI	Federal Bureau of Investigation
GH	Giga-Hertz
GSM	Global System for Mobile Communications
HF	High Frequency
IWN	Integrated Wireless Network
ITU	International Telecommunications Union
LAN	Local Area Network
LMR	Land Mobile Radio
LTE	Long Term Evolution
MHz	Mega-Hertz
NTIA	National Telecommunications and Information Administration
O&M	Operations and Maintenance
OIG	Office of Inspector General
P25	Suite of standards involving digital Land Mobile Radio services
PTT	Push-to-Talk
RoIP	Radio over Internet Protocol
SAFECOM	Communications program within the Interoperability and Compatibility Office
SARSAT	Search and Rescue Satellite
SDR	Software Defined Radio
SHF	Super High Frequency
SWAT	Special Weapons and Tactics
UHF	Ultra-High Frequency
USMS	United States Marshals Service
VHF	Very High Frequency
VoIP	Voice over Internet Protocol
WRC	World Radiocommunication Conference
WiFi	Wireless Fidelity
WMO	Wireless Management Office