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# *National Communications System National Coordinating Center*



## *Hurricane Andrew After Action Report*

*February 1993*

*The Office of the Manager  
National Communications System  
701 S. Court House Road  
Arlington, VA 22204-2198*

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## EXECUTIVE SUMMARY

On 24 August 1992, Hurricane Andrew struck southeast Florida, causing severe devastation to southern Dade County and Monroe County. Twenty-four hours later, Hurricane Andrew crossed the coastline into Louisiana, bringing further destruction to residential and business communities.

Hurricane Andrew was the first significant test of the plans and procedures outlined in the recently (January 1992) revised **National Plan for Telecommunications Support in Non-Wartime Emergencies**. It was also the first major disaster in which the provisions of the **Federal Response Plan** (April 1992) were implemented. Hurricane Andrew severely tested the provisioning function of the Telecommunications Service Priority (TSP) System and the first peacetime operational deployment of the National Transportable Telecommunications Capability (NTTC) was conducted. Finally, the Shared High Frequency (HF) Radio Resources (SHARES) program was activated to support response operations.

Dedicated government and telecommunications industry personnel ensured that response and recovery efforts had adequate telecommunications support to what turned out to be the largest disaster response operation in the history of the federal disaster response program. Support was eventually provided to two Disaster Field Offices, multiple Disaster Application Centers, two teleregistration centers, field hospitals, field kitchens, and tent cities.

The storm resulted in major efforts by all emergency response agencies, but as in all disasters, lessons were learned. The lessons learned in providing this support are as follows:

- **The organizational structure and procedures established by the National Plan for Telecommunications Support in Non-Wartime Emergencies, the Federal Response Plan Communications Annex, and the TSP System work. The Federal Emergency Communications Coordinator (FECC) must be the Disaster Field Office single focal point for telecommunications support. The FECC must understand the**



capabilities of emergency telecommunication resources within the disaster area and be able to coordinate their deployment .

Furthermore, the FECC must be the single point of contact for TSP requests and have the authority for TSP invocation on behalf of the Federal Coordinating Officer in order to ensure the timely provisioning of critical circuits and services.

- **The staffing resources required by a disaster having the magnitude of Hurricane Andrew are immense.** The requirement for a cadre of personnel trained in telecommunications support to emergency response and recovery operations quickly became evident. While all personnel involved performed admirably, the requirement to staff the Emergency Support Team (EST), the National Coordinating Center for Telecommunications (NCC), and the Emergency Response Team (ERT) Emergency Communications Staff for twenty-four hours per day operations over an extended period of time would eventually overwhelm the capabilities of the personnel who were actively involved with response and recovery efforts. Additionally, the scope of the duties of personnel assigned to the EST and ERT quickly expanded, requiring additional trained staff.
- **Additional training is required for personnel fulfilling the requirements of all levels of the Federal Response Plan Emergency Support Function 2 (ESF-2).** Personnel assigned to the ERT, NCC, and EST must receive more training in order to meet the rapidly expanding responsibilities at all levels of the ESF-2 structure.
- **The TSP System is an essential tool in managing requests for telecommunication services in response to a major disaster or emergency.** Use of the TSP System provisioning aspects throughout Hurricane Andrew response and recovery efforts was unprecedented and the system performed admirably. While highly successful, several issues surfaced that the TSP Program Office has already started to address. These issues include perceived State/federal conflicts of interest, military support requirements, interdependency with electric

power providers, and the existence of a Memorandum of Understanding between the General Services Administration (GSA) and the Federal Emergency Management Agency (FEMA) that removes TSP invocation authority from the Federal Coordinating Officer and FECC.

- **Joint planning is required in order to integrate the capabilities of mobile and transportable telecommunication resources, such as the NTTC, into the emergency response planning of other Emergency Support Functions.** While the first operational deployment of the NTTC proved successful and provided badly needed telecommunication support to the National Disaster Medical System (NDMS) Disaster Medical Assistance Teams (DMATs), full support could have been provided earlier had the use of NTTC been integrated into the planning process prior to the disaster declaration. This prior planning would allow the NCS to better understand user requirements and provide the using agencies with an understanding of system capabilities, how to obtain system support, and what on-site support the user agency must provide for mobile/transportable resources.
- **Cellular telecommunication networks are robust and provide badly needed capabilities in responding to disasters.** While the cellular networks in the disaster area were damaged by Hurricane Andrew, the service providers rapidly restored the existing networks and then expanded the capacity of those networks to 300% over pre-storm levels. However, concurrent with this expansion was a rise in the use of cellular telephones. Network congestion caused by this increased usage limited the effectiveness of this valuable technology. It was recommended by several disaster response officials that the feasibility of a priority override system or dedicated cellular capability for disaster response operations be examined.

- **The value of HF radio was proven.** In the initial aftermath of the storm, the SHARES network provided a capability to pass damage information and coordinate initial efforts. The SHARES network was used to assist Governor Chiles locate and communicate with emergency response officials in devastated areas of Monroe County.

While the most expensive disaster to date, Hurricane Andrew could have been worse. Had the storm not been as quick moving, had it been wetter, or had it struck but a few miles north in more populated areas, the effects on the telecommunications infrastructure could have been more devastating, complicating overall response and recovery efforts. Building on the success of Hurricane Andrew response efforts and capitalizing on lessons learned, the NCS is continuing to prepare for future disasters and emergencies.

# ***HURRICANE ANDREW AFTER ACTION REPORT***

## **1. INTRODUCTION**

In August 1992, the National Weather Service tracked the progress of a small storm as it grew into the first hurricane of the season, and provided indications that the storm would strike the Florida coast. Using the Emergency Broadcast System (EBS), the Governor of Florida issued warnings to the threatened population at 1530 hours on 23 August 1992 and 1000 hours on 24 August 1992. These warnings requested the civilian population in the threatened areas to begin evacuating and provided evacuation instructions.

On 24 August 1992, Hurricane Andrew struck southeastern Florida, causing significant damage to Broward, Dade, and Monroe Counties. The hurricane continued westward and struck the Louisiana coastline 24 hours later, causing severe flooding and erosion. In all locations, the hurricane's winds tore down power lines, uprooted trees, and smashed windows. Where the storm hit full force, entire square blocks of houses and other buildings were leveled, and telephone and power capabilities wiped out. Although hurricanes are common to Florida, the impact of Andrew was more devastating to United States coastal communities than any other hurricane in decades. Hurricane Andrew has provided the National Communications System/National Coordinating Center for Telecommunications (NCS/NCC) with an opportunity to evaluate the plans and procedures used by the Federal Government to respond to disasters. This report contains representative data collected and disseminated by the NCS/NCC. It includes a description of the force of the hurricane, its effects on the telecommunications infrastructure and National Security and Emergency Preparedness (NS/EP) users, and a summary of NCS/NCC actions taken in response to the disaster.

The National Coordinating Center (NCC) for telecommunications, formally activated 3 January 1984, is a joint government/industry organization responsible for managing the initiation, coordination, restoration, and reconstitution of the

Federal Government's NS/EP telecommunication services. The NCC coordinates industry and government telecommunication resources in response to the entire spectrum of crises and emergencies. Based on its day-to-day monitoring of the Public Switched Network (PSN) and the Federal Government's essential telecommunication facilities nationwide, the NCC is specifically responsible for analyzing and reporting telecommunication outages that affect national security and/or emergency preparedness.

## **1.1 BACKGROUND**

In 1988, Public Law 93-288 was amended by Public Law 100-707 and retitled as the **Robert T. Stafford Disaster Relief and Emergency Assistance Act** (P.L. 93-288, as amended). The Stafford Act gives the President the authority to respond to natural disasters and other incidents by providing assistance to save lives and protect public health, safety, and property. Its intent is to provide, at the request of a State Governor, orderly and continuing supplemental Federal Government assistance to State and local governments in carrying out their responsibilities to alleviate the suffering and damage resulting from disasters. Section 418 of P.L. 93-288, as amended, states "*The President is authorized during, or in anticipation of, an emergency or major disaster to establish temporary communications systems and to make such communications available to State and local government officials and other persons as deemed appropriate.*"

The **National Plan for Telecommunications Support in Non-Wartime Emergencies**, dated January 1992, establishes procedures for planning and using national telecommunication assets and resources in support of Stafford Act provisions in a Presidentially declared emergency, major disaster, extraordinary situation, or other emergency. Issued by the Director, Office of Science and Technology Policy, Executive Office of the President, in accordance with National Security Council policy, the National Plan is applicable to all Federal departments and agencies. It directs the NCS to develop plans as well as coordinate and manage telecommunications support for Federal organizations in non-wartime emergencies.

The **Federal Response Plan (FRP)**, dated April 1992, is an interagency plan for the mobilization of resources and conduct of activities to augment State and local disaster relief efforts under the authority of the Stafford Act. It delineates specific Federal actions to provide requested or preemptive response and recovery assistance to a State and its local governments affected by a significant disaster of any kind. The FRP is based on the fundamental assumption that a significant disaster will overwhelm the capacity of State and local governments to carry out the extensive emergency operations necessary to save lives and protect property.

The **Communications Annex of the FRP, Emergency Support Function #2 (ESF-2)**, is the operational plan for the execution of the concepts and procedures developed in the National Plan. Under ESF-2, the Manager, NCS, is responsible for assuring the provisioning of telecommunications support to Federal, State, and local response organizations. The Manager, NCS, through the NCC, is responsible for monitoring response efforts, supporting the Federal Emergency Communications Coordinator (FECC) by coordinating the provisioning of Federal and telecommunications industry assets to support response elements in the field, and monitoring the release and return of emergency telecommunication assets as commercial telecommunications are restored.

Hurricane Andrew is the first significant disaster to occur since the FRP was signed by participating departments and agencies. Consequently, it provides an exemplary test of the FRP concept and deserves extensive analysis. Hurricane Andrew also provided an opportunity to observe the performance of several NCS programs and initiatives, including the Telecommunications Service Priority (TSP) System, the National Transportable Telecommunications Capability (NTTC), and the Shared Resources (SHARES) High Frequency (HF) Radio Program.

## **1.2 PURPOSE**

The primary objective of this analysis is to provide an in-depth evaluation of the effectiveness of NCS emergency response plans and procedures. This report also discusses the performance of NCS initiatives involved in the Hurricane Andrew response and recovery effort.

### 1.3 SCOPE

This report is an analysis of interviews, reports, and observations covering the period from 23 August 1992 to 19 November 1992. It identifies the emergency response and recovery actions taken by key NCS/NCC representatives during the Hurricane Andrew disaster.

### 1.4 ORGANIZATION

This document is divided into five sections:

- **Section 1, Introduction** - Provides a brief description of Hurricane Andrew, describes the applicable laws and plans governing Federal response to disasters, and outlines the purpose, scope, and organization of the report.
- **Section 2, Hurricane Andrew Overview** - Tracks Hurricane Andrew's course across southern Florida and Louisiana, and describes its impact on the existing telecommunications infrastructure and its effect on NS/EP telecommunication users.
- **Section 3, Emergency Support Function #2 Response Actions** - Describes emergency response and recovery efforts at the national, regional, and local levels.
- **Section 4, NCS Initiatives** - Examines the performance and effectiveness of those NCS programs actively employed to support emergency response and relief efforts during the disaster.
- **Section 5, Lessons Learned** - Provides an assessment of Hurricane Andrew support activities.

## **2. HURRICANE ANDREW OVERVIEW**

This section describes Hurricane Andrew's destructive path across southern Florida and in Louisiana. It also identifies the hurricane's specific impact on the existing telecommunications infrastructure and its effects on NS/EP users.

### **2.1 HURRICANE ANDREW DESCRIPTION**

Hurricane Andrew, the first hurricane of the 1992 season, made landfall at approximately 0500 hours on 23 August 1992 in the outlying islands (Abaco and Eleuthera) of the Bahamas, with wind gusts up to 120 miles per hour (mph). The damage left in the wake of the hurricane was assessed at a 90 percent loss of housing on the two islands. Because these islands were not heavily populated, only four lives were lost. After hitting the Bahamas with 8-foot tidal surges, the hurricane continued its track towards the eastern coast of Florida, gaining strength as it advanced.

Hurricane Andrew was classified as a Category Four hurricane when it smashed into southeastern Florida on Monday, 24 August 1992. With sustained winds of up to 145 mph and gusts of up to 164 mph, Hurricane Andrew made its destructive landfall at 0500 hours, 35 miles south of Miami. The hurricane continued moving west at approximately 18 mph into the southern Dade County neighborhoods of Homestead, Perrine, and Cutler Ridge. The eye of the storm passed just west of Homestead Air Force Base, almost completely leveling it. Storm surges of 7 to 10 feet above normal were experienced along the shoreline with wave heights of 9 to 13 feet. The storm moved across the Everglades National Park and western coastal resort areas before blowing into the Gulf of Mexico later in the day. The furious winds ripped down power lines, uprooted trees, and leveled homes, leaving a path of destruction never before seen in the United States. The American Red Cross reported 44 fatalities attributable to the storm.<sup>1</sup> At 1400 hours on 24 August 1992, President Bush declared southern

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<sup>1</sup> Hurricane Andrew Situation Report Number 37, September 22, 1992.



Florida, covering Dade and Monroe (later including Broward) Counties, a major disaster area under declaration FEMA DR-0955-FL.

Hurricane Andrew moved across the Gulf of Mexico in a west-northwesterly direction, following the Louisiana coastline for an extended period of time, and made landfall approximately 25 miles southwest of Morgan City, Louisiana at 0200 hours, Wednesday, 26 August 1992. Once the storm centered over the Louisiana land mass, it was downgraded to a Category Three hurricane. President Bush immediately declared Louisiana's Terrebonne Parish a major disaster area under FEMA 956-DR-LA.

At 2000 hours on 26 August 1992, Hurricane Andrew was downgraded to a tropical storm while wavering in the vicinity of Meridian, Mississippi. By 2200 hours, while still moving northeastward, it was downgraded again to a tropical depression. While damage occurred throughout Louisiana, the majority of the destruction was centered in the coastal plains, with heavy damage to the farming industry and to residential and commercial buildings. By 29 August, 39 additional counties across the affected region were added to President Bush's previously declared disaster areas. Hurricane Andrew's course through southern Florida and Louisiana is shown in Exhibit 2-1.

Overall, Dade and Monroe Counties in southern Florida suffered the most devastation. The State of Florida estimated that 50,000 people or more have been left homeless.<sup>2</sup> American Red Cross workers have determined through street surveys that 137,561 homes have been damaged by Hurricane Andrew. Of those, 59% have been destroyed or have suffered major damage. Property damage is estimated between \$6 and \$15 billion.

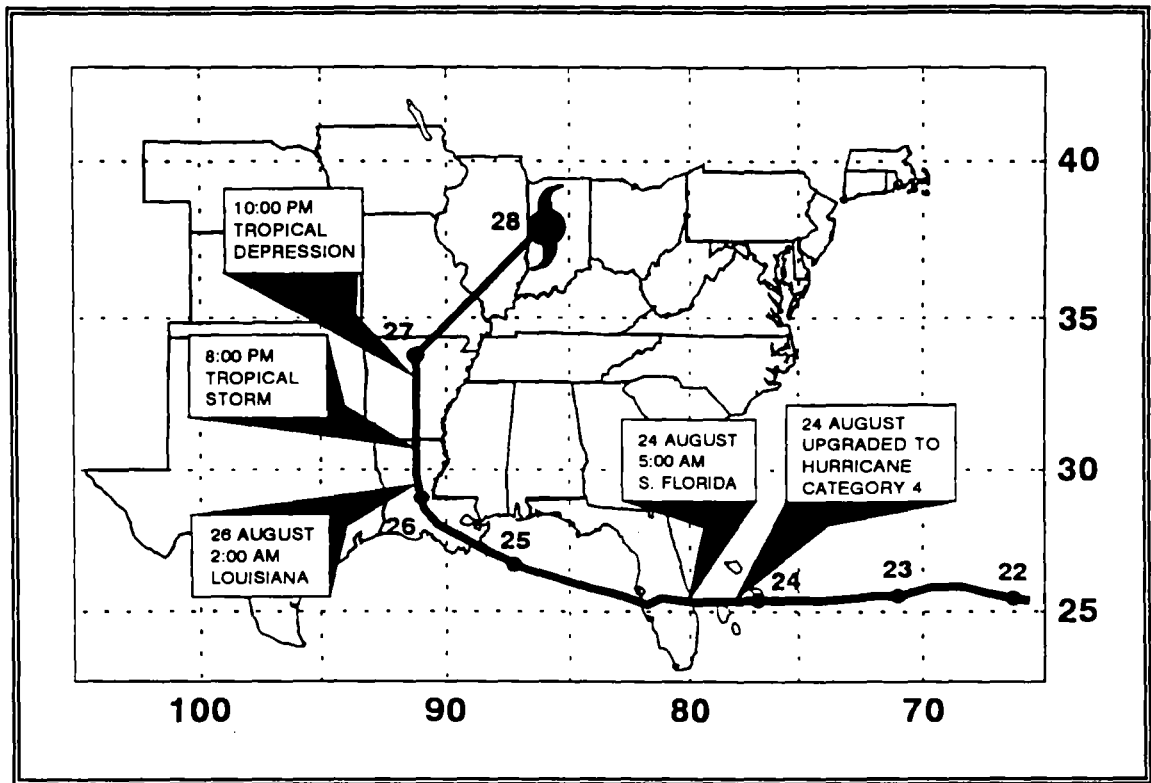
## **2.2 EFFECTS ON THE TELECOMMUNICATIONS INFRASTRUCTURE**

Despite the hurricane's tremendous force and power, the telecommunications infrastructure in both Florida and Louisiana generally survived with minimal damage. In part, this was due to appropriate planning and

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<sup>2</sup> Hurricane Andrew Situation Report Number 9, August 28, 1992.

**EXHIBIT 2-1**  
**Hurricane Andrew Ground Track: 22-28 August 1992**



preparation by both local and long-distance carriers in each State. Companies secured their facilities in accordance with their corporate procedures. In preparation, they sand-bagged entrances, secured doors and windows, fueled generators, and purchased batteries and additional generators to provide emergency power. Following pre-disaster planning procedures, they pre-positioned personnel, ensuring that technical expertise was immediately available to assess and correct telecommunication outages. They pre-positioned critical supplies and materials, staged repair vehicles at strategic locations, and ensured spare parts and equipment were readily available. While communications into and out of the affected regions of Florida and Louisiana remained operational, network management controls were exercised, restricting traffic to the affected areas to prevent saturation of local exchange carrier networks. For example, AT&T reported that its calling volume into the disaster area rose to 8.6 million attempted calls resulting in 5.5 million calls blocked by management controls.<sup>3</sup> At the same

<sup>3</sup> Hurricane Andrew Situation Report Number 4, August 25, 1992.

time, MCI experienced 242,000 blocked calls into the disaster area, as concerned friends and families tried to contact each other.<sup>4</sup> Specific damage sustained in each State is discussed below.

### **2.2.1 Florida**

The majority of outages in southern Florida resulted from damage to the "outside plant" equipment, which includes cable, antennas, and telephone poles. The majority of this damage was caused by the tremendous pounding the outside plant equipment received from Hurricane Andrew's winds. While 85% of the telephone lines in Florida are buried, the remaining 15% are strung between overhead poles and are very susceptible to wind damage. Unfortunately, the majority of telephone service in southern Dade County is provided by aerial cable, and this area was hit hardest by Hurricane Andrew. The conductor miles of cable for each area of Dade County are summarized below.

|                          | <b>North Dade</b> | <b>Central Dade</b> | <b>South Dade</b> |
|--------------------------|-------------------|---------------------|-------------------|
| <b>Aerial Cable</b>      | <b>773</b>        | <b>385</b>          | <b>967</b>        |
| <b>Buried Cable</b>      | <b>810</b>        | <b>147</b>          | <b>1073</b>       |
| <b>Underground Cable</b> | <b>3590</b>       | <b>2040</b>         | <b>2880</b>       |

As of 12 November 1992, BellSouth reported that the distribution system consisting of 1,700 poles, 5,485 drops, and 1,673 fiber spans was downed during Hurricane Andrew. Inside plant equipment, which includes central offices, received only minor damage. In one case, a central office in Homestead lost a major portion of its roof, however, that office remained operational throughout the disaster despite its obvious impairment.

AT&T reported that a microwave tower in Goulds, Florida was downed, wiping out connectivity to Cuba completely following the loss of the microwave

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<sup>4</sup> Hurricane Andrew Situation Report Number 4, August 25, 1992.

link. Additionally, AT&T radio terminal facilities in Florida City were severely damaged. No other long distance carrier reported any damage.

The biggest threat to the Florida telecommunications infrastructure following the hurricane was the extensive loss of commercial power. Power distribution systems throughout the area were severely damaged, affecting approximately 400,000 customers.<sup>5</sup> Due to the lack of commercial power, the majority of the telecommunication facilities in southern Florida were severely affected, forcing them to operate on emergency battery and generator power. BellSouth reported 37 central offices on emergency power and 3 on battery power.<sup>6</sup>

The cellular system received some of the heaviest damage from the storm--many cellular sites south of Miami were damaged. Damage to cellular sites included loss of connectivity to the PSN, downed towers, loss of power, and extensive wind damage to antenna systems. Other damage included loss of connectivity to the Florida Keys when a fiber optic cable was damaged due to downed utility poles, and failure of the Remote Switching Module serving 495 lines at Homestead Air Force Base. Despite extensive external damage, the telecommunications infrastructure in southern Florida suffered less loss of service than had been anticipated from a hurricane of this magnitude due to the fact that the storm was quick moving and relatively "dry." Had the storm been wetter and lingered over the area, the underground cable plant might have sustained water damage due to the area's high water table.

## **2.2.2 Louisiana**

The telecommunications infrastructure in Louisiana sustained less damage than that in Florida. Louisiana had more time to prepare for the onslaught of the storm and used that time wisely. Louisiana residents saw the massive destruction that the storm caused in Florida and immediately began preparations for its arrival. In addition, the storm weakened considerably when it hit land, tremendously diminishing its impact.

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<sup>5</sup> Hurricane Andrew Situation Report Number 9, August 28, 1992.

<sup>6</sup> Hurricane Andrew Situation Report Number 2, August 24, 1992.

A lack of commercial power forced the majority of telecommunication facilities to operate on generator power. BellSouth reported that 60 of their offices were on emergency power generators during the storm and only 2 of the 142 central offices located in the affected area lost service. MCI reported that a terminal in Baton Rouge was operating on battery power due to a generator failure.<sup>7</sup> The only central office failure in either State occurred in Louisiana when a generator failed, and battery power was exhausted.<sup>8</sup>

Physical damage to external telecommunications facilities in Louisiana was sometimes greater than in Florida. BellSouth reported that the distribution system consisting of 3,500 telephone poles, 4,250 drops, and 1 million feet of cable was downed or damaged.

## **2.3 EFFECTS ON NS/EP USERS**

Based on information derived from the NCS data base of NS/EP telecommunication users, 101 Federal Government offices located in southern Florida had NS/EP circuits. These included 215 circuits to such varied agencies as the Department of Transportation (DOT), Department of Defense (DoD), National Aeronautics and Space Administration (NASA), National Oceanographic and Atmospheric Administration (NOAA), and the National Security Agency (NSA).

Of these NS/EP users, the General Services Administration (GSA) reported 19 FTS-2000 locations isolated due to a loss of power. Homestead Air Force Base and Key West, Florida were isolated from the Defense Switch Network (DSN). Homestead became isolated when its facilities were destroyed, while Key West became isolated when a fiber optic cable was severed due to downed utility poles. The Federal Aviation Administration (FAA) air traffic control (ATC) and radar facilities in southern Florida suffered extensive damage and required TSP provisioning in order to reopen local airports. The Turkey Point nuclear power plant was isolated when a fiber optic cable was severed due to downed utility poles.

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<sup>7</sup> Hurricane Andrew Situation Report Number 6, August 26, 1992.

<sup>8</sup> Hurricane Andrew Situation Report Number 7, August 27, 1992.

### **3. EMERGENCY SUPPORT FUNCTION - 2 RESPONSE ACTIONS**

Federal, State, and local government response elements and the telecommunication entities began preparations for Hurricane Andrew on 23 August--the day before landfall in Florida. That morning, the Florida State Emergency Operations Center (EOC) was activated in Tallahassee and began round-the-clock operations. The Federal Emergency Management Agency (FEMA) Regional Operations Center (ROC) in Atlanta initiated 24-hour operations that afternoon and contacted Mr. Guy Darden, GSA/NCS Regional Manager, to act as the FECC. Mr. Darden appointed an alternate FECC to staff the ROC and prepared to move to the State EOC in Tallahassee as a member of the Advance Element of the Emergency Response Team (ERT-A). At 1400 hours, FEMA activated the Emergency Support Team (EST) in accordance with the **Federal Response Plan (FRP)**, requesting Emergency Support Function (ESF) primary agencies to send representatives to the Emergency Information and Coordination Center (EICC). The NCS (ESF-2) representative, CWO2 Curtis Law, arrived at the EICC at 1900 hours after having notified the Manager and Deputy Manager of the NCC of the EST's activation.

#### **3.1 NATIONAL LEVEL RESPONSE**

At the national level, ESF-2 is led by the Manager, NCC, and consists of the NCC, the EST representatives, and the Catastrophic Disaster Response Group (CDRG) representative. Together, these three elements provided the primary national-level support and coordination for the field response elements.

##### **3.1.1 National Coordinating Center (NCC)**

The NCC began emergency operations at 0530 hours on 24 August, and designated representatives to staff the EST for 24-hour-a-day operations. Mr. William Belford, Manager, NCC, met with NCC telecommunications industry and Government representatives and immediately began collecting damage assessment information and reporting to the Manager, NCS, the White House, the Federal Communications Commission, and other NCS member organizations. Mr. Belford then attended the first of two meetings of the CDRG at FEMA Headquarters,

where he reported the status of telecommunications capabilities and NCS actions taken in response to Hurricane Andrew. The NCC assumed 24-hour responsibility for "HUB" coordination of SHARES. SHARES played a crucial role in the first 48 hours of the response effort, connecting government and industry NS/EP response organizations in southern Florida with departments and agencies outside of the stricken area. One of the primary duties of the NCC was the assignment of TSP numbers for the provisioning of new service to NS/EP users. Throughout the aftermath of Hurricane Andrew, the NCC acted as primary support for the FECCs in Florida and Louisiana, coordinating the use of government and industry telecommunication assets in the affected areas.

Hurricane Andrew placed more demand on the staff and resources of the NCC than any prior disaster, presenting a significant challenge to NCC management and raising issues that should be addressed for future disasters. Currently, a limited number of experienced staff members at the NCC are knowledgeable about the telecommunications support required for disaster management. While this staff performed admirably during the disaster, extended operating schedules over a long period of time would eventually degrade performance. To meet this contingency, additional staff should be identified throughout the Office of the Manager, National Communications System (OMNCS) to receive training and instruction in the intricacies of emergency operations. Similar staffing and training issues exist relative to NCC radio room operations.

The NCC, in its role of coordinating government and industry telecommunications support to field operations, processed and tracked a significant volume of information daily during the disaster. NCC staff suggested using an automated management information system to aid decision makers in allocating scarce telecommunications resources and tracking response actions in real time. Also integral to its coordination mission is the ability of the NCC to communicate effectively with other telecommunication response elements. Communication with both the EST and the FECCs was accomplished primarily via FAX and telephone during Hurricane Andrew. At times, this was cumbersome, due to the large volume of time critical information being passed. Attempts at using E-mail for Situation Report (SITREP) information proved inefficient, taking up to 6 hours to

complete the data transfer. Other options should be explored for the electronic transfer and sharing of information.

### **3.1.2 Emergency Support Team (EST)**

The EST was fully staffed and operational on the morning of 24 August. Its primary function was to collect and disseminate damage information and coordinate ESF response activities at the national level. The director of the EST regularly held meetings with representatives of the 12 ESFs to receive status updates on emergency response actions within the individual ESFs and to coordinate response among the ESFs. In addition, ESF-2 representatives collected information from the FECCs and the NCC and provided input for inclusion in the national SITREP and various media releases. ESF-2 representatives coordinated regularly with other ESFs to determine their telecommunication requirements and to facilitate provisioning of services to response personnel in the field. Arranging support for telecommunications response elements often required ESF-2 staff at the EST to track the status of transportation requests and logistical support through each phase of an element's deployment. One significant example of this coordination was the use of the NTTC to provide support communication capabilities to the Disaster Medical Assistance Teams (DMATs) in southern Florida. Close coordination between the NCC, the Department of Health and Human Services (HHS), and DOT was the key to success in moving the NTTC from Clarksburg, Maryland to Dade County, Florida within 24 hours.

The OMNCS assigned 3 staff members to man ESF-2 at the EST on a 24-hour, 3-shift rotation. The ESF-2 staff initially viewed their role as liaison between the NCC and the EST, with the coordination and action officer roles being performed at the NCC. However, as operations progressed, the EST ESF-2 representatives took on much more of an action officer role. The personnel staffing ESF-2 at the EST learned their duties via on-the-job-training (OJT) and, with their prior experience in disaster management, were able to fulfill the requirements of their position. They reported, however, that to more effectively meet the requirements of the EST, a trained cadre of OMNCS response personnel should be developed. This would require the development of detailed standard



operating procedures, staffing requirements, and a training program that would provide a basic understanding of EST/ESF-2 roles and responsibilities.

The OMNCS staff assigned to the EST reported that, in addition to staffing support, they required increased information support in the form of an ESF-2 flyaway kit. The flyaway kit would include various documents, procedures, and contact lists for ESF-2 response teams. Additionally, a portable computer should be included in the flyaway kit, to allow better tracking of scarce telecommunication resources and permit dedicated data transfer with the NCC and the ESF-2 field elements.

### **3.1.3 Catastrophic Disaster Response Group (CDRG)**

The CDRG met twice during Hurricane Andrew after landfall in Florida and after landfall in Louisiana. At these meetings, national policy issues, the status of national and regional organization staffing, disaster declarations, and regional operations were discussed. Additionally, each Federal department and agency reported its response status. In the initial meeting on 24 August, the NCS briefed telecommunication industry damage assessment and its support mission accomplishments. The second CDRG meeting occurred on 27 August at 1400 hours. The NCS report referenced the restoration of telecommunications to the Turkey Point nuclear power plant, the establishment of the Disaster Field Office (DFO) in Miami, Florida, the restoration of service to Key West, Florida, and the impact of Hurricane Andrew on telecommunications facilities in Louisiana. HHS requested the assistance of the NCC in coordinating additional telecommunications support for DMATs in southern Dade County. This resulted in the NCC coordinating, through the EST, with HHS and DOT, the movement of the NTTC to southern Dade County to provide satellite and cellular telephone service to the DMATs.

## **3.2 FIELD ELEMENT RESPONSE**

Field elements involved in the Hurricane Andrew response efforts included Regional Operations Centers (ROCs) in Atlanta, Georgia, and Denton, Texas; the Advance Elements of the ERTs deployed to the Florida State capital, Tallahassee,

and the Louisiana alternate EOC in Alexandria, Louisiana; and ERTs at the DFOs in Miami, Florida, and Baton Rouge, Louisiana.

### **3.2.1 Regional Operations Centers (ROCs)**

The ROCs were located in Atlanta, Georgia, and Denton, Texas. A ROC is established at the FEMA Regional Office (or a Federal Regional Center) in response to (or in anticipation of) an event that may require Federal assistance under the FRP. The ROC is staffed by FEMA regional personnel and representatives from the ESF primary agencies, as required. It serves as an initial point of contact in the region for the affected State(s), the national EST, and Federal agencies.

### **3.2.2 Advance Element of the Emergency Response Team (ERT-A)**

Advance Elements of the Emergency Response Team (ERT-As) were deployed in southern Florida and Louisiana. The sequence of activities in each State is described below.

#### **3.2.2.1 Florida**

The ERT-A arrived at the State EOC in Tallahassee on 23 August and determined the best location for a DFO FECC to accommodate both State EOC personnel and Federal response elements. Mr. Guy Darden and telecommunications industry representatives were members of the ERT-A to ensure that the facility selected could be properly equipped to handle the volume of telecommunications traffic that would be generated at the DFO. On 25 August, the old Eastern Airlines facility at Miami Airport was identified as a suitable location for the DFO. At 1500, 25 August, the FECC established 24-hour operations for ESF-2 personnel, Purchase of Telecommunications Services (POTS) contract installers and Southern Bell Federal Marketing personnel. At that point, the monumental task of installing telephone service for the DFO was initiated. At 0135, on 26 August, FEMA invoked the TSP System to authorize emergency actions by AT&T to install four T-1 carrier lines and BellSouth to install 280 ESSEX lines into the Miami DFO. These services were to become operational by 0800 on 27 August. Initial DFO connectivity to the PSN was provided by noon on 26

August by the FEMA Mobile Emergency Response Support (MERS) Detachment from Thomasville, Georgia, and FEMA's Mobile Air-Transportable Telecommunications System (MATTS), allowing limited communications using KU band satellite and HF radio capabilities. The facility at Miami became fully operational at 1200 hours on 27 August, and the ERT-A staff moved from the State EOC to establish full operations.

#### **3.2.2.2 Louisiana**

The ERT-A in Louisiana was pre-positioned and operational at the Best Western Hotel in Alexandria when Hurricane Andrew hit the coast at 0200 on 26 August. Mr. Bill Hale, GSA/NCS Regional Manager, was the FECC for Louisiana and the leader of the ESF-2 staff on the ERT-A. An ESF-2 staff was also operational at the FEMA ROC in Denton, Texas. On the afternoon of 26 August, the ERT-A traveled to Baton Rouge to select a DFO site. To expedite communications at the DFO, Mr. Hale alerted South Central Bell and requested approximately 25 circuits to support the DFO when a location was determined. A temporary DFO was established at Camp Beauregard, Louisiana as of 0900 on 27 August, while awaiting the establishment of an operational DFO in Baton Rouge. During the afternoon of 27 August, an office building in downtown Baton Rouge was selected as the DFO. While waiting for the lease to be signed, South Central Bell worked throughout the night to pre-position 100 lines for use by the DFO. By the afternoon of 28 August, the DFO was operational, with additional ERT members en route to the DFO from Camp Beauregard.

#### **3.2.3 Emergency Response Team / Disaster Field Office**

The following two subsections describe the activities of the Emergency Response Teams in Florida and Louisiana after DFOs were established. The final subsection presents some observations on how these activities could be made more efficient.

### **3.2.3.1 Florida**

The Miami DFO became operational on 27 August with 280 ESSEX lines and 50 Florida WATS lines installed. As a result of the extensive damage in southern Florida, the Miami DFO quickly grew to become the largest DFO ever established. Staffing at the DFO exceeded 1,100 personnel, and telecommunications requirements grew to 2,912 Centrex lines and 144 FTS2000 trunks. The Emergency Communications Staff consisted of the FECC, and 7-9 personnel from GSA, the OMNCS, the U.S. Army Information Systems Command, as well as industry representatives from Southern Bell, BellSouth Mobility, COMTEL and Cellular One. A majority of Government personnel on the Emergency Communications Staff were selected by Mr. Darden from the Atlanta GSA office. Their experience in telecommunications contracting proved extremely valuable. There was excellent, close, and continuous coordination between Southern Bell representatives and Government officials in ESF-2. Southern Bell assigned five people to work as members of ESF-2 to provide damage and TSP status information to the FECC, as needed. ESF-2 also coordinated with Southern Bell supervisors to ensure that each TSP request was acted upon. Additional coordination between the Government and COMTEL, the POTS contractor, ensured sufficient telephone service was available at the DFO. Mr. Dan Smith, GSA/NCS Regional Manager from Region V, served as a Deputy to Mr. Darden. Three personnel from the Office of the Manager, NCS were dispatched to the Miami DFO to provide technical support in a rapidly expanding situation. Some examples of the service provided by the Emergency Communications Staff include:

- Processing 397 TSP invocations for 4,384 circuits or services--more circuits or services than were processed during Operation Desert Shield/Desert Storm.
- Working with ESF-12, Energy, to ensure coordination between Southern Bell and Florida Power and Light in restoring and provisioning services in support of NS/EP telecommunication users.
- Coordinating with the NCC, the EST, and telecommunication industry personnel in obtaining several mobile communication assets for use in

the affected areas. These assets included NTTC support to the DMATs, McCaw Cellular's Cell on Wheels or "COW" support to the Homestead area, several industry-provided phone banks for the general public and response element use, MCI mobile communications center support to the Red Cross, and AT&T Flyaway Satellite Terminal support to the Neighborhood Service Center in Florida City, Florida.

- Frequency coordination and allocation for the U.S. Army AM radio station, "Radio Recovery," including obtaining the license to operate from the FCC and National Telecommunications Information Agency (NTIA) in just over 8 hours (normal processing time is 18 months).
- Providing telecommunications support for 16 Disaster Application Centers (DACs) throughout the affected area in southern Florida.
- Supporting State and local telecommunication requirements to include providing services to the southern Florida school system, Government departments and agencies, and voter polling locations.

### **3.2.3.2 Louisiana**

Because less damage was caused by Hurricane Andrew in Louisiana and the population density in the affected areas was lower, the DFO in Baton Rouge was a considerably smaller operation than that in Miami. However, compared with DFOs used in the majority of disasters, the Baton Rouge DFO was a large operation. Total telecommunication services provided to the DFO included 141 business lines, 10 INWATS lines, and 96 AT&T Megacom lines for 800 service. The Emergency Communications Staff consisted of the FECC, one FEMA representative, one GSA representative, and two FEMA technicians who performed wiring and station moves within the DFO.

All telecommunication support to the DFO was provided by South Central Bell. Additional telecommunications support was provided to five DACs, the Small Business Association (SBA), Internal Revenue Service (IRS), and the Department of Agriculture (USDA). FEMA MERS detachments provided additional communication

capabilities to the DACs at New Iberia and Franklin. On 4 September, the Emergency Communications Staff coordinated the provisioning of mobile telephones to the DAC in New Iberia to replace FEMA MERS equipment that was redeployed to southern Florida.

### **3.2.3.3 Observations**

In the FRP Annex 2 (Communications), the FECC is given considerable latitude in defining the ESF-2 organization structure. This allows the FECC to tailor the Emergency Communications Staff to meet the situation. The FECC in Miami staffed the majority of the Emergency Communications Staff with GSA personnel, with staff from other organizations joining on an as-needed basis. ESF-2 calls for representatives of eight support agencies (the Departments of Agriculture, Commerce, Defense, Interior, and Transportation, the Federal Communications Commission, GSA, and FEMA) to augment the Emergency Communications Staff. By tapping into the personnel resources of these support agencies, the strain on GSA resources would be eased. Additional benefits would accrue, due to increased coordination between these interdependent agencies. In Miami, industry involvement played a key role in successful telecommunication response operations. The integration of industry representatives into the Emergency Communications Staff is a necessity for coordinated, effective telecommunications response operations.

Due to the length of operations in Miami, many Emergency Communications Staff positions were manned on a rotating basis. This caused some problems in terms of continuity and Emergency Communications Staff training. ESF-2 staff were not always replaced by fully qualified and trained personnel, nor did trained staff always return to the DFO. Untrained personnel arriving at the DFO had to overcome an extensive learning curve before they could effectively contribute to Emergency Communications Staff operations. While hard work and dedication on the part of ESF-2 personnel made up for training deficiencies, a trained cadre of personnel is needed to fulfill the varied responsibilities of the Emergency Communications Staff on a dedicated basis.

In order to coordinate with telecommunications carriers in the field, the FECC must know the status of TSP orders and their associated Telecommunications Service Requests (TSRs). The high volume of information and resulting confusion during disaster operations require the use of data base software or other automated means for maintaining this detailed information. The ability to conduct detailed analysis of telecommunications status information and to generate reports in support of DFO SITREPs is integral to the operation of the Emergency Communications Staff. A portable Management Information System (MIS) capability, which could be deployed on short notice to the DFO, should be developed, and Emergency Communications Staff members should be trained in its use.

While the FECC was the senior communications coordinating authority in the disaster area, he does not have operational control of the MERS or MATTS. The MERS from Thomasville, Georgia and the MATTS from Berryville, Virginia, both FEMA capabilities, were deployed initially in support of the Miami DFO. However, the commercial telecommunications infrastructure was not heavily damaged in that area and was quickly able to provide the required support to the DFO, supplanting the temporary arrangements made with the MERS system. The MERS was then deployed farther into the damaged area to support a DMAT. On 4 September a second MERS team, based in Denton, Texas, was moved to Florida to support one of the DACs. This MERS team had been in Louisiana but moved to Florida when it was no longer needed to support hurricane relief in that State. The MATTS was also one of the first mobile systems on the ground and initially supported DFO communication requirements. It later deployed to the disaster area in support of one of the DACs. To ensure efficient and effective deployment of FEMA's mobile assets, the deployment plans should be thoroughly understood and coordinated with the FECC.

### **3.3 TELECOMMUNICATIONS INDUSTRY RESPONSE**

The telecommunications industry's support to response and recovery actions taken in the aftermath of the hurricane was outstanding. They provided phone banks for public use in the stricken areas and deployed mobile switches and satellite terminals to support relief efforts. AT&T installed a mobile 5ESS switch at

Homestead Air Force Base. In addition, they deployed their flyaway satellite terminal system in Florida City, which routed calls through an AT&T switch in New York. MCI and Sprint both provided telephone banks and free services for public use. These actions were taken in addition to their efforts to repair their networks and provide service to the rapidly increasing Federal presence.

### **3.3.1 Cellular Telecommunications**

Cellular systems played a key role in the response efforts. At one point, McCaw Cellular reported the majority of their cell sites were inoperable due to a loss of power and damage to poles, lines, and towers. Although damage was severe, the cellular system proved to be the most resilient and easily restorable.

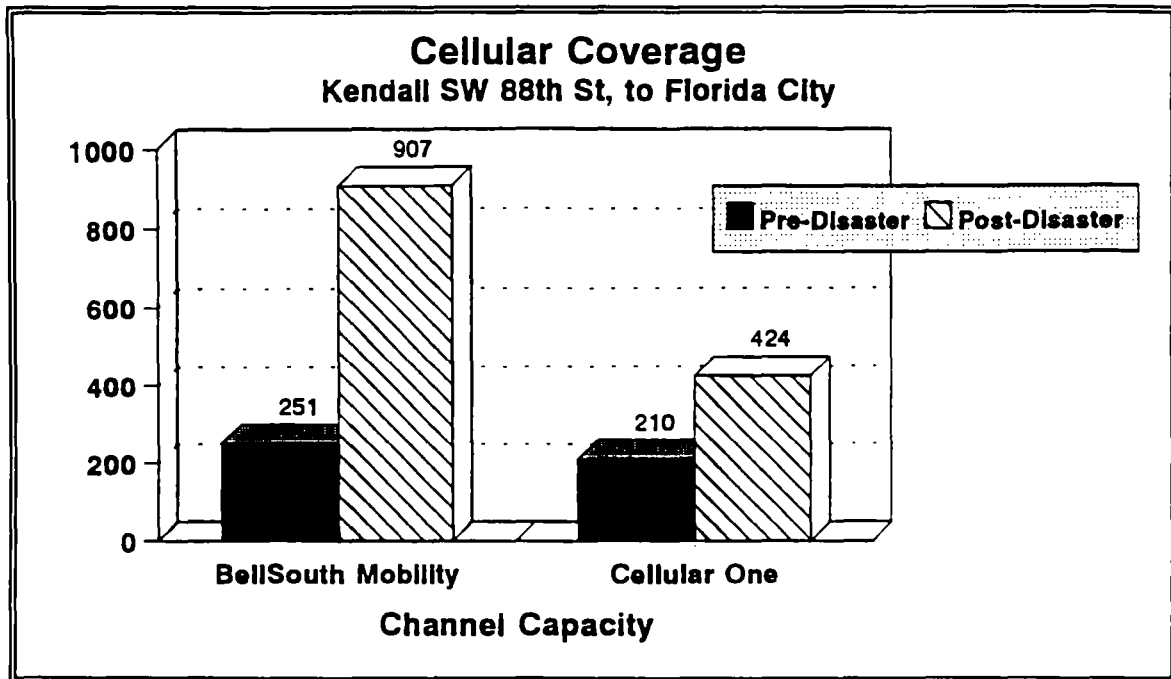
Both BellSouth Mobility and McCaw Cellular provided mobile cellular systems to replace lost cell sites. McCaw Cellular deployed their COW system to Homestead, established temporary microwave links, and provided portable generators. BellSouth Mobility also deployed several mobile cellular platforms, both to repair damaged facilities and to increase capacity.

Cellular network capability was restored to roughly 300 percent over pre-disaster capacity. The percentage of calls blocked due to system overloading averaged about 27% and sometimes peaked near 40% during the first few crucial weeks after the storm. As shown in Exhibit 3-1 below, BellSouth Mobility increased channel capacity from 251 channels prior to the disaster to 907 channels afterwards. McCaw Cellular increased channel capacity from 210 channels to 424 channels. A total of 579 BellSouth Mobility and 38 McCaw Cellular telephones were issued through 21 September.

Cellular telephones were an invaluable asset, providing support to key recovery personnel. They helped keep responders and emergency managers in touch, and provided communication between agencies, organizations, the media, and the public. At one point, most personnel assigned to the Miami DFO had cellular telephones.



EXHIBIT 3 - 1  
Cellular Channel Capacity



While it is obvious the cellular capability provided much needed support and worked beyond expectations, several concerns surfaced that should be addressed. The user community was not educated on the proper use and care of the cellular telephones. Many users did not know how or when to change batteries. Others did not understand operating procedures nor were they aware of the limited range of these telephones. A simplified operating instruction card that addresses these concerns should be developed and issued with the telephones. Users should also be given a short overview of the system capabilities, maintenance concerns, and operating procedures.

### 3.3.2 Local Exchange Carriers

Both BellSouth operating companies, Southern Bell in Florida and South Central Bell in Louisiana, acted superbly during all phases of the disaster. The companies held interdepartmental meetings in early May 1992 to discuss disaster planning and preparation activities in anticipation of the hurricane season. These meetings were held with State and local officials and other utility companies. In addition, emergency preparedness guides were developed and refined. These preliminary steps laid the foundation for successful response and recovery actions.

As Hurricane Andrew approached the Florida coast, the companies began preparatory actions such as reinforcing facilities and pre-positioning work crews and equipment. Shortly before Hurricane Andrew made landfall, the central offices in the hurricane's path were instructed to cut over to emergency generator power. These crucial steps, taken before Hurricane Andrew ever reached the Florida coast, ensured recovery actions were carried out as effectively as possible. As soon as the storm passed into the Gulf of Mexico, recovery actions were initiated. To help speed the recovery of the telephone network, BellSouth established the following restoration priorities:

- TSP restoration
- TSP provisioning
- Overall restoration.

This priority system allowed critical users in Florida and Louisiana to reestablish service and those organizations involved in relief efforts to establish new service.

#### **3.3.2.1 Southern Bell Operations in Florida**

While the majority of central offices were operating on generator power even several weeks after Hurricane Andrew struck, this caused no significant problems. BellSouth deployed generator technicians to provide routine maintenance and inspections, which ensured superb operations until commercial power was restored.

A total of 693 additional BellSouth personnel were dispatched to southern Florida to assist in recovery and restoration efforts. While long term plans are to convert to buried and underground cable, poles were erected to provide interim telephone service. Factors that continue to delay full restoration are abbreviated work hours due to curfew (lifted 16 November), clearance from power companies that it is safe to work in damaged areas, and significant amounts of debris. BellSouth telecommunications experts have been doing a tremendous job working nonstop since early August, and as the chart on the next page shows, their work continued well into the year.

The Southern Bell employees did an outstanding job balancing personal requirements and professional needs throughout the aftermath of Hurricane Andrew. In Florida, 1,000 of the 5,000 local Southern Bell employees had severe structural damage to their homes or their homes were completely destroyed. While the extent of damage to South Central Bell employees' homes and personal belongings was not as significant, personnel still suffered tremendously. BellSouth implemented several programs to assist their employees. These included establishing day care centers in southern Florida BellSouth offices, providing washing machines and dryers, placing beds in offices, and offering food and ice.

The dates shown in the graph below indicate when normal repair schedules for repair calls and requests for new service installations were scheduled to begin.

| <b>Area Served</b>             | <b>Repair Calls</b> | <b>New Service Installations</b> |
|--------------------------------|---------------------|----------------------------------|
| <b>North Area:</b>             |                     |                                  |
| <b>Canal</b>                   | <b>10/10/92</b>     | <b>10/22/92</b>                  |
| <b>West Miami</b>              | <b>10/05/92</b>     | <b>10/12/92</b>                  |
| <b>Kendall Area:</b>           |                     |                                  |
| <b>Red Road</b>                | <b>10/15/92</b>     | <b>10/22/92</b>                  |
| <b>Silver Oaks</b>             | <b>10/10/92</b>     | <b>10/17/92</b>                  |
| <b>West Dade</b>               | <b>10/05/92</b>     | <b>10/12/92</b>                  |
| <b>Perrine/Homestead Area:</b> |                     |                                  |
| <b>Perrine</b>                 | <b>11/20/92</b>     | <b>12/01/92</b>                  |
| <b>Naranja</b>                 | <b>11/20/92</b>     | <b>12/01/92</b>                  |
| <b>Homestead</b>               | <b>11/20/92</b>     | <b>12/01/92</b>                  |

### **3.3.2.2 South Central Bell Operations in Louisiana**

While telecommunications outages in Louisiana were not as severe as those in southern Florida, South Central Bell's decisive response to user needs kept outages at a minimum. The majority of damage in Louisiana was similar to that

seen in Florida--concentrated on outside plant equipment. Throughout the storm, the backbone of the South Central Bell network remained intact. Only 2 of the 142 central offices in Hurricane Andrew's path lost service, while another 60 were on emergency power for several days. In total, more than 1 million feet of cable were damaged and about 3,500 telephone poles were downed. A total of 265 South Central Bell employees were dispatched from Alabama, Tennessee, and Kentucky to assist restoration efforts in Louisiana.

## **4. NCS INITIATIVES**

This section describes several NCS initiatives and programs that played integral roles during Hurricane Andrew emergency response and recovery operations.

### **4.1 TELECOMMUNICATIONS SERVICE PRIORITY (TSP) SYSTEM**

The TSP System was used to full capacity for the first time during Hurricane Andrew, playing a vital role in supporting relief and recovery efforts that followed the hurricane's devastation. Previously, when the TSP System was used extensively during Operation Desert Shield/Desert Storm, the DoD was the primary requestor, and the substantial number of the TSP invocations occurred at a moderate pace throughout the course of the Desert Shield buildup. In Florida alone, however, more than 4,300 TSP circuits or services were provisioned to Federal, State, and local authorities during the Hurricane Andrew emergency. Hurricane Andrew was the first major emergency preparedness use of the TSP System and the first major opportunity to test the ability of the TSP System to manage telecommunication requirements when a large number of organizations competed for limited resources.

In Florida, the TSP System was used primarily for extensive provisioning of new services, an activity that was not envisioned in previous exercise scenarios that often focused on restoration. The critical telecommunications traffic that TSP-provisioned circuits carried was essential to the recovery effort and demonstrates the crucial importance of this system, as well as the cooperative efforts that contributed to its development and implementation. The extensive use of the TSP System to perform unexpected but crucial functions underscores the need for it to be integrated into ESF-2.

The telecommunications industry was extremely responsive in the aftermath of the hurricane. The sheer volume of Telecommunications Service Requests (TSRs) for southern Dade County was unprecedented, and TSP provisioning became the natural recourse. Only a few TSPs were invoked in Louisiana as a

result of Hurricane Andrew. Use of the TSP System during Hurricane Andrew gave telecommunication vendors a prioritization scheme within which to conduct their response efforts. TSP invocations provide the legal framework to give priority telecommunication service to critical Government users. The TSP System worked well during the response and recovery efforts for the storm, with only a limited number of procedural issues, which were eventually worked out during the course of recovery operations.

#### **4.1.1 TSP and the NCC**

The first Hurricane Andrew-related TSP requests were received by the NCC approximately 48 hours after Hurricane Andrew passed over southern Dade County, Florida. Immediately following the hurricane, the NCC concentrated on coordinating telecommunications assistance and assessing damage to the telecommunications infrastructure. Assessments were facilitated by resident NCC telecommunications industry representatives who advised the Manager, NCC, on the hurricane's probable impact on their systems. Similarly, Government representatives reported damage to their systems or loss of service.

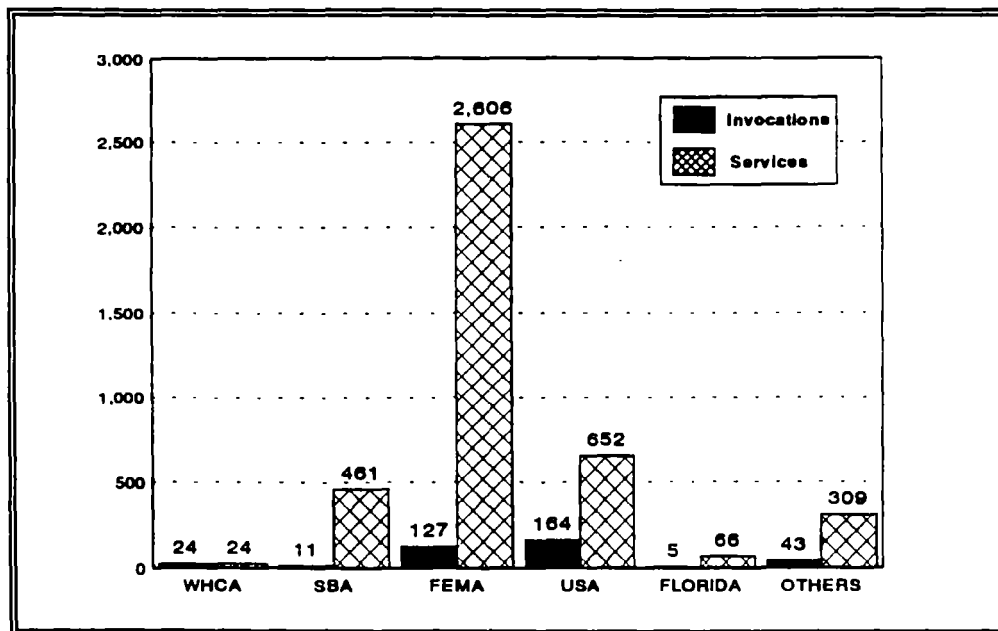
The TSP Program Office issued a daily TSP Invocation Report listing the status and significant attributes of all TSP invocations related to Hurricane Andrew. Although this document was appreciated by industry and government personnel for its substantive and timely information, generating it daily was a considerable workload for the NCC. The TSP Program Office will investigate standardizing this document with those produced by other industry and Government activities, and expects that, during any future emergency response situation, it will issue one full-fledged document periodically supplemented with daily updates.

#### **4.1.2 TSP Utilization**

Based on information derived from the NCS data base of NS/EP telecommunication users, 101 Federal Government NS/EP users located in southern Florida used 215 pre-Hurricane Andrew circuits. Of these, approximately 40 circuits or services had a TSP restoration priority.

Exhibit 4-1 shows the volume of services received by number of invocations through 28 September 1992. The following Federal agencies, departments, and activities requested TSP invocations to support their immediate NS/EP requirements (in chronological order of request):

**EXHIBIT 4-1**  
**Hurricane Andrew TSP Users**



- White House Communications Agency (WHCA)
- Florida State Government
- Florida Air National Guard
- Federal Emergency Management Agency (FEMA)<sup>9</sup>
- United States Coast Guard
- United States Air Force
- Federal Aviation Administration (requested through the Department of Transportation)
- Small Business Administration
- United States Army<sup>10</sup>

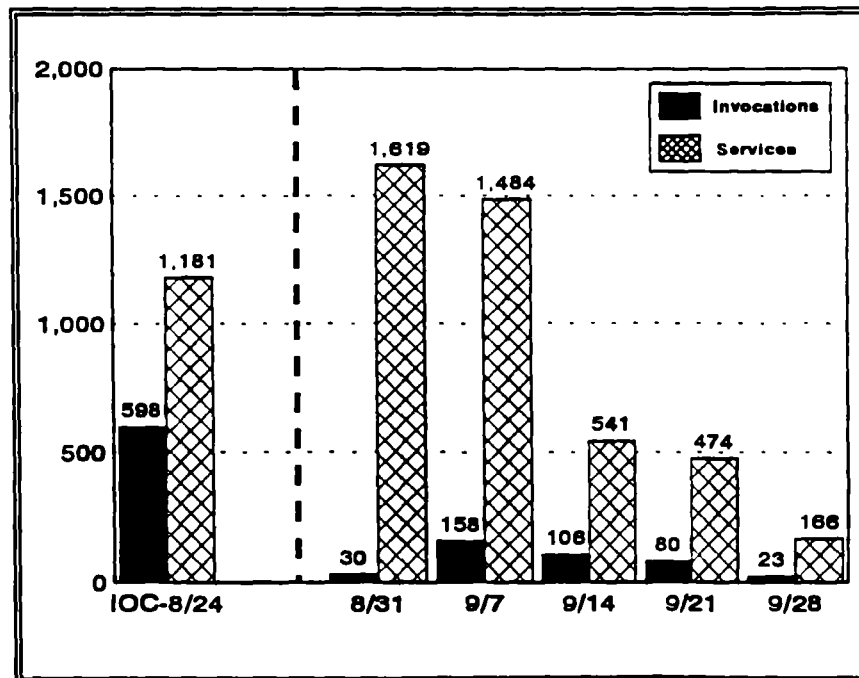
<sup>9</sup> FEMA requested the largest number of TSP invocations during the course of relief efforts, asking for 127 TSP invocations for 2,606 circuits or services.

<sup>10</sup> The U.S. Army had the second largest number of TSP invocations during the course of relief efforts.

- Social Security Administration (requested through the Department of Health and Human Services)
- Customs Bureau (requested through the Treasury Department)
- Federal Bureau of Investigations (FBI) (requested through the Justice Department)
- U. S. Army Corps of Engineers
- Internal Revenue Service (requested through the Small Business Administration).

From the Initial Operating Capability (IOC) of the TSP System in September 1990 until Hurricane Andrew on 24 August, the TSP Program Office processed a total of 598 TSP invocations provisioning 1,181 circuits or services (Exhibit 4-2). By 28 September, 4,384 circuits or services were provisioned by 397 invocations. In just 4 weeks, this represents a fourfold increase in circuits and services provisioned using fewer invocations. This process of issuing group TSP numbers (i.e., one invocation for 800 circuits) to vendors and users expedited both the billing and reconciliation processes.

**EXHIBIT 4-2**  
**Weekly Provisioning Requests**





BellSouth established priorities for restoration of the telephone network that allowed critical users to regain service, and permitted those organizations involved in relief efforts to procure new service to support humanitarian relief. These priorities were:

- TSP restoration requests to support recovery
- Provisioning of new services
- Overall restoration of other users.

For the most part, the telephone companies in Florida were not trying to prioritize requests for service from the Government. They relied upon the FECC to prioritize these requests. However, in some cases, lower priority requests were filled, while higher priority requests were not completed. In addition, excessive abuse of the "E" or emergency priority under the TSP System occurred, and coordinating military requests was sometimes difficult. Both of these issues will be discussed in subsequent sections.

#### **4.1.3 TSP-Related Problems Experienced During Hurricane Andrew Response Actions**

Every TSP request must support an NS/EP requirement--this is a prerequisite for program participation. The NS/EP user base expands during natural disaster crises and nearly every Federal department and agency has potential circuits or services that qualify as NS/EP requirements, as do many State and some local functions.

The TSP System ensures that critical circuits and services of designated subscribers are automatically placed at the top of the list for provisioning, and for service repairs if the restoration level of service is requested at the time of TSP invocation.

At the onset of Hurricane Andrew relief efforts in southern Dade County, Florida, a flood of TSP requests poured into the DFO, as all participants involved in the relief effort sought critical provisioning. This extremely high volume of urgent

requirements created problems that need attention in planning future response measures. The most significant problems are addressed in subsequent sections:

- Conflicts between Federal and State agreements with telecommunication vendors
- Excessive "E" provisioning requests
- TSP restoration priority
- DFO invocation procedures
- Coordination of military support requirements
- TSP Management Information System (MIS)
- Energy and telecommunications.

#### **4.1.3.1 Conflicts Between Federal and State Agreements with Telecommunication Vendors**

Coordination between Federal and State entities in ESF-2 needs to be established and exercised. State and local agencies, facing resource and budgetary constraints, are reluctant to relinquish or disclose existing agreements with telephone companies. They fear that the TSP System will preempt these preexisting telecommunications service restoration arrangements, especially for critical circuits carrying 911 emergency service. Two specific 911 service issues have arisen and are being addressed within the TSP Oversight Committee: preemption and cost. State and local authorities are concerned that if their 911 circuits were preempted, public safety in their jurisdiction could be jeopardized. They are also alarmed at the prospect of paying for a service that has been perceived as costing little or nothing.

The TSP System may preempt State and local restoration arrangements in the event of a national security emergency. Such a preemption, however, would

occur only in the most extreme emergencies. Because the system is designed to expedite the allocation of scarce resources in a prioritized fashion, in most instances, TSP circuits will be repaired simultaneously with local 911 circuits. Conflict would only occur in those instances where not enough resources existed to promptly restore both services.

The issue of Federal preemption of State and local users did not surface first with TSP. State and local authorities were accustomed to deferring to Federal telecommunications requirements in the event of a national security emergency, a point noted by the Director of the Florida Division of Communication. TSP, in fact, offers a significant advantage over its predecessor, the Restoration Priority System, in that restoration and provisioning priorities are available not only to Federal users, but also to State and local users. Qualified State and local users are able to purchase an extra layer of protection that, in the event of a major disaster, ensures their requests for service restoration or provisioning receive the same degree of attention as requests from Federal users. The key to whether or not users subscribe to TSP is based on State and local managers' perceptions that TSP provides benefits over and above their existing restoration arrangements, a perception that depends on an assessment of individual telecommunications needs.

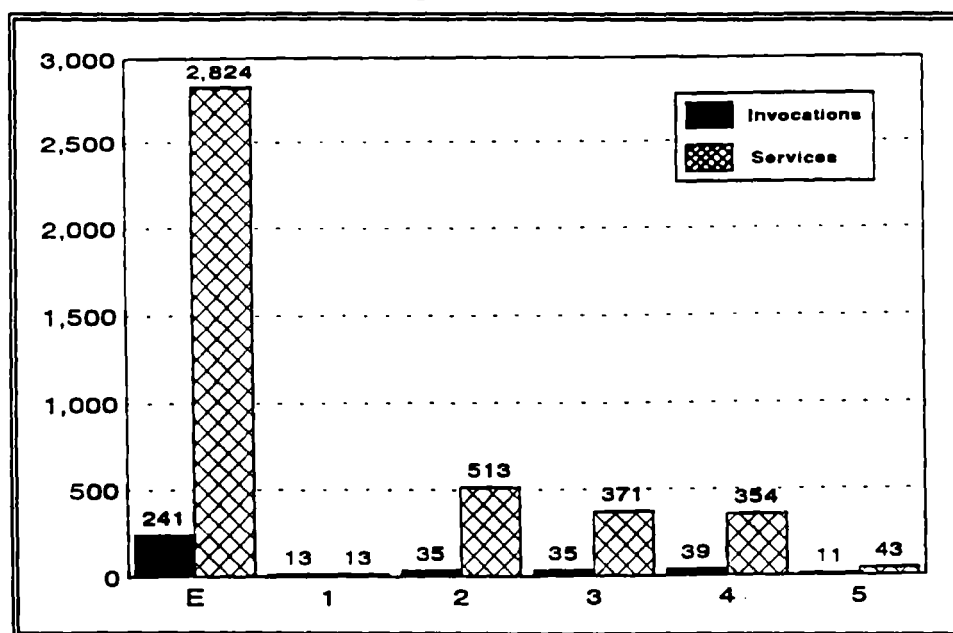
To resolve this continuing issue, the TSP Oversight Committee is participating in the development of a methodology through which State and local authorities can assess their need for the TSP System. This methodology, developed jointly by Federal, State, local, and industry representatives, allows users to perform a risk analysis on each component of their 911 networks. This analysis helps identify fundamental vulnerabilities, and thereby determine whether the benefits of TSP sufficiently offset these vulnerabilities to justify the costs of the program. Factors to be considered include the number of existing TSP circuits in the region, the existence of potential single points of failure, and the strength of current relationships with service providers.

#### **4.1.3.2 Excessive "E" Provisioning Requests**

Well over half of all Hurricane Andrew TSP requests were for Emergency, or Category "E" provisioning (Exhibit 4-3, below). Sixty-two percent of Joint Task

Force (JTF) requests carried "E" priorities when they were delivered and had to be reprioritized by the FECC to prevent an overload of requests. The Emergency category differs from the Essential category in that Emergency takes priority over all other assignments and indicates that critical service is required as fast as humanly possible, without regard to cost.

**EXHIBIT 4-3**  
**Provisioning Priority Distribution**



Initially, no person on the Emergency Communications Staff was sufficiently familiar with TSP to ask the questions necessary to filter the volume of Category "E" requests. Consequently, requestors would attempt to place emergency-level orders for circuits or services when they knew, for example, that telephones and facsimile machines would not arrive for several days. As the JTF was formed and the use of active military involvement increased, it became apparent that a knowledgeable TSP facilitator was needed on the Emergency Communications Staff. At the request of United States Forces Command, the U.S. Army Information Systems Command (USAISC) provided Mr. Rick Previtte. Mr. Previtte's presence contributed greatly to bringing this situation under control.

#### **4.1.3.3 TSP Restoration Priority**

One potential problem, with extremely significant cost, productivity, and manpower ramifications for the continuing southern Florida recovery effort, concerns damaged NS/EP circuits. Over 98% of Hurricane Andrew TSPs for Florida did not request service restoration priority when prioritized provisioning was requested -- even when prompted by members of the TSP Program Office. Granted, most of the circuits supported immediate response efforts for activities that were temporary in nature, but a significant number of permanent circuits were requested. The lack of restoration priorities could hinder future recovery operations, because, without the restoration priority, the NS/EP user has no greater priority when this service is interrupted than anyone else.

Kendall-Tamiami Airport in South Dade County is an excellent example. Following Hurricane Andrew, a TSP was invoked for this airport with a restoration level. This line was later disrupted, and the restoration priority allowed it to be reconnected immediately.

Users of TSP circuits or services without restoration priorities in place prior to Hurricane Andrew realized the value of this aspect of TSP when their circuits were disrupted. These users spent considerable time requesting Emergency TSP provisioning for new services to replace critical services disrupted by the hurricane.

The White House Communication Agency, DoD, and the State Department request restoration priorities on all NS/EP circuits as a standard operating procedure. Once their circuits or services are in place, their users want to be assured that their communications support will remain an immediate priority. Many other Government agencies have been reluctant to sign up for restoration priorities because of the additional cost of maintaining the priority.

#### **4.1.3.4 DFO Invocation Procedures**

The FRP and the **National Plan for Telecommunications Support in Non-Wartime Emergencies** identify the FECC as the sole central telecommunication coordinating point to receive and process requirements for emergency

telecommunication services from all Federal, State, and private relief organizations involved in recovery operations. Further, the FECC is to ensure the prompt establishment of telecommunications in the disaster area in accordance with the priorities established by the Federal Coordinating Officer (FCO) and consistent with the provisions of the TSP System. Independent of these two authorities, FEMA and GSA have entered into a Memorandum of Understanding (MOU) that directs GSA to process all TSP provisioning invocations to the FEMA National Network Operations Center (NNOC) and the FEMA TSP invocation official. This MOU impairs the TSP system's responsiveness to the FCO, Disaster Resource Manager (DRM), and the FECC.

During Hurricane Andrew, certain provisions of the FEMA/GSA MOU caused significant TSP delays. Once this fact was identified to FEMA by the FECC and the FCO, FEMA issued a temporary suspension of relevant provisions of the MOU. This action allowed the FCO and the FECC to respond immediately to the telecommunication requirements of the Federal and State recovery effort. However, this exception to the FEMA/GSA MOU was applicable only to Hurricane Andrew southern Florida relief efforts and was not extended to Louisiana or any other disasters.

#### **4.1.3.5 Coordination of Military Support Requirements**

Numerous problems were encountered supporting the large number of missions assigned to the military. The military arrived with little prior knowledge of the methods that could be used to request telecommunication support from the FECC, and it took several weeks to develop coordination procedures. Until specific lines of authority and procedures to request telecommunications support were established, support to the military was characterized by additional confusion and delays in an already stressed environment. Unit commanders in some cases demanded use of cellular and commercial assets in excess of support requirements and without recognition of residual telecommunication capability.

There were also problems with multiple points of contact on the JTF Andrews, Communication (J6) staff, invalidated service requests, and a lack of prioritized telephone service requests. JTF personnel were not familiar with the

organizational relationships that existed among the JTF, Defense Coordinating Officer (DCO), FEMA, and the GSA, causing confusion and impeding progress.

Ten percent of TSP requests in southern Florida, primarily those in support of military missions, were eventually canceled. Quite often the military would place TSP requests to support sites where they were using mobile, rapid-deployment communications equipment that did not provide access to the PSN. Frequently the vendor was physically unable to access these areas, or the military unit assigned to the site was relocated to another area before service could be provided. Examples include Mobile Field Kitchens, Life Support Centers (LSCs), and unit headquarters requiring commercial telephone service for coordination. These requests were made using emergency TSP priorities, which required the telephone service provider to work continuously until the services were installed. No coordination for site selection was performed prior to requesting service; therefore, in many cases, the provisioning of that service required extensive work on the part of the service provider. Quite often the phones did not arrive at the intended site until after the requestors had completed their mission and relocated. This problem was also exacerbated by incomplete location information on the request forms and the fact that street signs and landmarks were no longer in place, causing difficulty in locating the actual site.

Initial military telecommunication support requests were not made through the FECC, but placed directly with Southern Bell. These requests were honored and invoices for payment forwarded to the FECC who had no knowledge of the transactions. For example, the telephone company processed 5 priority orders for 41 business lines at the verbal request of the U.S. Army. TSP invocation was not authorized, nor were these requests cleared by the requestor or the vendor through the FECC. No written requests for these lines were made, and they amassed charges in excess of \$25,000 in their first month of use. These invoices are continuing to arrive at the ESF-2 for payment, long after the military units have departed.

This situation exemplifies the need for increased training at the user and vendor levels, and strict adherence to established policies and procedures for the allocation of critical telecommunication resources during regional emergencies.

This example also illustrates another problem: once telephone lines were established under a TSP authority, at a major expense to the Government, the requesting units in most cases did not issue the disconnect orders when they were preparing to depart. Phones were left unattended and available to anyone in the area. As late as October, the FECC was still invalidating and canceling circuits that were no longer required.

Problems also surfaced when military communications assets were activated in the affected region. No coordination was made with the FECC regarding frequency management, and numerous instances of interference occurred. The military brought in their own Systems Control Center (SCC), but only for management of frequencies associated with their Mobile Subscriber Equipment (MSE). When interference became a problem, the military would often shift frequencies until no interference was reported or detected, which many times caused problems with other military units and/or civil authorities.

In a meeting on 14 September, the FECC, his Emergency Communications Staff, and JTF J6 representatives agreed to the following criteria for prioritizing telecommunications resources among users with the highest direct impact on the civilian community relief effort:

**Priority #1:** Users with direct impact on the civilian community relief effort

**Priority #2:** Any military unit (company size or larger) with no means of commercial telephone communications

**Priority #3:** Military switchboards providing commercial telephone access

**Priority #4:** Subordinate offices within a staff, or to increase the existing telephone service.



They also agreed to the following guidelines for determining all other military requests for commercial telephone service:

- The military should exhaust organic communication assets prior to requesting commercial service.
- No new commercial service would be provided to locations unless the military unit was to remain at the location for more than 14 days.
- The Defense Coordinator's Office would validate all military commercial communication requirements.
- The FECC was to be notified immediately when the military wanted a TSP service terminated or moved.

These priorities and guidelines greatly improved the speed with which service was provided and alleviated substantial confusion. The FECC and the TSP Program Manager expressed the opinion that these priorities and guidelines should be reviewed for applicability to other types of natural, manmade, or technological disasters, and that future NS/EP contingency planning should incorporate the above, or a similar, predefined, prioritization scheme. With the increasing role of military support in non-conflict crises, it is imperative that all telecommunication users in a disaster area funnel their requirements through, and coordinate their capabilities with, the DFO.

#### **4.1.3.6 TSP Management Information System**

The TSP Management Information System (MIS) is composed of the main VAX hardware and TSP MIS software located at the Defense Information Systems Agency (DISA) Derry Engineering Building (DEB) at Reston, Virginia. It is connected to the TSP Program Office in the NCC. The TSP MIS can be accessed via the PSN through a modem connection. Hurricane Andrew has reinforced the concept that significant advantages in time and TSP management could be gained if the DFO could electronically process TSP requests directly into the TSP MIS. At the DFO, the TSP on-site coordinator would use a laptop or desktop computer to

process TSP invocations through the DISA DEB facility. TSP Authorization Codes would be relayed to the DFO through the computer link, and a hardcopy of all issued codes would print at the TSP Program Office. The TSP Program Office would be able to verify receipt of these codes by the carrier either by phone or through the resident NCC industry representatives.

One major enhancement to the TSP MIS system being tested is a complete electronic capability for major users such as the FAA and DoD. When fully operational in October 1993, this capability will permit users to submit TSP User Authorization Requests electronically and allow the TSP Program Office to respond electronically, streamlining the process by eliminating paperwork. The Department of Energy (DOE) has developed a personal computer (PC) based software package to generate the Form 315, the TSP provisioning request. The TSP Program Office is investigating the utility and possibility of distributing this software to other Federal users.

The TSP Program Office is considering the development of a process that would track TSP provisionings to alleviate duplicative reports between the NCC, Federal TSP subscribers, and the telecommunication vendors. All participants would then be able to use a single source document, preferably created and updated at a single location, for all internal and external uses.

#### **4.1.3.7 Energy and Telecommunications**

Telephone service restoration was sometimes frustrated by telephone installation crews and power utility crews working at cross purposes. In Florida, the power companies were required to sweep and approve buildings and supporting infrastructures before granting the telephone companies permission to enter and install telephone service. On many occasions, the telephone companies arrived prior to this inspection, wasting critical man-hours and resources. Independent work assignments between the telephone company and power utility work crews created substantial delays in the provisioning of new communication services.

Hurricane Andrew dramatically reaffirmed the recognized interdependency between telecommunications and energy. Some Emergency TSP requests were taking 2-3 days to complete, solely because telephone installation crews were not able to work in buildings that power utility crews had not yet swept. At this point, the power utility crew priorities were being set without coordinating with the DFO. Within a week, "crew teaming" was coordinated at the DFO between ESF-2 and ESF-12 (Energy). As a result power companies began dedicating repair crews to work with telephone installation teams.

## **4.2 NATIONAL TRANSPORTABLE TELECOMMUNICATIONS CAPABILITY (NTTC)**

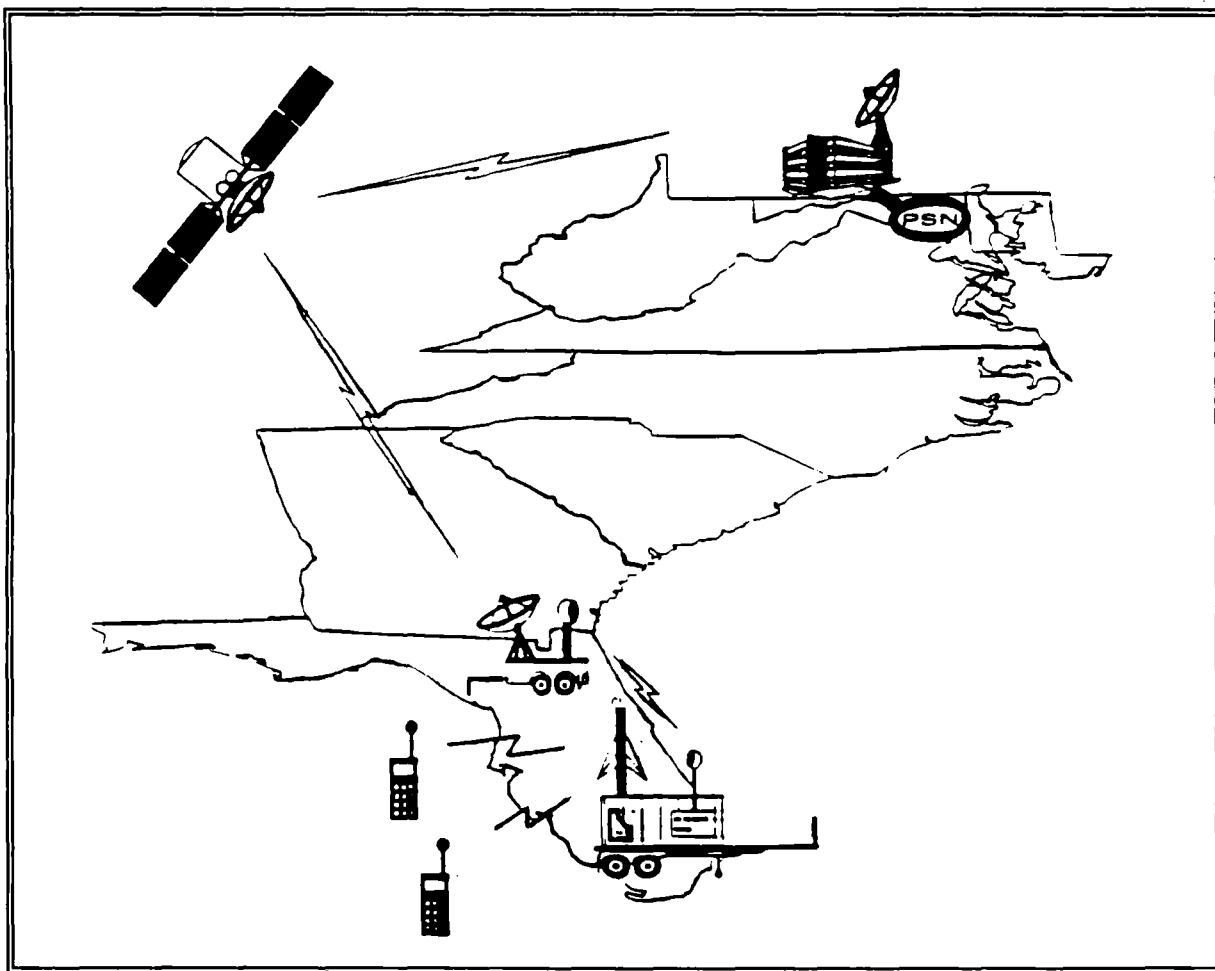
The NTTC supports NS/EP missions with a deployable telecommunications system that provides users with local telephone service and reconnection to the PSN using commercial, off-the-shelf cellular, microwave, and satellite equipment. As shown in Exhibit 4-4, the NTTC consists of a Mobile Telephone Switching Office (MTSO) with a single cell site, digital microwave system, Ku-band satellite earth station, Private Branch Exchange (PBX), and cellular and regular telephones.

The NTTC can be transported by air and by ground, can be deployed within 24 hours, and can operate on commercial power or its own generators. The NTTC is maintained in an operationally ready state in Clarksburg, Maryland.

### **4.2.1 Hurricane Andrew Deployment**

On 27 August, FEMA convened a meeting of the Catastrophic Disaster Response Group (CDRG). During this meeting, the Public Health Service presented an overview of their activities in southern Florida. They reported that they had two Public Health Service National Disaster Medical System (NDMS) Disaster Medical Assistance Teams (DMATs) currently deployed and clearly had a requirement for additional teams. They also needed a central point of operations. Since Homestead Air Force Base was uninhabitable, they staged out of the South Dade County Government Building in Miami. The DMATs were equipped with limited HF radio capability and a few cellular telephones. The Public Health Service requested communication support from ESF-2. ESF-2 and ESF-8 determined that the NCS' NTTC would meet the Public Health Service's needs.

EXHIBIT 4-4  
NTTC Operational Concept



The official request for the NTTC deployment was made by the Federal Coordinating Officer and initially was received verbally by the NCC at approximately 0130 hours, 28 August. The requirement for a written service request was temporarily waived because of the urgency of notifying the NTTC team immediately in order to facilitate rapid deployment. The first difficulty surfaced when it was discovered that the contractor had no trucks available to road-haul the system to Florida. They had only new vehicles that were not yet registered outside the State of Maryland. However, the NCC immediately began coordinating with the ESF-1 (Transportation) to facilitate police clearance for the unregistered truck to travel through the States of Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida. As a result, the system was on the road at 1800 hours that same day, and arrived at the intended operating site on

29 August at 1500 hours. At approximately midnight, i.e., within 48 hours of notification of deployment, the NTTC began supporting the DMATs with PBX and Satellite Earth Station (SES) capabilities. Full NTTC capability was not achieved until 3 September 1992 because of unforeseen line-of-sight problems with the digital microwave radio system. These problems are discussed in the following paragraphs. The NTTC system remained in operation until 18 September 1992. The time table for NTTC deployment is depicted in Exhibit 4-5.

#### EXHIBIT 4-5 NTTC Deployment Time Table

| DATE       | TIME  | DESCRIPTION                                                                                                                                                                                                                                |
|------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8/28       | 01:30 | Notified by FEMA/NCC to deploy NTTC.                                                                                                                                                                                                       |
| 8/28       | 18:00 | Flat-bed truck with NTTC system departed Washington, D.C. area with police escort.                                                                                                                                                         |
| 8/29       | 15:00 | Truck arrives at the South Dade County Government Building and off-loaded the SES.                                                                                                                                                         |
| 8/29       | 16:00 | SES towed into place. SES/PBX equipment unloaded.                                                                                                                                                                                          |
| 8/29       | 21:30 | COMSAT team arrived. COMSAT Engineers began setting up SES/PBX.                                                                                                                                                                            |
| 8/29       | 23:00 | PBX/SES operational with 6 telephones in the Medical Support Unit office. Began laying telephone wires to offices in South Dade County Government Building.                                                                                |
| 8/30       | 10:30 | Began deploying cellular system.                                                                                                                                                                                                           |
| 8/30       | 17:00 | MTSO operational.                                                                                                                                                                                                                          |
| 8/30       | 18:00 | Microwave terminal set up, but not operational.                                                                                                                                                                                            |
| 8/31       | 12:00 | Obtained concurrence to place microwave repeater on the top of the Community Bank building, which is four stories high. Installed microwave repeater.                                                                                      |
| 9/1        | 07:00 | Still not able to get microwave operational. COMSAT performed loop-back test.                                                                                                                                                              |
| 9/1        | 14:00 | Talked to Southern Bell technician who proposed using Southern Bell 18 GHz MW shot. Also contacted WHCA for assistance. WHCA agreed to provide additional repeaters and technicians.                                                       |
| 9/2        | 16:30 | WHCA personnel & equipment arrived. Surveyed several potential repeater sites and obtained permission to install microwave repeater equipment on two towers (Southern Bell & Florida Power & Light). Dismounted COMSAT repeater from bank. |
| 9/3        | 06:10 | Rain and thunderstorm delayed installation of the microwave link.                                                                                                                                                                          |
| 9/3        | 17:00 | All microwave equipment installed but the final northern link of the shot not working.                                                                                                                                                     |
| 9/3        | 20:30 | Technical review between WHCA & COMSAT determines non-compatible modems created the problem.                                                                                                                                               |
| 9/3        | 21:30 | Microwave operational - test call made to Mr. Boheim.                                                                                                                                                                                      |
| 9/3 - 9/17 |       | The NTTC system fully operational during this period.                                                                                                                                                                                      |
| 9/18       | 16:00 | System tear-down performed. Equipment packed and truck departed for the COMSAT facility.                                                                                                                                                   |

#### **4.2.2 Deployment Configuration**

The following subsections describe the NTTC deployment configuration as it was used during the Hurricane Andrew emergency.

##### **4.2.2.1 Satellite Earth Station Segment**

The NTTC SES segment and PBX were deployed at the NDMS Command Center, located at the South Dade County Government Building. The PBX provided local area switching capability to the Public Health Operations Center and Health Agency offices, including the U.S. Public Health Service, the Department of Veterans Affairs (DVA), the U.S. Army 82d Airborne Division, and the Joint Medical Operations Command. The PBX provided 30 land lines for the desktop telephones, facsimile machines, and STU-III's, and supported clear-voice, data, and facsimile communications. Power for this segment of the NTTC system was provided by two generators built into the trailer. Traffic from the SES was routed via a Ku-band satellite T1 link to the NTTC fixed gateway station in Clarksburg, Maryland. PSN access was then gained through a dedicated link between the fixed gateway station and a central office in Germantown, Maryland.

##### **4.2.2.2 Cellular System Segment**

The NTTC cellular system, including its MTSO and collocated cell site, was deployed to the City Hall building in Florida City, Florida, roughly 12 miles southwest of the South Dade County Government Building. This centralized geographic location for the NDMS operations was selected to maximize the cellular coverage, providing local communications to the surrounding NDMS remote sites within a radius of approximately 12 miles. Two generators provided power throughout the entire operation. Sixty cellular telephones were deployed with the system and distributed to the users for coordination with their command centers. Cellular phone users included DMATS, DVA, 82d Airborne, and the 44th Medical Brigade.

#### **4.2.2.3 Digital Microwave Radio Segment**

The digital microwave radio system was used to connect the cell site to the SES. It provided 12 miles of line-of-sight link using three repeater stations. While the system is equipped with one microwave repeater, two additional repeaters were required because of topographical interference that included both natural and manmade obstacles. WHCA deployed the two additional repeaters and three personnel to provide technical expertise and to help troubleshoot the microwave link. The three repeaters were set up at the Southern Bell tower, on the roof of the Community Bank, and at the Florida Power and Light (FP&L) tower. Power to the microwave repeaters was provided by a 48-hour rechargeable battery at the bank building, and by AC power at the Southern Bell and FP&L facilities. Facility personnel at each location provided exceptional support to the deployment team. However, due to engineering problems and severe thunderstorms, installation was delayed by several days, and this portion of the NTTC did not become fully operational until 2000 hours on 4 September. Although complete service was not provided until this date, it should be noted that the Public Health Service had no complaints because they were able to communicate with one another within the cell site and outside the disaster area using the PBX and the SES.

#### **4.2.3 Deployment Results**

This was the first emergency deployment of the NTTC system. The system was successfully deployed to the disaster site on very short notice. The NTTC deployment team rapidly adjusted to the real emergency situation and quickly established critical communications capabilities for the users. In addition to establishing the SES, the cellular system, and the digital microwave radio segments, the team members ran wiring for 30 telephone lines to offices throughout the headquarters building. The users were very pleased with the PBX capability, especially since they initially shared one telephone line borrowed from the next building. The contractor reported that there were more than 500 calls generated per day. The quality of the voice traffic on the cellular phones was very clear, but degraded on the fringes of the cellular coverage. The cellular phones were not utilized as much as desired, in part because some of the remote sites were redeployed beyond the cell coverage and in part because of user errors in

calling procedures. All in all, the NTTC system provided the needed contingency communications services during an emergency and satisfied many critical users.

#### **4.3 SHARED RESOURCES (SHARES) HIGH FREQUENCY RADIO PROGRAM**

The SHARES Program, developed by the NCS to support NS/EP telecommunication requirements, combines the resources of hundreds of Federal high frequency (HF) radio stations on a shared, interoperable basis to provide back-up communications during emergencies. During emergencies, competition for surviving assets is intense, and the operating environment is one of stress and makeshift arrangements. The SHARES Program offers a standardized mechanism that is robust, and uses an ideal communications medium common to all Federal departments and agencies. SHARES organizes existing resources into a single, interagency emergency message handling system that uses common radio operating and message formatting procedures, and shares designated frequencies. SHARES is dependent upon voluntary participation from Government, or Government-affiliated radio stations to pass critical or routine messages. Although a relatively new program, SHARES has already proven to be a highly reliable and successful communications program. In fact, SHARES proved to be an extremely valuable resource during Hurricane Andrew.

Even before Hurricane Andrew struck southern Florida, SHARES stations were already operational and standing by to provide emergency communications support. By the second day of the crisis, over 300 SHARES stations in the United States had been identified. In fact, within the affected areas in Florida and Louisiana, 36 of the 53 SHARES stations were up and communicating. During these first few crucial days, when telephone trunk lines were either not available or extremely congested, Federal, State, and local officials were able to pass emergency response and recovery traffic using the SHARES network. For example, immediately following Hurricane Andrew, Florida Governor Lawton Chiles used the SHARES network to contact the Regional Emergency Coordinator for Monroe County, Florida. Once located, SHARES was again used to link the Emergency Coordinator and the Governor via an HF phone patch at Bellcore's SHARES HF station in Washington D.C.



In another example, the FAA used the SHARES network to obtain property damage, personnel injury information, and status reports on all airport facilities in the disaster areas. Likewise, the Federal Highway Administration used the SHARES network to gather and report the status of all major interstate, primary roadway, and bridge failures in and around the affected areas. In both situations, the NCC continued to play an integral role in collecting, monitoring, or passing this message traffic.

SHARES also proved to be an alternative communication means to track and report recovery efforts. This was evident during Southern Bell's restoration of a major fiber optic cable cut 17 miles south of Florida City. Two restoration teams were sent to repair the damage, and, although Southern Bell was able to pass limited traffic on their own HF net, they also used the SHARES network to pass critical status reports to Bellcore headquarters in Washington.

Because of the inundation of telephone circuits and outages in certain areas in the south, HF radio proved *initially* to be the most expedient and reliable means of communications available. SHARES stations supporting the emergency response effort providing key officials a fast and effective means of sending, collecting, and reporting critical message traffic. Of the 414 SHARES stations identified during the disaster, 408 stations (319 program stations and 89 network stations) were on the air to provide HF radio coverage. One hundred eight SHARES formatted and interagency messages were processed. A total of 503 station personnel, representing 29 of the 36 Federal and Federally affiliated organizations comprising SHARES, were identified as being operational and supporting Federal, State, and local communication requirements. The NCC actively communicated with many of these stations, maintaining round-the-clock operations as a SHARES coordination station.

Throughout the emergency response and recovery effort, the SHARES program proved to be an invaluable communications resource that was highly reliable and extremely successful in passing emergency traffic. Despite its operational success, however, certain operational improvements are recommended for SHARES.

First, although over 900 SHARES stations nationwide have been identified in the relatively short time SHARES has existed, a need exists to expand SHARES awareness within the emergency response community. This can be accomplished by providing training for the FECC and the SHARES working group.

Certain shortfalls have been identified within SHARES operations. Specifically, a requirement exists to provide widespread automated tracking of participating stations and their operational status. Drawing on reports from on-site communicators and Government personnel supporting the emergency response, difficulties were reported in tracking messages sent, as well as identifying up-to-date operational SHARES stations. A new system should be developed to report SHARES activities regularly to the EICC, as well as other key organizations participating in the emergency.

Improvements to SHARES operations within the NCC are also suggested. The current NCC personnel staffing allowance does not include the requirement for a communications technician to install, operate, and maintain the radio equipment inside the Radio Room. Actions to change NCC personnel staffing quotas should be made immediately in order to better support future continuous communication requirements. Additionally, the current antenna system is not sufficient to support continuous operations, and is not capable of communicating with all states and other U.S. territories. Efforts should be made to procure an enhanced system, capable of supporting continuous high power transmissions across the entire HF spectrum.

## **5. LESSONS LEARNED**

This section contains telecommunications related lessons learned by the NCS/NCC staff during the Hurricane Andrew emergency.

### **5.1 TELECOMMUNICATIONS SERVICE PRIORITY (TSP) SYSTEM**

The TSP System proved to be an invaluable tool throughout the disaster. The professionalism and spirit of cooperation among the service providers, and the quick, responsive actions taken by both the Emergency Response Team/Emergency Communications Staff and NCC personnel ensured that a record number of provisionings were carried out effectively. Hurricane Andrew proved that the provisioning aspect of TSP works in a major domestic crisis. Precedents were established to use a single TSP invocation to request several hundred circuits or services providing all endpoints and classes of service are the same. Previously, with few exceptions, the general practice preferred by industry was to submit a separate request for each TSP circuit desired. It is readily apparent that this practice would have caused a monumental and unnecessary amount of paperwork, introducing substantial delays in processing the volume of TSP invocations experienced in the wake of Hurricane Andrew.

The following TSP related concerns arose during the course of Hurricane Andrew response and recovery efforts:

- State and Federal conflicts of interest
- FEMA/GSA MOU
- Interaction with military communication requirements
- Extension of the TSP MIS
- Relationship with electric utilities.

#### **5.1.1 State and Federal Conflicts of Interest**

Hurricane Andrew was the first large-scale test of the TSP system by a large number of Federal, State, and local organizations in a non-wartime crisis. From the perspective of State and local emergency managers, perhaps the most critical

aspect of the TSP System is the degree to which it interferes with existing service restoration arrangements.

TSP offers restoration and provisioning priorities to qualified State and local users, and does not negate any contract that already exists with local telephone companies. Whether these officials will subscribe to TSP will be based on State and local managers' perception that TSP provides benefits over and above their existing restoration arrangements. The TSP Program Office (PO) should continue to offer training on the TSP System to all interested parties. These training sessions should include State and local representatives, when possible, during Emergency Communications Staff Regional Training Workshops. Additionally, the TSP PO should continue to support efforts to develop a method for State and local authorities to assess their need for the TSP System.

#### **5.1.2 FEMA/GSA Memorandum of Understanding (MOU)**

The current FEMA/GSA MOU, which directs that all TSP requests in support of natural disaster response efforts be processed through the FEMA National Network Operations Center and the FEMA invocation authority, is contrary to the terms of the FRP, the **National Plan for Telecommunications Support in Non-Wartime Emergencies**, and the FCC's TSP Report and Order #88-341.

#### **5.1.3 Interaction with Military Communication Requirements**

Federal military support of the magnitude used during Hurricane Andrew was unique in the history of the Federal disaster relief program. Since it is likely that a substantial Federal military presence will be part of the Federal Government's response to massive major disasters in the future, a significant joint planning effort is necessary within the context of the FRP.

Criteria must be developed to screen and prioritize military requests for commercial service. These priorities and guidelines should be reviewed for applicability to all types of expected natural, manmade, or technological disasters. Ad hoc procedures developed jointly during Hurricane Andrew assisted in maximizing available resources to ensure that all efforts were being focused on

relief efforts and should be incorporated into existing or future plans. With the increasing role of military support in non-conflict crises, it is imperative that all telecommunication users in a disaster area funnel their requirements through, and coordinate their capabilities with, the FECC.

#### **5.1.4 Extension of the TSP Management Information System (MIS)**

The majority of the TSP requestors during the response to Hurricane Andrew had limited exposure or no experience with TSP provisioning, adding to existing problems and causing some delays. Significant advantages in time and TSP management could be gained if ESF-2 were able to electronically process TSP requests directly into the TSP MIS via computer. A hardcopy of issued codes would print at the TSP Program Office for verification.

Plans should be implemented to enable a trained TSP coordinator on site at the DFO to have direct access to the TSP MIS. Additionally, criteria need to be developed and incorporated in current plans for determining when such a coordinator should be deployed to the field. Continued testing of an upgraded TSP MIS electronic capability is recommended to eventually permit major TSP users to conduct the invocation process electronically. Additional capabilities should also continue to be investigated that will provide critical information to TSP users, as well as track TSP provisionings to alleviate duplicative reports among the NCC, TSP subscribers, and telecommunication vendors.

#### **5.1.5 Relationship with Electric Utilities**

Hurricane Andrew dramatically demonstrated again the need for a supportive relationship between electric power and telecommunications. Neither can provide full service without the other. In both Florida and Louisiana, telecommunications systems that survived the storm had to be maintained on emergency power.

In most cases the emergency power supplies supporting the telecommunications facilities were not designed for long term operation. To properly prepare for future disasters, adequate inventories of emergency power

equipment need to be established, and the equipment locations must be known across a broader spectrum of users so assets can be matched with needs.

Close coordination between the energy and communications ESFs needs to be made a standard operating procedure during emergency preparedness response and recovery phases of operation, with the coordination taking place at the DFO to ensure the most efficient conduct of restoration activities. Contingency plans should be developed between power and telecommunications authorities that provide guidelines during future emergencies.

## **5.2 STAFFING**

Hurricane Andrew provided the first significant test of the FRP. Telecommunications managers were faced with limited resources and extensive requirements and had to allocate resources to fulfill ESF-2 responsibilities. One significant issue identified during the disaster was the absence of a dedicated pool of trained personnel to staff the various ESF-2 teams. Personnel should be drawn from OMNCS program offices, ESF-2 Support agencies, and NCS member agencies to form a trained cadre of personnel that could respond in support of national, regional, and local elements of ESF-2. The OMNCS should support changes to the legal authorities governing the use of National Defense Executive Reservists (NDEs) and Individual Mobilization Augmentees (IMAs) to augment ESF-2 teams at all levels.

### **5.2.1 Emergency Support Team (EST) Staff Requirements**

OMNCS personnel assigned to staff the ESF-2 contingent of the EST were initially unprepared for the volume and scope of their duties at the EST. The multiple roles of advising the EST Director, coordinating with other ESFs, coordinating with the NCC and the field, and collecting and disseminating information for inclusion into the national SITREP require that the OMNCS analyze its support for the EST. The ESF-2 desk should be staffed with at least two persons, in order to maintain a watch on the phone while other duties are being carried out. A training program should be developed that ensures that personnel assigned know their roles and responsibilities on the EST, telecommunications

emergency management, NCS initiatives, and the TSP system. The number of personnel within the trained cadre should be sufficient to man the EST on a 24-hour basis for extended periods of time.

### **5.2.2 National Coordinating Center (NCC)**

Staffing requirements at the NCC fall into two categories, NCC Crisis Control Center (CCC) staff and NCC Radio Room staff. During the first 10 days of Hurricane Andrew, the CCC and Radio Room were staffed continuously. In the ensuing weeks they operated on a 12-16 hour day in support of the EST and Emergency Communications Staff.

#### **5.2.2.1 NCC/CCC**

The CCC was manned by three members of the NCC staff on an ad-hoc rotational basis. The success of NCC operations can be attributed to staff member dedication and experience in telecommunications disaster management. However, in order to support prolonged, 24-hour operations, and avoid staff fatigue, additional staff should be trained in disaster management. The OMNCS should identify personnel from within the OMNCS to enable the NCC/CCC to operate on a 24-hour basis. A training program should be developed, based on veteran staff members' experience, which prepares the identified staff to manage telecommunication disasters. Other potential source of personnel to be trained in CCC operations are NCS NDERs and IMAs.

#### **5.2.2.2 Radio Room**

The NCC assumed 24-hour responsibility for "HUB" coordination for the SHARES network during the first days of the disaster. Currently, no OMNCS employee is assigned to maintain and operate the Radio Room equipment. A number of "volunteers" need to be identified and trained to allow required coverage of this SHARES station during emergency situations.

### 5.2.3 Emergency Communications Staff Requirements

Emergency Communications Staff operations during Hurricane Andrew helped to highlight staffing requirements for ESF-2 DFO operations. In order for the Emergency Communication Staff to coordinate telecommunications response, it is imperative that representatives of the affected telecommunication carriers be fully integrated onto the team. Further analysis of ESF-2 operations indicates that the Emergency Communication Staff, at a minimum, should contain personnel with the following skills:

- Communications management
- Communications planning
- Communications contracting
- Communications equipment supply
- Communications equipment operation
- Frequency management
- TSP processing and ordering
- Disaster operations
- Automatic data processing (ADP)
- Cellular system capabilities
- Cellular system operations and management
- Cellular telephone programming and operating procedures
- Cellular maintenance.

The OMNCS should develop position descriptions, determine manning requirements, and identify a pool of responders to man the Emergency Communications Staff. It should additionally develop a comprehensive training program to ensure enough qualified personnel to support 24-hour ESF-2 operations.

Two team positions that were vital to the success of ESF-2 operations during Hurricane Andrew were the Military Liaison and the TSP Coordinator.

- **Military Liaison**--As illustrated during Hurricane Andrew, coordination with the military is crucial to establishing telecommunication requirements in support of military missions, for arranging air transport



of mobile telecommunications assets, and other forms of military support. It is even more important when a Joint Task Force is deployed into the area. A military liaison is required for the following duties:

- Participating in pre-disaster planning
- Providing full time liaison for the FECC
- Ensuring that all units deploy with organic communications
- Coordinating frequency allocations between military and other response elements
- Screening military TSP requests for validity
- Maintaining continuity of liaison as military units turn over
- Reviewing current Standing Operating Procedures (SOPs) developed by each military unit.

Additionally, the military liaison would be responsible for tracking the status of military units in the area and ensuring that those units cancel service upon leaving the disaster area.

- **TSP Coordinator**--The requirement for a full time position on the Emergency Communications Staff to administer and track the status of TSP requests was confirmed during Hurricane Andrew. This individual should be trained by the TSP PO and be thoroughly versed in all aspects of NS/EP telecommunications invocation procedures and the TSP process. This TSP expert would act as a single point of contact for all TSP issues and would provide much-needed relief to both the TSP PO and the Emergency Communications Staff by processing, tracking, and prioritizing all TSP requests. The TSP expert would also screen TSP requests to bring about a proper balance of "E" provisioning during the first few critical days after a disaster.

### **5.3 TRAINING**

Hurricane Andrew caused the most massive, complex, and resource consuming natural disaster in our history. All levels of the ESF-2 responded

quickly and effectively to the unprecedented number of telecommunication service requirements. However, many response activities were accomplished on an ad hoc basis. Detailed training objectives should be developed to assist all levels of the ESF staff in responding appropriately and effectively to a complete array of telecommunications emergencies. Training issues include:

- **Federal Response Plan (FRP) procedures**
- **Telecommunications Service Priority (TSP) process**
- **Use of Government/telecommunications industry mobile telecommunications assets**
- **NCC Radio Room operating procedures**
- **Use of radio frequencies in the disaster area**
- **Ultra High Frequency (UHF)/Very High Frequency (VHF) radio system capabilities and utilization.**

#### **5.3.1 Federal Response Plan (FRP)**

An overview of the FRP with emphasis on the ESF-2 annex should be provided to the ESF-2 staff at all levels. Specialized training should be developed that addresses concerns unique to the NCS/NCC, the EST, and the ERT. Training should include the national level response organizations activated during disasters, their missions and responsibilities, and their interaction with the ESF team. Detailed training should be provided on those annexes that interact most with the communications annex. Training should be extended to the members of the OMNCS staff, as well as ESF-2 support agencies. Comprehensive FRP training will ensure that the ESF staff works at a high level of efficiency, reduce coordination time with other agencies, and provide timely, critical telecommunications support. Cross training between and among the ESFs should be recommended to FEMA.

#### **5.3.2 Telecommunications Service Priority System**

All members of the Emergency Communications Staff should be trained and prepared to manage TSP requests. This will ensure TSP operations continue uninterrupted during critical stages of disaster relief, when the TSP expert is not available or is not deployed. Procedures should be developed that assist the

Emergency Communications Staff process and track TSP requests. Coordinated prioritization of Federal, State, and local provisioning requirements should also be addressed, because it is vital to the effectiveness of disaster response efforts. Members should also be trained in all aspects of the TSP MIS. Hurricane Andrew emphasized the need to have the TSP Program Office train other Federal departments and agencies as well. This will ensure emergency response managers are cognizant of the TSP System and its benefits, and understand how to obtain TSP provisioning.

### **5.3.3 Government/Telecommunications Industry Mobile Telecommunications Assets**

It is important that all members of the ESF staff be familiar with mobile telecommunication assets that may be used during disasters. A detailed training plan should be developed that defines equipment capabilities. This training should also list owning organization, funding requirements, transportation methods, and other logistical concerns. This material should be developed into a standing operating procedure and included in the Flyaway kits.

### **5.3.4 NCC Radio Room**

Personnel to maintain and operate the NCC radio room in support of prolonged, 24-hour disaster operations need to be identified. These personnel should be given training to make them familiar with equipment capabilities, maintenance procedures, SHARES network procedures, and NCC operational responsibilities. In addition, efforts to qualify these radio room operators for FCC amateur radio licenses should be made. This would ensure their ability to coordinate with amateur radio operators and operate smoothly in a post-disaster environment.

## **5.4 MOBILE TELECOMMUNICATIONS ISSUES**

Mobile/transportable, self-contained telecommunications proved to be an extremely valuable tool for disaster relief applications. A variety of systems were used in southern Florida including satellite systems, cellular systems, and portable

PBX equipment. Use of these systems for recovery operations reached an unprecedented level during Hurricane Andrew. These mobile assets supported a myriad of users, ranging from the JTF to State and local officials. These systems provided much needed support at critical times and received accolades from the user community. Mobile telecommunications systems will play an even larger role in future disasters. Prior to future deployments, the lessons learned in Hurricane Andrew in the following areas should be considered:

- NTTC-specific lessons learned
- Support to other organizations/response elements
- Management of mobile telecommunication assets.

#### **5.4.1 NTTC-Specific Lessons Learned**

Lessons were learned by the NTTC in the areas of site selection for mobile assets and establishment of contractual understandings prior to deployment.

##### **5.4.1.1 Site Survey and Coordination**

Three issues surfaced that can be corrected to ensure future deployments are conducted more efficiently. The first issue is one of improving communication and coordination between the user community, the site points of contact and the deployment teams. During the Hurricane Andrew deployment, the team responsible for setting up the cellular system was not fully aware of the users' requirements. As a result, the cellular system was not set up in the most advantageous location. More remote sites could have been supported if the system had been set up just a few miles north of the actual site used. In future deployments, the team should be briefed on the users' mission requirements so that they can better support that mission. The team should also instruct the users on NTTC system capabilities prior to system setup and operation, so that they gain as much benefit as possible.

The second issue involved the microwave setup. Although the system specification for the microwave indicated that 20 miles of separation was achievable, the 12-mile separation between the 2 NTTC components was more

than the microwave system could support with 1 repeater. This and the line-of-sight problems were corrected by the use of two additional repeaters supplied by WHCA. The program office should request that the contractor team be trained in microwave path establishment. The program office should also request that the contractor verify the maximum realistic distance that the NTTC microwave system can support.

The third site-related issue involved logistic support for the deployment team. User support at the deployment site was not well coordinated. The team had difficulty procuring fuel, security, and lodging. This critical support should have been identified to users as their responsibility for adequate system operation. The program office should prepare a pre-deployment checklist of site support requirements that must be satisfied by the user prior to deployment.

#### **5.4.1.2 Memorandum of Understanding**

In this area, two issues surfaced that can easily be corrected prior to the next deployment of the NTTC system. The NTTC system was deployed on a verbal agreement, and the MOU was not signed prior to the deployment. It was unclear who the exact requestor was and who was responsible for the deployment costs. This information was needed to authorize the extension of the deployment period and to resolve contractual paperwork for funding after the deployment. The point of contact information should be provided at the time of request. The program office should investigate and modify the procedures for emergency deployments to ensure all necessary information is captured prior to equipment deployment.

In addition, the contractor's cost proposal was not available prior to the deployment, which made it difficult to provide a cost estimate to potential customers. The program office should develop a fixed deployment cost strategy for a standard deployment. Any variable costs, such as transportation, special configurations, or unexpected modifications, will be added to the fixed cost.

#### **5.4.2 Support to Other Organizations/Response Elements**

Mobile telecommunication equipment capabilities are known only to a limited number of telecommunication professionals. An even smaller group understands who has operational control of the assets, procedures for obtaining their use, and other associated logistical concerns. The NCC should develop a data base and spreadsheet matrix that details the various mobile telecommunication assets in both the commercial and Government sector. In addition, the NCC should provide a detailed briefing to the other ESFs that details these assets, and discusses how they could be used and integrated into their specific plans.

#### **5.4.3 Management of Mobile Telecommunications Assets**

FEMA deployed its mobile telecommunications assets into Florida and Louisiana in record numbers. The process for deploying these assets and assigning them specific missions is not well understood by ESF-2. Even the FCO may not be fully involved in the coordination of these mobile assets. The OMNCS needs to work closely with FEMA to ensure that plans for the deployment of MERS and MATTS are understood and coordinated with the FECC.

### **5.5 CELLULAR TELECOMMUNICATIONS ISSUES**

Cellular telephones provided an invaluable resource throughout Hurricane Andrew response and relief efforts. Despite heavy damage, which included loss of connectivity to the PSN, downed towers, loss of power, and damage to antenna systems, the cellular system was one of the most reliable communications systems available. The FCO stated that the reliability and effectiveness of the cellular system played a critical role in keeping relief agencies and organizations communicating during critical periods of the relief effort. At one point, the vast majority of personnel assigned to the DFO had cellular phones. Over 700 cellular telephones were issued. In addition to its use within the emergency relief community, cellular telephones were a popular communications choice in the private sector. Burger King, with its headquarters located just outside of Homestead City, issued over 100 cellular telephones to its staff. To meet this increased demand, BellSouth Mobility and Cellular One cellular channels increased

from a combined pre-storm level of 461 to a post-storm level of 1,331, increasing capacity by 361%.

Although the support from the cellular telephone companies was outstanding, the sudden and unexpected demand for cellular telephones caused problems. Long tone delays became routine, frustrating users. The percentage of calls blocked due to system overloading averaged approximately 27% and sometimes peaked at approximately 39%. Some users were not educated in proper care and use of the cellular telephones, and became frustrated when the systems did not work properly. Despite these minor setbacks, the cellular system surpassed expectations. Cellular telephones will play a much larger role in future emergency relief efforts. They will also be used by the private sector, which could interfere with and impede relief efforts. With this in mind, there are two lessons learned that should be evaluated:

- Dedicated cellular capability
- Priority override system.

#### **5.5.1 Dedicated Cellular Capability**

Key response organizations and agencies should be provided with a dedicated cellular system for relief and response efforts. This system should act independently from and not interfere with commercial systems used by the civilian population.

#### **5.5.2 Priority Override System**

If a dedicated cellular system for emergency relief personnel is not achievable, then technology should be developed that will allow priority override. This will ensure key personnel have unimpeded access to the cellular system, even during its busiest hours.

A possible solution to both the dedicated cellular capability and the priority override system is an MTSO integrated with a MERS van. This system would

provide key users with a dedicated, private system. Call blocking could also be integrated into this system.

Dedicated systems will ensure the proper agencies have immediate and dedicated access to the cellular system. As stated by the FCO, a dedicated cellular capability, or a priority system will be instrumental in the success of future relief efforts.

## **5.6 INFORMATION SUPPORT**

Effective telecommunications disaster management cannot occur without accurate, timely information. Disaster managers must have up-to-date information on the status of response operations at their fingertips or easily accessible. Two methods of satisfying these needs, which should be used in unison for complete information support, are flyaway kits and portable, automated data processing (ADP) capabilities.

### **5.6.1 Flyaway Kit**

ESF-2 personnel deploying to the FEMA EICC or the DFO in the field, require a prepackaged, ready-deployable flyaway kit to ensure that all materials needed for effective disaster management are available to them when they arrive at their destination. The contents of each flyaway kit should be developed in close coordination with the FECC. A generic kit might include:

- FRP
- **National Plan for Telecommunications Support in Non-Wartime Emergencies**
- Contact lists
- TSP standard operating procedures
- Mobile telecommunication asset data
- SITREP formats
- Cellular telephone and a (nationwide) pager.



Additionally, a portable laptop computer with modem should be included in the flyaway kit. The computer would allow point-to-point data transfer among the EST, NCC, and Emergency Communications Staff in the field, increasing the efficiency of SITREP preparation and information sharing. Details on ADP support are described below.

### **5.6.2 ADP Support**

The need for increased ADP support was identified at all levels of the ESF-2 response. However, there is no universal agreement on the definition of "ADP." Data bases, computer hardware, and software programs are all mentioned by ESF-2 personnel. ADP support recommendations mentioned included:

- **Mobile Asset Tracking Data Base**--Would contain a list of all mobile telecommunications assets available for deployment in disasters. It would list the capabilities and the support requirements for each asset and could be updated to detail current deployment status. This data base would be remotely accessible via modem by the ESF-2 staff at the FEMA EICC and the DFO.
- **NCC Action Tracking Module**--Would be maintained by support staff at the NCC and would contain a status list of current actions being taken by NCC staff in response to FECC requests, and action officers assigned to each request.
- Transfer of SITREP information via E-Mail systems (tried during the Hurricane Andrew emergency, but not totally successful).
- Portable computer terminals with pre-loaded software packages.
- Remote access capability to TSP MIS.

## ACRONYMS

|       |                                               |
|-------|-----------------------------------------------|
| ADP   | Automatic Data Processing                     |
| ATC   | Air Traffic Control                           |
| CCC   | Crisis Control Center                         |
| CDRG  | Catastrophic Disaster Response Group          |
| COW   | Cell on Wheels                                |
| DAC   | Disaster Application Center                   |
| DCO   | Defense Coordinating Officer                  |
| DEB   | Derry Engineering Building                    |
| DFO   | Disaster Field Office                         |
| DISA  | Defense Information Systems Agency            |
| DMAT  | Disaster Medical Assistance Team              |
| DOD   | Department of Defense                         |
| DOE   | Department of Energy                          |
| DOT   | Department of Transportation                  |
| DSN   | Defense Switched Network                      |
| DVA   | Department of Veterans Affairs                |
| EBS   | Emergency Broadcast System                    |
| EICC  | Emergency Information and Coordination Center |
| EOC   | Emergency Operations Center                   |
| ERT-A | Emergency Response Team - Advance Element     |
| ESF   | Emergency Support Function                    |
| ESF-2 | Emergency Support Function #2                 |

|                 |                                                           |
|-----------------|-----------------------------------------------------------|
| <b>EST</b>      | <b>Emergency Support Team</b>                             |
| <b>FAA</b>      | <b>Federal Aviation Administration</b>                    |
| <b>FBI</b>      | <b>Federal Bureau of Investigation</b>                    |
| <b>FCO</b>      | <b>Federal Coordinating Officer</b>                       |
| <b>FECC</b>     | <b>Federal Emergency Communications Coordinator</b>       |
| <b>FEMA</b>     | <b>Federal Emergency Management Agency</b>                |
| <b>FP&amp;L</b> | <b>Florida Power &amp; Light</b>                          |
| <b>FRP</b>      | <b>Federal Response Plan</b>                              |
| <b>GSA</b>      | <b>General Services Administration</b>                    |
| <b>HF</b>       | <b>High Frequency</b>                                     |
| <b>HHS</b>      | <b>Department of Health and Human Services</b>            |
| <b>IMA</b>      | <b>Individual Mobilization Augmentee</b>                  |
| <b>IOC</b>      | <b>Initial Operating Capability</b>                       |
| <b>IRS</b>      | <b>Internal Revenue Service</b>                           |
| <b>JTF</b>      | <b>Joint Task Force</b>                                   |
| <b>JTF J6</b>   | <b>Joint Task Force Andrews, Communication</b>            |
| <b>LSC</b>      | <b>Life Support Center</b>                                |
| <b>MATTS</b>    | <b>Mobile Air-Transportable Telecommunications System</b> |
| <b>MERS</b>     | <b>Mobile Emergency Response System</b>                   |
| <b>MIS</b>      | <b>Management Information System</b>                      |
| <b>MOU</b>      | <b>Memorandum of Understanding</b>                        |
| <b>MPH</b>      | <b>miles per hour</b>                                     |
| <b>MSE</b>      | <b>Mobile Subscriber Equipment</b>                        |

|                |                                                                                           |
|----------------|-------------------------------------------------------------------------------------------|
| <b>MTSO</b>    | <b>Mobile Telephone Switching Office</b>                                                  |
| <b>NASA</b>    | <b>National Aeronautics and Space Administration</b>                                      |
| <b>NCC</b>     | <b>National Coordinating Center</b>                                                       |
| <b>NCS/NCC</b> | <b>National Communications System/National Coordinating Center for Telecommunications</b> |
| <b>NDER</b>    | <b>National Defense Executive Reserve</b>                                                 |
| <b>NDMS</b>    | <b>National Disaster Medical System</b>                                                   |
| <b>NNOC</b>    | <b>National Network Operations Center</b>                                                 |
| <b>NOAA</b>    | <b>National Oceanographic and Atmospheric Administration</b>                              |
| <b>NS/EP</b>   | <b>National Security and Emergency Preparedness</b>                                       |
| <b>NSA</b>     | <b>National Security Agency</b>                                                           |
| <b>NTIA</b>    | <b>National Telecommunications Information Agency</b>                                     |
| <b>NTTC</b>    | <b>National Transportable Telecommunications Capability</b>                               |
| <b>OMNCS</b>   | <b>Office of the Manager, National Communications System</b>                              |
| <b>PBX</b>     | <b>Private Branch Exchange</b>                                                            |
| <b>PC</b>      | <b>personal computer</b>                                                                  |
| <b>PO</b>      | <b>Program Office</b>                                                                     |
| <b>POTS</b>    | <b>Purchase of Telecommunications Services</b>                                            |
| <b>PSN</b>     | <b>Public Switch Network</b>                                                              |
| <b>ROC</b>     | <b>Regional Operation Center</b>                                                          |
| <b>SBA</b>     | <b>Small Business Administration</b>                                                      |
| <b>SCC</b>     | <b>Systems Control Center</b>                                                             |
| <b>SES</b>     | <b>Satellite Earth Station</b>                                                            |
| <b>SHARES</b>  | <b>Shared Resources High Frequency Radio Program</b>                                      |

|               |                                                       |
|---------------|-------------------------------------------------------|
| <b>SOP</b>    | <b>Standard Operating Procedure</b>                   |
| <b>SITREP</b> | <b>Situation Report</b>                               |
| <b>TSP</b>    | <b>Telecommunications Service Priority</b>            |
| <b>TSR</b>    | <b>Telecommunications Service Request</b>             |
| <b>UHF</b>    | <b>Ultra High Frequency</b>                           |
| <b>USAISC</b> | <b>United States Army Information Systems Command</b> |
| <b>USDA</b>   | <b>Department of Agriculture</b>                      |
| <b>VHF</b>    | <b>Very High Frequency</b>                            |
| <b>WHCA</b>   | <b>White House Communications Agency</b>              |