Communications Infrastructure Security, Access, and Restoration Working Group

Final Report

February 25, 2004

Executive Summary

In the aftermath of the tragedy of September 11, 2001, the Federal Communications Commission ("Commission" or "FCC") recognized the fundamental and essential role that media industries play in providing and coordinating communications in emergency situations. On March 28, 2002, the Commission announced the formation of a new federal advisory committee, the Media Security and Reliability Council ("MSRC").

The MSRC was charged with studying, developing and reporting on communications and coordinated activities designed to ensure the optimal reliability, robustness and security of the broadcast and multichannel video programming distribution ("MVPD") industries in emergency situations.

The MSRC analyzed the current status of media industries and prepared best practice recommendations. In order to do so, the MSRC was guided by the following objectives:

- Prepare a comprehensive national strategy for securing and sustaining broadcast and MVPD facilities throughout the United States during terrorist attacks, natural disasters and all other threats or attacks nationwide.

- Develop strategies that ensure the operation of broadcast and MVPD facilities before, during and after a major national emergency. This report will include recommendations for detecting, preparing for, preventing, protecting against, responding to and recovering from terrorist threats, natural disasters or other attacks upon America's infrastructure and its people.

- Provide recommendations to the Commission and media industries that, when implemented, will ensure optimal reliability, robustness and security of broadcast and MVPD facilities throughout the United States.

Organizationally, the MSRC was divided into two working groups: (1) Communications Infrastructure, Security, Access and Restoration ("CISAR") and (2) Public Communications and Safety ("PC&S"). This report provides the summaries and best practice recommendations of the CISAR working group. As such, the CISAR working group's mission is to:

- Address the risks and vulnerabilities of our nation's television, radio, multichannel video, microwave, and satellite infrastructure during a time of terrorist attack, natural disaster or other man-made catastrophe.

- Assess current practices in the areas of physical prevention and physical restoration in an effort to identify what enhancements or additions are needed.

- Focus on industry-specific measures as well as issues that extend across different media platforms.

- Evaluate the redundancy of media infrastructure within each industry and among different sectors.

Three subcommittees comprise the CISAR working group: Prevention, Restoration and Future Technologies. After a two-year process that included extensive meetings, data collection and analysis, each subcommittee developed a set of best practice recommendations that were presented to the MSRC and adopted at committee meetings in May and November 2003. Many of those best practice recommendations were based on information from surveys conducted by industry trade groups, including the National Association of Broadcasters ("NAB"), the National Cable and Telecommunications Association ("NCTA"), the Satellite Broadcasting and Communications Association ("SBCA"), and the Association of Public Television Stations ("APTS"). The survey responses rates were between 20% and 100% and covered most major markets in the country.

Tampa

During the course of their discussion, the PC&S working group decided to sponsor a "Model City" Workshop and invited the CISAR working to participate. With the leadership of the Florida Association of Broadcasters and strong support from other state industry associations, media companies and government leaders, the PC&S working group organized and conducted an Emergency Communications Workshop in Tampa in December 2003. At the Tampa workshop, the CISAR working group presented its best practice recommendations to members of the Florida broadcasting industry as well as the State and local emergency management agencies, which together, provided strong validation of the CISAR's best practices.

Prevention

The objectives of the Prevention Subcommittee were: to address the risks and vulnerabilities of media industries during a time of terrorist attack, natural disaster or other man-made catastrophe; evaluate the redundancy of media infrastructure; and recommend best practices to address the vulnerabilities. The subcommittee partitioned its consideration into national and local levels. This decision was made in recognition that a substantially different scale of operations and potential for disruption exists at each level. The partitioning also aided our consideration of mass media types, since the businesses and their associated infrastructure are substantially different for terrestrial television broadcasting, cable television ("CATV"), radio broadcasting, satellite television ("DBS") and satellite radio.

Because of the relatively small number of media networks and channels that are national in scope, the subcommittee was able to gather and assemble relevant information from a combination of first-hand knowledge and direct contributions from senior-level

engineering management at the various businesses. At the local level, the sheer number of facilities in the country is substantial – approximately 1,600 terrestrial TV broadcasters, 9,500 cable headends and 13,000 radio broadcasters. Further, it is well understood in the industry that a wide range of diversity exists in the level of disaster planning and backup facilities that have been considered prudent and affordable by different businesses and in different markets. This level of size and diversity clearly called for a more extensive data gathering effort. The subcommittee, in conjunction with industry trade associations, developed draft surveys for television broadcasters, radio broadcasters and cable operators. Outstanding cooperation was obtained from industry organizations (NAB, APTS, NCTA and SBCA), which took on the effort of determining an appropriate sample, distributing the surveys and tabulating the results.

Restoration

The Restoration Subcommittee was charged with assessing the communications industry's ability to restore services to the American people after a natural disaster or terrorist attack. This subcommittee derived its best practice recommendations, in part, from trade association survey data. It also examined case studies in order to evaluate past restoration efforts and determine which practices were most successful.

The objectives of the Restoration Subcommittee were: to determine the timelines currently required by media industries to restore services to the public after a natural disaster or terrorist attack; to recommend planning processes that can be initiated on a market-by-market basis to restore service to the public in the most expeditious manner; to evaluate past restoration efforts to determine which procedures were most effective and what bottlenecks existed to restoring service; to identify best practices for restoring service to the public; and, to make recommendations designed to improve the restoration process.

Working in conjunction with the Prevention Subcommittee, the Restoration Subcommittee developed surveys for media industries to determine the current capacity of each communications industry sector to restore service following a natural disaster or terrorist incident. The results of the surveys were designed to:

- Evaluate short-term recovery timelines from a loss of key components in the communications delivery system, such as towers, transmitters, studio-to-studio transmitter links, studios and cable headends.

- Determine the long-term manufacturing lead times for replacement of key components in communications delivery systems.

- Prepare case studies on the restoration of service following Hurricane Andrew in Florida, major earthquakes in Los Angeles and San Francisco, and the terrorist attacks on the World Trade Center in New York.

Future Technologies

The mission of the Future Technologies Subcommittee was to identify particular challenges and opportunities posed by digital technologies to the reliability of communications infrastructure and to consider new applications that are enabled by digital technologies that enhance media's role in disseminating security-related information. The subcommittee made two formal recommendations on how emergency notification systems can be leveraged, changed or enhanced to take advantage of digital technologies. The subcommittee agreed that the most important step was coordination of a digital common alert protocol that would serve across all digital platforms as a technical standard. This is a critical element in establishing reliable and universal messaging in a digital age. The subcommittee also emphasized the urgency of coordinating this standard to avoid the dissemination of competing or incompatible systems.

The subcommittee considered digital technologies as they apply to broadcast, cable and satellite television and broadcast and satellite radio. The scope was limited to point-to-multi-point communications and therefore did not address emergency messaging to cell phones, PDAs or basic email devices. Those devices have not been typically supplied by cable, broadcast or satellite television and radio. In the course of its discussion, there was considerable interest expressed in finding ways to alert the public using these newer devices. The subcommittee suggests that the responsibility for this future objective be clarified between the NRIC, the MSRC or some other organization. The subcommittee solicited and assembled information on existing efforts to pilot or use digital technologies in emergency messaging. These efforts are summarized into Appendix C.

Conclusion

Most members of the media industry have invested time and resources to ensure that the reliability and continued operation of their systems. However, as the survey data demonstrated, there are certain initiatives that can be undertaken to further secure the infrastructure of the media industry.

In this regard, this report strives to provide media organizations the opportunity to review the best practice recommendations in this report and take steps to strengthen their organization’s disaster recovery plans. Second, this report encourages the media industry to engage in dialogue with local government officials and establish inter and intra-industry cooperative agreements. Finally, we recommend that media industry review future technologies as they become accessible. In following these steps, we believe that the media industry will help ensure the security and reliability of the media infrastructure.

Prevention Subcommittee

Mission

1. Address the risks and vulnerabilities of our nation's television, radio, multi-channel video, microwave, and satellite infrastructure during a time of terrorist attack, natural disaster or other manmade catastrophe.

2. Evaluate the redundancy of media infrastructure within each industry and among different sectors.

3. Recommend best practices designed to address vulnerabilities in broadcast and MVPD facilities, including how best to address those vulnerabilities to prevent disruptions or misuse that would otherwise result from terrorist activities, natural disasters, or similar types of occurrences.

Approach

The subcommittee partitioned its consideration into national and local levels. This decision was made in recognition that a substantially different scale of operations and potential for disruption exists at each level. The subcommittee also partitioned its consideration by mass media type, since the businesses and their associated infrastructure are substantially different for terrestrial television broadcasting, cable television (CATV), radio broadcasting, satellite television (DBS) and satellite radio.

Because of the relatively small number of media networks and channels that are national in scope, the subcommittee was able to gather and assemble relevant information from a combination of first-hand knowledge and direct contributions from senior-level engineering management at the various businesses. At the local level, the sheer number of facilities in the country are substantial – approximately 1,600 terrestrial TV broadcasters, 9,500 cable headends and 13,000 radio broadcasters. Further, it is well understood in the industry that a wide range of diversity exists in the level of disaster planning and backup facilities that have been considered prudent and affordable by different businesses and in different markets. This level of size and diversity clearly called for a more extensive data gathering effort. The subcommittee developed draft surveys for television broadcasters, radio broadcasters and cable operators. With the assistance of MSRC leadership, outstanding cooperation was provided by industry organizations (NAB, APTS, NCTA and SBCA), which took on the effort of determining an appropriate sample, distributing the surveys and tabulating the results. All parties involved in the effort agreed that it was important that the process be designed to maintain the anonymity of the individual respondents.

Key Principles

Even as the subcommittee initially discussed how to make its efforts manageable, agreements were reached on certain key principles that guided subsequent efforts:

1. The focus of prevention considerations should be on media businesses and facilities that have a role in originating or delivering news and/or emergency warnings to the public. Thus, the continued origination of entertainment-only programming during a time of crisis was not considered essential, and possibly not even desirable.

2. The mission of prevention should be principally defined as ensuring that at least one mass communications medium remains in service (and that the public can find it) under even the most catastrophic conditions. Above the considerations of any individual industry or business, it is crucial to national security and public safety to preserve the ability for government (whether federal, state or local) to effectively ensure that news and public safety information can be communicated to the public during a time of crisis. *Thus, while keeping all stations on air is most desirable, ensuring that some stations remain on air to serve the community is an absolute necessity.* Thus, the concept of community level planning and coordination as a cost-effective means to achieve the required redundancy and geographic diversity of equipment and facilities was an important consideration.

3. Important, but lower a priority consideration, was given to planning activity to keep each individual media delivery business/system in operation**.** While best practices will be identified, this report, its analysis and recommendations are not substitutes for the detailed disaster and recovery planning of any individual mass media business.

However, it is recognized that redundancies that are planned to provide adequate protection against equipment failure and even natural disasters are not necessarily the same as those needed to protect against a deliberate attack. Specifically, protection against deliberate attack requires security measures at media facilities and a combination of both redundancy and geographic diversity for critical equipment and facilities.

National Prevention Best Practices - General

1. All media companies should reassess their vulnerabilities considering the possibility of deliberate attacks in addition to natural disasters and equipment failures and take appropriate measures to prevent loss of service and to expedite rapid recovery.

    1.1 In contemplating the possibility of deliberate attacks, vulnerability assessments should consider system redundancies and their geographic distribution.

National Prevention Best Practices - General

1.2 Because commercial communications satellites are the predominant means of national signal distribution for mass media, the vulnerability of the satellite infrastructure, especially TT&C, should continue to be examined and reinforced.

1.2.1 Each major source of news should consider alternatives to commercial communication satellites (*e.g.*, DBS satellites, Internet, etc.) as a last-resort backup means of signal distribution, even if technical signal quality is substantially degraded under such conditions.

For example, cable television redundancies have been planned to deal with natural disasters or outages to an inadvertent loss of connectivity (such as a backhoe snapping a cable), but not a deliberate attack. Large cable television operators often have a fiber link between local broadcasters and the cable headend. An example of a good practice is that they also continue to maintain an RF connection as a backup. However, many cable television operators must rely solely on RF, which may be an issue in rural areas. Another example, in the case of terrestrial television and radio broadcasting, is that rural areas can have more towers and less sharing of antennas co-located on a single tower than more crowded urban and suburban areas. Obviously, co-located antennas make the loss of a tower more significant. One example of redundancy and geographic diversity at the community level is that coverage areas should have two or more towers in order to provide some overall service robustness to the population. Therefore, in the final analysis, an attempt has been made to identify situations that lead to significant vulnerabilities within and across multiple media businesses and to recommend best practices that would help prevent catastrophic loss of service at the community level.

National Television and Radio Infrastructure

This section of the report describes the elements that compose the country's nationwide communications infrastructure – television networks (and associated cable news channels), radio networks and satellite television and radio service providers. The subcommittee recognized that disruption or loss of service by any single nationwide media service provider would have serious business and public interest impact. There are many practices for achieving high-reliability operations in their infrastructure that each network and service provider currently employs. The huge economic incentive to remain in continuous operation has driven each of these organizations to have redundancies and backup systems, coupled with extensive emergency planning and rehearsals.

National Prevention Best Practice - General

2. Each national media facility (television network facilities, radio network facilities and cable channel origination facilities) should have a vulnerability assessment and disaster recovery plan that is periodically reviewed, updated and practiced.

National Prevention Best Practices - General

3. Under government declared emergency conditions, news media should consider agreements that allow unconventional flexibility in local use and retransmission of the content to serve the public interest.

    3.1 In order to cost-effectively gain additional geographic diversity, news networks should consider the possibility of a backup carriage plan with other non-news networks that can be exercised under government declared emergency conditions.

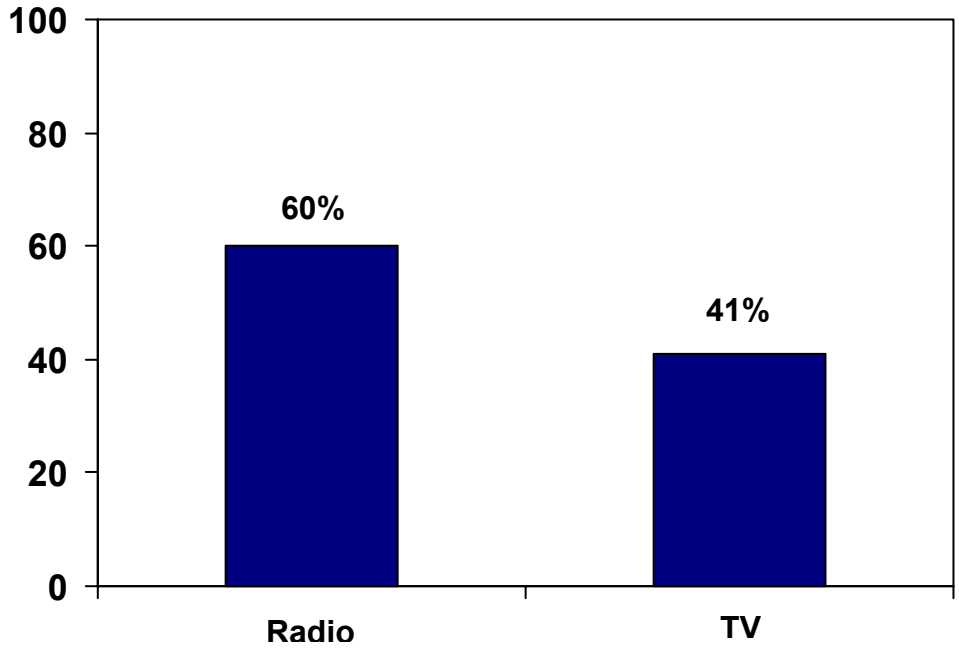
Disruption or loss of service by all national communications service providers would be truly catastrophic to American's social fabric. Fortunately, the collective diversity of the various networks and service providers makes this an extremely unlikely event. Nevertheless, it remains prudent to consider how collaborative efforts and contingency plans among national networks and service providers can further improve the overall robustness of nationwide mass media communications.

Television Networks

The four major broadcast television networks (ABC, CBS, Fox and NBC) and the Public Broadcasting Service (PBS) provide the television programming and network news that makes up the majority of viewing hours by the American public. Each commercial network owns TV broadcast stations in major markets and provide television service to almost all American households through their own stations, affiliated stations or cable retransmission of network programming. PBS is the nation's largest television network with 349 transmitters serving all 50 states, the Caribbean and Guam and Samoa. Each major broadcast television network is a large business with its own disaster planning and redundancies.

Television broadcasters are a primary source of national news and information, regardless of whether households in the community receive the signal over the air, by cable or through DBS. It is therefore vital that one or more television broadcasters be capable of continuing operations under the extremely adverse conditions that could occur in the event of a disaster.

Figure 1: Alternate site for news and programming



The four major broadcast networks operate dual origination centers with one typically located in New York and a second center in Los Angeles or Washington, DC. PBS has three separate uplink sites located in Alexandria and Springfield Virginia. PBS also has planned and tested a back-up origination site using the uplink facilities of a PBS member station located in the Midwest. Typically, network signals are distributed by redundant microwave radio links and fiber cable to two satellite earth stations that transmit signals. For example, each CBS affiliate has two satellite earth stations. Most television networks have operational redundancies in place that would enable one facility to instantaneously take over transmission operations from the main transmission center in the event of an emergency.

National Television Prevention Best Practices

Physical Security

4. National television networks and news channels should have appropriate physical security, augmented by security personnel and/or video surveillance at their key facilities, including studios/newsrooms, network origination and control centers and satellite communications facilities**.**

Backup Power

5. National television networks and news channels should take appropriate measures to provide backup power capabilities for their key facilities, including studios/newsrooms, network origination and control centers and satellite communications facilities.

Redundant Communications

6. National television networks and news channels should ensure that they have robust and redundant means of communications with their local affiliates.
7. National television networks and news channels should ensure that they have backup satellite phones or fiber links with their news origination centers.

Redundant Facilities

8. National television networks and news channels should plan to have emergency origination capability at a separate location from their primary studio (*e.g.*, backup studio, SNG remote, etc).

    8.1 During government declared emergency conditions television news networks should consider the possibility of a backup carriage plan with other non-news networks to gain cost-effective additional geographic diversity.

State of the National Television Industry

Highlights of findings in the state of national television infrastructure include these following examples:

Planning

- CBS affiliate stations in New York run simulators to train operators on emergency recovery procedures such as local access network failures, server failures, and videotape failures.

- Fox Network and Fox News Channel both have plans in place that are regularly audited to ensure that they are responsive to current conditions. Also Fox regularly tests systems to ensure they work as designed.
- NBC routinely drills and participates in disaster simulation in an effort to continually test and refine emergency procedures.
- PBS has had a formal written Disaster Recovery Plan in place for almost seven years. That plan is regularly updated. PBS routinely drills and participates in disaster simulation including planning and practicing emergency "shelter in place" scenarios.

Physical Security

- All networks and PBS surveyed maintain physical site security through a combination of security personnel, card restricted access, video surveillance, and other methods to ensure physical security.

Backup Power

- All networks and PBS have backup power generating facilities with enough fuel for several days of operations.

Redundant Communications

- All surveyed maintain a network of fiber links to major operations centers and uplink facilities.
- In addition, several networks, including PBS, have satellite phones in the event of an outage of regular telephony.

Redundant Facilities

- The Fox Television Network is based in Los Angeles. Fox News Channel, which is an independent organization, is based in New York. Redundant transmission systems are employed by both entities. Both provide origination back up for one another. Both also have limited backup facilities at tertiary locations.
- NBC uplinks its network feeds for all four time zones from a mid-town Manhattan location. In the event that the network center becomes completely incapacitated, news could be sourced at CNBC studios in mid-town Manhattan, delivered to MS-NBC in Secaucus, to NJ over redundant fiber and microwave links, and from there satellite linked to Burbank, California for nationwide distribution to affiliates. News could also be sourced at MS-NBC or in Burbank.

- As a further layer of redundancy, WNBC in New York maintains a microwave link with PBS in Long Island to uplink the network signal to Burbank in the event of an emergency.
- Satellite News Gathering ("SNG") trucks are located at each origination center and could also be used for alternate distribution.
- PBS headquarters, located outside Washington, DC in Alexandria, Virginia has 3 separate uplink sites and an unstaffed uplink facility located in Prince William County, Virginia. In addition, as noted above, PBS has made arrangements and practiced uplinking capabilities with a PBS member station located in the Midwest. Typically, network programming originates at PBS headquarters in Alexandria, Virginia, and is distributed to the main PBS uplink facility by fiber (primary) and uses microwave as a backup.

National Television Conclusions

Industry highlights demonstrate that the major television networks have extensive plans for emergencies and deep facilities and equipment redundancies. Based on the Prevention Subcommittee analysis of the state of the industry, the highest priority areas of concern in the national television infrastructure are:

1. Vulnerability assessments, emergency response drills and disaster recovery plans should be made with special consideration given to switching network origination and control among geographically diverse sites.
2. Networks and cable news channels should have backup carriage agreements with non-news channels, with supporting interconnections
3. Networks and cable news channels should make provision to have their audio signals available to national radio networks and satellite radio operators.

In addition to reinforcing their own facilities and operations, national television operators should consider jointly coordinating with one another and with affiliates to ensure that backup infrastructure is in place to continue operations in the event of a national emergency. This may also mean coordinating with affiliates of other networks in addition to their own affiliates, as well as with cable and satellite systems to ensure that emergency information can be disseminated to the public under the worst of conditions.

National Radio Broadcasting

Radio broadcasting is an integral part of the media industry in that it provides listeners with important news and information from around the world as well as entertainment and educational programming. Moreover, the ubiquity of radio enables people in urban and rural communities to have immediate access to important news and

information in the event of a national emergency. Like television networks, radio networks have a high economic incentive to create and maintain a highly reliable infrastructure.

National Radio Prevention Best Practices

Physical Security

9. National radio networks should have appropriate physical security, augmented by security personnel and/or video surveillance at their key facilities, including studios/newsrooms, network origination and control centers and satellite communications facilities.

Backup Power

10. National radio broadcasters should take appropriate measures (such as distributed transmission system) to provide backup power capabilities for their key facilities, including studios/newsrooms, network origination and control centers and satellite communications facilities.

Redundant Communications

11. National radio networks should ensure that they have redundant and geographically diverse means of communications with their local affiliates, including backup signal feeds on one or more alternatives to their primary satellite distribution (*e.g.*, terrestrial lines, Internet connections, satellite telephone, etc).

Redundant Facilities

12. National radio networks should plan to have emergency news origination capability at a separate location from their primary studio and/or intra-industry agreements for access to external news programming in the event of a national emergency.

    12.1 During government declared emergency conditions radio news networks should consider the possibility of a backup carriage plan with other non-news networks to gain cost-effective additional geographic diversity.

State of the National Radio Industry

Highlights of findings in the state of national radio infrastructure include:

Backup Power

- All national radio broadcasters surveyed have plans for at least 3 day of backup power for their facilities

Redundant Communications

- ABC Radio Networks distributes its programming from its main site in New York to New Jersey where SES Americom uplinks it. There are 2 routes from New York to New Jersey with nothing in common except start and end points. The New Jersey site has both a UPS and generator back-up system.
- NPR distributes programming through a single-channel-per-carrier C-band satellite system known as the Public Radio Satellite System (PRSS). In addition to the primary uplink at NPR's Washington headquarters, there are approximately fifteen geographically diverse regional uplinks, each of which is capable of delivering at least two discrete channels of programming to the PRSS. Most of these regional uplinks are equipped with ISDN codecs and POTS hybrids, allowing programming to be originated for the network from virtually any location via the public telecommunications network.
- Westwood One maintains multiple T-1 lines between its Washington, DC and New York facilities for CBS news and Westwood One talk programming. Also, there is connectivity between most key government buildings and Westwood's Washington Bureau and a T-1 connection between their Silver Spring, Maryland location and the Washington bureau. Westwood can also "back-haul" audio to and from the California offices via satellite.

Redundant Facilities

- ABC Radio Networks originates its programming from several studio locations and remote locations throughout the US. News mainly originates in New York. ABC Radio Networks has a back-up news origination site in Washington, DC. This back up could be activated or used within a few minutes by decision makers in New York, Washington, DC and Dallas, Texas. At that point, the main news origination would be out of DC. Dallas would be available if the others were not. In fact, any program origination can be done from anywhere as long as a dial-up ISDN link can be established to a working uplink

- NPR recently commissioned a second major production center in Culver City California with staffing and systems capable of originating continuous programming for the network. Program production elements and completed

program materials generated in Washington, DC are continuously "pushed" to the production center's networked digital audio workstation system through a dedicated DS3 circuit.

- Programming distributed by Westwood One originates from different studio locations around the country. This includes studios in New York, Washington, DC, Silver Spring, Maryland, and Culver City and Valencia, California. Westwood One provides program distribution for the CBS, CNN, FOX, and NBC radio networks.

National Radio Conclusions

As noted above, radio communications plays a unique role in ensuring that critical news and information is delivered to the public in the event of a national emergency. Based on the Prevention Subcommittee analysis of the state of the industry, the highest priority areas of concern in the national radio infrastructure are:

1. Vulnerability assessments, emergency response drills and disaster recovery plans should be made with special consideration given to switching network origination and control among geographically diverse sites.
2. Radio networks should engage in coordinated industry efforts to ensure that an appropriate level of diversity is reached with respect to satellite utilization; and
3. Radio networks should consider increasing their redundancy and geographic diversity by arranging (bi-directional) interconnections with television news providers.

In addition to reinforcing their own facilities and operations, national radio operators should consider jointly coordinating with one another and with affiliates to ensure that they have the backup infrastructure in place to continue operations in the event of a national emergency. This may also mean coordinating with affiliates of other networks in addition to their own affiliates and possibly television news networks to ensure that emergency information can be disseminated to the public under the worst of conditions.

National Satellite Television and Radio Services

Approximately 20 million American households receive MVPD services through direct broadcast satellite (DBS). DBS generally carries the same nationwide channels as cable, and also provides carriage of local stations in major metropolitan areas (referred to as local-into-local service). Currently, DirecTV and EchoStar retransmit local stations in 45 of the top 50 television markets

In addition, another 1.3 million Americans receive satellite radio service in their cars, homes, boats and recreational vehicles. Satellite radio carries approximately 100 channels of digital audio with music, sports, and information. During a time of national crisis, it may also be the primary means of communicating to its subscribers.

National Satellite Prevention Best Practices

Physical Security

13. Satellite television and radio service providers should have appropriate physical security, augmented by security personnel and/or video surveillance at their key facilities, including network origination centers, satellite control facilities, satellite communications facilities and terrestrial repeater sites.

Backup Power

14. Satellite television and radio service providers should take appropriate measures to provide backup power capabilities for their key facilities, including network origination centers, satellite control facilities, satellite communications facilities and terrestrial repeater sites.

Redundant Communications

15. Satellite television and radio service providers should ensure that they have geographically diverse redundancy for local-into-local signal feeds to their uplink sites.

16. Satellite television and radio service providers should ensure that they have redundant and geographically diverse means of communications with their news programming sources, including backup signal feeds on one or more alternatives to their primary satellite distribution (*e.g.*, terrestrial lines, Internet connections, satellite telephone, etc).

Redundant Facilities

17. Satellite television and radio service providers should plan to have emergency access to news sources at a separate location from their primary facility and/or intra-industry agreements that ensure carriage of news programming in the event of a national emergency.

18. Satellite television and radio service providers should ensure that they have geographically diverse redundancy for uplink and satellite control facilities.

State of the National Satellite Television and Radio Industries

Highlights of findings in the state of national satellite television and radio services include:

Planning

- Both major satellite broadcasters, DirecTV and Echostar, have disaster plans in place and have practiced these plans to ensure continued broadcasting through a disaster or other emergency.

Physical Security

- Satellite providers each maintain on site security and video surveillance. Also secure access systems are used to protect building security.

Backup Power

- Satellite providers maintain adequate backup power to continue operations in the event of an electrical outage.

Redundant Communications

- Both satellite MVPD providers maintain geographically diverse customer service facilities with backup power and have plans for the extended stay of key personnel.

Redundant Facilities

- Both satellite MVPD providers also maintain backup feed and downlink facilities capable of delivering at least expanded basic service. While most content is originated from a satellite feed, one provider has origination capability in the event of a disaster. Providers also maintain backup power at operations and downlink facilities adequate for operating up to one week. Both providers also have multiple up link facilities in geographically diverse locations. In addition one of the providers has a reciprocity agreement in place to continue service should there be a total satellite failure.
- XM's Washington, DC studio is supplemented by studios in mid-town Manhattan and at the Country Music Hall of Fame in Nashville, Tennessee. External feeds for content are received by either a satellite downlink with receive dish at the XM Studios or via fiber network connection.
- Control uplink for the XM satellites is located in Allen Park, Canada with a fully redundant system in Calgary, Canada. All programming content is uplinked from the XM studios in Washington, DC. The link from the broadcast center to the

uplink is via redundant fiber and both facilities are located at the XM facility in DC. XM also stores a spare satellite should there be problems with its in-orbit assets.

- Sirius also stores a spare satellite should there be problems with one of its three satellites**.**

National Satellite Television and Radio Conclusions

Satellite television and radio service subscribers depend upon their service providers to deliver critical news and information in the event of an emergency. MVPD services represent a growing number of television viewers nationwide, making their infrastructure an important security concern. While satellite radio only provides information to a small segment of the population today, it is anticipated that growth in the industry may make satellite radio listeners a sizable part of the population. Also, as noted in the radio section, portable and automotive receivers may be a major source of information in the event of a widespread power outage. Based on the Prevention Subcommittee analysis of the state of the industry, the highest priority areas of concern in the national satellite television and radio infrastructure are:

1. Satellite MVPD providers should seek to ensure geographically diverse redundancy for local-into-local signal feeds to their uplink sites;
2. Satellite radio providers should ensure that they have backup signal feeds and diverse redundancy for news sources;
3. Satellite television and radio service providers should ensure geographic diversity and enhanced security for uplink and satellite control sites.

In addition to their inherent subscriber audiences, satellite television and radio services are discussed later in the report as important backup signal feeds for local television and radio broadcasters and cable headends. Thus, their security is of potentially greater importance than their subscriber numbers alone might indicate.

National Infrastructure Conclusions

A great deal of geographically diverse redundancies already exist at each major television and radio network and at the satellite television and radio service providers. However, one notable fact emerges: all of the national media rely on satellite communications as their primary (and often only) means of delivering programming to affiliates or subscribers. While backup communications usually make use of different satellites than the primary system, and there is substantial diversity in the satellites and facilities that are employed, the ubiquity of a single communications modality gives cause to warrant continued scrutiny and diligence that this infrastructure remains secure. In addition, it would be prudent for television and radio networks and satellite service providers to consider non-satellite alternatives for tertiary backup, even if these communications provide a substantially lower level of technical quality. The crucial factor in examining such alternatives is the ability to continue to provide emergency

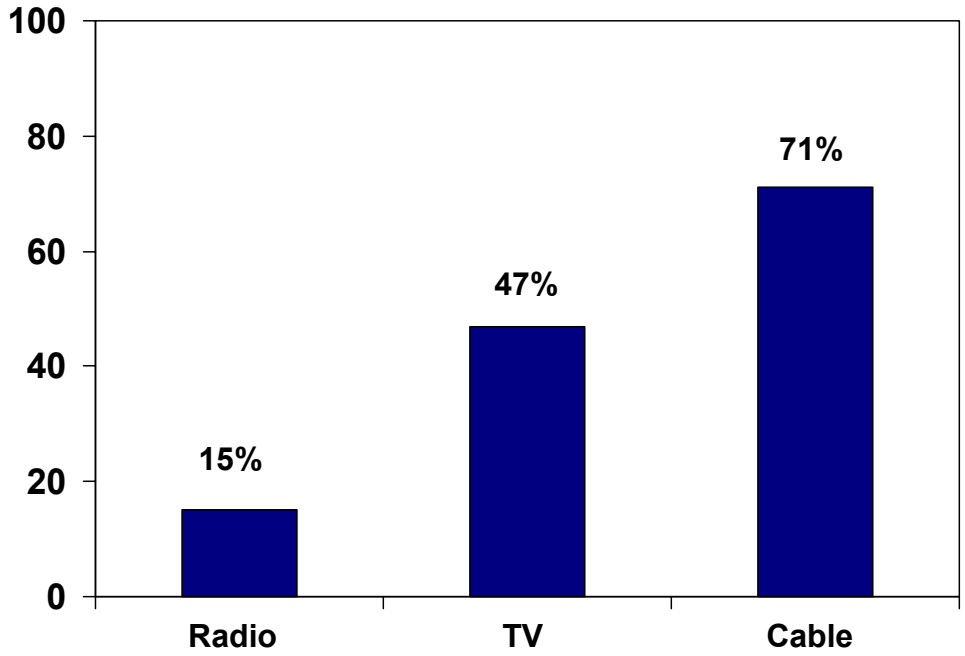
communications and news to the American public in the event of a disaster, rather than being a backup for the continuation of normal business.

Finally, in order to achieve the greatest possible strength on a nationwide basis, inter-industry agreements should also be considered that would ensure the public's access to news and information in the event of a disaster. Because radio, television broadcasting and cable operators typically operate as separate industries, emergency operations and carriage agreements among them are less common than agreements among companies in the same industry. It would be prudent to consider putting such agreements and the supporting interconnection infrastructure in place.

Local Radio, Television and Cable Infrastructure

In this section examination of the state of the local radio, television and cable industries occurs and best practices are described to help ensure that local media services remain available to the public under adverse conditions. Because most disasters and emergency situations are local in scope, maintaining at least some level of local mass media communications with the public is an essential part of a community's ability to cope effectively with emergency situations. Best practices for reducing the vulnerability of the infrastructure that each local radio broadcaster, television broadcaster and cable operator can consider implementing are detailed for each type of service in the following sections of this report. It is important that all media companies assess and consider their vulnerabilities and make informed decisions about their infrastructure with these criteria in mind.

Figure 2: Disaster recovery plans



Local Prevention Best Practices - General

19. Each local media facility (television stations, radio stations and cable headends) should have a vulnerability assessment and a disaster recovery plan that is periodically reviewed, updated and practiced**.**

20. Local media (television stations, radio stations and cable operators) in each market should cooperate to assess their collective vulnerability and to develop reciprocal agreements and a cooperative emergency response plan to ensure that some media will remain in service even under extreme circumstances.

    20.1 Vulnerability assessments should consider the location and geographic distribution of key facilities in the market, such as news studios, ENG receive sites, towers and cable headends.

    20.2 Vulnerability assessments and cooperative emergency response plans should consider the scenario of widespread power outage and the resulting importance of radio to reach battery powered and automotive receivers.

21. All Local Media (*e.g.*, Television Broadcasters, Cable Operators and Radio Broadcasters) in a market should collaborate to increase their collective geographic diversity and to establish redundant interconnections capable of supporting emergency operations.

    21.1 Cable systems and local broadcasters in a market should work jointly to develop prevention plans and to improve the redundancies in their interconnections.

    21.2 Radio broadcasters should work with television broadcasters and cable operators to establish diverse primary and backup signal feeds from local television broadcasters and cable systems for use in emergency situations.

22. Local Public/Private Partnerships should jointly examine their key suppliers to ensure that critical resources will have sufficient capacity to meet the needs of all of the organizations that may be relying on them during an emergency.

23. Local Public/Private Partnerships should jointly examine their key suppliers' emergency operations and recovery plans to ensure that they will be able to provide the needed materials and services to local media companies during an emergency.

However, it is essential to understand that not all best practices have equal importance or equal cost implications, and it is important to resist considering them as mandatory requirements that should be imposed on local media. The best practices represent an ideal situation that is unconstrained by financial or facilities realities. In assessing the applicability of these best practices, the particular capabilities, community service needs and logistical and financial practicality of each company's individual situation must be considered and appropriate decisions made.

More important than any individual company's abilities, it is the *collective* capability of the community's media assets to provide continued service in the event of a local disaster that should be considered. Thus, for example, it may not be necessary for all television broadcasters in a market to have backup news studios, so long as some do. Alternatively, if geographic diversity exists among "competing" broadcaster studios, backup studio capabilities might be provided by establishing fiber connections to a broadcaster's transmitter from a "competitor's" studio, as part of an appropriate emergency operations agreement between them. There are numerous examples of how cooperative efforts among media companies could meet the best practice recommendations in a more cost-effective manner than each company acting independently. However, the planning and implementation of such approaches can only be achieved by considering the specific situations of each community and the businesses involved reaching specific agreements.

When considering community priorities, it must be noted that radio broadcasters have a special importance, because they may be the community's last line of defense to communicate with the public under extremely adverse conditions. The ubiquities of battery-powered and automotive radio receivers make them the best available way to communicate with the public under widespread power outage conditions. Therefore, it is vital that one or more radio broadcasters in a community be capable of delivering emergency information to the public, even under extremely adverse conditions**.**

Local Radio

Radio is the most ubiquitous of all mass media, with receivers located in virtually every home and automobile in the country. There are approximately 13,000 radio stations across the U.S., serving their local communities. Because of the widespread availability of battery-powered and automotive receivers, radio broadcasters are likely to be the last line of defense for communicating with the public under the extremely adverse conditions that could result in the event of a local disaster. It is therefore vital that one or more radio broadcasters in a community be capable of delivering emergency information to the public even under extremely adverse conditions.

Local Radio Prevention Best Practices

Physical security

24. Radio broadcasters should have appropriate physical security, augmented by security personnel and/or video surveillance at their key facilities, including studios/newsrooms, satellite transmit and receive sites and antenna/transmitter sites.

Backup Power

25. Radio Broadcasters should employ diverse power grid sources wherever feasible.

26. Radio broadcasters should take appropriate measures to provide backup power capabilities for their key facilities, including studios/newsrooms, satellite communications and transmitters.

Redundant Communications

27. Radio broadcasters with local news origination should ensure that they have robust and redundant ways to communicate with external news services and remote news teams, such as the use of mobile radio and Internet to augment cell phones.

28. Radio broadcasters should have backup signal feeds to their primary satellite transmit and receive sites.

29. Radio broadcasters should have redundant signal paths to their primary and backup transmission facilities.

Redundant Facilities

30. Radio broadcasters with local news origination should plan to have emergency origination capability at a separate location from their primary studio (*e.g.*, backup studio, transmitter site, remote van, another station, etc).

    30.1 Radio broadcasters with local news origination should have a remote vehicle, or some means of delivering live news and information from a remote site.

    30.2 Radio broadcasters should have the capability of receiving a remote feed at an additional site from their primary studio (*e.g.*, directly at their tower site, at a backup studio, etc).

31. Radio broadcasters should have a backup satellite transmitter and receiver, or an alternate means (*e.g.*, a Satellite Radio receiver, a dedicated phone line or a streaming audio Internet connection) to send and receive signals from and to national news services in emergency situations.

Local Radio Prevention Best Practices

Redundant Facilities

32. Radio broadcasters should have a backup transmitter, and should attempt to make practical arrangements for geographic diversity where possible (*e.g.*, provisions for emergency use of other backup transmitter/antenna facilities in the community or other means).

33. With the cooperation of federal and local policy makers, all radio broadcasters in a market should collaborate to increase their collective site diversity and redundancy, including their collective news studios, operations, satellite transmit and receive facilities and transmitter and antenna sites.

State of the Local Radio Industry

Some highlights of the radio industry survey conducted by the NAB are:

- 93% of radio stations have the capability to retransmit EAS sources.
- 77% of radio stations are affiliated with a news network.

Planning

- 15% of radio stations have a written disaster recovery plan.
- 7% of radio stations reported that they rehearsed their plans.

Physical Security

- 39% of radio stations have secure access at primary studio / news facilities; 6% have security personnel and 11% have video surveillance.
- 93% of radio stations have their satellite dishes located on premises; 67% of radio stations have secure access at their primary satellite facilities, 7% have security personnel and 19% have video surveillance.
- Most (95%) radio transmitters are located on a small hill or mountaintop, while 4% are on buildings; 32% of radio stations have secure access at their primary transmitter facilities, 2% have security personnel and 2% have video surveillance.

Backup Power

- 56% of radio stations have backup power at their primary studio.
- 49% of radio stations have backup power at their primary satellite link facilities.
- 47% of radio stations have backup power at their primary transmission facilities.

Redundant Communications

- Studio-to-transmitter links (STLs) are primarily microwave (62%), but there are also a large number of fiber links (19%) and on-premise equipment (11%); 48% of radio stations have a backup STL.

- 23% of radio operators can activate a backup communications link to their transmitter facility within 15 minutes while an additional 31% can activate a backup communications link within three hours.

Redundant Facilities

- 59% of radio stations have backup local news or live programming origination capabilities other than their main studio; however, only 27% have backup power capabilities at their backup studio.

- 18% of radio stations have backup satellite dishes; only 11% have uplinks

- 53% of radio stations have backup transmitters, with 13% being geographically diverse; but only 19% have backup transmitters can operate at full power; 19% of radio stations have backup power at their backup transmitter.

- 66% of radio stations report that there is a separate transmitter site in their market that is 3 or more miles away from their transmitter.

Local Radio Conclusions

NAB survey data shows that many radio stations are operating very lean, and without the redundant equipment levels of television stations or cable systems. Based on the Prevention Subcommittee analysis of the aggregated responses to the NAB radio survey, the highest priority areas of concern in the radio infrastructure are:

1. Vulnerability assessments and disaster recover plans should be made. Only 15% of all radio stations have a written disaster recovery plan. This is an obvious first step for the industry to rectify, since vulnerability assessment and disaster recovery planning drive other budgetary decisions about facilities, equipment, etc. Additionally, to be effective, disaster plans must be rehearsed -- only 7% radio stations reported that they rehearsed their plans.

2. Physical security should be tightened - 39% of radio stations have secure access to their studio, 67% at satellite dishes, 72% at transmitter.

3. Especially because of radio's key role in power outage conditions, more widespread deployment of backup power is advisable, particularly at primary and backup studios and transmitters.

4. Additional backup for satellite dishes is advisable; lower cost backup means such as consumer satellite radio receivers, telecom or Internet connections could be considered as alternatives to additional satellite dishes and receivers.

5. The relatively small number of satellite uplinks at local radio stations (11%) implies that radio is not well positioned to be a source of national news in an emergency. Again, low cost alternatives such as telecom and Internet should be considered as a potential source for outgoing information.

It is imperative that radio operators jointly coordinate to ensure that they have the backup infrastructure in place to continue operations in the event of a local emergency. This may also mean coordinating with local TV broadcasters and cable systems to ensure that emergency information can be disseminated to the public under the worst of conditions.

Local Television Broadcasting

Television broadcasters are a primary source of local news and information, regardless of whether households in the community receive the signal over the air, by cable or through DBS. Television broadcasters are often a crucial community resource for local news origination, as well as for the delivery of television service to antenna-equipped receivers, including an increasing number of portable and battery powered devices. It is therefore vital that one or more television broadcasters be capable of continuing operations under the extremely adverse conditions that could occur in the event of a local disaster.

The National Association of Broadcasters ("NAB") and the Association of Public Television Stations ("APTS") developed the industry survey to assist in evaluating the reliability and security of local television stations. The NAB surveyed commercial television stations. A total of 361 commercial television stations responded to the survey representing a 33% response rate. Twenty percent of the respondents represent markets 1-25. The 33% response rate provides statistically compelling results for analysis. The APTS surveyed public television stations. A total of 60 public television stations responded to the survey representing over one-third of all public television licensees. The response rate reflects a significant portion of the public television community. The results of the NAB and APTS industry surveys form much of the basis for our analysis and resulting recommended best practices.

Local Television Prevention Best Practices

Physical Security

34. Television broadcasters should have appropriate physical security, augmented by security personnel and/or video surveillance at their key facilities, including studios/newsrooms, satellite communications facilities and antenna/transmitter sites.

Local Television Prevention Best Practices

Backup Power

35. Television broadcasters should employ diverse power grid sources wherever feasible.

36. Television broadcasters should take appropriate measures to provide backup power capabilities for their key facilities, including studios/newsrooms, satellite communications and transmitters.

Redundant Communications

37. Television broadcasters with local news origination should ensure that they have robust and redundant ways to communicate with external news services and remote news teams, such as the use of mobile radio and Internet to augment cell phones as well as some means of receiving remote feeds (*e.g.*, directly at tower site or at a cable headend) and delivering live news and information from a remote site (*e.g.*, ENG/SNG truck).

38. Television broadcasters should have backup signal feeds to their primary and backup satellite transmit and receive sites.

39. Television broadcasters should have redundant signal paths to their primary and backup transmission facilities.

Redundant Facilities

40. Television broadcasters with local news origination should plan to have emergency origination capability at a separate location from their primary studio (*e.g.*, backup studio, transmitter site, ENG remote, another station, cable headend, etc).

    40.1 Television broadcasters with local news origination should have an ENG or SNG truck, or some means of delivering live news and information from a remote site.

    40.2 Television broadcasters should have the capability of receiving a remote feed at an additional site from their primary studio (*e.g.*, directly at their tower site, at a backup studio, etc).

41. Television broadcasters should have a backup satellite transmitter and receiver, or an alternate means (*e.g.*, a DBS receiver, or a streaming video over a broadband Internet connection) to send and receive signals from and to national news services in emergency situations. (We recognize that there may be copyright issues involved but recommend that operators negotiate a reasonable solution).

Local Television Prevention Best Practices

Redundant Facilities

42. Television broadcasters should have a backup satellite transmitter and receiver, or an alternate means (*e.g.*, a Satellite Radio receiver, a dedicated phone line or a streaming audio Internet connection) to send and receive signals from and to national news services in emergency situations.

    42.1 Television broadcasters should examine the possibility of their DTV facilities providing emergency backup capabilities to their analog facilities.

43. Television broadcasters should provide the same prevention approaches to their DTV facilities, to the extent economically feasible.

44. With the cooperation of federal and local policy makers, all television broadcasters in a market should collaborate to increase their collective site diversity and redundancy, including their collective news studios, operations, satellite transmit and receive facilities and transmitter and antenna sites.

State of the Local Television Broadcasting Industry

Some highlights of the NAB and APTS television survey include:

Planning

- 47% of all commercial television stations and 31% of public stations have a written disaster recovery plan.

- 17% of commercial television broadcasters and 12% of public stations report that they rehearse their plan.

Physical Security

- 88% of commercial television broadcasters and almost 90% of public stations have secure access at their primary studio/news facilities; 23% of commercial television broadcasters have security personnel and 50% of public stations have security personnel; 65% of commercial television broadcasters have video surveillance and approximately 60% of public stations have video surveillance.

- 93% of commercial television broadcasters and 90% of public stations have their primary satellite receive dishes on premises; 65% of commercial television broadcasters and approximately 80% of public stations have secure access at their primary satellite facilities; 20% of commercial television stations and

approximately 40% of public stations have security personnel and 37% of commercial television stations and approximately 38% of public stations have video surveillance.

- Most (96%) television transmitters of commercial television broadcasters and 66% of public stations are located on a small hill or mountaintop with a large tower (74% of towers for commercial television broadcasters and 71% of public stations are over 500feet), while 3% of commercial television broadcasters and 2% of public stations are located on buildings; 86% of commercial television broadcasters and approximately 80% of public stations have secure access at their primary transmitter facilities, 11% of commercial television stations and approximately 20% of public stations have security personnel and 27% of commercial television stations and 20% of public stations have video surveillance.

Backup Power

- 71% of commercial television broadcasters and 58% of public stations have backup power at their primary studio facilities.

- 70% of commercial television broadcasters and 57% of public stations have backup power at their primary satellite downlink; 37% of commercial stations and 67% of public stations have backup power at an uplink (they may not have an uplink).

- 76% of commercial television broadcasters and 60% of public stations have backup power at their primary transmitter.

Redundant Communications

- 76% of commercial television broadcasters and 53% of public stations have backup signal feeds from primary satellite downlink.

- 44% of commercial television broadcasters have backup signal feed from primary satellite uplink.

- 75% of commercial television stations' and approximately 70% of public stations' studio-to-transmitter links (STLs) are primarily microwave and 14% of commercial television stations and 30% of public stations STLs are fiber; 74% of commercial television broadcasters and approximately 72% of public stations have a backup STL.

Redundant Facilities

- 41% of commercial television broadcasters and 28% of public stations have backup local news or live program origination capability at a location other than

their primary studio; however, at a backup studio, only 20% of commercial television stations and 12% of public stations had backup power capabilities.

- Most commercial television broadcasters have remote newsgathering capability. 77% of commercial television broadcasters and 17% of public stations have an ENG truck and 44% of commercial television broadcasters and 10% of public stations have an SNG truck.

- 53% of commercial television broadcasters and approximately 38% of public stations have a backup satellite downlink; 14% of commercial television stations and approximately 12% of public televisions have backup satellite uplink.

- 31% of commercial television broadcasters and 25% of public stations have a backup transmitter, but only 12% of commercial television stations and approximately 5% of public stations have a geographically diverse backup transmitter and only 15% of the commercial stations' backups and only 46% of public stations backups are full power; only 22% of commercial television broadcasters and 24% of public stations have backup power at their backup transmitter.

- 23% of commercial television broadcasters and 29% of public stations plan to use DTV transmitters as a backup.

- 42% of commercial television broadcasters and 45% of public stations report that they share a primary transmitter site with other local broadcasters; 71% of commercial television broadcasters share the site with 3 or fewer other broadcasters.

- 66% of commercial television broadcasters and 75% of public stations report that their community has another transmission tower 3 or more miles from their own site. We also note that maintaining multiple towers in a community requires appropriate policy support at both the federal and local levels.

Local Television Broadcasting Conclusions

NAB and APTS survey data shows that many television stations have invested in redundancy to prevent loss of service from routine equipment and power failure. As expected, far fewer stations have taken the more costly and elaborate steps needed to protect against outages due to natural disasters or deliberate attack.

Based on the Prevention Subcommittee analysis of the aggregated responses to the NAB and APTS surveys, the highest priority areas of concern in the local television-broadcasting infrastructure are:

1. Vulnerability assessments and disaster recovery plans should be made. Only 47% of all commercial television stations and 31% of public stations have a written

disaster recovery plan. This is an obvious first step for the industry to rectify, since vulnerability assessment and disaster recovery planning drive other budgetary decisions about facilities, equipment, etc. Additionally, to be effective, disaster plans must be rehearsed -- only 17% of commercial television broadcasters and 12% of public stations report that they rehearse their plan;

2. The presence of stand-alone backup studio facilities (backup studios and/or ENG/SNG trucks with appropriate communications to the station's transmitter) should be increased where feasible and their emergency power capability examined. Television broadcasters should strive to be capable of originating news even if their primary studio became totally incapacitated and a power outage was simultaneously in progress.

The local television broadcasting industry should move forward and engage in substantive joint planning to protect against outages due to natural disasters or deliberate attack. However, there are several stations in each local market that could provide much of the essential diversity of facilities at relatively modest cost, if joint planning to help prevent and recover from loss of service were put into effect. In fact, NAB survey results indicate that 13% of commercial television broadcasters have a reciprocity agreement of some kind with other local broadcasters**,** indicating that such agreements are indeed possible.

Cable Television

The US cable television industry serves approximately 73 million basic cable customers. The Nation's cable network is comprised of about 9,339 cable systems, with approximately 9,899 headend facilities. Many of the systems are owned by Multiple System Operators (MSOs), with the ten major MSOs providing service to about 60 million households. Cable carries national and local cable news channels, which are an important source of news and information for the public. The carriage of broadcast television programming is generally provided by carrying the local affiliate's signal. The local affiliate also provides an important source of local news coverage. In addition to these services, there are many channels of nationwide cable programming that serve a wide diversity of interests for entertainment and information. The cable industry is also a leading provider of Internet access service in the US, providing high-speed cable modem service to approximately 15 million customers. Also, approximately 2.5 million customers receive local telephone service from cable television operators**.**

The National Cable and Telecommunications Association ("NCTA") developed an industry questionnaire to assist in evaluating the reliability and security of cable systems. NCTA administered, collected and aggregated the results of the questionnaire in May 2003. In total, 22 questionnaires were distributed, and 17 responses received. The responses represent approximately 83% of total US basic cable customers. The aggregated results to cable industry questionnaire help form the basis for our analysis and recommended best practices.

Local Cable Television Prevention Best Practices

Physical Security

45. Cable Operators should have appropriate physical security, augmented by security personnel and/or video surveillance at their key facilities, including their headend, hub, plant and customer service facilities.

Backup Power

46. Cable Operators should employ diverse power grid sources wherever feasible.

47. Cable Operators should take appropriate measures to provide backup power capabilities for their key facilities, including their headend, hub, plant and customer service facilities.

Redundant Communications

48. Cable systems should have backup satellite receivers for their major news and information channels. In cases where a backup satellite receiver is unaffordable or impractical, cable operators should consider the use of DBS receivers at headend and/or hub facilities for use in emergency situations.

49. Cable systems should have redundant signal routes as far out in their network as economically practical.

Redundant Facilities

50. Cable Operators should take appropriate measures to provide redundant and geographically diverse equipment for their headend, hub and plant facilities, appropriate to the system's operations and facilities.

    50.1 Cable systems should have capability in an emergency situation to provide some news or information from a location other than their primary headend, where economically practical.

51. Cable systems should have some capability to obtain news and information in an emergency situation, such as their own studio or an arrangement to receive signals from local television broadcasters or cable program providers (*e.g.*, ENG/SNG trucks or satellite links).

52. All Cable Operators in a market should collaborate, where possible, to increase their collective site and equipment diversity, redundancy and interconnections.

State of the Cable Television Industry

Highlights of the NCTA survey results are:

Planning

- 70% of all cable operators surveyed and 100% of the top10 MSOs reported that they had a written disaster recovery plan.

- 59% of all cable operators, and 67% of the top10 MSOs reported that they had rehearsed their disaster recovery plan.

- 12% of all cable operators, and 23% of the top10 MSOs reported that they had a reciprocity agreement with other local cable operators.

Physical Security

- 100% of cable headends have some level of secure access; 13% of all operators and 25% of the top10 MSOs have security personnel and 32% of all operators and 63% of the top10 MSOs have video surveillance.

- Approximately 35% of the cable plant is underground; 33% within the top 10 MSOs.

- 84% of customers among all operators, and 83% among the top 10 MSOs, are served by systems with physical security at customer support facilities.

Backup Power

- 73% of customers among all operators, and 72% among the top 10 MSOs, are served by systems with standby power supplies.

- 98% of customers among all cable operators, and 96% among the top 10 MSOs, are served by a primary headend facility with backup power; 75% have an average standby time in excess of 72 hours.

- 87% of customers among all cable operators, and 86% among the top 10 MSOs, are served by a hub facility with backup power; 74% have an average standby time in excess of 72 hours.

- 64% of customers among all operators, and 62% among the top 10 MSOs, are served by systems with backup power at customer support facilities.

Redundant Communications

- Most cable operators receive local broadcast signals with an antenna (76% of systems) or a fiber connection (24% of systems); 33% of cable systems among the cable operators surveyed, and 52% of systems among the top 10 MSOs have an over-the-air backup feed for broadcasters' signals.

- 54% of customers among all cable operators, and 53% among the top 10 MSOs, are served by systems that have backup satellite receive capabilities.

- 63% of customers among all cable operators, and 62% among the top 10 MSOs, are served by systems that have redundant signal routes from headend to hubs.

- 5% of customers among all cable operators, and 5% among the top 10 MSOs, are served by systems that have redundant signal routes from hubs to neighborhood nodes.

- 88% of the customers of all cable operators are served by a headend with Internet connections.

Redundant Facilities

- 35% of customers among all cable operators, and 35% among the top 10 MSOs are served by systems that have backup headend or hub facilities capable of delivering at least expanded basic service at a separate location other than the primary headend.

- 33% of customers among all cable operators, and 32% among the top 10 MSOs are served by systems that have a remote news vehicle.

Cable Television Conclusions

NCTA survey data shows that many cable operators have taken good steps to prevent outages due to equipment and power failure as they have modernized their plant. The survey results indicate that much of the nation's cable network is in fact quite modern, since 64% of the cable plant among all operators, and 85% among the top 10 is capable of 750 MHz or greater bandwidth. Based on the Prevention Subcommittee analysis of the aggregated responses to the NCTA survey, the primary areas of concern in the cable infrastructure are:

1. Vulnerability assessments and disaster recovery plans should be made by smaller cable operators as well as the larger ones. Additionally, to be effective, disaster plans must be rehearsed -- 71% of cable operators report that they rehearse their plan.

2. Geographically diverse backup capabilities should be expanded for cable headends that serve large numbers of customers. The potential for the destruction of a cable headend facility to cause loss of cable services for a large number of customers in a local franchise area is significant. Approaches to reduce these risks might be made more cost-effective if solutions were considered that provided a higher degree of protection for a limited number of key news and information channels that would be critical to the community in a time of crisis.

3. Where economically feasible, cable operators should continue to appropriately "harden" their plant, particularly in areas prone to severe weather or natural disasters.

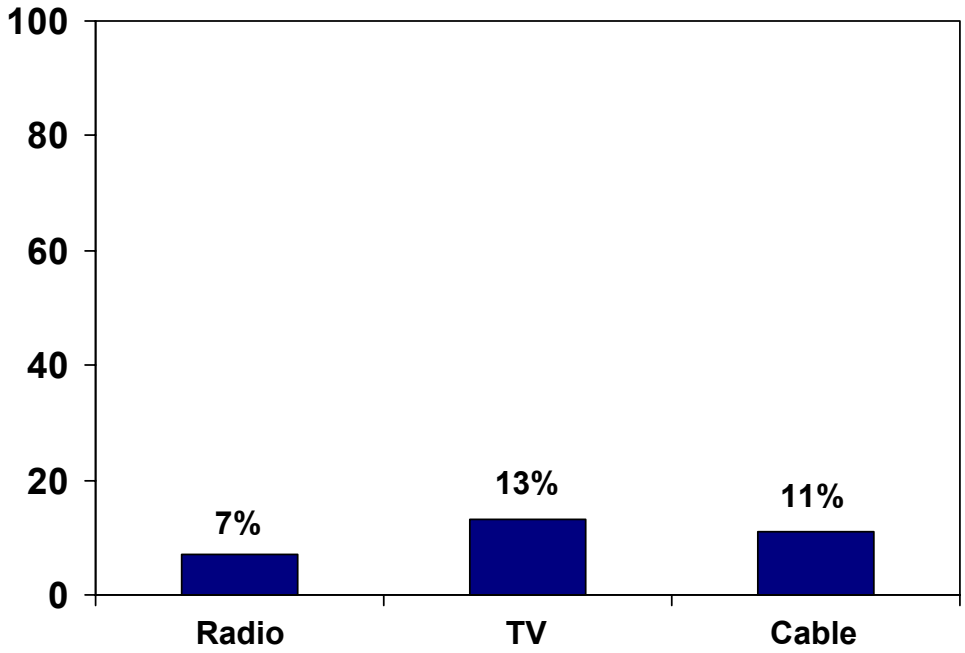
In many markets there may only be one cable operator. As such, it is imperative that cable operators and broadcasters jointly coordinate to ensure the redundancy of the interconnections among local broadcasters (often a key source of local news and information) and cable systems.

Local Infrastructure Conclusions

The brute-force approach of providing geographically diverse redundancies at each radio station, television station and cable system is an obvious approach, but one that is likely to be both financially and operationally impractical. Certainly, all media companies should have vulnerability assessments and a disaster recovery plan that is periodically rehearsed. Hopefully, as industry awareness of MSRC Best Practices grows, additional investments will be made in providing redundancies that are appropriate in each respective business. These steps alone will make a significant improvement in the robustness of US media infrastructure.

It is worth restating the critical importance placed on the *collective* capabilities of media companies to continue providing service to their communities. In both examples and best practice recommendations, it has been pointed out that inter-company agreements among media companies of each type (i.e, radio, TV broadcasters and cable operators) have the potential to reduce vulnerabilities in an affordable and practical way. Strengthening each type of media in a community will make great strides in reducing vulnerabilities and in ensuring continued mass media service to the community during times of emergency.

Figure 3: Reciprocity agreements



In order to achieve the greatest possible strength on a community-wide basis, inter-industry agreements should also be considered. Because radio, television broadcasting and cable operators typically consider themselves as different industries, emergency operations agreements among them are less common than agreements among companies in the same industry.

But consider, for example, a situation in which a television news crew can capture an evacuation warning from civil authorities, but few citizens in the affected area can receive television because of a power outage. In such a case, a simple audio interconnection among television and radio stations could ensure that the warning would be sent out on radio stations, thus reaching a potentially large number of citizens with battery powered or automotive radios.

We expect that cooperative agreements among radio stations, television broadcasters and cable operators will increase as they find that joint efforts are a cost-effective way to achieve the robustness required to ensure that they can serve their communities in times of crisis. Also, in partnership with local emergency management officials, local media should jointly examine the diversity and recovery capabilities of key suppliers, whose own continued ability to provide materials and services may become a critical path item for the media's ability to continue operations.

In conclusion, the subcommittee believes that significant advances in the robustness of the local media infrastructure in the US can be achieved with relatively modest investment, based upon cooperative planning and joint efforts of all local media.

Restoration Subcommittee

Introduction

The Restoration Subcommittee was charged with assessing the communications industry's ability to restore broadcast radio and television service, as well as multichannel video program distribution such as cable and direct broadcast satellite (DBS), to the American people after a natural disaster or terrorist attack. The report examines case studies in order to evaluate past restoration efforts and determine which practices were most successful.

Mission

The mission of the Restoration Subcommittee was to:

1. Determine the timelines currently required by broadcast radio, television, cable and DBS to restore service to the public after a natural disaster of terrorist attack.

2. Recommend planning processes that can be initiated on a market-by-market basis to restore service to the public in the most expeditious manner.

3. Evaluate past restoration efforts to determine which procedures were most effective and what the bottlenecks were to restoring service.

4. Identify best practices for restoring service to the public.

5. Make recommendations designed to improve the restoration process.

Approach

Working in close consultation with the Prevention Subcommittee, the Restoration Subcommittee helped develop surveys for the radio, television, cable and DBS industries to determine the current capabilities of each communications industry to restore service following a natural disaster or terrorist incident. The results from these surveys were designed to:

1. Evaluate short-term recovery timelines from a loss of key components in the communications delivery system, such as towers, transmitters, studio-to-transmitter (STL) links, studios, and cable headends.

2. Determine the long-term manufacturing lead times for replacement of key components in the communications delivery system, including towers, transmitters, STLs, studios, and cable headends.

3. Prepare case studies on the restoration of service following Hurricane Andrew in Florida, major earthquakes in Los Angeles and San Francisco, and the terrorist attacks on the World Trade Center in New York.

The Restoration Subcommittee wishes to acknowledge the contributions of leading industry trade groups, notably the National Association of Broadcasters (NAB), the Association of Public Television Stations (APTS), the National Cable and Telecommunications Association (NCTA), and the Satellite Broadcasting and Communications Association (SBCA).

State of the Industry

In the event of a natural or man-made disaster, the quickest restoration process is for a broadcaster to have redundant facilities and emergency backup power. In the event the primary facility is affected, having a geographically diverse transmission facility is the only way to ensure a short-term restoration in the range of minutes to hours.

These emergency facilities are viewed as ways to prevent disruption of service to the public. This report will define restoration as the longer-term processes necessary to resume broadcasting in the event the primary studio and transmission facilities suffer a *catastrophic* failure. Many emergency plans have focused on how the stations should respond to natural and man-made disasters around them. The plans do not focus on how the stations will respond if their studios or transmitters are destroyed or rendered inoperable due to other circumstances such as biological attacks.

This section will focus on long-term restoration processes that could take weeks, months or, as we will see in the case studies, even years to complete. The best practice recommendations will look at ways to reduce these restoration timelines and steps that stations can take to prepare for such catastrophic failures.

This emphasis on long-term restoration processes is not meant to suggest, however, that devising and implementing procedures for short-term restoration of over-the-air broadcasting and other media services are any less urgent. Indeed a number of the recommendations offered by the Restoration Subcommittee are specifically designed to ensure the timely resumption of service in the immediate aftermath of a natural or man-made disaster. One such recommendation involves the need to establish market-by-market restoration committees consisting of FCC licensees and other electronic media, notwithstanding the fact that intense marketplace competition makes this an especially challenging goal. Another recommendation notes that intra-industry dialogue and planning are also vitally important. Failing to have a cooperative framework, if not a contingency plan, in place prior to an emergency will make restoration of service that much more difficult.

Because they are typically more numerous and their facilities more geographically diverse, radio stations may be particularly well positioned to provide critically needed

information during major emergencies, assuming that they have cooperated and engaged in joint planning at the local level.

In sum, the subcommittee found that America's broadcast, cable and DBS sectors have made measurable strides in the area of emergency planning, but that much remains to be done if they are to respond effectively in a worst-case situation.

Local Radio

An industry survey of the nation's radio stations found, for example, that fewer than one in five have a "geographically diverse" backup transmitter and that nearly one-half of those polled lack backup capability altogether. In terms of activating the backup transmitter, nearly one-half expressed confidence that they could restore a signal within one hour, while a clear majority said that they could have a signal on the air within 24 hours, of an emergency.

Among radio stations surveyed, less than one-fifth have written disaster recovery plans, although virtually all of those who do manage to identify key personnel and provide them with extended-stay support. Of those with disaster recovery plans, only a small minority has struck reciprocity agreements with other local broadcasters. And only one in eight radio stations with disaster recovery plans have updated them since September 11, 2001.

Local Television

Fewer than 50 percent of local television stations have a geographically diverse backup transmitter and antenna, according to another industry-sponsored study made available to the subcommittee. On a positive note, three of four stations have backup power at their primary transmission site and over half said they could operate on backup power for more than 48 hours. One-half of those responding indicated they could activate a backup link to their primary transmission facility within 15 minutes, nearly two-thirds within one hour, and three-fourths inside three hours. The survey results show that a significant number of TV stations share their transmitter/antenna facilities with other local stations. While there are benefits in sharing facilities, we recognize the importance of diversifying these transmitter/antenna facilities.

Industry survey data suggest that a bare majority of local television stations have prepared written disaster plans, but nearly an equal number have not. Of those with disaster recovery plans, the vast majority identifies essential personnel and provides extended-stay support. Not unlike their radio counterparts, fewer than one in seven have entered into reciprocity agreements with other local broadcasters. Approximately one of every three TV stations polled reported that they have updated their contingency planning since 9/11.

In terms of the viability of digital television (DTV) during emergencies, the vast majority of local stations have co-located their DTV and analog transmission/antenna

facilities and only a scant number have backup for transmitting digital TV. Nearly one-third, however, have agreements with cable systems to distribute their digital signal. And the uniquely flexible digital TV technology allows a local station to offer multiple channels of standard-definition television (SDTV) during an emergency or even to downconvert its digital service to NTSC (analog).

Cable

Standby power supplies, according to industry-sponsored research, serve nearly three of every four cable providers. While for all practical purposes every cable company carries broadcast programming, three-fourths rely on an over-the-air feed for their broadcast signals.

Seven of every ten cable providers have a written disaster recovery plan, detailing how they would continue to operate if portions of their systems were to be rendered inoperable; that figure rises to 100 percent when the question is put to the ten largest Multiple System Operators (MSOs). The vast majority of those responding said that these plans identify key personnel in the event of an emergency.

According to industry-sponsored research, relatively few cable providers have forged reciprocity agreements with other local cable operators. Only one in eight generally – and one in five among the largest MSOs – currently has reciprocity plans in place. This is understandable considering that in most markets there is only one cable operator.

DBS and Digital Satellite Radio

America's DBS providers have made considerable progress in the area of disaster recovery planning, according to the survey data. Written emergency plans – identifying key personnel and providing them with extended-stay support – have been prepared and implemented. Not unlike their broadcast and cable counterparts, however, DBS companies need to update these contingency plans in the aftermath of 9/11 and strike reciprocity agreements with their competitors.

At satellite downlink and customer service facilities, the DBS industry appears to have achieved a high degree of physical security. With backup power at primary satellite downlinks and backup downlink facilities, DBS providers indicated that they could activate backup downlink satellite communications in 15 minutes to one hour.

Like the DBS companies, the digital satellite radio industry has written disaster recovery plans but needs to improve in the areas of rehearsing for emergencies and establishing reciprocity arrangements. Digital satellite radio providers have physical security at their primary downlinks, but have an uneven record in terms of backup power at those facilities.

Network Radio and Television

Surveys of the industry indicate that most commercial networks have multiple geographically diverse origination centers that have emergency power and multiple communications transmission paths including C and Ku Band uplinks and downlinks, inner city microwave facilities, fiber optics and satellite telephones. They appear well prepared to restore service and news coverage in the event of a catastrophic failure of their primary facility.

Some networks have established a third level of protection by agreeing to reciprocity agreements with other networks. CBS, for example, has geographically diverse, redundant origination centers in New York and Los Angeles. They also have redundant uplink sites in both cities. The uplink sites contain redundant paths to the origination center as well as emergency power. Further redundancy is achieved by routing the signal to two satellites and to two receiving dishes at each affiliate. In the event of catastrophic failure at both the main and backup origination centers, CBS has established reciprocity agreements with the ABC television network to provide technical facilities, including inventory of commercial libraries.

Having written agreements established prior to the event are crucial to rapid restoration of service in the event of catastrophic failure. These agreements were invoked recently during the complete failure of Galaxy 4, which contained multiple transponders utilized by the broadcast and cable industries.

Conclusion

Industry surveys suggest that both the major networks and DBS providers have redundant, geographically diverse origination centers and satellite distribution facilities. In addition, many of the local television stations in major markets have redundant transmitters and emergency power, which will enable them to restore service in as little as 15 minutes or less.

In the event of catastrophic failure of the tower or studio, however, stations are far less well prepared. As a result, if a station has exhausted its backup facilities, which are usually co-located at the main tower/studio complex, they will be confronted with much longer restoration times, quite possibly on the order of months or even years.

Relevant Case Studies

While the Restoration Subcommittee enjoyed full access to the broadcast, cable and DBS survey data, its best practice recommendations are based to a significant degree on the personal experiences of industry executives in real-world emergencies, including hurricanes and earthquakes as well as terrorist attacks on the World Trade Center. Because they are central to the subcommittee's findings and recommendations, these case studies are presented in the body of this report rather than as an appendix.

Hurricane Andrew (1992)

In 1992, Hurricane Andrew devastated much of the broadcast infrastructure in the Homestead and South Miami (Fla.) area. Many stations lost their transmission towers and had no geographically diverse transmission site.

CBS station WCIX-TV, Channel 6, lost its 2,000-foot tower when the eye of the hurricane passed over the Homestead transmission facility. The Channel 6 studio and newsgathering operation remained operational with emergency backup power, even though the studio and office complex suffered substantial wind damage. Even though the main transmitter was off the air, the station had pre-established microwave and fiber links to cable headends and low-power repeater sites. Many of the station personnel were left homeless due to the storm and were camped out in the studio as their only possible alternative. In order to recover from this natural disaster, the network stepped in with three distinct teams. The first team was charged with installing a temporary transmitter and antenna at an alternate location. The second was charged with staffing the newsgathering and production operation. The third team consisted of roofers, carpenters, and electricians charged with repairing the homes of station personnel.

The transmitter restoration team's challenge was to locate the Channel 6 transmitter antenna and alternate tower site. A new transmitter would have taken over 60 days to manufacture, which was an unacceptable lead time. As a result, a 30-year-old tube transmitter was pressed into service. A used Channel 6 antenna was located at an antenna manufacturer, and space on a 900-foot tower 30 miles to the north of the original site was located. Within five days, WCIX/Channel 6 was back on the air at reduced power.

The next stage in the restoration process was to rebuild the 2,000-foot tower and transmission plant at its original Homestead location. The lead-time for fabricating the tower and guy lines was 12 months. However, the longest lead-time was securing local building and zoning approval to erect an identical tower at the same location. Because the tower was down for more than 30 days, the FAA removed the tower from its database, which necessitated re-applying to the FAA and conducting an inquiry into whether the tower represented a hazard to air navigation. Without this determination, the local building and zoning authority would not consider processing the construction permit. As a result, the permitting process took over 18 months and the tower erection process took an additional 12 months – a total of 30 months to erect an identical tower at the exact location of the original tower.

Had the eye of Hurricane Andrew passed 20 miles to the north, it is highly likely that every television station in the greater Miami area would have lost its transmission capability, since the transmission towers are clustered in adjacent antenna farms.
The restoration of service to the Miami area could have been improved by better federal government interagency coordination between the FAA and the FCC, and through federal

preemption authority to re-erect the tower in the same location and elevation in accordance with EIA 222 Tower Construction Codes.

Los Angeles (1993) and San Francisco (1995) Earthquakes

In both of these earthquakes, broadcast operations were disrupted due to loss of electrical power from downed lines and loss of studio-to-transmitter links (STL). The STL losses resulted in microwave dishes being misaligned after the tremors and/or fiber optics being severed. Additionally, an overloaded cellular telephone network further hindered communications between station personnel involved in restoring service.

In order to facilitate communications from stations' technical personnel, alternate communications systems were utilized including amateur radio repeaters and equipment, 450 MHz business radio, and satellite telephones. Temporary microwave links were established between the studio and transmitter using electronic newsgathering vehicles. In locations where studio buildings were damaged, satellite newsgathering vehicles and electronic newsgathering vehicles were used as makeshift control rooms in alternate buildings. Backup generating facilities at the studio and transmitter were essential components to remaining on the air for many days due to the massive power grid disruption. Mobile generators were in strong demand and were allocated in many cases to hospitals and other medical facilities, leaving the broadcasters to fend for themselves if they did not have existing backup facilities.

1993 and 2001 Attacks on the World Trade Center

In two separate incidents, the greater New York area was adversely affected when terrorists attacked the World Trade Center. This resulted in both television and radio stations being knocked off the air for extended periods of time.

In February 1993 a truck bomb was exploded in the lower levels of the World Trade Center. The blast disrupted the main electrical distribution system and numerous water supply lines. The water flooded the emergency generators, thereby eliminating all emergency power to the World Trade Center. The only commercial news broadcaster with a full-power redundant facility at the Empire State Building was WCBS-TV. Within ten seconds of the disruption of service at the World Trade Center, WCBS switched to its alternate site at the Empire State Building. The other broadcasters were off the air for over 48 hours until electrical power was restored at the World Trade Center.

In September 2001 two commercial airliners piloted by terrorists destroyed both buildings of the World Trade Center, resulting in the permanent loss of two radio and nine television transmission facilities. WCBS-TV again was the only commercial news station in town with redundant emergency backup facilities. Not only were broadcasters affected by this loss, but also a major fiber optics hub was demolished when Building 7 of the World Trade Center collapsed after the attack. This in turn affected data circuits, video circuits linking television stations to cable companies, direct broadcast centers and related services.

The major obstacle in restoring television and radio service in the number-one market in the United States has been the lack of local building and zoning permission to erect a temporary tower for the broadcasters. More than two years after the attack, many of the television stations are operating at 20 percent power or less and have no emergency backup power in the event of a massive blackout. The only station with enough emergency backup power to operate analog and digital facilities is WCBS-TV.

The schedule for restoration of the broadcast transmission facility in New York City remains uncertain. The most optimistic projection for restoration is 2009. Had the broadcasters been allowed to erect a temporary tower on Governor's Island – which was federal land at the time of the attack – service could have been restored in 18 months.

Restoration Best Practices

1. Radio and television broadcasters, cable companies, direct broadcast satellite (DBS) and digital satellite radio providers, and other delivery media should develop and implement written disaster recovery plans, geared not only to short-term disruption but to the possibility that primary transmission and studio facilities may suffer catastrophic failure.

2. Television and radio stations and other media organizations should update their disaster recovery plans as events warrant, and regularly conduct emergency drills at least once a year.

3. FCC licensees, MSOs, and other electronic media organizations (including television, radio, cable, DBS, digital satellite radio, and telecommunications) should establish market-by-market restoration committees.

4. Radio and television stations and cable systems should implement studio and transmitter reciprocity arrangements to ensure signal availability in all markets.

5. Television stations should develop plans for utilization of ENG trucks as emergency alternate studios, with microwave links at transmitter sites for both analog and digital service.

6. Television stations should create plans for alternate paths to cable headends. Alternate emergency distribution paths could include: DTV transmitter to cable headend, downconverted to NTSC; SNG to DBS to cable headend and DBS to homes; cross-connecting cable systems; opening local-to-local DBS service to all subscribers on an emergency basis; low data rate Internet links; and portable microwave links.

Restoration Best Practices

7. Radio and television stations should develop recovery timelines in situations where backup facilities exist. Stations with backup facilities should be prepared to provide service within 15 minutes of loss of primary facility.

8. The Federal Emergency Management Agency (FEMA), or another appropriate federal entity, should acquire and administer emergency response broadcast equipment packages. These containerized recovery systems would be stored in regional depots for use in emergency situations and would include self-contained VHF, UHF, AM and FM transmission units and mobile generators, along with sections for 500-foot and 100-foot towers. (See Appendix B for estimated costs.) The federal government should also have the authority to designate emergency channels for television and radio where needed.

9. Federal preemption authority should be established during federally declared emergencies for replacement towers and other essential broadcast and delivery media needs.

10. Radio and television stations should have the ability to access alternate telecommunications capabilities. These may include: satellite phones, amateur radio facilities in studios, and alternate 450 MHz communication repeater sites with portable handheld units.

Future Technologies/Digital Solutions Subcommittee

Mission

- Identify particular challenges and opportunities posed by digital technologies to the reliability of communications infrastructure
- Consider new applications that are enabled by digital technologies that enhance media's role in disseminating security-related information
- Supplement the work of the overall MSRC to plan for optimal reliability, robustness and security of broadcast and MVPD facilities using new technologies
- Recommend how emergency notification systems can be leveraged, changed, or enhanced to take advantage of digital technologies.

Approach

The subcommittee approached our work by initially reviewing the forecasts for the rollout of digital media technologies and identifying the technologies of focus. Our work primarily considered digital technologies as they apply to broadcast, cable and satellite television, and radio. Our scope was therefore limited to point-to-multipoint communications. We have not addressed emergency messaging to cellphones, PDAs or basic email devices because those are not devices that cable, broadcast or satellite has traditionally supplied. In the course of our discussion, there was a considerable amount of interest expressed in finding ways to alert the public using these newer devices, and we suggest that the responsibility for that be clarified between the NRIC, the MSRC or some other organization.

The subcommittee solicited and assembled information on existing efforts to pilot or use digital technologies in emergency messaging. These include models that are based on revisions to the existing Emergency Alert System (EAS) and models that are based on entirely new technology or new approaches. We include a summary of these efforts in Appendix A, with the intention to communicate the range of activities that could inform the EAS revision process. We also closely monitored the work of the Public Communications and Safety Working Group so that issues related to digital technologies could be coordinated across the MSRC effort. This included incorporating comments and input from the PCS workshop in Tampa.

Through discussion of these inputs and idea generation around other potential applications that could be developed to enhance emergency messaging, the subcommittee composed two recommendations to the full MSRC.

Future Technologies/Digital Solutions Best Practices

1. Government should coordinate development of a Media Common Alert Protocol (MCAP). This protocol should be designed to deliver emergency messages via digital networks. It should flow over all methods of digital transport and be received by all digital receivers. This protocol should be optimized for point-to-multi-point networks and devices only.

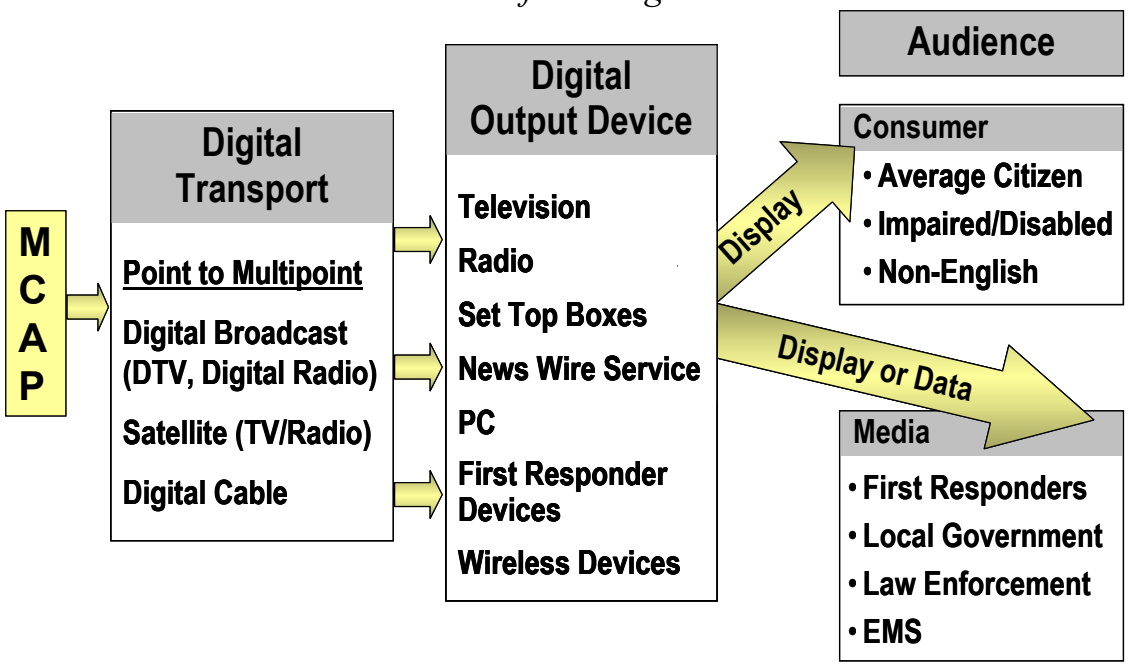
    1.1 Key attributes of the MCAP should be addressability, scaleability, interoperability and prioritizing.

    1.2 Industry organizations and companies should develop standards and specifications for carriage of MCAP on various media.

MCAP Description:

- Protocol to deliver emergency messages via digital radio and television networks
- Protocol that flows over all methods of digital transport and can be received by all digital receivers
- Protocol that is optimized for point-to-multi-point networks and devices only

MCAP flow diagram



MCAP Rationale:

- There must be a single, ubiquitous standard for alert messaging over radio and television. The importance of one standard, that is developed and accepted before a multitude of incompatible systems arise on their own, cannot be overstated.

- The nation's current Emergency Alert Service (EAS) must evolve to embrace the digital medium. A common protocol can be a critical element of a transition.

- Digital technology offers many enhancements over existing systems in terms of speed, robustness and flexibility. Government and media should take full advantage of these enhancements to communicate emergency and safety information. Digital data, expressed as audio, video or text, can play a critical role in successful management of emergency situations.

- Digital networks and digital devices are adopted at different rates by consumers, schools, government and response organizations. A universal digital protocol that is simple, comprehensive, and flexible, will accommodate the variability in when and how digital media is implemented.

MCAP Key Attributes:

- **Addressability:** national, regional and local
- **Scaleability:** support variable and dynamically changing bit rates
- **Interoperability:** easily transported within existing digital media systems
- **Prioritizing:** automatic based on alert level

Other Issues:

- Once the MCAP is defined, industry organizations and companies will have an important role in progressing to implementation, by developing standards and specifications for carriage of MCAP on various media.The importance of coordinating the development of MCAP before other standards are developed is highlighted by the existence two efforts that are already underway in this area. First, the Partnership for Public Warning has issued a standard called OASIS, which is referenced (without identification) in Appendix C ("Draft Common Alert Protocol). Second, in January 2004 the Consumer Electronics Association adopted a performance standard for public alert received over the NOAA Weather Radio Network known informally as the all- hazard receiver standard. According to CEA's public statement "the standard expands the functionality of the receivers by increasing the options available to consumers about when and how they are notified of these alerts." Our committee acknowledges these efforts as being within the framework of an MCAP and we cite them as potential catalysts for development and adoption of a single standard as soon as possible.

Future Technologies/Digital Solutions Best Practice

2. The existing tool set of digital television, comprised of standards for over-the-air, cable and satellite, should be leveraged in the development of new emergency notification standards and practices. Many of the existing capabilities are readily applicable, including but not limited to multiple video and audio channels, uniform channel designation, closed captioning and the ACAP middleware standard.

Examples of how existing standards could be applied:

- Content written to ACAP middleware standard
    - The ACAP standard, developed by the ATSC in conjunction with CableLabs will provide a common consumer platform for enhanced and interactive content. This will support display and processing of supplemental information. Emergency content based on MCAP would be compatible with the ACAP standard. Applications could be developed to allow easy consumer access to MCAP data. (Example: lists of local available shelters is accessible while video of local disaster is distributed on primary signal)
- Multiple video and audio channels
    - Create a program paradigm that identifies a specific uniform virtual channel within a broadcast transport stream that a viewer would be directed to switch to in the event of an emergency. Initial notification to the viewer would be made via a crawl or aural announcement on the primary program channel directing them to switch to the alternate virtual channel. (Example: Channel 5.5, where the ".5" is an agreed upon emergency channel designation)
    - In later years as receive devices adopt targeting capabilities, such as directed channel change, and device activation based on emergency alert transmission, this tuning would become automatic.
- Closed captioning
    - The existing analog captioning standard supports two closed captioning channels and 2 text channels. This capability is implemented in current receivers and could be used to deliver specific text based information to homes augmenting what is delivered by the primary program channel. This enhanced information would be of particular value to the hearing impaired.

In addition to these examples of applying the existing tool set, we cite the example below of Single Frequency Networks (SFN) to illustrate the potential for new technology to enhance our emergency alert infrastructure. It will be important to monitor

the evolution of technology across all MVPD platforms and identify enhancements to the base infrastructures that will improve the reliability, redundancy and robustness of any MVPD service. Implementation of single frequency broadcast networks across the country would provide both redundancy and local origination capabilities that do not exist in our broadcast infrastructure today. Rather than a single point of failure as experienced in New York on 9/11, failure of any single portion of the network could be localized to a small area rather than affecting the entire market.

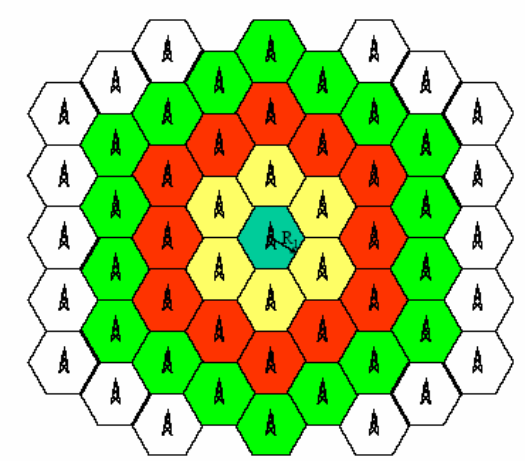
Description of Single Frequency Networks

Distributed transmissions systems also know as single frequency networks (SFN), may be able to play a role in providing improved reliability of digital television signal delivery through redundant, low power, transmitters in the event of a disaster that disables the main TV transmitter site.

An SFN comprised of several low power DTV transmitters with overlapping signal coverage can be used to augment or even replace the traditional high power transmitter site, which can be a single point of failure causing a complete loss of TV service area.

An SFN is more flexible in terms of coverage area than a single high power transmitter with a high antenna. They are more interference resistant and also cause less interference. They are inherently much more fault tolerant. They have the potential of offering lower installation cost, and more potential transmitter sites, allowing for easy coverage extension.

Problems in a traditional system such as, transmitter failure, antenna failure, primary AC power failure etc., may result in a complete loss of coverage. In an SFN system, the loss of a single transmitter will result in minimal loss of coverage, if there is overlap in the coverage between adjacent transmitter sites. If there is no overlap, the loss of a transmitter site results in only a partial loss of coverage area. It is possible and even desirable, to implement an SFN network using lower antenna heights. This makes it possible to use existing structures as transmitter sites such as buildings, water towers, and cellular towers.



The diagram above provides an example of a dense SFN surrounding the central higher power transmission site.

TV receiver equalizers are the key to successful implementation of a Single Frequency Network. SFN networks utilize several transmitters simultaneously transmitting the same modulation information on the same frequency. A receiver might get its signal from more than one transmitter resulting in multipath interference also known as "ghosting". The receiver must work in such an intentional multipath environment to successfully recover the DTV signal. The ATSC DTV transmission system uses equalization techniques that work in severe multipath environments. Use of equalizers in DTV receivers can eliminate the multipath limitations of analog systems. The limitations in SFN reception are directly related to receiver equalizer performance. Not all equalizers perform the same and some receivers are better suited for an SFN environment than others. DTV receiver equalizer performance specifications will need to include the capability required to receive signals in an SFN environment. The ATSC is in the process of developing a Recommended Practice that will address issues related to SFN design.

Conclusion

Digital platforms throughout the MVPD universe are in their infancy. As we reviewed the variety of technologies currently in place we noted a number of proprietary implementations. Fortunately, we feel that this is just a transitional issue that was a result of developmental timing of each of the systems we analyzed. The good news is that cable, satellite and broadcast are now working together to insure that technical standards are in place that will support interoperability for both programming and emergency alerts in a seamless manner throughout the country.

As we look out into the future, there are many uncertainties about the timing and particular levels of adoption of digital technologies. One certainty however, is that the devices and consumer uses of digital media will be significantly more varied than in the past. For example, throughout the second half of the last century it was assured that broadcast radio and television would reach almost every home because there was

uniformity in receivers. Looking out into the future, there is no assurance that the reach of broadcast will be as universal because homes may not have a digital tuner and antenna, which are necessary to receive digital television over the air. (One data point to note on this topic is that under 15% of the digital televisions sold to date are equipped with an over-the air tuner). Similarly, many radios today are not sold with an AM band, and consumers are listening to music via digital download or other non-broadcast devices. The overall message here is that with so many options in a digital age about how to receive media, no one form can be relied on in the way broadcast as been relied on in the past. Our committee recommends that examination of consumer adoption of digital devices be an integral part of the next phase of the MSRC effort.

The committee urges the government to coordinate development of MCAP. It is essential that the industry utilize **one protocol** that can flow over digital radio and television systems. We applaud the pioneering efforts to use digital media for alert messaging described in Appendix C. However, we are concerned that without government leadership in coordinating development of standards as the first step, the country will implement an array of multiple non-compatible alert systems or will not develop any at all.

Appendix A – Subcommittee Members

Prevention Subcommittee

Subcommittee Chairman & Broadcast Television Subgroup Chair
Glenn Reitmeier
NBC

Cable Television Subgroup Chair
Peter Brubaker
Susquehanna Communications

Radio Subgroup Chair
Jack Goodman
National Association of Broadcasters

Subcommittee Members
Mark Erstling
Association of Public Television Stations

Paul Gemme
Time-Warner Cable

Wayne Hall
Comcast

Tania Hanna
Harris Corp.

John Matthews
Radio-One

Charlie Morgan
National Radio Systems Committee

Larry Nelson
Nelson Multimedia

Maureen O'Connell
Fox/NewsCorp

Mark Richer
ATSC

Andy Scott
National Cable and Telecommunications Association

Jeff Tate
Susquehanna

Lonna Thomson
Association of Public Television Stations

Bud Warner
SES-Americom

Kelly Williams
National Association of Broadcasters

Restoration Subcommittee

Subcommittee Chairman
Bob Seidel

Subcommittee Members
Jay Adrick
Harris Broadcast Communications

Sterling Davis
Cox Enterprises

David Donovan
MSTV

Al Kenyon
Clear Channel

Gary Kline
Cumulus Media

Bob Lawson
Verestar

Bob Morgan
American Tower

Robert Plummer
DirecTV

Andy Scott
NCTA

Gwen Wood
PBS

Future Technologies Subcommittee

Subcommittee Chairman
Ira Goldstone
Tribune Company

Subcommittee Member
Lisa Wiersma
Tribune Company

Appendix B – Broadcast Restoration Packages

(Please note that all prices are approximations)

AM Broadcast

1 KW. Flyaway System
$55,500

Includes:
1KW. Solid State Transmitter
Audio Processing Equipment
Monitoring Equipment
Dummy Load and Switch
250' Transmission Line with Connectors
Antenna Tuning Unit
Quick Erect Frequency Agile Antenna
Shipping Cases
Tools

5 KW. Flyaway System
$122,500

Includes:
5 KW. Solid State Transmitter
Audio Processing Equipment
Monitoring Equipment
Dummy Load and Switch
250' Transmission Line with Connectors
Antenna Tuning Unit
Quick Erect Frequency Agile Antenna
Shipping Cases
Tools

50 KW. Containerized System
$420,000

Includes:
50 KW. Solid State Transmitter
Audio Processing Equipment
Monitoring Equipment
Dummy Load and Switch
250' Transmission Line with Connectors
Dehydrator System
Antenna Tuning Unit
Quick Erect Frequency Agile Antenna

ISO Shelter with air conditioning, ventilation ducts, power distribution, signal panels and equipment mounting racks
Tools

FM Broadcast

1 KW. Flyaway System
$48,500

Includes:
1 KW. Solid State Transmitter
Audio Processing Equipment
Monitoring Equipment
Dummy Load and Switch
250’ Transmission Line with Connectors
Quick Erect Frequency Agile Antenna
Shipping Cases
Tools

10 KW. Containerized System
$205,500

Includes:
10 KW. Solid State Transmitter
Audio Processing Equipment
Monitoring Equipment
Dummy Load and Switch
500’ Transmission Line with Connectors
Dehydrator System
Quick Erect Frequency Agile Antenna
ISO Shelter with air conditioning, ventilation ducts, power distribution, signal panels and equipment mounting racks
Tools

VHF Analog – Low Band

5 KW. Containerized System **$364,000**

Includes:
5 KW. Solid State Transmitter
Video Processing Equipment
Audio Processing Equipment
Monitoring Equipment
Dummy Load and Switch
1000' Transmission Line with Connectors
Dehydrator System
Side Mounted Emergency Antenna
ISO Shelter with air conditioning, ventilation ducts, power distribution, power regulator, signal panels and equipment mounting racks
Tools

VHF Analog – High Band

10 KW Containerized System **$422,000**

Includes:
10 KW. Solid State Transmitter
Video Processing Equipment
Audio Processing Equipment
Monitoring Equipment
Dummy Load and Switch
1000' Transmission Line with Connectors
Dehydrator System
Side Mounted Emergency Antenna
ISO Shelter with air conditioning, ventilation ducts, power distribution, power regulator, signal panels and equipment mounting racks
Tools

UHF Analog

30 KW Containerized System $1,108,000

Includes:
30 KW. Atlas Solid State Transmitter
Video Processing Equipment
Audio Processing Equipment
Monitoring Equipment

Dummy Load and Switch
1000’ Transmission Line with Connectors
Emergency Antenna
ISO Shelter with air conditioning, water to air heat exchanger, power distribution, power regulator, signal panels and equipment mounting racks
Tools

UHF DTV

7.25 KW. Containerized System
$934,000

Includes:
7.25 KW. Solid State Transmitter
4 Channels of Video Processing Equipment
4 Channels of Audio Processing Equipment
4 Channel ATSC Encoder
PSIP System
Monitoring Equipment
Digital Mask Filter
Dummy Load and Switch
1000’ Transmission Line with Connectors
Emergency Antenna
ISO Shelter with air conditioning, ventilation ducts, power distribution, power regulator, signal panels and equipment mounting racks
Tools

Mobile Power Generation Systems

Each system includes generator set, weather enclosure, muffler, trailer, day tank, metering package, circuit breaker, battery and other applicable options

20 KW	**$16,000**
30 KW	**$19,000**
50 KW	**$28,000**
100 KW	**$52,000**
200 KW	**$126,000**

Tower Systems

Medium Duty Tower
$65,500

Medium duty tower package capable of being configured into several AM one-quarter wavelength antenna arrays at any Medium Wavelength (MW) frequency or supporting FM emergency antenna systems.

Includes:

75 Ten foot quick erectable tower sections (Rohn 55 or similar)
Antenna base plates
Antenna top sections 4
Base Insulator sections 20
Guy brackets
Guy anchors
Guy insulators
5000 Guy Cable
Turnbuckles
Guy Lugs

Gin Pole fixtures with hoisting line
10,000’ Copper ground wire
Assorted hardware for guy and ground wire systems

Heavy Duty Tower System $750,000

500’ Heavy duty tower system capable of supporting up to three emergency television or FM antennas, transmission lines and STL antennas.

Includes:

Tower sections
Tower base section
Tower top section
Guy brackets
Guy anchor materials
Guy cables
Lighting equipment
Antenna mounting brackets
Grounding cables and hardware
Tower base materials
Climbing ladder
Safety equipment

Summary of Restoration Packages by Location

Eastern United States Restoration Package

RADIO
1Kw AM Flyaway System
5 Kw AM Flyaway System
50 Kw AM Containerized System
1 Kw FM Flyaway System
10 Kw FM Containerized System

TELEVISION
VHF Analog Low Band System
VHF Analog High Band System
UHF DTV System

GENERATOR SYSTEMS
20 Kw System
30 Kw System
100 Kw Systems
200 Kw Systems

TOWER SYSTEMS
Medium Duty Towers
Heavy Duty Tower

$4,044,500

Central United States Restoration Package

RADIO

1Kw AM Flyaway System
5 Kw AM Flyaway System
50 Kw AM Containerized System
1 Kw FM Flyaway System
10 Kw FM Containerized System

TELEVISION

VHF Analog High Band System
UHF DTV System
UHF Analog System

GENERATOR SYSTEMS

20 Kw System
30 Kw System
100 Kw Systems
200 Kw Systems

TOWER SYSTEMS

Medium Duty Towers
Heavy Duty Tower

$5,561,500

Western United States Restoration Package

RADIO
1Kw AM Flyaway System
5 Kw AM Flyaway System
50 Kw AM Containerized System
1 Kw FM Flyaway System
10 Kw FM Containerized System

TELEVISION
VHF Analog Low Band System
VHF Analog High Band System
UHF DTV System

GENERATOR SYSTEMS
20 Kw System
30 Kw System
100 Kw Systems
200 Kw Systems

TOWER SYSTEMS
Medium Duty Towers
Heavy Duty Tower

$4,044,500

APPENDIX C – Existing Digital Technologies

The information below contains summaries of existing or announced efforts in deploying digital technologies for alerts. Inclusion in this list does not imply any endorsement or evaluation of the effort.

Use of digital broadcasting spectrum – datacasting

Overview of the process:

Through "datacasting" packets of information (data) can be embedded within a digital television signal and sent to PCs outfitted with a DTV tuner card.

The data would be encrypted by a public safety agency, then received by the station and inserted into the digital TV signal.

The station sends the data packet through their digital transmitter to the intended recipients.

- The receiving PC is equipped with an inexpensive DTV tuner card (costing roughly $300) and a small antenna placed on the computer (costing approximately $30).
- The data can consist of text, video, audio, graphs, maps or medical information.
- The system is entirely "addressable" so that public safety agencies can direct to whom the data is sent.
- The datacasting services are delivered simultaneously with the station's regular digital broadcast program stream, without interfering with that service. Viewers would not experience any interruption or degradation of the signal they receive.

The service requires very little of a station's digital capacity. Transmission of the data over the digital spectrum decreases the information lag to just seconds, and bypasses the congestion of wireline and wireless services. Reach is a major advantage as over the air television could potentially reach 99 percent of American households, and the addressable nature of the network allows secure information to relevant agencies and first responders in the field.

The Kentucky Network has been one of the pioneers in this field. Several key KY state agencies are involved in the initiative, including the KY State Police, and KY Division of Emergency Management. The system follows the general outline of the APTS proposal, using datacasting on the digital spectrum for receipt on specially equipped personal computers, laptops, or any device with a digital TV module.

Specific datacasting efforts have been developed in Kentucky and New Jersey. Also, a station in New York City has set out to establish an urban testbed to develop and analyze end-to-end solutions for effective dissemination of information to first-

responders acting in national disaster situations. The station is also prepared to use their transmitter on the Empire State Building and a portion of their spectrum for experimental purposes. The station will support the project by providing a portion of their digital spectrum and its Instructional Television Fixed Service (ITFS) band, operating at approximately 2.5GHz.

The project proposes to develop a system to capture, integrate, disseminate and display video, other sensor data, and multi-source national intelligence data related to special operations for urban environments, perimeter defense, homeland defense, emergency response systems, emergency broadcast systems, and mobile C2.

A unique feature of the proposed system, enabled through the use of the ITFS band, is the use of an in-band return path to handle requests for additional information coming back from emergency responders within the same broadcast channel. Unlike the DTV channel spectrum (being more of a pure broadcast channel), ITFS will allow two-way communication. Depending on the geography and purpose of the message, either the ITFS or DTV band could be used.

Use of satellite system in AMBER alerts

A state emergency management association has requested local stations in their state to install new satellite receiver systems for receiving and activating these various alerts. The system would be triggered by the state police, who would receive information from local police (for AMBER alerts) or any other appropriate government agency.

The transmission of an alert on the satellite system would be supplemental to the existing daisy chain EAS system, which would still be activated utilizing the current EAS receiver. The current EAS system has recently introduces a new "CAE" code, to represent a Child Abduction Emergency.

The request from state emergency management association is based on their view that a new satellite system would introduce less delay into the AMBER alert notification, as the signal would be broadcast simultaneously to all stations, avoiding the delay in the daisy chain radio method utilized by the current EAS system. The satellite also has the ability to transmit other information along with the alert, such as photos and audio.

Emergency Digital Information Service

The Emergency Digital Information Service (EDIS) is an advanced digital tool used by one state's emergency managers to alert and inform the news media and the public. EDIS has been in continuous operation since 1990. In 1999 the statewide EDIS network was upgraded to add image and sound capabilities and to use an advanced satellite datacast technology for reliable statewide service.

EDIS is a service of the Governor's Office of Emergency Services in partnership with private, local, state and federal organizations and agencies. Service to the deaf and hearing-impaired and other populations with special needs are a particular emphasis of the EDIS program

EDIS is a combination website, newswire and a 24-hour broadcast service. Authorized agencies release text, pictures and sounds over EDIS using their own existing information networks. News media and the public access the latest EDIS information in many ways: over the Internet, via digital radio broadcasts, on their pagers, by email. EDIS bulletins, maps, pictures and sounds are specially formatted for the computers and graphic systems used by the news media.

EDIS is designed to be disaster-resistant. A sophisticated satellite distribution network constantly updates "mirror" EDIS servers in selected newsrooms and network facilities around the state. EDIS can be used to trigger Emergency Alert System (EAS) alerts, but it can also be used to follow through with the detailed information people need after an initial alarm.

EDIS carries a wide range of emergency and public safety bulletins. Weather alerts, earthquake data, and tsunami warnings are available over EDIS, as are urgent alerts and prevention information from state and local agencies. Simple text bulletins have been at the heart of EDIS since its inception and are still the most widely received. EDIS can also deliver maps, graphics and photos as well as sound files.

Every EDIS message comes from an authorized emergency-management or public-safety organization which is responsible for its content. Any local, state or federal agency with emergency management responsibilities can request authorization to use EDIS, as can selected voluntary and non-governmental organizations.

Draft of Common Alert Protocol

A not-for-profit organization that promotes the development, convergence and adoption of e-business standards has drafted a common alert protocol (CAP). The CAP is defined as an open, non-proprietary digital message format for all types of alerts and notifications. The CAP format is compatible with emerging techniques, such as Web services, as well as existing formats including the Specific Area Message Encoding (SAME) used for NOAA Weather Radio and Emergency Alert System, while offering certain key enhancements. Key benefits of CAP will include reduction of costs and operational complexity by eliminating the need for multiple custom software interfaces to the many warning sources and dissemination systems involved in all-hazard warning.

Each CAP Alert Message consists of an alert segment (basic information), which may contain one of more information segments (specific event data), each of which may contain one or more area segments (geographic area the information applies to). The primary use of the CAP Alert Message is to provide a single input to activate all kinds of alerting and public warning systems. A secondary application of CAP is to normalize

warnings from various sources so they can be aggregates and compared in tabular or graphic form as an aid to situational awareness and pattern detection. Although primarily designed as an interoperability standard for use among warning systems and other emergency information systems, the CAP Alert Message can be delivered directly to alert recipients over various networks, including data broadcasts.

Among the principles which guided the design of the CAP Alert Message were:

- **Interoperability** – Exchange of alerts and notifications among all kings of emergency information systems
- **Completeness** – Provide for all the elements of an effective warning message
- **Simple implementation** – Not place undue burdens on technical implementers
- **Simple XML and portable structure** – Although the primary anticipated use of the CAP is as an XML document, the format should remain sufficiently abstract to be adaptable to other coding schemes
- **Multi-use format** – One message schema supports multiple message types **Familiarity** – The data elements and code values should be meaningful to warning originators and non-expert recipients alike
- **Interdisciplinary and international utility** – The design should allow a broad range of applications in public safety, emergency management, and allied applications, and should be applicable worldwide.

Wireless access to alert messages

Two private are working together to deliver homeland security threat information to cell phone users via live on-demand wireless audio streaming and SMS alerts. When alerts break, a brief text message is automatically sent to the user's handset, enabling them to connect directly to a detailed live or on-demand audio presentation of the related information.

There are numerous scenarios in which this combined technology might be utilized, including:

- Terrorist activity warnings
- Homeland Security Advisory System status updates
- Post-attack communications
- Public addresses
- Joint coverage of television and radio broadcasts
- Emergency resource notification

The partnership offers a number of benefits to both homeland security agencies and the general population:

- Reach – There are currently an estimated 137 million wireless users in the U.S., with penetration in most adult demographics exceeding 60%

- Flexibility – The wireless technology platform is scalable and can be integrated into any telecommunication infrastructure
- Customization – The platform enables user-level content customization
- Security – The core components of the platform can be centrally housed in a single secure facility
- Adaptability – The same system can be utilized for additional public service applications beyond homeland security communication

Another private company has developed a new device called the Instant Traffic Reporter. The device, a small unit designed to fit inside the car, will provide instant traffic reports to users within a local area. The device is being marketed as the only on-demand source of traffic reports, where motorists can get instant access to local conditions versus every 10 minutes or so on local radio. The Instant Traffic Reporter tunes in to a special radio signal transmitted by a radio company that updates traffic reports on a constant loop 24 hours a day and updates them whenever there is a traffic incident. Users simply press a button on the device to get the latest updates.

In addition to traffic reports, the device will allow emergency notification via a series of audible and visual alerts. The unit is addressable, and an emergency incident (severe weather, terrorist alert, AMBER alerts, etc) can trigger a series of lights and beep tones on the unit. Users can then hear the latest emergency message.