CHAPTER VIII

Telecommunications Companies

Chapter Structure

A. BACKGROUND

This chapter provides an overview and assessment of the respective responses to the December 2008 ice storm of the two New Hampshire telecommunications companies reviewed. The scope of the assessment, as directed by the staff of the NHPUC, was limited to the TDS Companies (Hollis Telephone Company, Kearsarge Telephone Company, Merrimack Telephone Company, and Wilton Telephone Company) and the New Hampshire exchanges operated by Northern New England Telephone Operations, LLC, d/b/a FairPoint Communications-NNE (FairPoint). TDS serves approximately 31,000 access lines in 16 exchanges; FairPoint serves approximately 450,000 access lines in 117 exchanges within the state.[1] [2] TDS and FairPoint are addressed separately, although common themes have been explored with each company. Maps of the territories covered by each of these companies may be found in Chapter I.

B. EVALUATION AND CRITERIA

TDS and FairPoint were evaluated in the areas of effective preparation for prolonged emergencies, efficient and timely response to outages, and restoration of service. Specific areas of evaluation included:

1. Disaster planning and preparation
2. Availability and use of resources
3. Bulk line testing
4. Coordination with electric utilities and local governments.

[1] TDS. (August 10, 2009). Data Response TE0045. NEI.
[2] FairPoint. (August 10, 2009). Data Response TE0040. NEI.

1. **Preparation for emergency response starts with a plan. This plan should describe the policies and procedures required to prepare for and respond to a given storm or other disaster. This plan should include methods for**:
   - Identifying the potential for natural disasters
   - Communicating within the company
   - Communicating with outside entities
   - Preparing the company to respond as rapidly as possible.

2. **Preplanning is necessary to ensure a sufficient work force is available and can be effectively used during a widespread disaster. The following issues must be evaluated:**
   - How and when were existing workforces within the state utilized?
   - How and when were contractor forces and out-of-state work forces utilized?
   - How was the productivity of work forces maximized?
   - How were trouble reports handled? Were they handled individually or were mass sweeps used where work crews concentrated on restoring geographic areas?
   - How were service orders and routine work scheduled during the restoration efforts?
   - How were technicians moved from one work location to another as areas became accessible after roads were cleared and electrical work was completed?
   - How was overtime handled?
   - How productive were workers during the restoration process?

3. **Bulk line testing plays an important role during the restoration of telephone service. This capability allows lines to be tested before the customer reports a trouble condition. It can also identify locations where multiple customers are likely to be out of service. In particular the important issues are:**
   - What capabilities did each telephone company have for bulk line testing?
   - How productive were the bulk line testing efforts?

4. **Communication and coordination with the electric companies that operate in jointly affected areas is critical to timely telecommunications restoration efforts. Telecommunications workers generally do not enter jointly affected areas until the electric company has communicated to them that the area has been declared safe. Telecommunications personnel are neither trained nor equipped to respond to the possibility of electrocution from downed power lines. It is important to know:**
   - What coordination issues existed with the affected electric utility?
   - Did the coordination efforts between the electric and telecommunications companies adversely impact the restoration efforts of telecommunications and electric service?

- Were there any access and communications issues with other entities such as state and local public officials, firefighters, first responders, and other emergency personnel?

The following two tables indicate the extent to which each of the utilities met the criteria. These tables were not prepared to compare one utility with another. The two utilities differ in corporate structure and territory service area, experienced different amounts of damage to their systems and, as a result, faced different problems. These tables were prepared to show where each utility may improve its performance in preparation for the next storm or disaster. A further explanation for the improvements that are recommended for each utility may be found in the findings and conclusions section of this report. The meanings of the symbols used in the tables are:

○	Improvement is needed as stated in the report
◐	Adequate with minor improvements suggested as stated in the report
●	Effective with no improvements noted.

Table VIII-1 - Evaluation Matrix - FairPoint

1) DISASTER PLANNING AND PREPARATIONS	
The potential for natural disasters was identified.	◐
Efficient methods were used to communicate within the company.	●
Efficient methods were used to communicate with outside entities.	◐
The company was prepared to respond as rapidly as possible.	◐

2) AVAILABILITY AND USE OF FORCES	
Existing workforces within the state were used effectively.	◐
Contractor forces and out-of-state work forces were used effectively.	◐
Productivity of work forces was maximized.	●
Trouble reports were handled effectively.	●
Service orders and routine work were scheduled effectively during restoration efforts.	○
Technicians were effectively moved from one work location to another as areas became accessible, once roads were cleared and electrical work was completed.	●
Overtime was handled appropriately.	●

3) BULK LINE TESTING	
The company has facilities for bulk line testing.	●
The bulk line testing effort was effective.	○

4) COORDINATION WITH ELECTRIC COMPANIES/LOCAL AUTHORITIES	
The utility effectively coordinated with the local electric utility.	○
Communications with electric utilities did not adversely impact the restoration efforts of telecommunications and electric service.	○
Communications were effective with other entities, such as state and local public officials, firefighters, first responders, and other emergency personnel.	●

Table VIII-2 - Evaluation Matrix - TDS

1) DISASTER PLANNING AND PREPARATIONS	
The potential for natural disasters was identified.	●
Efficient methods were used to communicate within the company.	●
Efficient methods were used to communicate with outside entities.	●
The company was prepared to respond as rapidly as possible.	◐
2) AVAILABILITY AND USE OF FORCES	
Existing workforces within the state were used effectively.	●
Contractor forces and out-of-state work forces were used effectively.	●
Productivity of work forces was maximized.	●
Trouble reports were handled effectively.	●
Service orders and routine work were scheduled effectively during restoration efforts.	●
Technicians were effectively moved from one work location to another as areas became accessible, once roads were cleared and electrical work was completed.	●
Overtime was handled appropriately.	●
3) BULK LINE TESTING	
The company has facilities for bulk line testing.	○
The bulk line testing effort was effective.	○
4) COORDINATION WITH ELECTRIC COMPANIES/LOCAL AUTHORITIES	
The utility effectively coordinated with the local electric utility.	○
Communications with electric utilities did not adversely impact the restoration efforts of telecommunications and electric service.	○
Communications were effective with other entities, such as state and local public officials, firefighters, first responders, and other emergency personnel.	○

C. TASKS

In conducting this assessment, TDS and FairPoint executives, managers, and engineers were interviewed. Additionally, a number of data requests were submitted to each utility and each data response was reviewed and analyzed.

Focus was placed on the storm chronology and the emergency preparedness, planning, operation, and restoration efforts of each company. In an effort to develop a set of suggested best practices, an examination was made of each company's performance.

As an aid in evaluating the companies' responses to the December 2008 ice storm, the TDS Field Services Disaster Recovery Plan (TDS Plan) and the FairPoint Disaster Plan (FairPoint Plan) were reviewed. In addition, work force availability during the restoration was analyzed in detail. This analysis included an examination of the number of available technicians during November 2008, December 2008, and January 2009, compared with the same period in 2007 and 2008.

The ability to perform bulk line testing prior to customer trouble reports was examined with both companies. Bulk line testing was also discussed with an outside technical expert from the manufacturer of one of the switches commonly used in the New Hampshire system.

D. FINDINGS AND CONCLUSIONS – TDS

Conclusion: The TDS Field Services Disaster Recovery Plan has several significant deficiencies.

Before a utility can respond to a widespread customer service outage, it must prepare a plan to cover such an emergency. The utility's response when the emergency develops would begin with consulting this plan. TDS considers its plan to be proprietary and confidential, so it is addressed here only in general terms.

Plan Elements

The TDS plan establishes a command center, defines a command structure, and defines and assigns responsibilities for handling the emergency response. The local Field Service Managers (FSMs) are key to effective coordination and conduct of emergency operations. The FSMs set up Command Centers in the field and act as overall coordinators. The plan directs that communications be established with the media, the NHPUC, the customers, and the local authorities to the extent possible. Priorities for storm damage restoration are identified and appear to be consistent with established industry practices.

Plan Shortfalls.

Despite its strengths, there are areas where the TDS plan does not address issues critical to its successful application. These are:

- No provision is made for communication and coordination with the electric utilities, which is an essential element in recovering from a natural disaster such as this ice storm.[3]
- No provision exists to supply specific reference material for coordination and liaison with the electric utilities.[4]
- No provision is made for the training necessary to apply the plan.
- No provision is made to update or review the plan according to a formal time line.[5] While it is true that the plan is updated annually and after each disaster event, the plan itself does not define the times or the procedures for this to occur.[6]
- No provision is made for a procedure to review and update the various emergency contact lists that are required to provide information for contacting employees, government officials, contractors, and suppliers during an emergency.
- No provision is made to list electric utility contacts in the plan.[7]

Recommendation No. 1: TDS should revise its Field Services Disaster Recovery Plan to include training requirements and requirements for reviews and updating. This revision should include the following:

- Require that personnel be periodically trained in the requirements and responsibilities included therein. Even though the majority of the personnel involved in this restoration effort were very experienced, periodic re-training would be optimal.
- State specifically when, by whom, and by what method the plan will be updated. This revision should be done at least annually, after each major event, and by a cross functional team that includes the Local FSMs.
- Require periodic reviews to ensure that the lists of contacts included in the plan are as current as possible. Since the utility appears most vulnerable in this area, this review should be completed prior to the winter season.
- Require coordination with the electric utilities whose facilities are located in the TDS service area and include a list of contact information so that communication may be established.

[3] TDS. (March 20, 2009). Data Response STAFF 1-1. NHPUC.
[4] TDS. (May 22, 2009). Data Response TE0032. NEI.
[5] TDS. (March 20, 2009). Data Response STAFF 1-1. NHPUC.
[6] TDS. (March 20, 2009). Data Response STAFF 1-2. NHPUC.
[7] TDS. (March 20, 2009). Data Response STAFF 1-1. NHPUC.

Conclusion: TDS's preparation for the December 2008 ice storm was efficient and effective.

For its disaster recovery plan to be useful, a utility must have a way to determine when a storm is imminent so it has time to put the plan into effect as far in advance as possible. The first indication that a natural disaster such as the ice storm may be approaching is often given in forecasts provided by entities such as the National Weather Service. Staying abreast of current and forecasted weather allows utilities to recognize that a storm may have the potential for causing major system damage.

TDS tracks weather patterns and events in its Network Monitoring Operations Center (NMOC) located in Wisconsin. The NMOC provides advanced technical support for network management operations and monitors all network elements which have remote alarm capability. When a weather event appears imminent, the NMOC notifies local field management to begin the communications process and gather local information. The NMOC management then begins an assessment of the availability NMOC employees with the requisite technical expertise in the areas likely to be affected.

The Technical Customer Operations Center (TCOC) is responsible for repair calls for voice, internet, and television customers in all thirty states in which TDS operates. The TCOC is notified of an imminent threat, along with the Network Operations Center-Trouble Resolution (NOC-TR), which is responsible for determining the type of dispatch needed at the local level.[8] These centers also begin an assessment of their available resources and the overtime needed to handle the anticipated increase in call volume and customer outages.[9] As the probability of a major system disruption becomes more likely, communications between the NMOC, the TCOC, the NOC-TR, and field management forces increase to keep everyone informed of the situation.

An emergency response team is put together under the auspices of the Emergency Operations Center (EOC). The EOC consists of the center managers, the local FSMs, government affairs personnel, communications staff, and the appropriate Executive Vice President (EVP). The EOC is chaired by the Advanced Technical Support Manager or his designee. The participants may vary as the situation changes.

Communication is primarily accomplished through conference calls that are held three times per day for the duration of the restoration effort. The primary function of the EOC is to ascertain what resources the FSMs require and when they require them, and then to make those resources available. The local FSMs, the Regional FSM, and the EVP determine the availability of personnel resources. The FSMs are the key to this process, and every effort is made to accommodate their needs.[10]

[8] Corso, M. Manager-Advanced Technical Support, TDS. Interview by Satterfield, J. May 27, 2009.
[9] Fermanich, B. Manager-TCOC, TDS. Interview by Satterfield, J. May 27, 2009.
[10] Corso, M. Manager-Advanced Technical Support, TDS. Interview by Satterfield, J. May 27, 2009.

At the local level, preparation is also started as the probability of damage from an approaching weather pattern appears more likely. During the December 2008 ice storm, generators were located, fueled, and tested to ensure they would operate correctly. When commercial power is interrupted for an extended period, these generators are used to power the subscriber line carrier (SLC) sites and remote central offices (COs), which are not normally generator equipped. The SLC systems and the remote COs are equipped with batteries. However, the battery life varies depending on their condition and the volume and duration of customer calls. TDS has 102 SLC sites in New Hampshire with 28 stationery generators and 44 portable generators available to serve them.[11] TDS also has 6 COs and 10 remote COs in its New Hampshire serving area. Local technicians are contacted to determine their availability for overtime work and contacts are made by the local FSMs with their peers in Maine and Vermont to alert them that assistance might be required.[12] [13]

Conclusion: Overall, TDS's ice storm restoration effort was efficient and effective.

TDS efficiently moved its work force into areas needing restoration and relocated them as necessary. Workers from outside the state and contractors from outside the company were obtained and efficiently deployed during the restoration effort. Restoring customer service was given top priority and workers concentrated on restoring storm damage rather than handling other types of routine work or installation service orders. Overtime was assigned as needed.

Restoration was initiated with a review of the storm situation and damage, starting with the operations centers and concluding with field activities. An analysis of call volumes made to the TCOC during December 2008 revealed that, during the first eleven days of the month, the number of offered calls averaged 30.3 per day with an average speed of answer (ASA) ranging from 13 seconds to one minute and 11 seconds. ASA is defined as "the average amount of time a customer is waiting in the call queue until they speak with an advisor."[14] From Day 2, Friday, December 12, to the end of the month, there was an average of 117.8 calls per day. ASA ranged from a low of 23 seconds to a one day high of six minutes and 58 seconds, with the highest call volume occurring on Day 3, Saturday, December 13, with 44 received calls.[15]

Tests are not conducted on the customer line when a repair call is received at the TCOC. Instead a trouble ticket is created and referred to the NOC-TR where tests are made on the line and decisions are reached about whether an outside dispatch, inside dispatch (central office), or no dispatch is appropriate. The local FSM is sent the information and then dispatches the correct technician.

[11] TDS. (May 19, 2009). Data Response TE0037.7. NEI.
[12] Raymond, E. Local FSM, TDS. Interview by Satterfield, J. June 19, 2009.
[13] Harmon, D. Local FSM, TDS. Interview by Satterfield, J. June 19, 2009.
[14] TDS. (May 28, 2009). Data Response TE0035.8. NEI.
[15] TDS. (March 20, 2009). Data Response STAFF 1-11. NHPUC.

In a major outage such as caused by the ice storm, when calls are received at the TCOC, primary outage tickets are created to cover specific locations such as a SLC site failure or a damaged or cut cable that would result in multiple customer outages. As more customers call in to report service disruptions, those reports are associated with primary outage tickets. A system is used that can group the customer trouble reports by their addresses to the address ranges covered by the primary ticket. When a field technician reports to the Field Service Technician Contact Center (FSTCC) located in the NOC-TR that a cable has been repaired or a SLC site restored, the primary ticket is closed along with all the associated customer trouble reports. To ensure that customers' troubles have been repaired, automatic calls are made to the reporting customers, with positive verification required that service has been restored. If a customer cannot be reached by the automated call system, the customer is called by a representative in the Customer Contact Center (CCC) located in the TCOC. If the customer still cannot be reached, or indicates the trouble has not been satisfactorily corrected, the trouble is re-dispatched. During a major restoration effort, inbound calls are given priority and the outbound verification calls are delayed.[16]

The NMOC increases its alarm monitoring capability for the impacted area. As alarms are detected from equipment in the impacted area, referrals are made to the NOC-TR for dispatch. The TCOC is also notified so a primary ticket may be created if needed. Direct communication with the field may also be done from this center.[17] [18]

As the ice storm began, field technicians and the local FSMs began to respond. The first efforts, began early on Day 2, Friday, December 12, and were directed at supplying the SLC sites and remote COs with portable generators. Since there were not enough generators for all locations, a rotation and fueling plan was worked out. Offices already equipped with stand alone generators were visited to insure proper operation of the batteries and the generators. During this restoration effort, there was no central office or remote CO failures. Two SLC sites failed due to severely poor accessibility that did not allow deployment of a generator. Initial field assessments were difficult and delayed because of blocked roads. As the situation improved each day, more areas became accessible. At times, however, some roads which had formerly been opened were once again closed.[19] [20]

During the first EOC conference call on the morning of Day 2, Friday, December 12, the local FSMs were asked about their needs. This inquiry prompted a crucial management decision. If borrowed forces were brought in too early and could not gain needed access, then resources would be wasted. If resources were brought in too late, customer service restoration would be unduly delayed. Throughout this event the FSMs were provided with the manpower resources

[16] Snomalski, E. Data Analyst, TDS. Interview by Satterfield, J. June 19, 2009.
[17] Corso, M. Manager-Advanced Technical Support, TDS. Interview by Satterfield, J. May 27, 2009.
[18] Fermanich, B. Manager-TCOC, TDS. Interview by Satterfield, J. May 27, 2009.
[19] Raymond, E. Local FSM, TDS. Interview by Satterfield, J. June 19, 2009.
[20] Harmon, D. Local FSM, TDS. Interview by Satterfield, J. June 19, 2009.

they requested. Technicians were moved from location to location within the state as access became available and trouble areas were cleared. Eight technicians were moved from Merrimack and New London to Wilton. Later in the restoration effort, eight technicians were moved from new London and Wilton to Hollis.[21] Personnel were brought in from outside the state starting as early as Day 3, Saturday, December 13 and ending Saturday, January 3, 2009. In total, there were over 800 hours worked by forces from outside the state in December and over 50 hours in January. These forces were a combination of FSTs and managers working as technicians. There were three technicians and one manager brought in from Vermont and six technicians and two managers brought in from Maine.[22] In addition, there were 133 available contractor days starting on Day 2, Friday, December 12, 2008, and lasting until Day 24, January 3, 2009.[23] Contractor forces were used primarily for replacing poles on solely owned routes and putting up drops in area sweeps.[24] [25]

In addition to borrowed forces and contractors, overtime was worked by the existing TDS forces in New Hampshire. There are a total of 27 field service technicians and two assistant field service technicians (these personnel assist the Local FSMs with the clerical aspects of their positions) permanently assigned to TDS in New Hampshire. A comparison was made of hours worked by these forces between November and December 2007 and January 2008 (the year prior to the storm), and the same period in years 2008 and 2009 (the year of the storm). This analysis is displayed in Table VIII-3.

Table VIII-3 – Hours worked by permanent forces in November and December 2008 and January 2009 compared to the prior year.[26]

Month	Total ABD* Hours	Average ABD* Hours/ Tech/Day	Total SSH** Hours	Average SSH** Hours/Tech /Day	Total Hours	Average Hours/Tech /Day
Nov 2007	5132.1	8.43	281.5	1.08	5413.6	6.22
Nov 2008	4617.0	8.38	326.6	1.02	4943.6	5.68
Dec 2007	4744.0	8.17	348.5	1.05	5092.5	5.66
Dec 2008	5947.4	9.32	1481.9	5.67	7429.3	8.26
Jan 2008	5310.5	8.32	255.5	1.01	5566.0	6.19
Jan 2009	5145.8	8.45	417.8	1.44	5563.6	6.19

**ABD = Average Business Day*
***SSH = Saturday, Sunday, Holiday*

[21] TDS. (March 20, 2009). Data Response STAFF 1-23 Attachment C. NHPUC.
[22] TDS. (March 20, 2009). Data Response STAFF 1-23 Attachment C. NHPUC.
[23] TDS. (March 20, 2009). Data Response STAFF 1-20 Attachment C. NHPUC.
[24] Raymond, E. Local FSM, TDS. Interview by Satterfield, J. June 19, 2009.
[25] Harmon, D. Local FSM, TDS. Interview by Satterfield, J. June 19, 2009.
[26] TDS. (May 26, 2009). Data Response TE0026. NEI.

As can be seen from the above table, the total hours increased by 45.9 percent between December 2007 and December 2008. A similar increase may be seen in the average hours per technician per day. The average hours per technician per day will yield a more valid figure for comparison purposes since the months differed in the number of business days. Average ABD hours per technician per day increased 14 percent between December 2007 and December 2008, reflecting the limited amount of daylight available in which to work safely before or after a normal work day. However, the comparable number of average SSH hours per technician per day increased more than five-fold when comparing December 2007 to December 2008. Technicians typically worked an average of ten or more hours per day during this event both on business days and weekends. The hours per technician per day in the table above are averaged over the total force and reflect technician days off that are required to ensure safety and work quality. Since the existing permanent workers were already working nearly the maximum allowable hours during business days, the only hours available for extra work were on weekends and holidays. For that reason the increase in hours for each technician came mainly on the weekends and holidays. The total hours worked when both permanent and temporary workers are considered increased by about 3,000 hours comparing December 2007 to December 2008.[27]

Available work force is an important component in a major storm restoration, and equally important is how these forces are used. The use of field forces was reviewed by analyzing the number of service orders worked and troubles cleared. Service orders dispatched were reviewed for November and December 2008 and January 2009. Figure VIII-1 displays the results of this analysis.

[27] TDS. (March 20, 2009). Data Response STAFF 1-23. NHPUC .

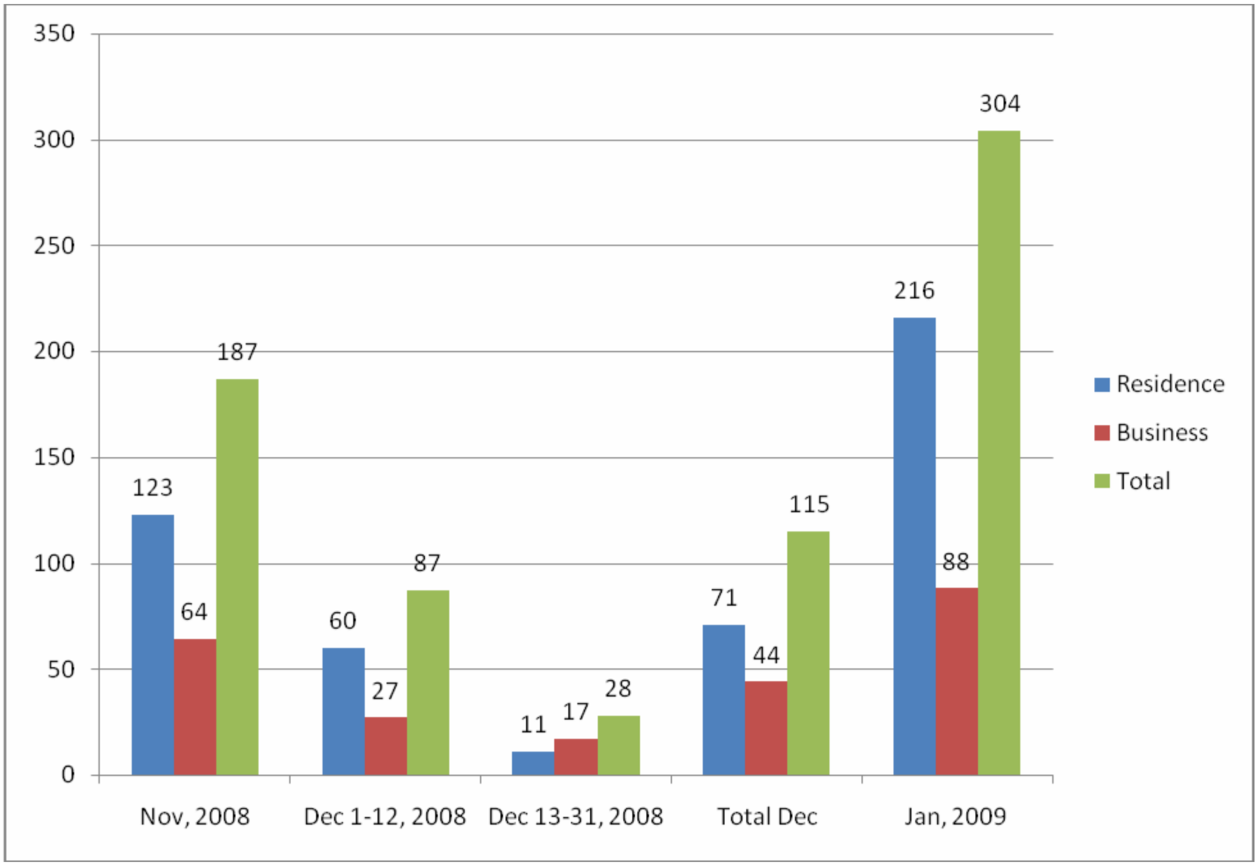

Figure VIII-1 - Service orders dispatched – TDS.[28]

A review of Figure VIII-1 shows that prior to the storm (December 1-12) the month of December was on track to be a typical month for dispatched orders. After the storm (December 13-31) the number of dispatched orders drops dramatically as forces concentrated on service restoration. Note that the number of orders worked in January 2009 increased significantly, likely due to filling the backlog of orders that were not completed the month prior during storm restoration.

An analysis of the number of trouble tickets cleared for November and December 2008 and January 2009 was done and these months were compared to the same period one year earlier. Figure VIII-2 summarizes this analysis.

[28] TDS. (June 2, 2009). Data Response TE0038. NEI.

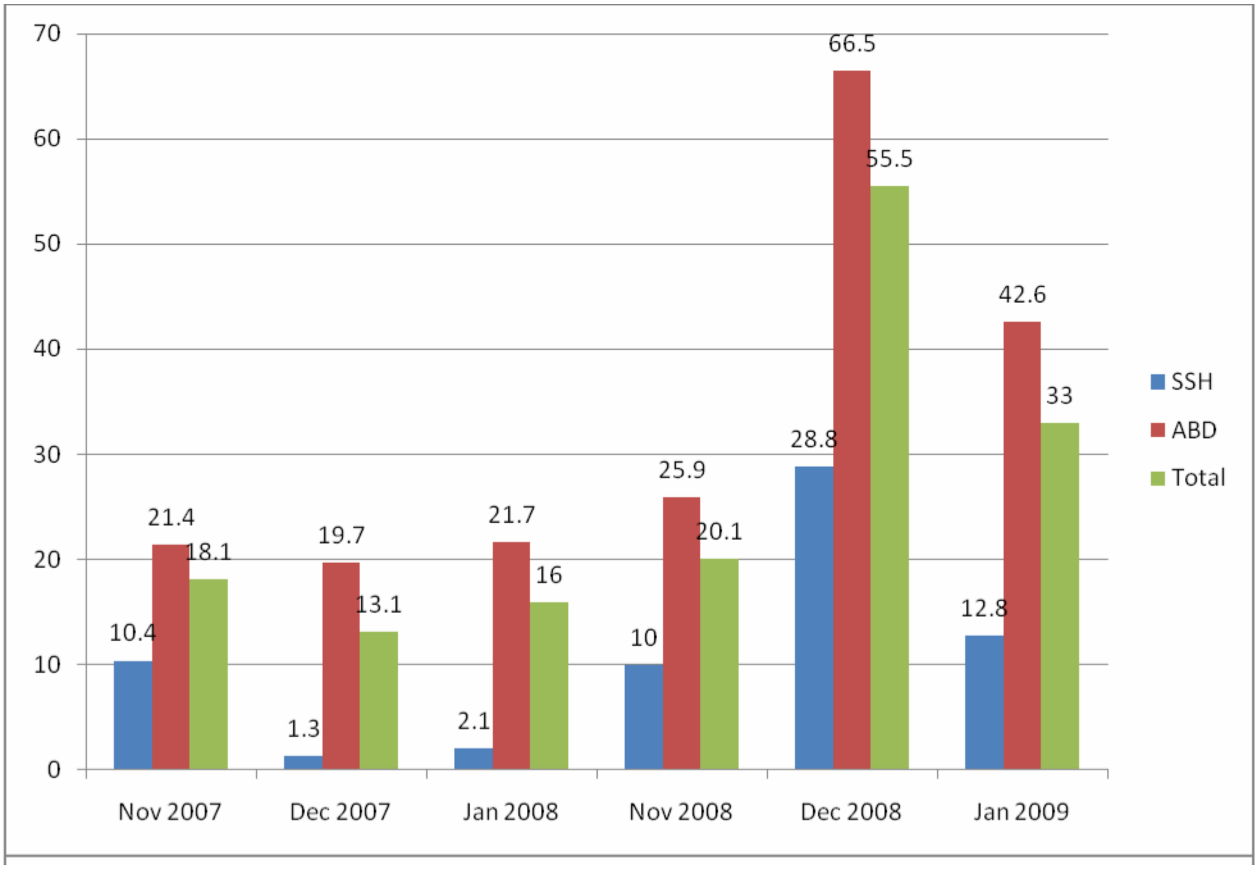

Figure VIII-2 - Average number of trouble tickets cleared per day-TDS.[29] [30]

When reviewing Figure VIII-2 it is apparent that December 2008 shows an increase in service outages caused by the ice storm. December 2008 tickets cleared increased by more than four times over December 2007. The comparable Saturday-Sunday-Holiday (SSH) figures increased by more than 22 times, reflecting the additional hours worked on weekends and holidays. Even though it is difficult to quantify exactly the total number of troubles cleared due to some troubles being cleared without trouble reports being issued, it may still be noted that the number of reported troubles cleared increased more than five fold between December 2007 and December 2008, while hours increased by approximately 62 percent.

Since the technicians perform so many functions, a pure trouble-cleared productivity analysis cannot be accurately done. Moreover, rather than responding to individual customer trouble reports, TDS used mass sweeps. These consisted of clearing all trouble conditions that could be seen in an area once that area became accessible. Technicians were instructed to clear all the problems they could see on a street to which they were dispatched. Nonetheless, a comparison of the increase in hours versus the increase in trouble tickets cleared provides a strong indication

[29] TDS. (May 28, 2009). Data Response TE0023. NEI.
[30] TDS. (May 28, 2009). Data Response TE0024. NEI.

that productivity degradation was not a factor during the recovery. TDS considers that the last customer outage associated with the December 2008 ice storm was restored on Day 24, Saturday, January 3, 2009.[31]

As part of the overall review of the restoration, an analysis was made of the routes carrying umbilicals from host offices to the remote COs. It should be noted that no remote COs were lost during this outage, and the survivability of the umbilicals was essential to the proper functioning of the remote switches. TDS considers the information it furnished to be confidential, but it indicates that most of the facilities are using fiber optic technology, and the larger remote COs are served by diverse routes with fully protected ring architecture. With the increase in planned routes this year, all remote COs will have diversity among themselves and with the rest of the world.[32] [33]

During the restoration, tree trimming crews cut or nicked some of the telephone cables while clearing debris. These damaged cables are subject to future water intrusion if not promptly repaired. After the storm they were identified using existing proactive maintenance and repaired.

In some cases telephone cables were erroneously pulled into the area on the poles reserved for higher voltage conductors. While these problems were corrected, they still took time away from customer restoration efforts and created safety hazards. It was also discovered that some of the replacement poles were not properly guyed to resist the telephone cable loads.[34] [35] The proper guying of these poles should be checked as part of the utility's ongoing maintenance effort.

Conclusion: TDS is effectively preparing for the next major outage.

As restoration efforts were being completed, preparation was already underway for the next major outage. The Centers are reviewing data and budget information from this storm and others around the country to adjust staffing levels to improve readiness. They are working to develop systems that will allow standardized reports down to street level. This will allow technicians to be more readily put on sweeps and be involved in mass closing of trouble areas. However, this system will continue to depend on customer trouble reports to allow grouping of troubles.[36] [37]

At the local level, equipment is being placed at some SLC sites (e.g., power cords, security devices, etc.) that will speed up generator placements. Further, the number of generators in New Hampshire is being increased. Even though during the December 2008 storm review there was no indication of battery neglect, batteries at the SLC sites are undergoing routine maintenance which includes replacement if their output is low. Sites are also being routinely checked for

[31] TDS. (March 20, 2009). Data Response STAFF 1-28. NHPUC.
[32] TDS. (May 26, 2009). Data Response TE0035.6. NEI.
[33] Kidder, C. Geographical Architecture, TDS. Interview by Satterfield, J. May 27, 2009.
[34] Raymond, E. Local FSM, TDS. Interview by Satterfield, J. June 19, 2009.
[35] Harmon, D. Local FSM, TDS. Interview by Satterfield, J. June 19, 2009.
[36] Fermanich, B. Manager-TCOC, TDS. Interview by Satterfield, J. May 27, 2009.
[37] Corso, M. Manager-Advanced Technical Support, TDS. Interview by Satterfield, J. May 27, 2009.

proper bonding and grounding. CO generators and remote CO generators (where equipped), as well as all CO batteries, are routinely tested to insure viability during a major power outage.[38] [39]

Conclusion: TDS in New Hampshire does have the capability to conduct bulk testing of customer access lines. [40]

Bulk testing of customer lines before a customer trouble is received is dependent on the existence of equipment in the central offices that will interact with the test system to perform tests on customer lines. Such a system typically works at night and has the ability to test a number of customer lines to provide reports on those that appear to be in trouble. Bulk testing is not totally conclusive since inside wiring and portable telephone problems may also be identified as trouble conditions in the telephone network. However, bulk testing provides a good indication of where major outages may be located and could be an aid in quicker restoration. A conversation with a manufacturer expert verified that the capability for bulk testing does exist, although bulk testing was not used during the December 2008 ice storm restoration. TDS advised that were reviewing the possibility of utilizing this feature during future outages.

Recommendation No. 2: TDS should use its bulk line testing capability during the initial phases of a major restoration effort.

- Bulk line testing will assist in identification of areas of severe customer outages allowing technicians to be more effectively used from the very start of the restoration effort. This can also aid in coordination with the electric utilities and local authorities as they prioritize their own restoration efforts.

Conclusion: Coordination and communication with local governments and the electric utilities during the response to the December 2008 ice storm was not effective.

TDS's response to the storm took longer than necessary due to the lack of a plan for effective communication and coordination with local governments and the four electric utilities. The communications that did occur was largely by happenstance. It took place between telecommunications technicians and electric company technicians, local officials, or first responders encountered in the field. There was no official coordination between the electric utilities and TDS during the storm restoration although unsuccessful attempts were made to contact PSNH by telephone.[41] TDS employees traveling to work took note of cleared areas and furnished this information to management. Likewise, telecommunication employees working in areas near electric utility employees or tree trimming crews might make contact with them to gather information which they then gave to management.[42] [43] Formal procedures and processes

[38] Raymond, E. Local FSM, TDS. Interview by Satterfield, J. June 19, 2009.
[39] Harmon, D. Local FSM, TDS. Interview by Satterfield, J. June 19, 2009.
[40] TDS. (October 16, 2009). Email, Michael C. Reed, Manager, State Government Affairs.
[41] TDS. (May 22, 2009). Data Response TE0033. NEI.
[42] Raymond, E. Local FSM, TDS. Interview by Satterfield, J. June 19, 2009.
[43] Harmon, D. Local FSM, TDS. Interview by Satterfield, J. June 19, 2009.

for communication were not established for sharing information or for coordinating restoration efforts. Customer restoration would have been greatly advanced by effective communication and coordination between the utilities enabling telecommunications workers to get safe and quick access to the impacted areas.

Recommendation No. 3: TDS should establish a forum whereby local TDS management and electric company management meet regularly to coordinate operations and plan for emergencies.

- TDS managers should meet with electric utility managers and local government officials at least annually (preferably biannually) to discuss communication, coordination, and mutual problems, both ongoing and those relating to emergency restoration.
- TDS should identify key sites where power and telephone service are critical.
- TDS should place a person in the EOC from the predominant electric company in the affected area during an outage. That person should have access to up to date electric company information and be able to furnish it to the TDS EOC on a timely basis. This individual can also be a conduit for communication from TDS to the electric company.
- TDS should establish an industry forum for the purpose of creating an internet site that can be utilized to provide current information on restoration efforts. This might include such things as areas cleared of downed power, roads that have become accessible, etc. Since the electric companies are at the forefront of most restoration efforts associated with an event such as the December 2008 ice storm, it would seem logical for them to take the lead in keeping the site current. Access by other involved parties, such as telecommunications companies and cable companies, should be encouraged. As communications and coordination are improved, restoration time and safety will likewise be improved.

E. FINDINGS AND CONCLUSIONS – FAIRPOINT

Conclusion: FairPoint Communications should improve its Disaster Response Plan.

The 117 exchanges located in FairPoint's service area were purchased from Verizon Telecommunications effective March 31, 2008. At the time of the December 2008 ice storm, FairPoint was in a transition period and still operating on Verizon's legacy systems. The transfer of the network and operational support systems was not completed until the end of January 2009; consequently, FairPoint's Disaster Response Plan was not fully operational at the time of the storm. The company is currently conducting an in-depth audit of the plan to ensure that post-cutover system and organizational changes are incorporated.[44] FairPoint's plan was reviewed to determine its applicability in a situation similar to the December 2008 ice storm.

FairPoint considers its plan to be confidential and proprietary, so it is addressed here in general terms. The plan is a structured document that addresses potential outages resulting from severe weather, single building incidents, or work force disruptions. It includes annual updating to allow for changes that may occur in the various aspects of the business. The plan contains a number of contact lists that must be kept current. The plan also includes provisions for tests and exercises to validate its effectiveness. Departmental plans, accessed through hyperlinks from the main plan, are used for responses to major outages such as the ice storm.[45]

Generally, FairPoint's plan has much strength and appears to be a usable document. However, there are areas that need to be improved. Among these are:

- The plan does not identify who is responsible for conducting training and exercises.
- The plan is unclear in defining the responsibility for updating and reviewing the major departmental plans, which are vital to an effective response to an event such as the ice storm.
- The plan does not provide for review and updating after a major outage or event.

Recommendation No. 4: FairPoint should revise its Disaster Response Plan to better focus on responsibility for training, exercises and updating.

- FairPoint should revise its plan to identify who is responsible for the training, exercises, and mock drills.
- FairPoint should revise its plan to fix responsibility for reporting the results of the exercises and updating the plan with lessons learned.
- FairPoint should revise its plan assign responsibility for updating the departmental plans.

[44] Matherly, A. Director-Risk Management, FairPoint. Interview by Satterfield, J. July 2, 2009.
[45] FairPoint. (March 20, 2009). Data Response STAFF 1-1. NHPUC.

- FairPoint should revise its plan to provide for a formal updating process after a major outage. A major outage is classified as one that reaches the two highest levels of severity using the color codes included in the plan.

Conclusion: FairPoint's preparation for the December 2008 ice storm was efficient and effective.

The FairPoint Disaster Response Plan is important for strategy, policy, and general procedures, but the tactical response to an emergency begins with the identification of a potential major event. At FairPoint, weather channels and various weather related internet web sites are monitored by managers in the centers involved in customer restoration, including the Repair Resolution Center (RRC), the Dispatch Resource Center (DRC), and the Network Operations Center (NOC). The RRC is responsible for receiving calls from customers that have experienced a service outage. The DRC coordinates the dispatch of the appropriate technician to perform the necessary repair work. The NOC performs surveillance on all network elements with remote alarm capability. Field operations managers who are responsible for the Central Office, installation and maintenance department, and construction department also monitor the weather using similar sources.

As a result of this monitoring, senior management recognized that the December 2008 ice storm would likely have a major impact on customer service; however, the extent of damage was difficult to anticipate. As the storm approached the state, personnel at centers and in the field were contacted to determine their availability to work overtime. Technicians were advised to fuel their vehicles and stock up on supplies they might need. Supply Chain Management was advised to stock up on items likely to be required for the restoration. Portable and truck-mounted generators were tested and fueled.[46] [47] [48] These generators are used to power subscriber line carrier (SLC) sites in the event of an extended power failure. The SLC sites are equipped with batteries, but battery life is limited and depends on call volume and battery condition. At the time of the ice storm there were 1,119 Remote Terminal sites in operation throughout the State of New Hampshire and FairPoint maintained 29 portable and 293 truck-mounted generators.[49] All remote central offices (COs) are equipped with backup generators and fuel levels for the generators located at these COs were checked. FairPoint had 124 COs and 96 remote COs that served New Hampshire customers at the time of the storm. A listing of central office switches by type is shown below in Table VIII-4.

[46] Powell, D. Director of Operations, Dispatch Resource Center; FairPoint. Interview by Satterfield, J. June 15, 2009.
[47] Aubrey, S. Director-Central Office Operations, FairPoint. Interview by Satterfield, J. June 15, 2009.
[48] Pouliot, D. Director of Operations-Installation and Maintenance and Construction, FairPoint. Interview by Satterfield, J. June 15, 2009.
[49] FairPoint. (June 5, 2009). Data Response TE0037.7. NEI.

Table VIII-4 - Number of FairPoint Central Office switches by type[50]

Type	Number
DMS 10	5
DMS 100	1
Nortel CS2K Softswitch	1
5ESS Tandem	2
5ESS Stand Alone	5
5ESS Host	14
5ESS RSM	92
5ESS EXM	1
5ESS ORM	3
Total	124

FairPoint also has large capacity portable generators for use in central offices in the event a fixed backup generator fails. As the storm approached, communication between centers and field operations regarding storm preparations increased.[51] [52] [53]

The emergency response was controlled by the Emergency Operations Center (EOC), headed by the Senior Vice President of Operations and Engineering for Maine, New Hampshire, and Vermont. Others participating in the EOC were:

- The Director of Operations, Dispatch Resource Center;
- The Director-Central Office Operations;
- The Director of Operations-Installation and Maintenance, and Construction;

[50] FairPoint. (August 10, 2009). Data Response TE0042. NEI.
[51] Powell, D. Director of Operations, Dispatch Resource Center; FairPoint. Interview by Satterfield, J. June 15, 2009.
[52] Aubrey, S. Director-Central Office Operations, FairPoint. Interview by Satterfield, J. June 15, 2009.
[53] Pouliot, D. Director of Operations-Installation and Maintenance and Construction, FairPoint. Interview by Satterfield, J. June 15, 2009.

- The Manager, Outside Plant Engineering-Support;
- The Manager, Central Office Engineering;
- The Manager-Proactive Maintenance Field Forces;
- A representative from the logistics support group (Supply Chain);
- The Vice President-Government Relations for New Hampshire.

A representative from Corporate Communications was available as needed for contacts with the external media. No one from FairPoint company headquarters participated in the EOC. Throughout the restoration, the EOC used twice daily conference calls as their primary method of communication. The first organized conference call was held on Day 2, Friday, December 12, at approximately 9:00 a.m. Prior to this there were many calls between the Senior Vice President for Operations and Engineering and her staff to determine their readiness and to obtain initial damage assessments.[54]

Conclusion: FairPoint should not have diluted its restoration efforts by working unrelated service orders, even though the overall restoration effort is considered effective.

FairPoint has a union contract that specifies the amount of overtime that can be worked in the absence of a declared emergency. Management did not declare an emergency during this restoration since there were no problems getting adequate overtime. There were occasions when arranging sufficient overtime on weekends and holidays was a problem, but ultimately the necessary hours were obtained. Initially some construction forces were used to respond to customer service outage reports. However, since repairing the large numbers of downed and damaged cables was a major part of the restoration effort, construction forces were redirected to this task as soon as possible. Personnel in the proactive maintenance group (a group that works on trouble indicators before the customer is aware of a potential outage) with prior installation and maintenance background were moved into customer trouble repair positions to respond to customer trouble reports. Technicians were moved in from other states and were relocated within the state as trouble areas were cleared and others became more accessible. Contractors saw some use, primarily in replacing downed poles, but the union contract limited this to some degree.[55]

The overall manner in which restoration was accomplished was explored by NEI in the course of this review, starting with an examination of the centers and ending with the work done in the field. This included both a review of the central office and outside operations. At the time of the storm, FairPoint was using an Automatic Call Distributor (ACD) configuration for calls into the RRC. Incoming calls were distributed to the Customer Service Attendants (CSAs) that are

[54] Mead, K. Senior Vice President-Operations and Engineering, FairPoint. Interview by Satterfield, J. June 16, 2009.
[55] Pouliot, D. Director of Operations-Installation and Maintenance and Construction, FairPoint. Interview by Satterfield, J. June 15, 2009.

plugged into the system. When the number of calls exceeded the number of available CSAs, the calls were placed in a queue. This center operates twenty-four hours a day, seven days a week using three shifts. Workers are assigned overtime to handle the higher than normal call volumes that are expected when a large numbers of customers are out of service due to severe weather.[56] An analysis of call volumes to the RRC revealed that typical call volumes for December 1 to 11 were 1,263 calls daily. From December 12 to 31 the average daily calls increased to 2,373, with the two highest days being Day 2, Friday, December 12 when 5,731 calls were received, and Day 5, Monday, December 15 when 4,317 calls were received.[57]

The average speed of answer (ASA) is measured starting with the time a customer is placed in queue and ending with their call being answered by a CSA.[58] For a normal month such as November 2008, the average ASA is 10 seconds; however, for December 2008, the average ASA was 153 seconds, or just under two minutes.[59] The two days with the longest ASA following the storm were Day 2, Friday December 12, when the ASA was 243 seconds, and Day 3, Saturday, December 13, when the ASA increased to 255 seconds.

In December 2008, FairPoint was still operating using the Verizon legacy systems. Consequently, as repair calls were completed by the CSAs, they were entered into a system called V-Repair. This system, using Mechanized Loop Testing (MLT), conducted tests on the reported customers' lines and determined where troubles could be handled best. Troubles were then routed to a system called Work Force Administration-Dispatch Out (WFA-DO) or Work Force Administration-Dispatch In (WFA-DI), depending on whether the trouble condition was thought to be in the outside plant network (DO) or the central office, or should be handled by a dispatch center (DI).

When WFA-DO detects more than three customer trouble reports in a 100 cable pair complement, the system builds a multiple trouble report. Once the multiple trouble report is cleared, all individual troubles associated with it are cleared also. All trouble reports cleared in a day are sent to the Sky Creek Company, a contracted vendor whose automated system places calls to the customers to verify that service has been restored. Business customers are called by a representative from the FairPoint customer service center in Burlington, Vermont.

The Dispatch Resource Center (DRC) monitors WFA-DO, WFA-DI, and WFA-Control (WFA-C) to determine the volume of work in a particular area and the number of hours needed to handle it. These systems can dispatch technicians in two ways. The technician can be given a single work dispatch followed by another when the first is completed, or the technician can be "bulk loaded" by being given the entire day's projected work on the initial download of customer troubles and installation orders. To optimize their efficiency during the ice storm restoration, the

[56] Astle, B. Manager-Repair Resolution Center, FairPoint. Interview by Satterfield, J. June 30, 2009.
[57] FairPoint. (March 20, 2009). Data Response STAFF 1-11. NHPUC.
[58] Astle, B. Manager-Repair Resolution Center, FairPoint. Interview by Satterfield, J. June 30, 2009.
[59] FairPoint. (June 29, 2009). Data Response TE0040.4. NEI.

DRC bulk loaded the construction and proactive maintenance technicians and the majority of its regular technicians. It also handled closeouts when the technician completed work on customer trouble reports. The DRC has 66 administrative assistants and 8 managers assigned during normal operations. During the restoration, the DRC used its normal force and assigned overtime as required to support the field work, allowing it to remain in operation as long as technicians were working.[60]

The NOC operates twenty-four hours a day, seven days a week all year long and monitors all equipment with remote alarm capability down to SLC system level. On Day 2, Friday, December 12, alarm monitoring and surveillance was increased for the areas affected by the storm by assigning overtime and shifting geographic coverage responsibilities (the center covers the states of Maine, New Hampshire, and Vermont). Alarm indications were referred to operations personnel so technicians could be dispatched. This was done for alarms occurring in the outside plant network and the central office, as well as large customer installations with premise equipment monitored by the NOC. The NOC also monitors dial tone delay (DTD) during a storm restoration, although DTD was not a problem during this storm.[61]

During restoration efforts, CO operations personnel visited the COs to insure that generators were fueled and functioning properly, and technicians worked extended hours to provide the necessary support. The technicians also maintained equipment, such as switches, multiplexers, and fiber optics terminals located in the central office building, and worked closely with outside workers on trouble reports that required work in the CO. During this storm, 45 COs in New Hampshire were operating using power supplied by generators. Fuel became a major concern because some of the COs were without commercial power for up to ten days. Lists of offices operating on emergency power were provided to the electric companies and they responded by restoring them when possible.[62]

On Day 2, Friday, December 12, the first morning after the storm, field forces were mainly concerned with assessing the damage and moving portable generators to the SLC sites that were accessible. The first EOC conference call was held on the morning of Day 2, Friday, December 12, when the field managers communicated their understanding of the extent of the damage even though the damage assessments had just begun. After the first two days it was decided that more generators were needed, so approximately 50 were moved from northern New Hampshire and Maine into the most affected areas.[63] Of the 1,119 SLC sites, FairPoint estimated that 150 failed because access could not be gained before the batteries were exhausted.[64] For the first two days

[60] Powell, D. Director of Operations, Dispatch Resource Center; FairPoint. Interview by Satterfield, J. June 15, 2009.
[61] Smee, J. Vice President-Network Operations, FairPoint. Interview by Satterfield, J. July 7, 2009.
[62] Aubrey, S. Director-Central Office Operations, FairPoint. Interview by Satterfield, J. June 15, 2009.
[63] Pouliot, D. Director of Operations-Installation and Maintenance and Construction, FairPoint. Interview by Satterfield, J. June 15, 2009.
[64] FairPoint. (June 29, 2009). Data Response TE0040.5. NEI.

the construction technicians helped clear customer trouble reports. However, due to the amount of damage requiring their specialized attention, they soon changed to replacing and splicing cable.63 Starting Day 5, Monday, December 15, forces were moved from other states into New Hampshire to assist in the restoration. Figure VIII-3 shows the number of technician days worked each week by technicians from outside of New Hampshire.

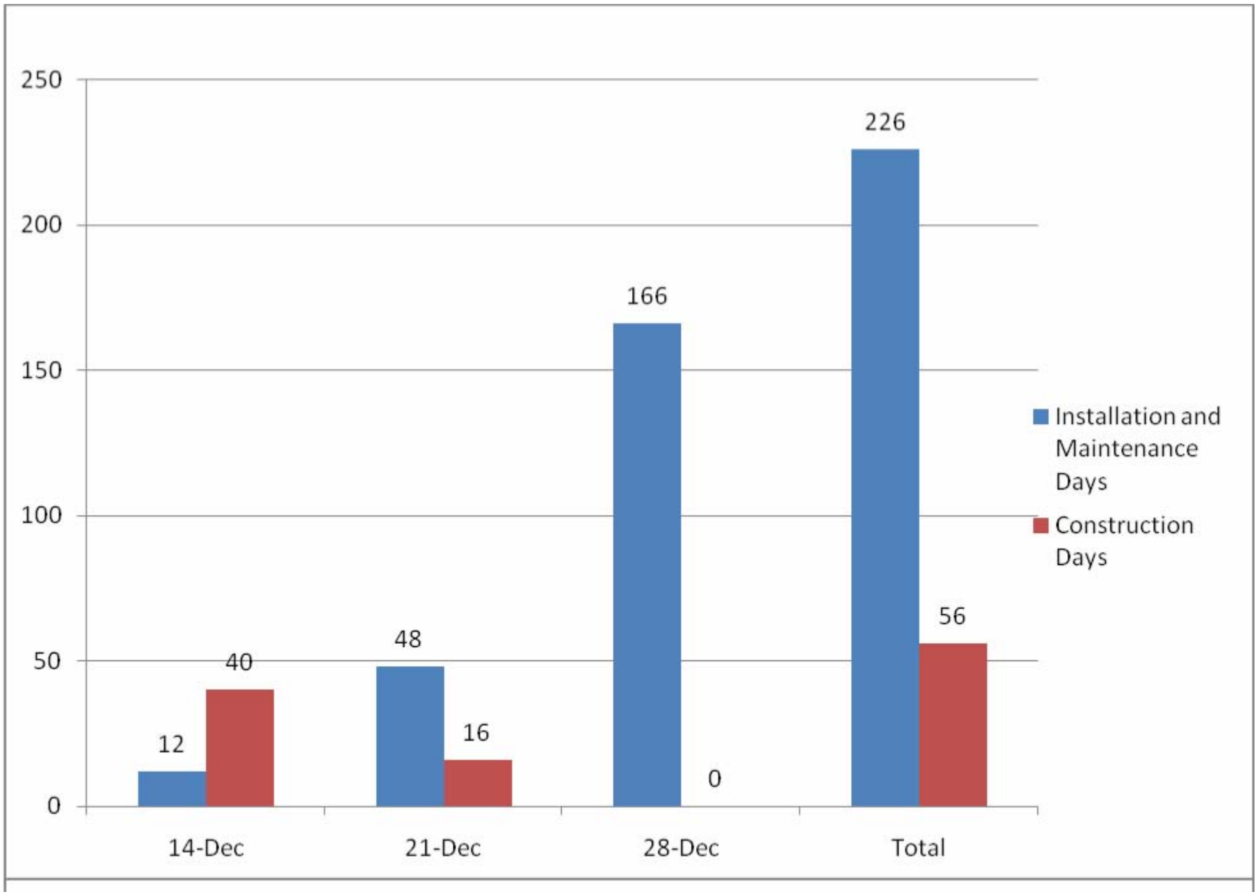

Figure VIII-3 – Technician-days worked per week by technicians from outside of New Hampshire. December 2008.[65]

As restoration proceeded, some areas were restored while others became accessible. This resulted in workers being relocated within the state as needed. Proactive maintenance forces were used throughout the effort to help clear customer trouble reports rather than attend to their regular duties. Splice Service Technicians (SSTs) were relocated from their normal work locations to other areas in the state. In general, forces were moved from north to south since the southern portion of the state was the hardest hit and the damage in the north could be repaired more quickly. Figure VIII-4 shows the number of proactive maintenance technician days and the

[65] FairPoint. (June 5, 2009). Data Response TE0007. NEI.

number of SST days used during the storm. The proactive maintenance technician days shown on the chart are the number of days during which the proactive maintenance technicians were working on storm restoration rather than their normal duties. The SST days shown on the chart are the number of technician days during which SSTs were working in areas of the state other than their normal areas of operation.

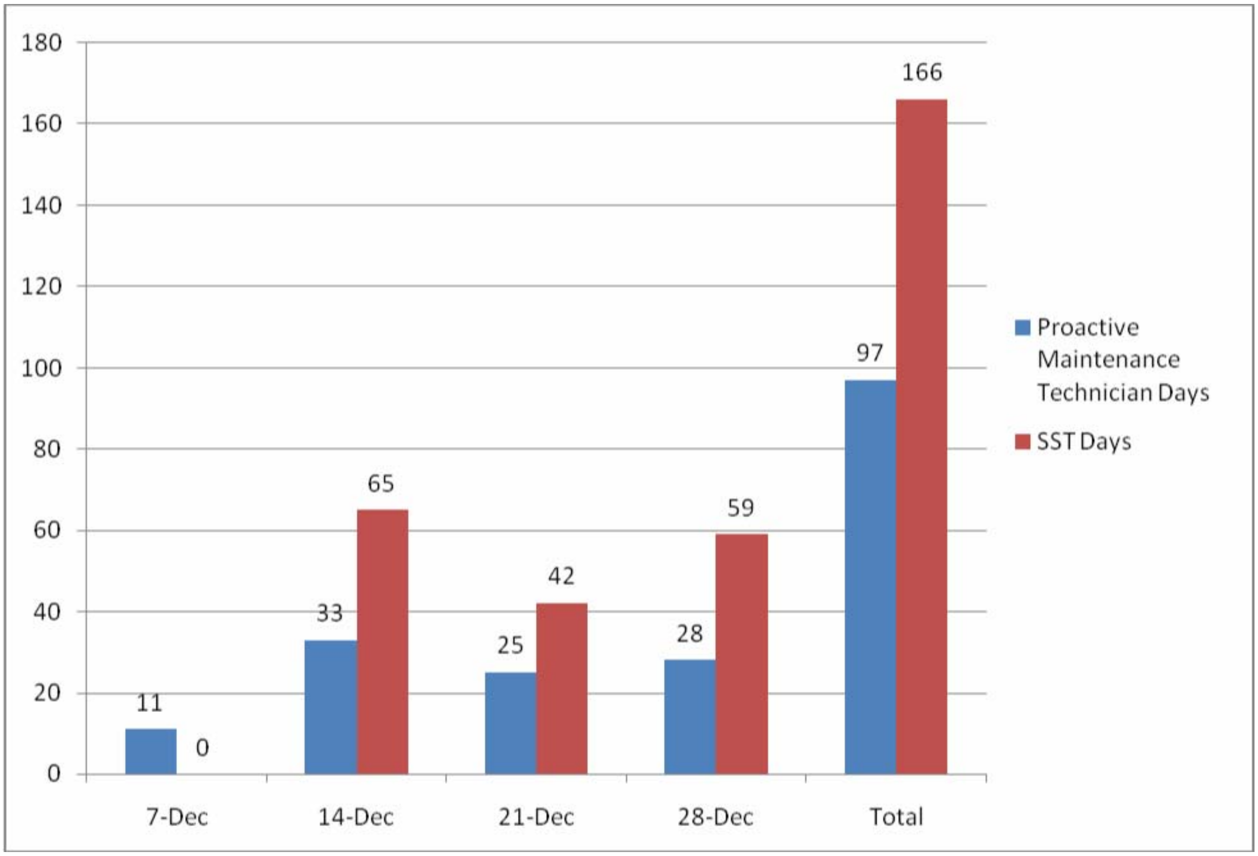

Figure VIII-4 - Proactive maintenance technician days and SST days for the weeks shown. December 2008[66]

FairPoint also engaged contractors starting as early as Day 1, Thursday, December 11. A total of 80 trim crews and 13 ground crews were used from that day through Day 21, Wednesday, December 31.[67] The contractors were mainly used for tree trimming and setting poles.[68]

[66] FairPoint. (June 5, 2009) Data Response TE0008. NEI.
[67] FairPoint. (March 20, 2009). Data Response STAFF 1-24. NHPUC.
[68] Pouliot, D. Director of Operations-Installation and Maintenance and Construction, FairPoint. Interview by Satterfield, J. June 15, 2009.

Productivity indicators during the restoration period were reviewed. True productivity is impossible to measure since technicians were instructed to repair any drops they came across as they were dispatched on other, unrelated trouble calls. The approach used was that technicians entered an area as soon as it was accessible and cleared all the problems they could see. This method reduced restoration time by minimizing travel time and the issuing of additional dispatch orders. In an effort to improve customer relations, technicians were directed to repair troubles for customers that approached them while they worked on other problems. The DRC was informed about some of these repairs, but in many cases the technician did not call in these additional troubles.[69] Figure VIII-5 provides a comparison of productivity for SSTs by comparing the number of jobs performed in an eight-hour day in November and December 2007 and January 2008, with the jobs performed per day during the same periods in 2008 and 2009.

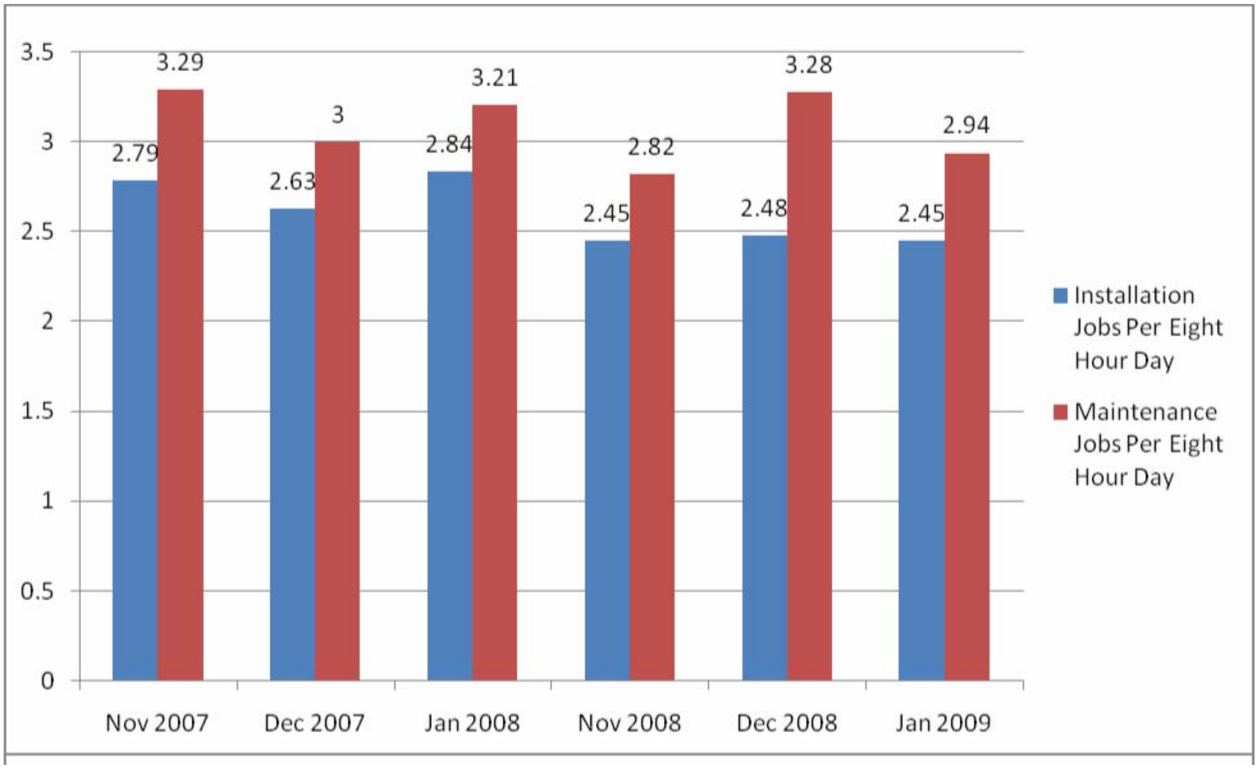

Figure VIII-5 - Installation and maintenance jobs per eight-hour day.[70] [71]

As may be seen in Figure VIII-5, productivity measured by maintenance jobs per day improved in December 2008 compared with December 2007 and November 2008. With due consideration

[69] Pouliot, D. Director of Operations-Installation and Maintenance and Construction, FairPoint. Interview by Satterfield, J. June 15, 2009.
[70] FairPoint. (June 5, 2009). Data Response TE0009. NEI.
[71] FairPoint. (June 5, 2009). Data Response TE0010. NEI.

to the caveats mentioned previously, it may be seen that productivity definitely improved during the restoration.

Assigning overtime also was used extensively to expedite restoring customer service. Figure VIII-6 provides a comparison of overtime hours worked by installation and maintenance, and construction technicians during November and December 2007 and January 2008, compared with the overtime hours worked during the same months in 2008 and 2009.

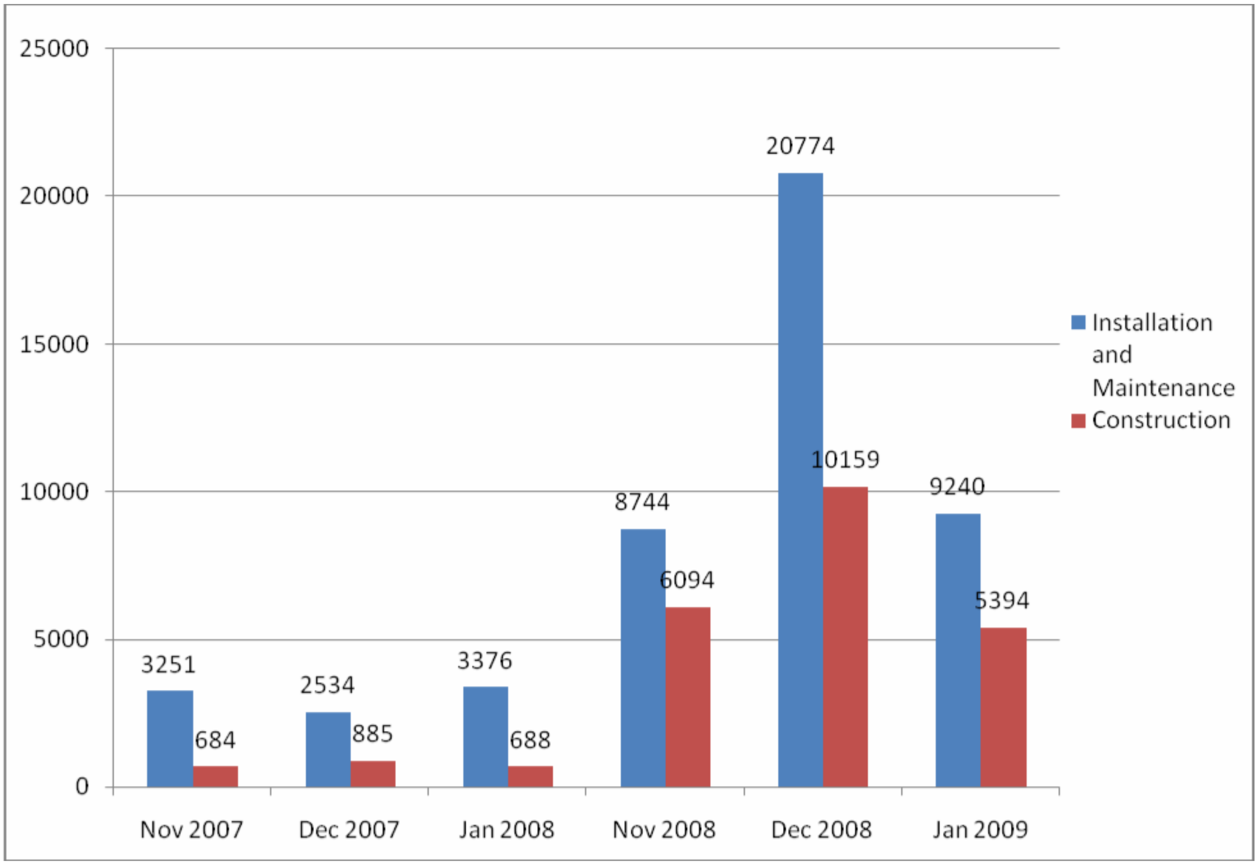

Figure VIII-6 – Technician overtime hours[72] [73]

During December 2007 there were 313 SSTs and 73 construction technicians assigned to New Hampshire. During December 2008 there were 356 SSTs and 65 construction technicians assigned.[74]

[72] FairPoint. (June 5, 2009). Data Response TE0012. NEI.
[73] FairPoint. (June 5, 2009). Data Response TE0013. NEI.
[74] FairPoint. (March 20, 2009). Data Response STAFF 1-19. NHPUC.

Using a 40 hour work week and 4.33 weeks per month, 313 SSTs would have approximately 54,211 base hours in a month. Given the December 2007 overtime hours of 2,534, this equates to an overtime rate of approximately 4.7 percent. Using a similar calculation for December 2008, 356 SSTs would have approximately 61,659 base hours and 20,774 hours of overtime which is an overtime rate of approximately 33.7 percent.

FairPoint's Outside Plant (OSP) Engineering organization in New Hampshire assisted in the restoration by providing nine experienced engineers to help with damage assessment. In total there were 41 employees that assessed the damaged areas. In addition to the engineers, managers from the installation and maintenance department, and construction department were used.[75] The engineering department assisted the restoration effort by making contact with the electric companies when requested by field workers and by placing support personnel in construction centers to expedite engineering work orders (EWOs). They also issued blanket EWOs to cover areas with major damage. In some instances, EWOs were not issued before work was done, and records were updated after technicians had already performed the needed emergency work.

The engineering department maintains an electronic log of poles replaced in their maintenance areas and uses E-mail to notify other users when they can move their pole attachments. This database is used to record pole replacements by the electric utilities and track the progress of work by intermediate attachers. E-mail is also used to notify the electric utilities when FairPoint has completed its work. During the restoration, spreadsheets were used to record storm replacement information and the database was updated to reflect the new status of equipment after restoration was considered complete.[76]

The availability of workers and how they are utilized are important considerations during restoration from a large-scale service disruption. Toward that end, it is useful to compare the number of service orders for new or additional service during the restoration period with the number of orders during non-emergency periods. During November 2008 there were 104 service orders per day. During December 2008 there were 113 per day and for January 2009 there were 112 per day.[77] These months appear nearly equal, even though December was when the major restoration effort was underway. Figure **VIII-5** shows that there were 2.48 average installation jobs worked per eight hour day during December 2008. If there were 113 installation orders worked per day in December and they were worked at a rate of 2.48 installations per eight-hour day, then 45 technician-days, or 360 technician-hours, were required to handle them. While it is never possible to stop all service order work because of emergency orders, it may be seen that for every service order that could have been deferred, 1.32 additional customer trouble reports could have been cleared based on the productivity numbers from Figure VIII-5.

[75] FairPoint. (March 20, 2009). Data Response STAFF 1-29. NHPUC
[76] Laprise, S. Manager-OSP Engineering-NH South, FairPoint. Interview by Satterfield, J. June 16, 2009.
[77] FairPoint. (June 2, 2009). Data Response TE0038.2. NEI.

The impact on overall restoration time caused by working on service orders can be determined by a similar calculation. If no service orders had been worked between Day 3, Saturday, December 13 and Day 21, Wednesday, December 31, then 2,834 additional maintenance jobs could have been done in December after the storm. Assuming 113 installation jobs per day, 19 days, and 1.32 maintenance jobs that could have been worked per installation job, then 113x19x1.32=2,834.

To determine the impact this had on overall restoration time, the number of maintenance jobs done per day must be calculated. Figure VIII-5 shows that it took 3.23 hours for an installation job (8 hours/2.48 installation jobs per eight hour day) and 2.43 hours for a maintenance job (8 hours/3.28 maintenance jobs per eight hour day). There were a total of 3,207 installation jobs during December 2008,[78] which took a total of 10,358 hours (3,207 installation jobs x 3.23 hours per installation job). From Figure VIII-6 it can be determined that the total SST hours worked during December 2008 was 82,433 (61,659 base hours + 20,774 overtime hours). Since 10,358 hours were used for installation jobs, the remaining 72,075 hours (82,433-10,358) would have been used for maintenance jobs. Given the 2.43 hours to complete a maintenance job, approximately 956 maintenance jobs were completed per day on average in December 2008 (72,075 hours/2.43 hours per maintenance job/31 days). By applying the 956 maintenance jobs per day to the 2,834 maintenance jobs that could have been completed if no installation jobs had been worked, the overall restoration time could have been reduced by approximately three days (2,834 maintenance jobs that could have been worked/956 maintenance jobs per day=2.96 days). As noted earlier, it is not possible to stop working on installation jobs entirely, but this analysis gives an indication of the impact to restoration time caused by FairPoint continuing to work on these types of orders.

FairPoint considers that the last customer without service due to the December 2008 ice storm was restored on Day 25, Sunday, January 4, 2009.[79] If FairPoint had decided to stop working on installation jobs completely during storm restoration then the final customer may have been restored to service on Day 22, Thursday, January 1.

The routes carrying umbilicals from the host COs to the remote COs was reviewed. While no remote COs were lost during this storm due to power outage or loss of the host to remote links, the survivability of the umbilicals is essential to the proper functioning of the remote switches. An analysis of the routing for the umbilicals indicates that 74 of the 96 remote COs are currently served via fiber ring technology from their host CO. The remaining offices can only be served via a linear optical path, or folded topology, meaning there is no route diversity. Each of the remote COs not on a fiber ring is currently served using sheath or carrier (equipment) level

[78] FairPoint. (June 2, 2009). Data Response TE0038.2. NEI.
[79] FairPoint. (March 20, 2009). Data Response STAFF 1-28. NHPUC.

diversity or both. [80] FairPoint has extensive procedures in place to ensure that diversity is maintained as rearrangements are made in the outside plant.[81]

Recommendation No. 5: FairPoint should focus on restoring customer service during a large-scale restoration effort.

- FairPoint should divert resources from installation to restoration during a large scale outage. During this restoration, the number of dispatched service orders hardly varied from the preceding and the succeeding months. There were 3,365, 3,207, and 3,253 service orders for new or additional service (installation jobs) for November and December 2008 and January 2009 respectively.[82] It would be expected that during a major restoration the number of installation jobs would be significantly reduced. It would also be expected that the month following the critical restoration period, the number of installation orders would increase significantly as those delayed by the restoration effort would be done. Clearly, this did not happen during the restoration effort from this storm.

Conclusion: FairPoint is effectively preparing for the next major outage.

As the restoration was completed, FairPoint began preparing for the next major event. More portable generators were procured for use at the SLC sites and to provide backup for the CO generators.[83] [84] The operations support systems were upgraded since they will be of major importance for efficient restoration from the next major outage. The systems now in place were not used during December 2008 when the Verizon legacy systems were still being used. All Verizon legacy systems were replaced in January 2009 by newly developed FairPoint systems. These systems, while state of the art, are undergoing refinements to make them even more usable. These upgrades will be important during the next major event when increased volumes of customer calls and trouble reports are expected.[85]

In the NOC, the new collection and display system, NETCOOL, has been updated to include an address table for the remote terminals. This will allow technicians to be more effectively dispatched.[86]

The FairPoint Communications Disaster Response Plan is now completely in place. This plan has been improved since December 2008, but it is still new. Consequently, FairPoint recognizes

[80] FairPoint. (June 29, 2009). Data Response TE0040.6. NEI.
[81] FairPoint. (June 29, 2009). Data Response TE0040.7. NEI.
[82] FairPoint. (June 2, 2009). Data Response TE0038.2. NEI.
[83] Pouliot, D. Director of Operations-Installation and Maintenance and Construction, FairPoint. Interview by Satterfield, J. June 15, 2009.
[84] Aubrey, S. Director-Central Office Operations, FairPoint. Interview by Satterfield, J. June 15, 2009.
[85] Powell, D. Director of Operations, Dispatch Resource Center; FairPoint. Interview by Satterfield, J. June 15, 2009.
[86] Smee, J. Vice President-Network Operations, FairPoint. Interview by Satterfield, J. July 6, 2009.

the need for training, exercises, and mock drills to make the plan effective. Contact lists are a major part of the plan and are updated monthly to ensure they are kept as current as possible.[87]

Conclusion: FairPoint should have conducted bulk testing of customer lines during the restoration effort.

Bulk testing on customer access lines before the customer reports a trouble condition can be done by FairPoint with the type of central office switch commonly used in New Hampshire. The system typically runs at night. It tests the cables chosen and provides an indication of potential trouble conditions. The tests are not totally conclusive because inside wire conditions and portable telephone troubles can also be misidentified as trouble conditions within the telephone company's network. However, the test does provide indications of where major outages may exist and this could be an aid to quicker restoration. Bulk testing was not done during this restoration because of the possibility of false trouble indications being generated.[88]

Recommendation No. 6: FairPoint should use its bulk testing capability during the initial phases of a major outage restoration effort.

- Using bulk testing will provide indications of where major outages are located. Such information will give focus to the early use of the work force. It can also aid in coordination with the electric companies and local authorities as they prioritize their restoration efforts.

Conclusion: Coordination and communication with the electric utilities was inadequate although coordination with local authorities was effective.

Improved communications and coordination between FairPoint and the electric utilities would have allowed FairPoint to respond more quickly during restoration of service. Communications between the FairPoint construction team and the electric utilities were handled at the local levels. Although there were no formal regularly scheduled calls between FairPoint and the electric utilities, there were multiple daily communications between the companies to pass information, prioritize work, and communicate work plans for the following day.[89] However, there were still situations encountered where SSTs were turned away from an area by the electric companies.[88] This resulted in lost time since the telecommunications technicians had to be rerouted and then return at a later date.

Coordination of pole replacements in areas maintained by FairPoint was done through the office of the OSP Engineer. This coordination was effective, as was coordination with local authorities.[90] Coordination with local authorities was handled through the office of the Vice

[87] Mead, K. Senior Vice President-Operations and Engineering, FairPoint. Interview by Satterfield, J. June 16, 2009.
[88] Powell, D. Director of Operations, Dispatch Resource Center; FairPoint. Interview by Satterfield, J. June 15, 2009.
[89] FairPoint. (March 20, 2009). Data Response STAFF 1-25. NHPUC.
[90] Laprise, S. Manager-OSP Engineering-NH South, FairPoint. Interview by Satterfield, J. June 16, 2009.

President of Government Affairs-NH, which was closely involved throughout the restoration effort with the operations managers that were directing technicians and operations personnel. There was little delay in contacting local authorities.[91]

Recommendation No. 7: FairPoint should negotiate to add additional elements of communication and coordination with the electric utilities during storm restoration.

- FairPoint should negotiate with the electric utilities to allow a FairPoint representative to be located in their EOC during any large-scale restoration effort. Following this storm, contacts with the electric utilities were largely done at the local level. If a FairPoint representative were to be located in the EOC, this person could provide FairPoint workers and the DRC with current information about cleared areas. This person could also be the conduit for information flowing from FairPoint to the electric company.
- FairPoint should establish an industry forum for the purpose of creating an internet site that can be utilized to provide current information on restoration efforts. This might include such things as areas cleared of downed power, roads that have become accessible, etc. Since the electric companies are at the forefront of most restoration efforts associated with an event such as the December 2008 ice storm, it would seem logical to coordinate closely with them in keeping the site current. Access by other involved parties, such as telecommunications companies and cable companies, can be as open or as limited as desired. As communications and coordination are improved, restoration time and safety will likewise be improved.

[91] Shea, K. Vice President, Government Affairs-NH, FairPoint. Interview by Satterfield, J. June 15, 2009.