Reducing coordination risks around communication infrastructure protection during disasters:

An Alberta Floods Case Study

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Executive summary

Matt J. Duffy in his report, Smartphones in the Arab spring talks about how the increased availability of mobile smartphones made a huge impact on the reporting of the Arab spring revolution (Duffy, 2011). While pervasive availability of smartphones was critical, the true enabler of the mobile reporting phenomenon was the extensive connectivity through communication networks in the Arab region. Communication networks have had crucial influence on many events and natural disasters responses in the recent past.

The importance of communication networks was further highlighted by the message from Federal Emergency Management before the Hurricane Sandy hit the east coast of United States. “Phone lines may be congested during/after #Sandy. Let loved ones know you're OK by sending a text or updating your social networks." (Roberts, 2012) This message emphasizes two aspects – during emergencies keeping the general public connected is vital and the communication networks can be vulnerable.

This essay looks at a specific case of floods in the Alberta region of Canada where the local incumbent telephone service provider TELUS worked with local power agency ENMAX to respond to the floods. Amidst the success stories are shortcomings in the preparation from TELUS, the industry, and other agencies in the region in protecting the communication infrastructure. Although there were few major disruptions, advanced preparedness could have reduced the need for heroic efforts to avoid the catastrophe.

The rise in importance of communication networks has presented a new development in emergency risk management – it has increased the importance of connectivity as a critical service, which was not the case a few years back. This change in dynamics has several implications on the communications industry, other agencies as well as the government. Communications companies are not a means of connecting people anymore – they are a critical service and hence they have the social and moral responsibility to act accordingly. Traditional critical services need to accept the entrance of a new partner in their domain and work closely with communications companies to prepare for emergencies. Lastly, government bodies need to expand their emergency operation centres to include communications companies and focus on new risk management and mitigation strategies within this new landscape.

Introduction

The Institute of Risk Management defines risk management as “… the systematic process of understanding, evaluating and addressing the(se) risks to maximise the chances of objectives being achieved and ensuring organisations, individuals and communities are sustainable.” (Theirm.org, 2015).

Risk management is one of the key focus areas for the industry and government alike. For public companies, besides protecting the business, the organisation risk management is a means of sharing information between the principal(s) and agent(s) to reduce asymmetric information exchange. Depending on the maturity, various industries have evolved their risk management strategies to different extents. Many companies across industries have developed a sound risk management strategy in terms of organisational alignment, protocols and processes for identifying and addressing the risks.

There has been a steady rise in the number of natural disasters in recent years. According to World Disaster Report, earthquakes/ tsunamis and windstorms accounted for around 8% and 25% of all the disasters in the world in 2012 respectively (International Federation of Red Cross and Red Crescent Societies, 2013). Utility companies traditionally have been at the forefront of risk management planning as they are classified as critical services. However, a PricewaterhouseCoopers report identified that the utility companies are well equipped to handle localised problems like power outage but take time to adapt and respond to major emergencies like earthquakes, floods or hurricanes (Conkle, et al., 2012). Natural disasters disrupt the infrastructure extensively and hence a robust response plan is crucial for all affected industries. The loss and subsequent rebuilding has significant associated costs. Better preparedness can help control the damages better - this requires investments which has become a huge challenge in recent times. Changing economic conditions have forced industries to look at cost control and management; hence collaboration and cooperation are the ideal options to improve emergency preparedness.

Local governments are crucial in any disaster response as they are best placed to evaluate the situation, understand the implications and supervise the coordinated efforts. Many governments have invested heavily in setting up Emergency Operation Centres (EOCs) to help them prepare for and respond to emergencies. These centres act as the test bed for government bodies and critical external agencies to pre-plan, practice and execute the standard drills for emergency response; they also become crucial coordination centres during actual recovery.

The external agencies have well defined risk management plans designed to protect their infrastructure and the services to their customers. However, when disasters occur, the impact is pervasive and not organisation specific. Without a coordinated response structure, the individual processes fall short of achieving the ultimate goal of rapid disaster recovery. For example “Power outages could disrupt more cell sites if they run out of back-up power before commercial electricity services are up and running again.” (Carew, 2012). The blackout of cellular communication would in turn hamper the power company’s ability to communicate and coordinate with its internal teams to restore power. Thus most services agencies are also customers of each other. When there is a natural disaster, there is this symbiotic reliance between various agencies to help their clients to help themselves. A lot of the practice drills that

happen in the EOCs focus on getting the basics right, so that during the crunch time tasks are executed in a pre-determined, coordinated manner.

Traditionally, connectivity was not considered a critical service and hence was never included in the ambit of emergency response preparation. With growing influence of communications on disaster recovery responses, there is a pressing need to integrate such companies into the emergency response activities – not only during the recovery but also during preparation. This would work in favour of both the communications companies as well as the other agencies given the mutual interdependence amongst the industries.

Natural Disasters and Their Impact

While it is difficult to consistently predict natural disasters in advance, it is certain that their impacts are serious and long lasting. The earthquake in Japan resulted in an overall loss and repair investment of US $8 billion for NTT (NTT Docomo, 2011). Hurricane Sandy cost Verizon close to US$319 million loss as reported in its 2012 Q4 report (Thomson Reuters Streetevents, 2013). This loss was after Verizon changed it strategic risk management approach to network disruption and increased it investments to reduce network outages based on its experiences from Hurricane Katrina.

NTT and Verizon adopted battery backup and reserve generators to mitigate the risks, while AT&T continued to rely primarily on power companies for power supply in places like Manhattan. This was evident when Verizon burnt 100,000 gallons of fuel per day to keep its facilities running compared to 40,000 gallons per day by AT&T during Hurricane Sandy (Troianovski & Ante, November 15, 2012). Regardless of the approach, these are clear examples of lack of coordination between various agencies when it comes to protecting communication infrastructure.

In recent years, communications companies have increased their investments in battery backups, UPS and backup generators for sustained network up time during disasters. While these investments are critical, the industry as a whole must also look beyond its own operations to develop a robust disaster recovery plan. This involves intra-industry and inter-industry collaboration and cooperation. An ideal platform to do this would be the EOCs that exist in most major towns and cities to help the governments manage disasters.

Power Companies Emergency Preparation

A power industry expert interviewed for this essay mentioned that power companies and other critical service agencies have developed a sound risk management strategy that helps them respond to disasters effectively in a timely manner. He stressed that the key to good disaster

response is in robust preparation. The power companies pre-plan and practice several drills to help them respond to disasters.

- Mutual Aid Agreements: Most utility companies in North America have a mutual aid agreement. “These mutual aid agreements between utilities, agencies, organizations, and jurisdictions provide a way to efficiently obtain emergency assistance in the form of personnel, equipment, materials, and other related services from outside the area of impact.” (APPA Mutual Aid Working Group, 2014).
- Understanding the disaster and assessing the needs: Power companies understand the primary natural disasters that could affect their operations in the region and tailor their disaster recovery plans and infrastructure built out to address the associated challenges. For example, Alberta being a flood affected region, the power companies learn where the overflowing water would flow, identify risky sub-stations and develop backup plans like an emergency operation centre, replacement equipment, manpower, etc. This preparation becomes crucial if the risky substations power critical infrastructures like airports or hospitals.
- Testing and Drills: Power companies carry out extensive tests and drills to simulate disaster scenarios internally as well as in government established EOCs. These drills not only help test the procedures but also allow the teams to work together in stressful situations while maintaining mutual dignity and respect. These collaborative exercises also help develop relationships which are crucial during actual emergency response.

2013 Alberta Floods – TELUS Impact and Responsiveness

Alberta’s super flood of 2013 was Canada’s costliest natural disaster with projected damages and associated recovery costs exceeding $6 billion (Canada, 2014-04-17). Calgary – Canada’s fourth largest city with a population of 1.15 million (CBC News, 2013)– was severely affected by the floods. The impact of the floods in Calgary and the associated disaster recovery efforts by TELUS highlight some of the immediate needs around risk management for communications companies.

To better manage the emergency situations, the Calgary Emergency Management Agency (CEMA) upgraded its EOC in 2012. TELUS was one of the key members in setting up the centre. Today during normal times this EOC has key personnel from the City business units and external agencies like ENMAX, ATCO, and Alberta Health Services to support front-line response personnel and business continuity by maintaining City services. (The City of Calgary, 2015). The EOC has an Industry Canada Desk to represent the communications companies in Canada. This arrangement was made due to limited space availability and to ensure optimum space

utilisation. When the floods affected the city, TELUS and Shaw (local cable operator) were invited to the EOC on a need basis to manage the situation.

Normand Rochon, Project Manager at TELUS Corporate Business Continuity highlighted some of the key operational successes that were achieved through close collaboration and successful partnership between ENMAX and TELUS. The Calgary main central office (CO) was a critical infrastructure for TELUS serving the City of Calgary and a major section of Alberta's population. The floods threatened shut down the substation powering the CO. At the EOC TELUS shared the list of its critical infrastructure with ENMAX and they were able to quickly redistribute power to the CO from an alternate substation. This close coordination at the EOC helped avoid a major communication disaster during the floods.

Normand explained that besides the Calgary CO the collaboration with ENMAX helped TELUS secure three out of the ten critical infrastructures across the affected region. For the remaining infrastructure, especially mobility towers, TELUS relied on UPS (battery backup on site) to power the equipment for six to eight hours and used generators at the site till power was restored. ENMAX took just eight days to restore the power to the entire system - a major achievement for the company (Enmax, 2013).

Despite its success, TELUS suffered a huge financial loss of $7 million as reported in its Annual report (TELUS, 2013). In 2013, TELUS was impacted by the Alberta floods and Lac-Mégantic explosion in Quebec but the majority of the aforementioned losses were attributed to the Alberta floods.

Key Learnings for TELUS

Accordingly to Normand, since the floods TELUS has taken several steps to prepare itself better for future disasters:

- Collaboration with power companies: Timely sharing of critical infrastructure list with ENMAX helped ensure Calgary CO remained functional throughout the floods. Hence, TELUS has stepped up its efforts to build closer relationships with power companies in eastern and western Canada where it has significant critical infrastructure. Normand feels reaching out to these companies is just the first step and that building working collaborations are far from reality today.
- Restructuring the COs: Floods typically tend to affect the bottom one to two feet of the basement in central offices. Hence, TELUS is actively restructuring its central offices to move critical infrastructure to higher floors and reduce the risk of future floods impacting the operations.

- Government Collaboration: TELUS is also working with government bodies in Alberta, Ontario, Quebec and British Columbia to participate in the EOCs. TELUS has important network infrastructure in these four provinces.
- Internal Audit Team: TELUS continues to maintain focus on its audit team that looks at financial, customer impact, physical infrastructure and natural disaster risks. This team also identifies TELUS' preparedness to handle risks in these areas and looks at need for insurance coverage to protect against the potential losses.

Normand agreed that measuring the disaster responsiveness remains difficult for TELUS as there are few tangible, measurable factors which can be monitored during the response phase. TELUS relies on its traditional metrics of network up-time and Recovery Time Objective (RTO) to evaluate the impact of floods. Network up-time identifies the total loss to TELUS customers in dollar amounts due to unavailability of TELUS network. RTO measures how quickly the network was restored after a disaster which can be a proxy to the team responsiveness. However, the challenge with RTO during disasters is that one needs to take into consideration possibility of inaccessible locations.

Observations and Recommendations

The Alberta Flood case along with other major disruptions in the recent past like hurricane Katrina and Sandy bring to fore some of the vital aspects of risk management for communication networks. Here some of the key observations from the Alberta flood case:

- Lack of Industry Level Coordination: Physical borders can curtail the telco response to disasters especially in the regions around the boundaries of its operation, as per Normand. Currently, the telephone companies in North America coordinate with a contact phone number for all kinds of support – during normal and emergency times. This is far from the mutual aid agreements that utility companies have for their preparedness for disaster management.
- Lack of regional agencies coordination: While utility companies like power, water, etc. collaborate and work together in EOCs and have mutual aid agreements; the telephone companies have been looking to build wireless networks with backup power and add generators to their infrastructure. There is also a general lack of coordination between communications companies and other agencies in terms of disaster planning as evident from the fact that TELUS has just started reaching out to other power companies – post the flood disaster.
- Lack of governmental coordination: Even today, the Calgary EOC website identifies power companies and health services as critical external agencies that form part of its regular EOC

group. This leaves out the communications companies. As described earlier, connectivity is becoming one of the crucial necessities of the modern world, more so during disasters and emergencies. Leaving out communications companies from the critical services bracket is an important misstep in disaster risk management by government bodies. While single seat for the communication department at the EOC is good representation of the industry, lack of the industry participation in drills is a strategic error.

The Alberta floods highlight risks at three distinct levels that could impact communications severely. Here are some key recommendations for improving the strategic risk management to protect communication infrastructure during disasters and emergencies:

- Intra-Industry Collaboration: Communications companies must explore the options of Mutual Aid Agreements that would help them share resources (manpower, equipment, etc.) during disaster. This would allow companies access to wider pool of resources giving them greater flexibility in managing the situation and responding to it efficiently. There would be concerns around sacrificing competitive advantages, but general field jobs like repairing cables, splicing fibres, etc. are common functions where companies can collaborate for rapid response. During Hurricane Sandy, when AT&T and T-Mobile shared their networks, it was a major breakthrough in the industry (Kelly, 2012). Such collaborations should be pre-planned through agreements so they can be executed immediately rather than negotiated during the disasters.

- Inter-Industry Collaboration: Communications companies and power companies must work together to manage disaster response. Given the mutual interdependence between the two agencies, sharing the critical infrastructure list would help both companies to develop backup plans and infrastructure redundancies to protect their respective services - lack of power or connectivity.

  Communications companies are increasingly investing in generators for backup power for their network in case of outages. Power companies can collaborate with them to explore alternatives to share the power during planned outages, maintenance or even during disasters wherever feasible. These temporary power sources could be invaluable to power companies, especially in remote and hard to reach areas.

- Regulatory Influence: Government bodies must realise the importance of communications to the citizens and ensure communications companies are included in the EOC on a regular basis. This would allow communications companies to collaborate with other agencies better thereby improving the regional preparedness for disasters. Government must also exploit EOC collaborations to develop new innovative ways of getting disparate industries to share their expertise and learning to develop better emergency response standards. The

expanded EOC could mimic the military joint operations that countries have, to develop their armed forces to handle specific targets situations.

Collaboration has been an important aspect of existing disaster recovery partnerships. By appending connectivity to the list of critical services, protection of communication infrastructure can be included within the realm of emergency response preparation. This opens up additional avenues for cooperation and hence better service to general public. Working together allows various agencies to tap into a common resource pool and keep costs down while improving the reliability and control over their infrastructure.

Bibliography

APPA Mutual Aid Working Group, 2014. *Resolution 14-06,* Denver, Colorado: American Public Power Association.

Canada, E., 2014-04-17. *Canada's Top Ten Weather Stories for 2013.* [Online]
Available at: http://www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=5BA5EAFC-1&offset=2&toc=show
[Accessed 27 February 2015].

Carew, S., 2012. *Hurricane Sandy disrupts Northeast U.S. telecom networks | Reuters.* [Online]
Available at: http://uk.reuters.com/article/2012/10/30/us-storm-sandy-telecommunications-idUKBRE89T0YU20121030
[Accessed 28 February 2015].

CBC News, 2013. *Calgary's population hits 1.15M people.* [Online]
Available at: http://www.cbc.ca/news/canada/calgary/calgary-s-population-hits-1-15m-people-1.1385386
[Accessed 27 February 2015].

Conkle, A., Warren, T. & Samson, P., 2012. *Business continuity and disaster recovery: Enhancing enterprise resiliency for the power and utilities industry,* Delaware: PricewaterhouseCoopers LLP.

Duffy, M. J., 2011. Smartphones in the Arab spring. In: M. Steffens , R. Smith & A. McCombs, eds. *IPI Report: Media and Money.* Vienna: International Press Institute, p. 53.

Enmax, 2013. *Annual Report,* s.l.: Enmax.

International Federation of Red Cross and Red Crescent Societies, 2013. *World Disasters Report: Focus on technology and the future of humanitarian action,* Geneva: International Federation of Red Cross and Red Crescent Societies.

Kelly, H., 2012. *AT&T, T-Mobile share networks to help Sandy victims.* [Online]
Available at: http://edition.cnn.com/2012/10/31/tech/mobile/att-tmobile-networks-sandy/
[Accessed 1 March 2015].

NTT Docomo, 2011. *Restoration Status for Damage Caused by the Great East Japan Earthquake and Future Responses.* [Online]
Available at:
https://www.nttdocomo.co.jp/english/info/media_center/pr/2011/001523.html
[Accessed 1 March 2015].

Roberts, C., 2012. *NY Daily News.* [Online]
Available at: http://www.nydailynews.com/news/national/text-don-talk-save-network-capacity-carriers-article-1.1194830
[Accessed 28 February 2015].

TELUS, 2013. *TELUS reports third quarter 2013 results.* Vancouver, TELUS News Release, p. 11.

The City of Calgary , 2015. *The Emergency Operations Centre.* [Online]
Available at: http://www.calgary.ca/CSPS/cema/Pages/The-Emergency-Operations-Centre.aspx
[Accessed 27 February 2015].

Theirm.org, 2015. *Risk Management.* [Online]
Available at: https://www.theirm.org/about/risk-management/
[Accessed 21 Feb 2015].

Thomson Reuters Streetevents, 2013. *VZ - Q4 2012 Verizon Earnings Conference Call.* s.l., THOMSON REUTERS STREETEVENTS.

Troianovski, A. & Ante, S. E., November 15, 2012. *Calling for (Cellphone) Backup,* s.l.: The Wall Street Journal.

Views and opinions expressed by Normand and the power industry expert are their personal opinions and do not reflect the views of the organisations they have or are currently working in.