Independent market research and competitive analysis of next-generation business and technology solutions for service providers and vendors

HEAVY READING
WHITE PAPER

How Your Enterprise Network Can Weather the Next Storm

A Heavy Reading white paper produced for Intelsat

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INTRODUCTION

Natural and human-made disasters are a big and growing problem for companies and organizations worldwide. Not only are these incidents becoming more destructive and catastrophic, but they are also becoming more and more commonplace these days.

In fact, the world has seen a staggering tenfold increase in the number of natural disasters since the early 1960s, according to the 2020 Ecological Threat Register (ETR). Specifically, the number of disasters globally soared from a relatively low 39 in 1990 to 396 in 2019, as per the Institute for Economics and Peace.

Beyond the horrendous human toll, what is less visible is the huge economic toll that hurricanes, floods, tornadoes, tsunamis, earthquakes, volcanoes, wars, terrorist attacks, pandemics, power outages, major accidents, and other catastrophic events can take on enterprises, other businesses, organizations, institutions, and government agencies. When emergencies strike, they cause equipment damage, network disruptions, lost employee productivity, and (of course) lost revenue. And those financial costs have clearly soared over the past three decades.

But all hope need not be lost. There are significant steps that businesses and other organizations can take to mitigate the economic wreckage of disasters. With improved network connectivity, the introduction of more connectivity options, and better emergency preparedness planning overall, the heavy financial costs can be drastically reduced. According to a recent study by think tank Fair Tech Institute (FTI), the damage costs from natural disasters can be potentially slashed by an impressive 39% with improved network connectivity.

This white paper spells out the devastating economic toll of disasters and delves into the various types of financial costs that businesses, organizations, and institutions can incur. The paper also presents ways that these same businesses, organizations, and institutions can prevent and limit those catastrophic costs in the future through better emergency planning, more network connectivity options, and other critical measures.

THE BAD NEWS: ECONOMIC COSTS OF DISASTERS KEEP RUNNING HIGHER

Although it might seem like lost revenue or lower employee productivity or some combination of the two would rank as the greatest financial damage caused by natural disasters, that may not be the whole story. The truth is that the costs of network downtime are much more far-reaching than either of those categories might suggest.

According to an independent data protection and security research firm, Ponemon Institute, business disruption accounts for the greatest share of network downtime costs. This category considers both reputational damage to the business or organization and customer churn. Revenue losses followed behind in second place in the firm's research. The third largest financial pain associated with incidents was end-user productivity.

Figure 1: Economic costs of network downtime

Category	Share of costs
Business disruption	Highest
Revenue loss	Second highest
End-user productivity	Third highest

Source: Ponemon Institute

In fact, 40% of enterprises in a recent survey reported that network downtime can cost their firms more than $1,500 per minute, according to Information Technology Intelligence Consulting. Other sources such as Gartner and Atlassian report that network downtime costs can be much greater, soaring as high as $5,600 per minute or even $9,000 per minute for the largest organizations.

But it is not just large businesses and other organizations that run up such hefty network downtime expenses. Medium-sized and small companies feel the pain of network downtime as well. For instance, Atlassian estimates that smaller firms lose $427 per minute when their networks go down.

Another common type of economic cost is the loss of employee productivity. For example, consider the time that a company's IT team must spend resolving each individual incident. Or consider the adjacent teams that must also get involved in incident management, whether they be public relations coordinators, social media managers, or customer service reps, as well as other employees affected by the outage.

For software providers, service-level agreement (SLA) financial penalties, government fines (for any breach of regulatory requirements), and litigation and legal settlements amount to very real financial costs as well. Plus, for companies dealing in physical products, depleted stock inventories can be a significant risk factor. And that does not even consider other factors such as contractor costs, equipment replacement, and employee retention problems.

Not surprisingly, then, a staggering 40% of businesses fail to reopen their doors after a natural disaster hits, according to the US Federal Emergency Management Agency (FEMA). Plus, another 29% fail to last just two years after that. In other words, the cost of network downtime can be catastrophic and cripple an organization both now and for years to come, if not forever.

THE GOOD NEWS: ECONOMIC COSTS OF DISASTERS CAN BE MITIGATED

While they may run high, however, the costs of natural disasters can be cut or at least limited. What this means is that disasters do not have to be quite so disastrous, at least financially speaking.

How can the heavy financial costs of disasters be cut? Simply put, by introducing more and better network connectivity options and making smarter use of the networks that are already available. As noted earlier, researchers have found that with improved network connectivity, the damage costs from disasters can be potentially reduced by as much as an impressive 39%.

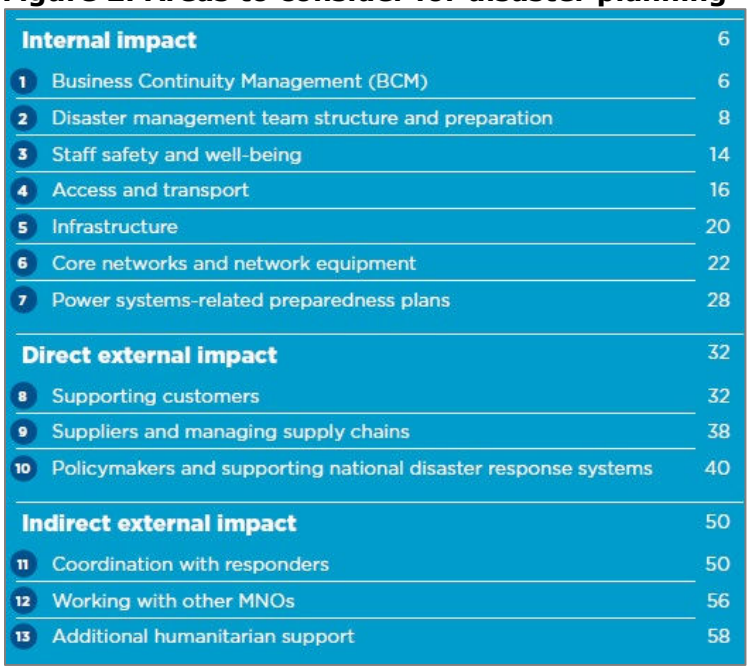
What is clear is that time is critically important in responding to any natural disaster. That is why organizations need to develop a comprehensive business connectivity plan that encompasses several connectivity options, potentially including satellite service solutions.

Accordingly, minimizing network downtime should be a priority for companies and organizations of all shapes, sizes, and stripes across all industries. The question, then, is: How can organizations reduce their network downtime risks and minimize their disaster costs?

First, businesses and other organizations can create a general recovery framework that spells out the main areas to consider when dealing with a disaster. This high level view will help organizations define the depth and breadth of their overall planning.

For instance, the GSMA has identified a number of areas of internal impact (staff safety, infrastructure including communications and power systems, and team structure and preparation), direct external impact (customers and suppliers), and indirect external impact (local and regional government, other businesses, and first responders). By considering these areas, organizations can determine how broad or narrow their disaster recovery plans should be.

Figure 2: Areas to consider for disaster planning



Internal impact		6
1	Business Continuity Management (BCM)	6
2	Disaster management team structure and preparation	8
3	Staff safety and well-being	14
4	Access and transport	16
5	Infrastructure	20
6	Core networks and network equipment	22
7	Power systems-related preparedness plans	28
Direct external impact		32
8	Supporting customers	32
9	Suppliers and managing supply chains	38
10	Policymakers and supporting national disaster response systems	40
Indirect external impact		50
11	Coordination with responders	50
12	Working with other MNOs	56
13	Additional humanitarian support	58

Source: GSMA

Second, businesses should develop a detailed emergency plan covering all aspects of their organization. Start planning today to boost the chances that your company will survive the disaster and then recover from it. Review the emergency plan annually and update it regularly as you add new employees or make other changes to your organization.

Enterprises can find multiple examples and associated resources from government and business associations. In the US, for example, the ready.gov website outlines plans and toolkits for various hazards and events. The US Chamber of Commerce offers an online guide with links to numerous supporting resources.

As part of that planning process, companies should assemble any emergency telecommunication systems such as MDRUs (movable and deployable ICT resource units used in emergency situations) in sufficient numbers before a disaster occurs. In general, any such system installed in advance may be on standby for years since it is difficult to gauge when a disaster will strike. As a result, they may well fail when the time comes because of problems linked to operating skills or battery life. So, test the emergency systems periodically to make sure they are working properly.

Third, enterprises and other organizations should eliminate, or at the very least minimize, their vulnerability to single points of failure by diversifying their network portfolios and making better use of the connectivity options that are available to them. Research has shown that removing single points of failure from an organization's existing infrastructure and processes is one of the quickest ways to reduce network downtime and mitigate disaster costs. After all, the ultimate objective of any communication system is to maximize connectivity options and minimize emergency response times during disasters. This means doing things like balancing network traffic loads between servers, following good backup practices, and building peer review and technical fail-safe processes into every service rollout.

Another critical step is to prioritize disaster prevention. Although there is no 100% foolproof way to avoid incidents, that does not mean they cannot be minimized. In fact, the high cost of network downtime should be a powerful incentive for any organization's leadership to prioritize replacing outdated systems and security features, as well as fixing issues before they balloon into full-blown incidents, according to experts.

Finally, when disasters inevitably occur, organizations should make every effort to communicate clearly, efficiently, and frequently to employees, their families, customers, partners, and all others concerned. Leverage every media platform available to get critical messages out. Use cell phones, walkie-talkies, and other devices that do not rely on electricity as a backup to your telecommunications system.

With all these plans in place, companies and organizations of all shapes and sizes will be much more ready to deal with the next disaster. But there is one other potential option to consider for the emergency preparedness list.

CONSIDER SATELLITE SYSTEMS IN YOUR EMERGENCY PLANNING

As part of the move toward eliminating single points of failure and diversifying network connectivity options, organizations should consider taking advantage of satellite-based solutions. Satellite technology can help reduce financial costs during emergencies, particularly in areas where cellular networks cannot reach, by providing a primary or backup option for a company's connectivity services.

Complementarity between multiple networks for disaster management is essential because no single deployment model is sufficient to cope with the number and nature of projected hazards and the geographical diversity of different areas. Indeed, complementary satellite-enabled connectivity is a good option even for highly connected telecom markets because they usually have some underserved areas.

For example, satellite networks can handle part of the traffic load when mobile networks become overburdened. Unfortunately, Mozambique government officials learned that lesson painfully during Cyclone Idai, a catastrophic tropical storm that destroyed more than 100,000 homes over several days in March 2019.

As Mozambique's Communications Regulatory Authority, ARECOM, admitted in the wake of that horrific storm, government officials underestimated the risk potential and resulting need for satellite service after putting all their faith in landline fiber networks for backhaul connections. "It was a mistake to phase out satellite just because fiber arrived," the government agency stated in its report summarizing the disaster and the nation's response to it.

As the report recommended, the way forward for Mozambique should include the adoption of "alternative technologies to ensure communications in risk areas (including satellite communications)." It also recommended installing the infrastructure locally to avoid disaster relief delays caused by "excessive bureaucracy in customs clearance."

In other words, making satellite networks a basic part of emergency preparations can be a critical step in saving lives and reducing disaster costs. As the Satellite Industry Association asserted in a report, "although the performance of satellite systems was impressive, their use has often been limited by a lack of preparation."

USE CASES FOR SATELLITE-BASED SOLUTIONS

There are a variety of satellite-based solutions that can be effective in emergency planning. This section runs through those solutions and cites some examples of use cases for them.

Satellite phones offer one promising option for dealing with disasters. These mobile devices connect to other phones or the telephone network itself using radio signals to orbiting satellites, instead of relying on terrestrial cell sites like cell phones do. The chief advantage of sat phones is that they can be used in most or all locations on the Earth's surface, not just in areas covered by cell towers.

Another satellite-based option for communicating during emergencies involves the use of very small aperture terminals (VSATs). VSAT technology uses a relatively small antenna to transmit and receive signals over a satellite communications network. VSATs can send and receive both narrowband and broadband signals, including video, voice, data, cellular, and Wi-Fi transmissions.

VSAT technology proved crucial in a natural disaster when a major volcanic eruption and resulting tsunami devastated the South Pacific nation of Tonga and severed the undersea communications cable connecting Tonga to the rest of the world in January 2022. Fortunately, the University of South Pacific, a regional university with locations owned by Tonga and 13 other member countries in the Oceania region, had VSAT services set up on two islands in the central part of Tonga. As a result, Tongan authorities and residents were able to use the university's Ku-band satellite connection, supported by Intelsat, to communicate with the outside world.

"When word spread that there was a working network connection at our campus in Ha'apai, people from all over the island started queuing up to connect to our network to send a message out to their family and friends," said Kristone Finau, director of IT services at the University of South Pacific. Not surprisingly, then, Intelsat reported a massive surge in traffic over the connection, delivering 8.9 terabytes of data during the first month after the volcano erupted.

Portable VSAT solutions, sometimes referred to as communications-on-the-move (COTM) and communications-on-the-pause (COTP) services, represent a third set of satellite-based technological solutions for use during emergencies. These solutions both leverage smaller, portable satellite antennas for on-the-move or first-responder use cases.

COTM and COTP terminals are typically more expensive than stationary VSAT equipment, so they may not be a primary option for most enterprises. But they can still have their place in disaster communications planning. That was borne out last year in Haiti, when a powerful earthquake struck the southern part of the country and caused severe damage to the terrestrial communications networks.

In response to the emergency, Intelsat leveraged FlexMove, a global, redundant, fully managed high throughput satellite (HTS) solution utilizing small portable antennas, to provide reliable high speed connectivity in the disaster zone while the terrestrial networks were down. Working closely with HELP.NGO, an international disaster response team, Intelsat restored connectivity, enabling the United Nations response team to coordinate and transmit survey shots of topography and aerial images of multiple disaster sites. As a result, local authorities and government agencies were quickly able to determine where to deploy emergency resources.

One more satellite-based option for emergency communications involves the use of temporary, portable cell sites. Known as cell towers on wheels (COW) or cell towers on light trucks (COLT), these mobile network solutions work by attaching mobile antennas to a pneumatic mast on a trailer or light truck to provide a mobile network through a backhaul link using either satellite or microwave.

What this means is that these temporary cell sites can take the place of non-functioning cellular base stations during disasters. As a result, they offer one of the fastest methods for restoring a communications network and replacing damaged base transceiver stations (BTS). Because COW/COLT-based services are typically associated with filling gaps in the public cellular network, they may not be part of a single enterprise's plans. But understanding local mobile network operator (MNO) disaster recovery plans may be part of an organization's preparations.

Finally, satellite connectivity options can be set up in advance for use during emergency situations. That is what one of Intelsat's biggest cellular backhaul customers has done in Japan to maintain service in case of an earthquake, tsunami, or other catastrophic event that could impact the existing terrestrial backhaul network. In addition to using satellite capacity to provide day-to-day cellular network connectivity to thousands of sites across the nation's southern islands, the customer has positioned equipment with hundreds of other sites to use satellite backhaul in case of disaster.

Telecommunications service providers may consider integrating satellite solutions into their enterprise customers' day-to-day networks to serve as hot standbys or provide resilient active-active connectivity. For instance, if used as one of the physical underlay networks for an SD-WAN branch location, the satellite service can provide redundancy for local fiber cuts and unpredictable broadband links, in addition to serving as a disaster recovery service.

CONCLUSION

As this paper has shown, it pays to have a well-tested emergency action plan in place before a natural or human-made disaster occurs. So, be prepared before disaster strikes by taking these steps:

- Plan ahead for responding to disasters. As part of that emergency planning, consider including satellite service options and integrating them with existing broadband networks and processes.
- Do not let your emergency plan just sit on the shelf until disaster strikes. Test out emergency response systems regularly during normal times to make sure they are ready to go into action when an emergency occurs.
- Assemble any emergency telecommunication systems such as MDRUs in sufficient numbers before a disaster occurs. Then test the emergency systems periodically to make sure they are working properly.
- Conduct regular employee drills to ensure that staffers know how to use, deploy, and reconfigure the emergency services available. Update the drills when new employees join the company or conditions change.
- Distinguish between outage recovery (e.g., due to a local fiber cut) and disaster recovery (e.g., after a natural disaster, power outages, cell service outages). Adopt a different focus for each one of these circumstances.

By following these suggested steps, businesses, organizations, institutions, and agencies can fortify themselves against the financial fallout from disasters. They can limit the potentially cataclysmic monetary damages and hasten the economic recovery process. And they can ensure that when a disaster inevitably strikes, they will be able to respond swiftly, safely, efficiently, and effectively.