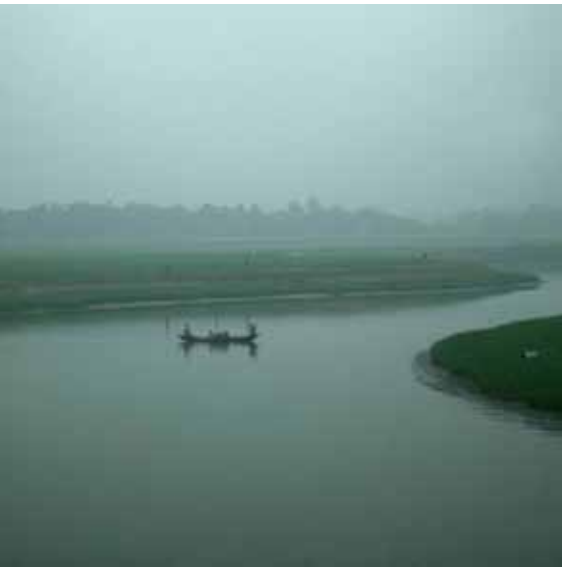
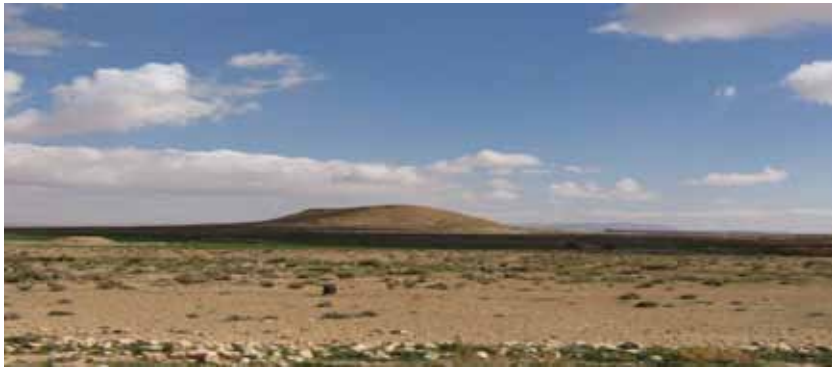
Disaster Response

Dealing with Disasters:

Technical Challenges for Mobile Operators





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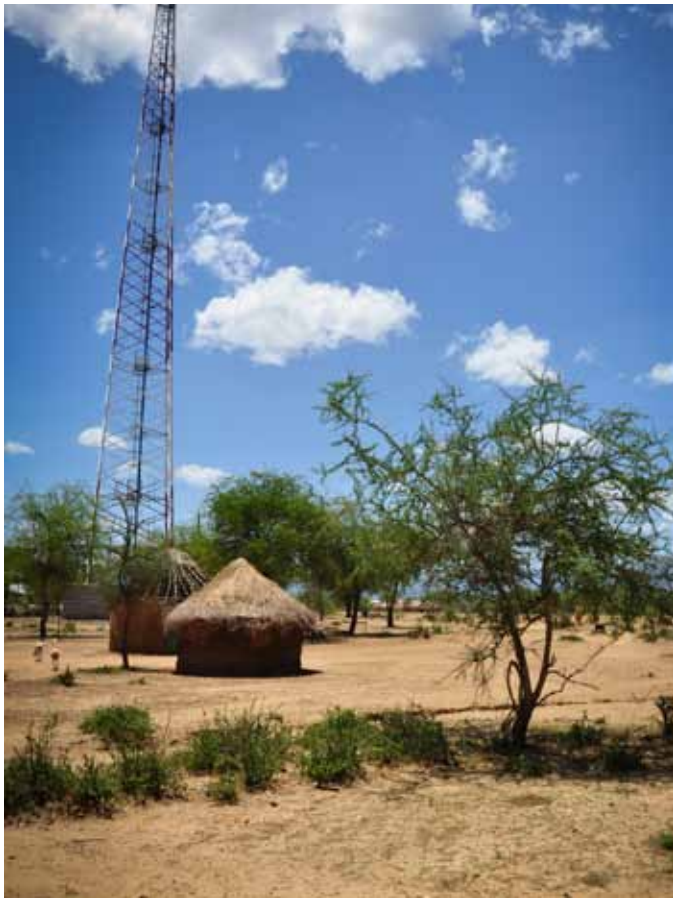


1 Overview

The first 72 hours following a natural disaster are critical. This window of time is when emergency responders are most able to save lives, and when swift assessments of damage are urgently needed. Communication in this period is essential to facilitate the flow of information between governments, communities and humanitarian organisations.

A disaster situation with a severely disrupted telecommunication infrastructure magnifies chaos and uncertainty. Poor communication between responders can severely hamper assessment and relief efforts, and prevent affected populations from connecting with responders and relatives. The resulting rise in ad-hoc and uncoordinated communication methods further complicates the emergency response.

Mobile communication networks are the pre-eminent way for an affected population to communicate with the world in and beyond a disaster zone. Although utilised before, the power of mobile became particularly evident in the aftermath of the 2010 Haitian earthquake which saw a proliferation of new coordination and response strategies that were built around this platform. The mobile phone and in particular voice calls are people's primary method of communication in a disaster. As mobile communication becomes ubiquitous and its role in disaster response increases, a renewed commitment to creating robust mobile networks that can support effective communication during this period is essential.

The GSMA Disaster Response Programme will engage in a two-tiered programme that seeks to understand how mobile operators can most effectively support each other and improve resilience among networks in disaster scenarios, and to identify how the mobile industry can best help citizens and humanitarian organisations on the ground following a crisis. The Coordination Work Stream will focus its efforts on addressing the challenge faced by operators in managing relationships with, and requests from, humanitarian response organisations. It will explore the growing role of mobiles and Mobile Network Operators (MNOs) in disasters, and create strategies to maximise their participation in responding to emergencies. The working groups will work towards achieving improved standards of practice, accountability, coordination and support for disaster-affected populations and the humanitarian response community.

The Technical Work Stream will focus on the technical challenges faced by MNOs before, during and after disasters. It will provide a forum for mobile operators to discuss issues and work toward industry cooperation. The working groups will contribute to the creation of a live blueprint that will evolve to suggest practical methods operators can use to improve their coordination, preparedness, resilience and ability to respond to the disasters specific to their locations.

This discussion document presents the intention of the GSMA Disaster Response Programme in proposing key technical challenges faced by MNOs before, during and after disasters. It aims to open a discussion about which challenges are most important and to pave the way for creating and implementing working solutions.

With the participation and commitment of the GSMA membership, this document will evolve into a live, regularly updated blueprint for addressing these challenges, implementing solutions and developing industry-wide standards that will improve the reliability, durability and effectiveness of the mobile network in a disaster.

Currently the document highlights six technical areas where MNOs can make a significant contribution to helping the affected governments, responders and the population:

Early Warning Systems and Preparedness – Mobile networks can play a key role in minimising loss of life, infrastructure damage and loss of revenue by ensuring that the population is prepared for disasters and where possible informed beforehand. (see 3.1)

Improving the Resilience of the Mobile Network – The mobile is the most widespread method of communication in the world. It is relied upon as critical infrastructure and needs to be as robust as possible. What can be done to improve this, what is cost effective and what are the best approaches? (see 3.2)

Informing and Alerting During a Disaster – Keeping the affected population informed and alerting them to developing situations and support mechanisms is key to an effective disaster response. What services can MNOs provide and can they be standardised? (see 3.3)

Disaster Response – Disasters will continue to happen, and when they do, what are the ways in which operators can improve their disaster response and network restoration? (see 3.4)

Alleviating Network Congestion – One of the major technical challenges that operators face during a disaster is the issue of network congestion. Can operators arrive at a common strategy to cope with the unprecedented demand and provide reliable network performance in a disaster? (see 3.5)

Future Initiatives using Emerging Technologies – As Mobile networks evolve and new technologies are implemented, what opportunities for improved performance in disasters do new mobile technologies offer? Can we get ahead and include functionality that will address continuing challenges in disaster response in new standards? (see 3.6)

As part of the GSMA Disaster Response Programme, this initiative collects data and statistics from MNOs that will identify trends, recurring areas of weakness, and opportunities for intervention before and during disasters. Collating this data will allow for the categorisation of disasters, the establishment of patterns and will inform future GSMA Disaster Response initiatives.

Why Telecommunications Need to be Prioritised in a Disaster Scenario

During an earthquake in 2010, a local operator discovered that emergency organisations only considered basic relief services (i.e. medical attention, food, water, shelter, sanitation) in their emergency plans. Fuel was in short supply after the earthquake and available stock was distributed only to local emergency services. The local operator was therefore not able to replenish its emergency generator fuel and many sites stopped functioning. Because telecommunications were not considered an essential service and given priority, critical communications were disrupted and the coordination of relief efforts was severely hampered.

2 Aims and Outcomes

Aims of the Disaster Response Technical Work Stream:

- To establish best practices and industry-wide standards
- To develop and drive adoption of these standards, recommendations, and to disseminate lessons learned
- To address industry-wide and regionally-specific challenges in network preparedness and restoration
- To provide a regularly updated resource for MNOs to inform their disaster response planning and to provide a platform where they can share experiences
- To improve cooperation, coordination, and support among mobile operators by creating frameworks for sharing information during disasters

Outcomes of the Disaster Response Technical Work Stream:

- Improved ability to provide essential services to customers
- Improved ability to support the work of the humanitarian community
- Reduced infrastructural damage to physical network architecture in a disaster
- Reduced failure of mobile networks in a disaster
- Improved business continuity and revenue protection

3 Technical Challenges for Mobile Network Operators

Initial Focus Areas for Mobile Operators and Discussion Points

When disaster strikes, MNOs face many challenges to ensure continued network operation and to support both the population and the government in the relief and rebuilding efforts. Many challenges centre on coordination between MNOs, government and humanitarian stakeholders. Additionally, MNOs face infrastructural and technical challenges in network resilience and restoration. This section presents an initial framework for addressing these technical challenges and provides a brief overview of proposed topics undertaken by the Technical Work Stream in the GSMA Disaster Response Programme.

Working group participants will determine the focus areas for the Technical Work Stream. The group will also establish priorities so as to have the greatest impact in addressing the most significant challenges faced by MNOs before, during and after disasters.

The initial focus areas suggested are the following:

- **Early Warning Systems and Preparedness**
- **Improving the Resilience of the Mobile Network** – What can be done, what is cost effective and what are the best approaches?
- **Informing and Alerting During a Disaster** – What services can MNOs provide and can they be standardised?
- **Disaster Response** – What are the ways in which operators can improve their disaster response and network restoration?
- **Alleviating Network Congestion** – Can operators arrive at a common strategy to cope with unprecedented demand and provide reliable network performance in a disaster?
- **Future Initiatives using Emerging Technologies** – What opportunities for improved performance in disasters do new mobile technologies offer?

3.1 Early Warning Systems and Preparedness

Early warning and preparedness measures are generally cost beneficial. The World Bank and the US Geological survey estimated that a US$40-billion investment in disaster preparedness would have saved $280 billion in damages during the 1990s.[i] A recent World Bank report found that spending on Early Warning Systems weather forecasting and sharing data have high returns.[ii] Therefore investment in early warning systems can significantly reduce the impact of a disaster on a nation's economy. The scale and reach of mobile networks make them ideal for use in early warning systems. Cell sites can be used for siting equipment and the networks can be used for distributing warnings to both responders and the general population.

One MNO in the Philippines has launched an initiative that demonstrates how mobile operators can coordinate with other agencies to benefit the wider population and reduce costs. In 2010, the weather bureau of the Philippines, PAGASA, signed a deal with operator SMART to locate 60 rain gauges at cell sites. Cooperation between the government and the mobile operator is expected to help the weather bureau issue more accurate and effective flood forecasts and warnings. The co-location at cell sites will also help to ensure uninterrupted power supply for the instruments, increase their security and reliability, and reduce installation costs.[iii] The first of its kind in Asia, innovative partnerships such as these may serve as a model for other cooperation and coordination efforts.

i Department for International Development (DFID). (2005). Natural Disaster and Disaster Risk Reduction Measures. From: http://www.dfid.gov.uk/pubs/files/disaster-risk-reduction-study.pdf
ii World Bank. (2010). Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention. p118.
iii SMART. (5 Oct 2010). PAGASA taps Smart for co-location of weather instruments [Press Release].

CASE STUDY: DEWN
GSM-based Early Warning System for Disasters

Following the devastating 2004 Indian Ocean Tsunami, the Sri Lankan Disaster Management Centre (DMC), together with Dialog telekom PLC and other partners, began work on a mass early warning system. The system uses the GSM network to send alerts via SMS and cell broadcasting to specially developed alarm devices and mobile phones. The alarm device contains a siren, flashing lamps and an LCD display and is intended for public buildings and spaces. In addition, they made available a Java app that can turn a smart phone into an alarm device and supply information and warnings in the three local languages. DEWN access is controlled by the DMC and in a disaster scenario, DEWN first alerts the emergency personnel on their individual phones and then sends a public alert to all alarm devices. This system was launched in January 2009; now, should another devastating event occur in Sri Lanka, the country has a robust and reliable way to save lives by providing timely warnings to the at-risk population.[iv]

This focus area provides a forum for sharing operator experience of early warning and information distribution systems. It will also collate new initiatives, technology advances and lessons learned in order to understand what works and how the use of mobile networks can improve disaster preparedness for emergency responders as well as the at-risk and affected population. This initiative is also investigating the possibility for developing worldwide technical standards and cooperation between operators in preparedness and contingency plans.

Discussion Points:

- Sharing operator experiences of early warning systems
- The role of MNOs in hazard detection systems (earthquake, flood, etc.)
- Remote sensors for monitoring cell generator fuel levels
- Innovative mobile detection systems for natural disasters
- The shared use of infrastructure for early warning systems – possibilities and potential pitfalls
- Joint preparedness and contingency plans for disaster response efforts – possible and / or desirable?

3.2 Improving Resilience of Mobile Networks

What can be done, what is cost effective and what are the best approaches?

As has been proved in many recent disasters, the cell-based design of mobile networks automatically imparts the network with a degree of resilience. Multiple switching centres, backup circuits and business continuity measures already employed by operators have further increased this resilience. However, if mobile networks are to be relied upon as a critical communication infrastructure that can be used by both customers and first responders, their resilience to disasters must be maximised.

Although other network elements should not be ignored, the Base Transceiver Station (BTS) or Node B in 3G networks is often the most vulnerable part of the mobile infrastructure in a disaster scenario. To maintain a functional network the BTS(Node B) needs to be adequately protected against multiple hazards and must have sufficient power to run autonomously for a prescribed period. Therefore, any effort to maximise resilience should focus mainly on the BTS(Node B).

An example from Japan: in response to recent disaster-influenced network resilience planning, NTT DOCOMO plans to construct approximately 100 highly resilient 'Large Zone' base stations that will be separate from ordinary stations and will be built to superior resiliency and redundancy standards. NTT DOCOMO anticipates that these stations will cover approximately 35% of the population in the most densely inhabited areas of Japan.[v]

This focus area shares best practices and challenges related to technical designs for network resilience and also provides guidelines for understanding and mitigating the effects of a natural disaster on mobile infrastructure. Through enhanced planning and the identification of targeted investments in network resiliency, MNOs can use these methods to ensure that their networks are both less affected by disaster and better able to cope with the impact and aftermath.

This focus area is divided into the following three sub areas: Power, Resiliency in Network Design and Infrastructure, and Backhaul Resiliency.

iv Dialog. (n.d.). Disaster and Emergency Warning Network (DEWN). From http://www.dialog.lk/about/responsibility/outreach-cr/dewn/
v NTT DOCOMO. (28 April 2011). New Disaster Preparedness Measures. From: http://www.ntt.co.jp/ir/tohoku_e/pdf/20110428_docomo_2.pdf

3.2.1 Power

In all disasters, one of the major problems affecting network reliability is a lack of available power. This applies to all aspects of the network, but the situation is most acute at the BTS(or 3G Node B). Although the BTS may survive physically, the disruption of power mains can eventually cause the BTS to fail. Therefore, improving the resilience of power systems will have the greatest effect on the resilience of the network.

Typical challenges include insufficient backup battery systems, inadequate fuel to power backup generators for the duration of a power outage, obtaining and transporting fuel to base stations and the disruption of fuel supplies. Getting additional fuel to base stations after a disaster can be difficult due to fuel availability and damaged infrastructure such as roads and bridges, as well as the condition and/or availability of transport vehicles.

The GSMA advocates that mobile networks be viewed as a critical component of basic emergency infrastructure and will work with MNOs to improve fuel provisioning and logistics in disasters.

This focus sub area will help operators create and share best practices for the design of power systems to address specific disaster vulnerabilities and network requirements.

Power: The Most Important Component of Disaster Network Resilience

- After a 2010 Earthquake, a local operator reported that only 16% of base stations in the affected region were rendered inoperable by the earthquake. Just 28 hours later, however, a staggering 86% of base stations became inoperable. The cause? Power failure.
- In the wake of the Japan tsunami in March 2011, approximately 8,000 mobile base stations were immediately disabled. Within 24 hours, that figure almost doubled when backup power systems became exhausted and the number of inoperable base stations rose to 15,000. These power outages were responsible for 85% of mobile communication breakdown during that time.[vi]

Discussion Points:

- Replacement of "rule of thumb" calculations for autonomy with disaster aware methodology
- Emergency power sources – combining sources for increased autonomy, resilience and cost effectiveness
- Minimum battery provision for BTSs – developing standards for battery capacity and generator fuel capacity to enhance autonomous operation
- Sharing best practices in resilience for off-grid and on-grid power and scaling backup power solutions
- Alternative power sources – increasing resilience (and cost effectiveness) through the use of solar, wind and natural gas systems
- Generator fuel – ensuring adequate supply and the cooperation of operators in locating and distributing emergency fuel

Alternative Power Sources: GSMA Green Power for Mobile

The GSMA Green Power for Mobile Programme provides a toolkit for determining suitability of base station sites for green power. For more information, please see: http://www.gsma.com/developmentfund/green-power-for-mobiles-interactive-replication-guide/

3.2.2 Resiliency in Network Design and Infrastructure

The BTS and core network infrastructure should be designed to withstand environmental hazards that are relevant to particular geographic and geological vulnerabilities. The immense structural damage caused by the Haiti earthquake, for example, demonstrates the importance of adhering to building codes. During the earthquake, Digicel did not lose any towers that had been built to proper specifications; the sites that suffered the most damage were roof-top sites on buildings that were damaged or collapsed. This sub area examines how network resiliency can be improved through infrastructure and network design and whether disaster design standards are required.

vi Hideo Tomioka, Ministry of Internal Affairs and Communications, Japan. (16 Mar 2012). Maintaining Communications Capabilities during Major Natural Disasters and other Emergency Situations. From: http://www.soumu.go.jp/main_sosiki/joho_tsusin/eng/presentation/pdf/Telecommunications_Policy_Division_MIC.pdf

Discussion Points:

- Promotion of adherence to building standards to improve resilience against disasters for structures and antennas
- Sharing best practices in robust antenna and tower design
- Innovative network design to secure communications in the event of a disaster

3.2.3 Backhaul Resiliency

It is common business continuity practice to reduce single points of failure in the network. A single backhaul connection from edge elements of the network represents a single point of failure. This backup is especially crucial during a disaster, when the likelihood of losing a connection is high; providing multiple network backhauls will increase a network's resilience. This sub area shares field experiences and aims to build resiliency standards for connecting the network. What are the most cost-effective, resilient connection solutions?

Discussion Points:

- Which backup circuits are best suited to particular disaster vulnerabilities?
- Resilient connectivity standards
- Availability of satellite backhaul at strategic network points
- Efficient resilient network topologies

3.3 Informing and Alerting - Communicating with Customers

What services can MNOs provide and can they be standardised?

As the mobile network penetration increases, its impact in terms of disseminating information to disaster-affected populations also increases, with more customers dependent on being connected via mobile technology. Through sharing examples of tried-and-tested initiatives for information dissemination, MNOs can provide more timely information services to assist both national disaster management agencies and the affected population.

In the past few years, significant innovations in disaster communications have been accelerated by the widespread use of social media and the involvement of Volunteer and Technical Communities (VTCs). As mobile penetration increases globally, and these VTC communities become further integrated and influential, operators will have new challenges and responsibilities in supporting solutions developed by these new humanitarian players. Understanding how these communities engage with mobile operators will be addressed by the coordination workstream.

Mobiles have typically played a supplementary or complementary role to other modes of communication, such as radio and television. The latter methods are ideally positioned for scenarios where there is an urgent need to broadcast authoritative information and reach as many at-risk people as possible. Mobile networks provide a distinct and unique ability to provide decentralised 2-way information and also to target information where it is most needed. The opportunities and challenges of harnessing the potential role for operators in facilitating communication for disaster-affected populations will be a core focus of the coordination workstream.

This focus area aims to discuss MNO experiences of methods and technologies for informing the population – which services and solutions work and which do not from a technical perspective. In addition, it will address technical issues in messaging systems, evaluate and suggest new mobile-based services that can assist the emergency response, and establish technical best practices in communicating with customers and the affected population.

Discussion Points:

- Implementation of standard numbering solutions i.e. fixed short codes – examination of existing schemes and potential alternatives
- The use of operator provided IVR systems to provide information to affected populations
- 2-way communication and alerting – what technical solutions work and how can they be implemented?
- Cell Broadcast – how should this be used and are standards needed?

3.4 Disaster Response and Repairing the Network

What are the ways in which operators can improve their disaster response and network restoration?

In the immediate aftermath of a large-scale disaster many parts of operators' mobile networks may be affected, while operators' resources for repairing the network are also severely challenged. A similar situation will be occurring in parallel with many other operators who will all be focussed on restoring their network capacity as quickly as possible. How can the mobile network industry ensure that they are both prepared to respond to the disaster and maximise their use of resources?

This focus area provides a platform for discussion of technical issues and challenges faced by operators in responding to a disaster and repairing their networks. These discussions will lead to the development of technical standards and practical guidelines to enable a swift, coordinated operator response immediately following a disaster, thereby ensuring that effective communications are restored as quickly and efficiently as possible.

This subject is divided into the following three sub areas: Quick and Coordinated Technical Assessments, Fast Restoration of Communication and Logistics.

3.4.1 Quick and Coordinated Technical Assessments

After a disaster it is important to quickly assess the common operational situation. This sub area looks at establishing a pre-positioned and agreed framework outlining how operators can coordinate to share information with each other and with the humanitarian community.

Discussion Points:

- Establishment of common priorities for communication restoration after a disaster
- Definition of a framework for information sharing between operators during a disaster
- Developing a framework for determining what technical information is shared between MNOs and the wider disaster response eco-system.

3.4.2 Fast Restoration of Communication

Priority must be given to the rapid restoration of communications following the onset of a disaster. An improvement in communication and cooperation between MNOs will ensure more efficient usage of resources and common prioritisation in network restoration. This can lead to a faster restoration of services and a more predictable communication platform for both the responders and the affected population. This sub area enables operators to share past experiences and develop practical guidelines and procedures that can be put in place before disaster strikes.

Discussion Points:

- Development of frameworks for operators to categorise the scale of a disaster and determine a proportionate response
- Determining feasibility for establishing joint priorities for restoration of networks
- Immediate restoration – the possible directory and provision of shared emergency satellite phones for essential sites, supply of satellite terminals
- Potential for network and resource sharing in critical situations
- Possibilities for sharing specialised human resources, such as engineers, and developing common operator emergency training and protocols
- Understanding the application of lightweight portable instant cell networks and cell restoration, and establishing a register of available units whilst ensuring interoperability
- Establishing a directory of Cell on Wheels (COWS) and similar technology, and possibilities for sharing in an emergency
- Addressing agreements around availability of satellite back haul for cell restoration and formation of partnerships with the VSAT (and other satellite) stakeholders where appropriate
- Establishment of restoration standards that enhance predictability and are better able to inform responders about network availability, restoration and prioritisation

3.4.3 Logistics

Following a disaster, the disruption of the transport infrastructure and competing priorities create logistical problems that can cause delays and challenges in network repair and restoration. It is critical that MNOs prepare themselves for these challenges and develop appropriate contingency plans. This sub area addresses common logistical issues about cooperation and coordination between operators and authorities.

Discussion Points:

- Improving coordination with governments to prioritise fuel deliveries
- Logistical assistance – is official support (e.g. government/military) required?
- Construction of MNO fuel storage sites and site directory
- Delivery of critical spare parts for mobile network infrastructure
- Addressing the barriers and regulations around importation of emergency telecommunication equipment
- Feasibility of creating shared backup repositories of major equipment
- Prepositioning shared emergency equipment (VSATS, sat phones, etc.)

3.5 Alleviating Network Congestion

Can operators arrive at a common strategy to cope with unprecedented demand and provide reliable network performance in a disaster?

In recent disasters, one of the primary problems that hamper the correct functioning of the network is the surge in traffic and congestion. Immediately following a disaster, affected people, responders and governments all turn to the mobile network for support. Voice and data traffic can surge to levels that flood the network and degrade its performance for a significant period. This phenomenon can disable an otherwise functional network. It's important to be aware that this congestion almost always occurs and is present even when no infrastructure has been damaged by the disaster. Take for example the case of an earthquake measuring 5.8 on the Richter scale which struck the U.S. state of Virginia on 23 August 2011; despite very minor infrastructure damage, this small earthquake had a large effect on the mobile networks.

All operators reported higher call volumes and network congestion in affected areas – so much so that residents and first responders were unable to place calls on mobile networks during the critical first hour after the quake.

The level of congestion is different for each disaster and can vary from 2-to-3 times the normal call volume to 50 or 60 times (as was the case after the Japan Tsunami in 2011). Smaller congestion peaks can be managed by MNOs through the use of different network management techniques such as call gapping, employing half rate on the network, and by using directed retry. Still, managing an exceptionally huge demand will be problematic. To design networks that can cope with this exceptional peak demand would prove highly expensive and impractical; operators must therefore use innovative methods to keep vital channels of communication open.

This focus area discusses different approaches to dealing with disaster-induced network congestion – which solutions work and which do not. It aims to collate solutions, standards and best practices that can enable MNOs to cope with soaring network demand following a disaster and/or to set expected standards/recommendations of service restriction to ensure a predictable response.

Overload: Network Saturation in Disasters

- After a 2010 earthquake, network traffic rose to over 10 times the average New Year holiday usage. Although only a small percentage of base stations became inoperable due to the earthquake, the additional user demand saturated the phone network within the first 24 hours.
- In the aftermath of the Japan tsunami in 2011, call levels reached up to 60 times normal traffic volume resulting in operators having to impose restrictions on up to 95% of voice calls.[vii]

vii Masaru Fujino, Counselor for Communications Policy, Embassy of Japan. (18 Apr 2012). ICT responses to The Great East Japan Earthquake One Year Later. Presented at National Cable and Telecommunications Association. From: http://www.soumu.go.jp/main_sosiki/joho_tsusin/eng/presentation/pdf/120418_1.pdf

This subject is divided into the following five sub areas: Designing Networks to Cope with Congestion, Prioritising Users, Prioritising Existing Services on the Network, Providing Services for Overloaded Networks, and Educating Customers to Ease Congestion.

3.5.1 Designing Networks to Cope with Congestion

This sub area examines how networks can be designed to be more tolerant of the traffic spikes that occur after a disaster. It also looks at the constraints and possibilities for improvement and how innovative techniques and emerging technologies can be used to improve the delivery of service.

Discussion Points:

- What network management techniques should be used, and should these be standardised?
- Progress made and the practicality of allocating specific wireless spectrum during emergencies
- As operators increase available bandwidth to meet consumer data demand, how will this affect congestion?
- Determining the feasibility of guaranteed delivery of mobile services after disaster
- Sharing innovative methods for upgrading network capacity of core facilities

3.5.2 Prioritising Users

If mobile networks are to be relied upon as a robust, reliable communication channel following a disaster, it is vital to ensure voice connectivity for high priority first responders and providers of emergency services. This need was recognised in the U.S. after Hurricane Katrina, when the Wireless Priority Service (WPS) was implemented. This service was designed to allow high-priority calls to bypass the congestion if the approved user dialled * 272 as a prefix to the outbound number. A method for prioritising users called ACCOLC was used in the UK after the London bombings in 2005 (the system is now known as MTPAS); once implemented, users with a service-enabled SIM are given priority access over the radio network, whilst requests from non-priority enabled SIMs are rejected.

This sub area examines the issue of prioritising users and assesses the benefits and challenges of these existing systems (despite some successes in implementing WPS, widespread adoption and usage has not yet been achieved).

Discussion Points:

- Feasibility of creating a register of first responder and humanitarian numbers which can be prioritised on the networks, and possible implementation of service similar to WPS
- Challenges with existing services such as WPS and MTPAS and possible solutions
- Could alternative standard user priority method be implemented?
- Understanding existing capacity for the allocation of specific spectrum for emergency coordination

3.5.3 Prioritising Existing Services on the Network

During the Haiti earthquake in 2010, voice services were highly congested and SMS and BlackBerry Messenger were often the best means of communicating. Following this experience, Digicel stated that, "what also proved very useful for Digicel's staff was the BlackBerry Messenger and the GPRS in general, it was less congested than both voice and SMS and staff were using this means to communicate major decisions and news related to the network recovery".[viii] These services are low bandwidth, best-effort delivery mechanisms that place less stress on the network than voice services.

This sub area shares MNO experiences and aims to develop techniques that can ensure certain services will receive priority in a disaster, thereby achieving a predictable service during times of crises.

Discussion Points:

- Ensuring automatic roaming on emergency numbers?
- Text first-talk later? Establishing the scope for allowing SMS-only for a limited time period immediately following a disaster
- The prioritisation of packet switched networks, which are more reliable than circuit switched after a disaster (after the Japan tsunami in 2011, restrictions on the packet switched network were temporary and only applicable to 30% of connections)

viii Digicel. (2011, August). Operators Role in Natural Disasters, The Haitian Case Study. Presented at the GSMA BARG.

- Requirements for ensuring voice call capabilities (time limits on calls, reduced call quality, etc.)
- Designing next-generation networks with increased disaster awareness in mind

3.5.4 Providing Services for Overloaded Networks

In the event of a severe overload, how can mobile networks, as a critical part of the disaster ICT landscape, provide additional services that can enable the government, responders and disaster-affected population to communicate reliably, despite the severe network congestion?

This sub area looks at what services can be implemented and whether it is possible to achieve a standard toolset of disaster services that offer reliable communication in disasters.

CASE STUDY: Innovations for Congestion

In the aftermath of the Japan tsunami in 2011, severe restrictions left many affected unable to make voice calls. Other methods of communication, such as SMS, were more successful, but people are still far more reassured by hearing a voice in times of crises. To solve this problem, NTT DOCOMO has developed an innovative service for smart phones. When the voice (circuit switched) networks are overloaded and a call cannot be delivered, the service converts the voice message to a data file and carries it to its destination via the less congested packet network.[ix]

Discussion Points:

- Innovative use of SMS services
- Voice services – converting voice into IP and sending over the packet network
- Applications that can involve social media and/or GPS type information
- Smartphones are becoming cheaper and more widespread, can they be used to help with congestion?

3.5.5 Educating Customers to Ease Congestion

Operators are well placed to provide leadership in disaster-prone areas by educating their customers on what to expect from the network when a disaster occurs. Together with educating customers on how best to use the mobile network during a disaster, this is a cost-effective method for reducing the load on networks.

This sub area discusses how to educate customers and set their service expectations in a disaster. Can a worldwide format for educating customers be agreed to ensure consistency across operators?

Discussion Point:

- Effective ways to inform and educate customers about mobile usage during and after disasters

3.6 Future

What opportunities for improved performance in disasters do new mobile technologies offer?

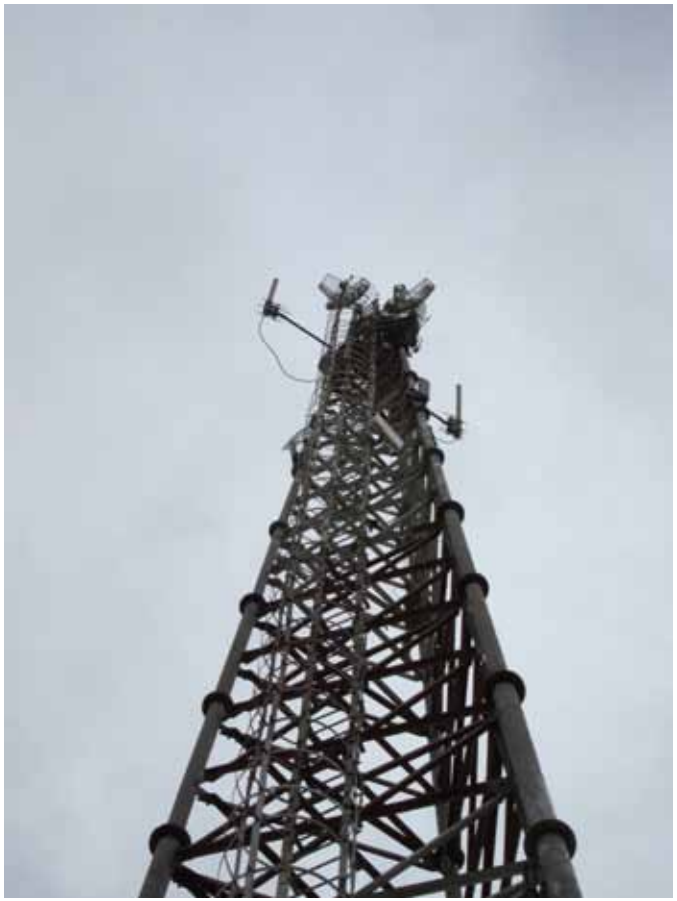
As mobile network technologies develop and operators adopt new standards, there is an opportunity to explore how these new technologies can be harnessed to improve network resilience during and after a disaster.

This focus area provides a forum for ideas and suggested solutions that incorporate developing mobile technologies (such as LTE) and the examination of how these technologies and solutions can be integrated into the future generations of mobile networks. It also works toward the drafting of standards and best practices that can be adopted in future networks and explores new applications of emerging technology to support disaster response.

Discussion Points:

- Innovative solutions for voice services to alleviate congestion using VoLTE
- Can the future adoption of heterogeneous networks play a role in future disaster solutions?
- How can new messaging technologies such as e-MBMS be used to efficiently inform and update at-risk populations of potential/on-going hazards?

ix Hideo Tomioka, Ministry of Internal Affairs and Communications, Japan. (16 Mar 2012). Maintaining Communications Capabilities during Major Natural Disasters and other Emergency Situations. From: http://www.soumu.go.jp/main_sosiki/joho_tsusin/eng/presentation/pdf/Telecommunications_Policy_Division_MIC.pdf



4 Operations to Support the Technical Challenges

Collating Data on Disasters

As part of the GSMA Disaster Response Programme, this initiative collects data and statistics from MNOs that will identify trends, recurring areas of weakness, and opportunities for intervention before and during disasters. Much of the available data in this field currently lacks standardisation and therefore the effects of disasters can be difficult to compare quantitatively. Collating this data will allow for the categorisation of disasters, the establishment of patterns and inform future GSMA Disaster Response initiatives.

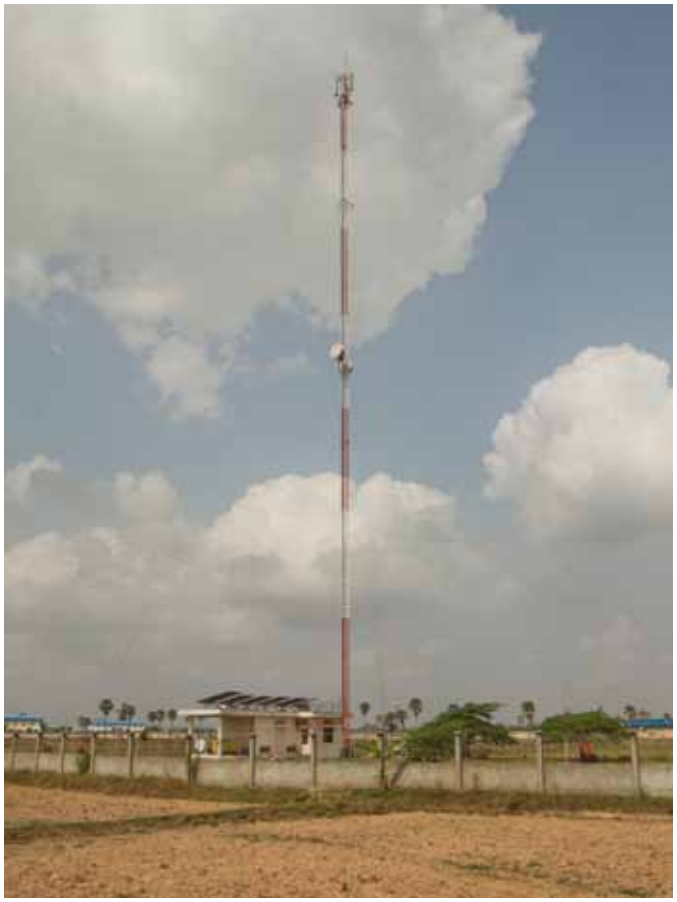
Preliminary categories for collected data:

- A snapshot of basic MNO status in the region before the disaster
- Operator status immediately post disaster, including physical status, network status (Voice, Data and SMS), and restoration information
- Operator status and network recovery at post-disaster intervals

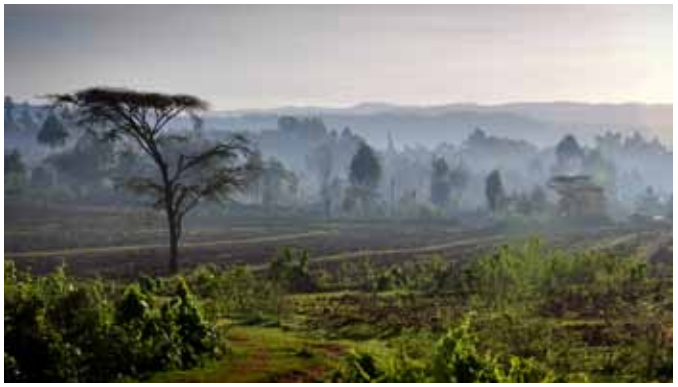
If required, the data collected can be made anonymous and aggregated so that individual MNOs cannot be identified.

Discussion Points:

- What data is available, and how can this be standardised?
- How will this data be collected?
- Issues regarding anonymity and data security
- Who will have access to this data?



5 Conclusion



This document has outlined the preliminary objectives of the GSMA Disaster Response Programme Technical Work Stream and the priority areas of focus to be addressed by participants.

In order to overcome the challenges that the mobile industry faces in disaster preparedness, recovery and response, improved inter-industry support and a commitment to share best practices and develop common standards will be required to ensure impactful and effective strategies.

To participate in the programme, provide feedback, or suggest areas of inclusion for the Working Group, please contact disasterresponse@gsm.org.

Or visit:

http://www.gsma.com/developmentfund/programmes/disaster-response/

About the GSM Association

The GSMA represents the interests of mobile operators worldwide. Spanning 220 countries, the GSMA unites nearly 800 of the world's mobile operators, as well as more than 200 companies in the broader mobile ecosystem, including handset makers, software companies, equipment providers, Internet companies, and media and entertainment organisations. The GSMA also produces industry-leading events such as the Mobile World Congress and Mobile Asia Expo.

About the Development Fund

Serving the Underserved through Mobile

The GSMA Development Fund brings together our mobile operator members, the wider mobile industry and the development community to drive commercial mobile services for underserved people in emerging markets. We identify opportunities for social, economic impact and stimulate the development of scalable, life-enhancing mobile services.

For more information on the GSMA Disaster Response Programme, please email: disasteresponse@gsm.org

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