



Italy Earthquake Response and Recovery:

A Disaster Response
Case Study



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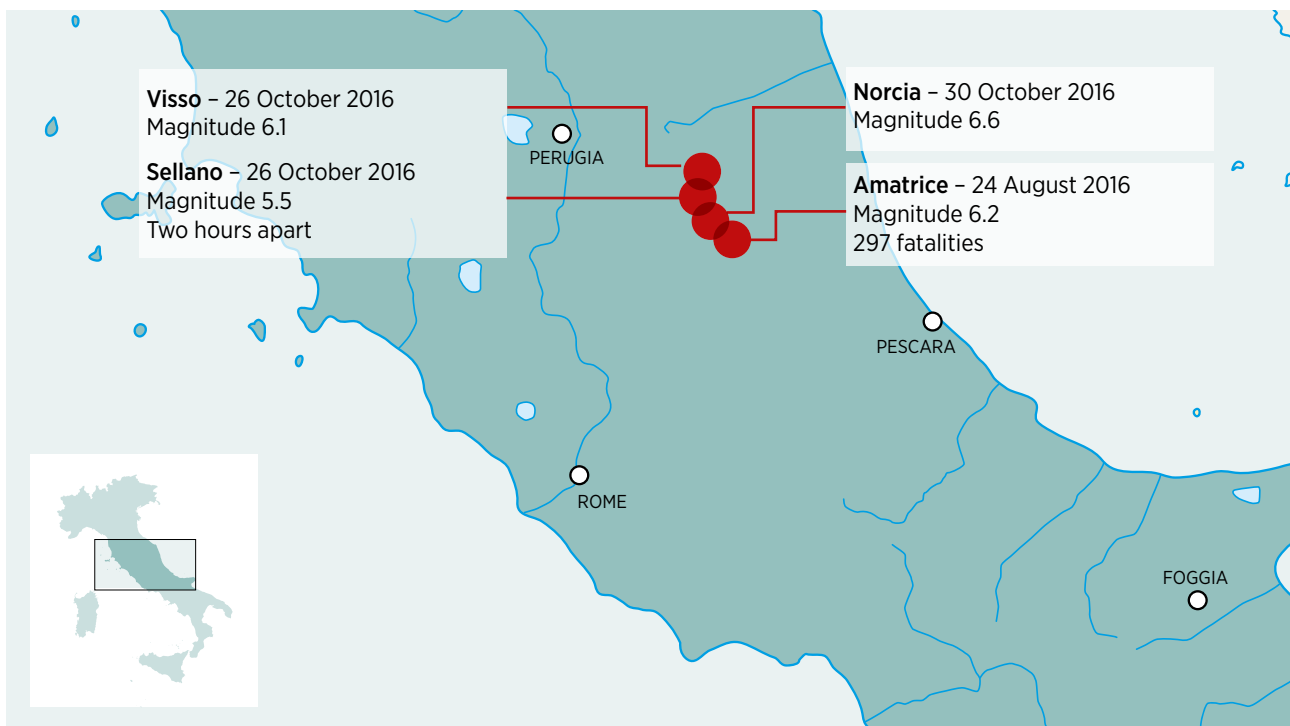
Introduction



In the early hours of 24 August 2016, a magnitude 6.2 earthquake struck Central Italy, 10km from Norcia, at a shallow depth of 10km. Multiple aftershocks followed, resulting in 297 fatalities and approximately 400 injuries. Serious damage occurred in the regions of Lazio, Umbria, and Marche with the towns of Amatrice, Accumoli, and Arquata del Tronto being hardest hit.¹ The Italian Government declared a state of emergency in the country's worst hit regions, and mobile network operators (MNOs) reacted quickly to restore services and play a critical role in humanitarian response. On 26 October two more violent aftershocks occurred, followed by further smaller aftershocks, destroying buildings or rendering them structurally unsafe in several towns and villages in the mountainous central region, forcing thousands of people to abandon their homes. In the aftermath of these earthquakes, rapid access to information and communication played a crucial role in the response and recovery of the affected communities.

1. Humanity Road, 24 August 2016, <http://humanityroad.org/wp-content/uploads/2016/08/Italy-HR-Sitrep1Aug242016.pdf>

Italian Earthquakes, August and October 2016



This case study highlights the response, best practices, and lessons learned by MNOs in Italy (TIM, 3 Italia², Wind³ and Vodafone) as a result of these earthquakes, and outlines priority areas aimed at improving preparedness and response to future emergencies. It aims to capture the key actions taken by MNOs in

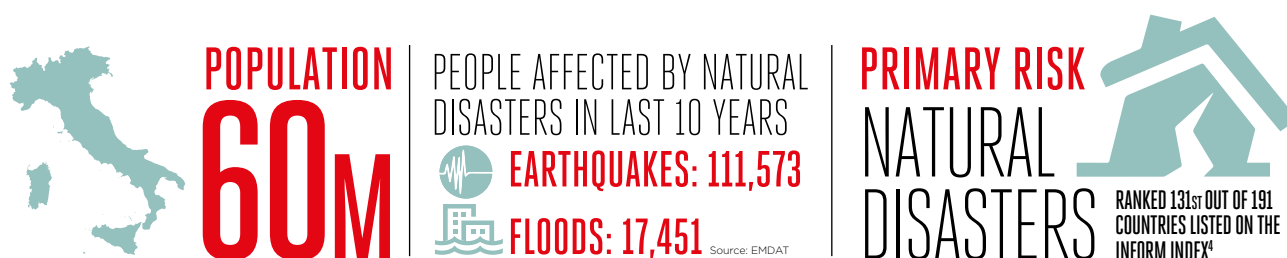
the affected areas in the hope that they can assist other MNOs in preparing for earthquakes and other emergencies elsewhere in the world, with the ultimate aim of ensuring reliable connectivity in times of crisis, to prevent loss of life.



2. On 31 December 2016, Wind and 3 Italia merged to become Wind Tre
3. Ibid

Disaster risk in Italy

Italy - Disaster Vulnerability Facts and Figures



The August earthquake was the result of a shallow faulting on a NW-SE oriented fault in the Central Apennines, which is one of the most seismically active areas in Italy. The Apennines is a mountain range stretching from the Gulf of Taranto in the south of Italy to the Po basin in the north of the country, formed by the ongoing subduction of the Adriatic Plate beneath the Eurasian Plate.

Due to the tectonic and geological complexity of the central Apennine region, it has experienced a number of fatal earthquakes in recent history. As exposure to natural disaster risks, particularly earthquakes, will continue to pose a challenge for the country, it is important to recognise the important role that the mobile industry can play in disaster response and recovery.

Major earthquakes in Italy's recent history

Magnitude (Mw)	Date	Location	Impact
7.2	28 December 1908	Messina	82,000 fatalities
6.7	13 January 1915	Avezzano	32,000 fatalities
6.9	23 November 1980	Eboli	2,735 fatalities, 7,500 injured
6.3	06 April 2009	Abruzzo	295 fatalities, 1,000 injured, 55,000 homeless
6	20 & 30 May 2012	Emila-Romagna	24 fatalities, 350 injured, 15,000 homeless

4. INFORM index: <http://www.inform-index.org/>

Mobile Market in Italy

Mobile penetration in Italy is estimated at 82.7%⁵, with a unique subscriber base of 49.47 million⁶. As a mature telecoms market unique subscriber growth is minimal, with penetration forecast to rise to 83.09% by 2020. Average revenue per connection is €12.6, slightly higher than the average for Southern Europe which is €11.92⁷.

Italy is a competitive mobile market with three MNOs; Wind Tre, Vodafone and TIM. In December 2016, Wind (Veon) and 3 Italia (CK Hutchison Holdings) merged to form Wind Tre⁸, which currently holds the largest market share at 41%⁹. The remaining market share is held by Vodafone (30%) and TIM (29%).

First phase of response

In the early hours of 24 August, following the first 6.2 magnitude earthquake, immediate inspection was undertaken of all MNO network equipment to assess functionality of fixed telephone communications, mobile, and internet, identifying no damage to TIM, 3 Italia or Vodafone's networks. The assessment of the infrastructure was reported to the National Civil Protection Service (Protezione Civile); the body - formed in 1992 - responsible for the prevention of various types of risk and for the coordination of activities needed to overcome emergencies. MNOs immediately made contact with the Joint Operating Committee, established by the National Civil Protection Service, to create a channel of communication with

all internal units performing emergency-related activities. The committee is a grouping of key organisations, including the police forces, energy and telecommunications providers, enabling them to coordinate their relevant activities and support requests from local and national government authorities.

Extra emergency lines were activated at police headquarters in Rieti in addition to those already in operation. All MNOs provided special emergency equipment, including fixed and mobile communications located at the relief centres.¹⁰



We worked in synergy with the other people involved in the Civil Protection System and with the company structures working on the ground...facilitating interventions of the technical structures, with the support of relevant institutions.

Maria Letizia Stazi, Head of Crisis Management, TIM



5. GSMAi Q4, 2016

6. ibid

7. ibid

8. <http://www.windtre.it/>

9. Activities of Wind and 3 Italia prior to December 2016 have been attributed to the original company. Activities from December 2016 onwards are attributed to Wind Tre.

10. TIM website: http://www.telecomitalia.com/content/dam/telecomitalia/it/archivio/documenti/media/note_stamp/mercato/2016/TIM-Terremoto-Ricarica-e-Internet-gratis-25-agosto-2016.pdf

Emergency personnel and equipment deployment

Emergency equipment was used to strengthen fixed, mobile, and data networks in affected areas. TIM interventions included new lines, a stronger mobile signal and Wi-Fi with free access in the temporary shelter areas. TIM also provided 2G/3G/LTE coverage in the affected areas, strengthening services in the various territorial Coordination Centres, run by the Civil Protection team and in the premises used by local institutions and police.¹¹

TIM deployed 240 staff to work in the affected areas for ten days, including a task force of engineers to deal with emergencies and to facilitate relief efforts, with the support of satellite phones to address possible network congestion due to the sudden upsurge in voice and data traffic. In the first minutes following the first August earthquake, people mainly used voice services, causing congestion issues and reducing the number of successful calls which could be made.

Wind reported that in the first ten minutes following the earthquake, their Mobile Switching Centre (MSC) Server which manages customer phone calls, experienced high Central Processing Unit (CPU) usage. They also reported that the radio access network Key Performance Indicators (KPIs) showed the rejection of some calls due to call congestion. Call availability was restored within minutes, though the level of traffic remained high for the first 30 - 40 minutes following the August earthquake.

In coordination with Vodafone Foundation and the Italian Civil Defence, Vodafone Italy immediately deployed Instant Network volunteers to the affected areas to check that the network coverage was optimal for rescue teams. The Instant Network is a portable GSM network that fits in 4 cases, weighing under 100kg, and can be established in less than 40 minutes. The Instant Network provides 2G and 3G connectivity, has inbuilt wireless capability and secure connectivity via firewall and VPN.

The volunteers also delivered Instant Charge facilities in the emergency camps, set up in the mountainous area to support those affected by the earthquakes and

emergency services personnel. Instant Charge, a durable and portable outdoor mobile charger which allows up to 66 devices to be charged simultaneously at any one time can be set up in under 10 minutes.¹²

In order to reduce possible disruption caused by ongoing power outages, generators were deployed by MNOs to power network infrastructure, including main stations and Base Transceiver Stations (BTS). TIM quickly sent several response vehicles equipped with generators, specifically designed and developed for emergency interventions, to the worst affected municipalities.

Wind deployed five power generators for two days, until the national-grid power supplies could be fully restored. Following the earthquakes in October in which four access network BTS sites were compromised as a consequence of damage to the buildings on which they were installed, Wind deployed two temporary BTS. By 11 November, three of the original sites had been reactivated while the fourth was activated in a new location on 23 December.

In addition to the four BTS damaged in October, Wind had five BTS out of service due to power supply interruption. After exhaustion of the backup batteries they went out of service, and were restored only after the mains power supply resumed or by the installation of an external power generator. Three BTS were restored in the afternoon of 30 October, and two the day after, due to road closures.

Vodafone ensured that rescue teams and affected populations had access to reliable communications by optimising mobile coverage by installing an additional mobile BTS to improve the mobile capacity in the area.

Direct contacts between MNOs were established for jointly solving operational problems in the area, with exchange of site hosting and exchange of power availability by power generators in cases of nearby sites.

11. TIM for the August 2016 earthquake: technology and people - Case Study, November 2016, <http://www.telecomitalia.com/tit/en/sustainability/stakeholders/community/case-study-terremoto-agosto-2016.html>

12. Vodafone Foundation website: <http://www.vodafone.com/content/foundation.html>

Customer support

All three MNOs offered specialised customer support to ensure that the affected populations had reliable access to essential communications throughout the crisis.

Customer Support

- Suspension of billing and credit management activities for affected subscribers
- Free voice and data
- Social media updates regarding national response activities
- Charging stations, new handsets and activation of SIMs

TIM

- TIM suspended deadlines for subscriber billing and blocked credit management actions to allow continued customer access to services.¹³
- Offered free restoration of all fixed lines in buildings that had been checked and declared safe, and created new lines in temporary accommodation.
- Credited customer accounts in the municipalities of Amatrice, Accumoli and Arquata del Tronto with €10 top up and 2GB.
- Suspended ordinary activities on social media accounts and made those channels available to Protezione Civile to send service information. Additionally, the channels were used by TIM to support and inform its customer base.
- TIM's sales team used a TIM camper van to provide charging stations, activate SIM cards and provide new phones to customers who needed them.

Vodafone

Vodafone undertook commercial actions in support of the municipalities affected, both for private and business customers. In particular:

For private customers:

- €10 top up and free SIM substitution in shop
- Resettling of renewal cost (up to four renewals) for subscribers of fixed lines in houses destroyed or unusable and the possibility to request disabling telephone live with no penalties
- Activation of 15 GB free for each renewal (up to four renewals) for subscribers of fixed lines and associated data SIM
- Activation of an extra one GB free for browsing for mobile customers

13. <http://www.telecomitalia.com/tit/it/archivio/media/note-stampa/market/2016/NS-TIM-Terremoto-24-agosto-2016.html>

For business customers with registered offices in municipalities seriously affected:

- **Calls from mobiles, and SMS, free for four weeks**
- **Resettling the bill to business customers living in the municipalities most affected (Amatrice, Arquata del Tronto and Accumoli).**

For both private and business customers:

- **All contact activity for marketing purposes were suspended**
- **Expiration dates of invoices were deferred and credit management actions suspended**

In the second phase after the emergency, Vodafone gave direct assistance to affected customers, distributing handsets and substituting SIMs.

Vodafone also provided customers in the affected areas with live access to Vodafone's call centre and donated 30 tablets to children on their first day at elementary school at the Arquata del Tronto (Ascoli) camp.

WIND

- **Identified affected customers through the internal client database and personal details, such as their postcodes, within the first 48 hours after the earthquake.**
- **Immediately suspended all billing and credit management activities for the populations struck by the earthquake.**
- **Donated credit of €5 per month, to customers in areas struck by the earthquake each month until the end of the year.**
- **Offered for two months and completely free of cost, 200 minutes per month of voice services and one GB per month of data services.**

3 Italia

- **On 24 August, 3 Italia donated credit of €50 to affected pre-paid customers**

Fundraising efforts

All MNOs in the country, in agreement with the National Civil Protection Service, activated a pre-arranged short code '45500' to raise funds for the affected population. Italian telecom firms TIM, Vodafone Italy, Fastweb, Coopvoce, 3 Italia, Wind and Infostrada participated. Italian subscribers could **donate €2.00 by texting 45500** or by dialling the same number from a landline.

The donation platform in phase one, related to the earthquake of 24 August, was activated immediately after the disaster and was in place until 8 October. A second phase was launched for the recovery of the earthquake on 30 October. Wind and 3 Italia **customers donated over €4.9 million** across the two phases, collected via mobile and fixed line donations. On 31 December 2016, the Civil Protection Service (Protezione Civile) launched a new fundraising initiative in order to support school building reconstruction. This third initiative ended on 14 February 2017, with **Wind and 3 Italia raising €500,000**.

In addition to participating in the donation platform, TIM joined a fundraising initiative promoted by Corriere

della Sera and TG La7 to support the earthquake victims in need of basic necessities and long-term assistance. The dedicated Crowdfunding website - unaiutosubito.org - was built with expertise from TIM and Starteed and to date has **raised over €1.4 million from over 19,000 individual donors**. The website allows people to donate online, via credit card or bank transfer from Italy and abroad.

3 Italia's employees also joined the fundraising initiative promoted by Corriere della Sera and TG La7 through a pay roll donation, **donating €23,000**, while Wind's employees joined a similar initiative promoted by the **telco unions, donating €12,000**, with an additional €12,000 matched by the company.

TIM joined an initiative jointly promoted by the Italian employers' federation and unions to collect money to support the population affected by the earthquake. TIM employees contributed to the fundraising (from 15 September to 10 January) each **giving the equivalent of one hour of pay**. TIM matched the total amount collected with its own contribution.

All MNOs in the country, in agreement with the National Civil Protection Service, activated a pre-arranged short code '45500' to raise funds for the affected population.



11. TIM for the August 2016 earthquake: technology and people - Case Study, November 2016, <http://www.telecomitalia.com/tit/en/sustainability/stakeholders/community/case-study-terremoto-agosto-2016.html>
 12. Vodafone Foundation website: <http://www.vodafone.com/content/foundation.html>

Learning from past experience

MNOs operating in Italy are well prepared for disasters, having had a long history, as well as recent experience, of earthquakes and floods in the country. MNOs are acutely aware of the important role they must play in times of disaster, not only for their own businesses, but for their subscribers and the wider community.

For example, in the immediate aftermath of the 2009 earthquake, TIM ran a series of initiatives in affected parts of the Abruzzo region, including free top-ups for customers, bill dispatch service suspension, deployments of public telephones and - in the longer term - contributed significant donations.¹⁴

Although new communication technologies are important, knowledgeable staff trained for disaster scenarios are key for the successful management of such emergencies. Maria Letizia Stazi, Head of Crisis Management at TIM stated:

"Every manager in the crisis team must keep their managerial, specialist and technical skills up to date. It is also fundamental to develop the personal and behavioural characteristics that people called on to act in an emergency need to have: balance, self-control, multi-tasking, lucid and rapid decision-making, problem solving, but also willingness to intervene at any time of the day or night to deal with long periods of stress."

To ensure optimal operational efficiency in such situations, Wind Tre has a Crisis Management Procedure, updated regularly, to address company behaviour in case of an earthquake or any other extreme event. The procedure identifies the units involved with their related powers and responsibilities, the information flows to be activated and the main activities to be performed in coordination with the National Civil Protection Service.

Furthermore, after an initial pilot activity, Wind Tre is running a Business Continuity Management programme that aims to identify and manage the risks threatening operational continuity with the purpose of enabling the organisation to prevent and respond efficiently to critical events potentially endangering the achievement of its objectives. Wind Tre performs annual assessments of the risk exposure levels of its principal transmission sites with respect to earthquakes and floods, and identifies the interventions required to contain the risk within accepted thresholds.

The experience of previous events is constantly fed into this system. For example, new rules at the national level were added after the L'Aquila earthquake for civil engineering works related to network infrastructure.

Key challenges and future considerations

The Italian earthquakes and aftershocks that took place in August and October 2016 resulted in limited damage to the mobile network infrastructure of MNOs operating in the affected regions. Wind Tre reported that the most significant problems stemming from the earthquakes were created not by damages to telecommunication infrastructure but by power shortages in the electricity network in the area.

Subsequently, Wind Tre has identified the strengthening of battery backup as a priority area, committing to investing more into battery backup improvement. The current batteries in the majority of Wind Tre sites have a life-duration that is appropriate for a normal power outage, but not for a very long outage caused by a major earthquake. As a preparedness measure, the sites in the recently affected areas have been subject to battery backup improvement.

14. http://www.telecomitalia.com/tit/en/archivio/media/comunicati-stampa/telecom-italia/corporate/istituzionale/2009/04_09_b.html

Key Challenges

- Power outages in the electricity network in the area.
- Affected areas were widely dispersed over difficult terrain making assessments and emergency equipment delivery challenging.

Post-emergency activities to improve preparedness

Wind Tre

- Wind Tre will strengthen battery backup at its sites as a priority.
- Improvements in mobile emergency equipment availability by area, in addition to leveraging new technologies that improve network and service resilience.

TIM

- Assessments of damages and expense sustained to inform allocation of funds for upcoming emergencies.
- Investments in prevention, training and communication.

Wind Tre is also improving their mobile emergency equipment availability by area and will continue leveraging on new architectures and technologies (e.g. pooling of resources to produce redundancy) that improve the network and service resilience in case of extreme events such as these.

For TIM, in addition to problems caused by power shortages, the response to the August earthquake was particularly challenging due to the impacted areas being widely dispersed over arduous terrain, making accessibility and delivery of emergency equipment to remote villages and towns difficult. The road infrastructure in many of the affected areas was poor with numerous blocks and bottlenecks making access near impossible.¹⁵

TIM's post-emergency activities include assessing the damages suffered and the expense sustained in order to allocate necessary levels of funding for upcoming emergencies. TIM state they will "take action to improve planning, where necessary, and at the same time continue to invest in prevention, training, communication; namely, in all those activities that enable the risks to be reduced, maintaining the structures in a state of readiness, disseminating a culture of protecting company resources and collaborating with the Country System." For Vodafone, the network was not seriously affected by the earthquakes and aftershocks and offered constant

mobile coverage starting from the early phases of disaster emergency relief. Therefore, Vodafone did not deem it necessary to implement new activities or changes to improve preparedness in the future, but continue to regularly assess their continuity and response planning.

The impressive response to the earthquakes in Italy is testament to the advanced processes, technologies and preparedness measures that the MNOs operating in Italy had in place prior to the earthquakes, and the strategies that had been implemented by the National Civil Protection Service to ensure a rapid and well-coordinated response to emergencies.

This case study also demonstrates the importance of robust and consistent training for MNO staff to ensure that they are well prepared both personally and professionally in times of crisis. Whilst there was only limited damage to the mobile network infrastructure of MNOs operating in the region, power shortages proved problematic. Consequently, areas for improvement, such as the strengthening of battery backup and leveraging on new technologies, have been identified to ensure an even more efficient response in future. The intention of this study is to share these examples of best practice with the wider mobile industry to improve preparedness and response activities for earthquakes and other emergencies in other markets.

15. TIM for the August 2016 earthquake: technology and people - Case Study, November 2016, <http://www.telecomitalia.com/tit/en/sustainability/stakeholders/community/case-study-terremoto-agosto-2016.html>



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