

# Impact of the Kaikoura earthquake on the Telecommunications Infrastructure

Andrew Austin  
Department of Electrical and Computer Engineering  
The University of Auckland

Paper submitted to the NZSEE Bulletin special issue:

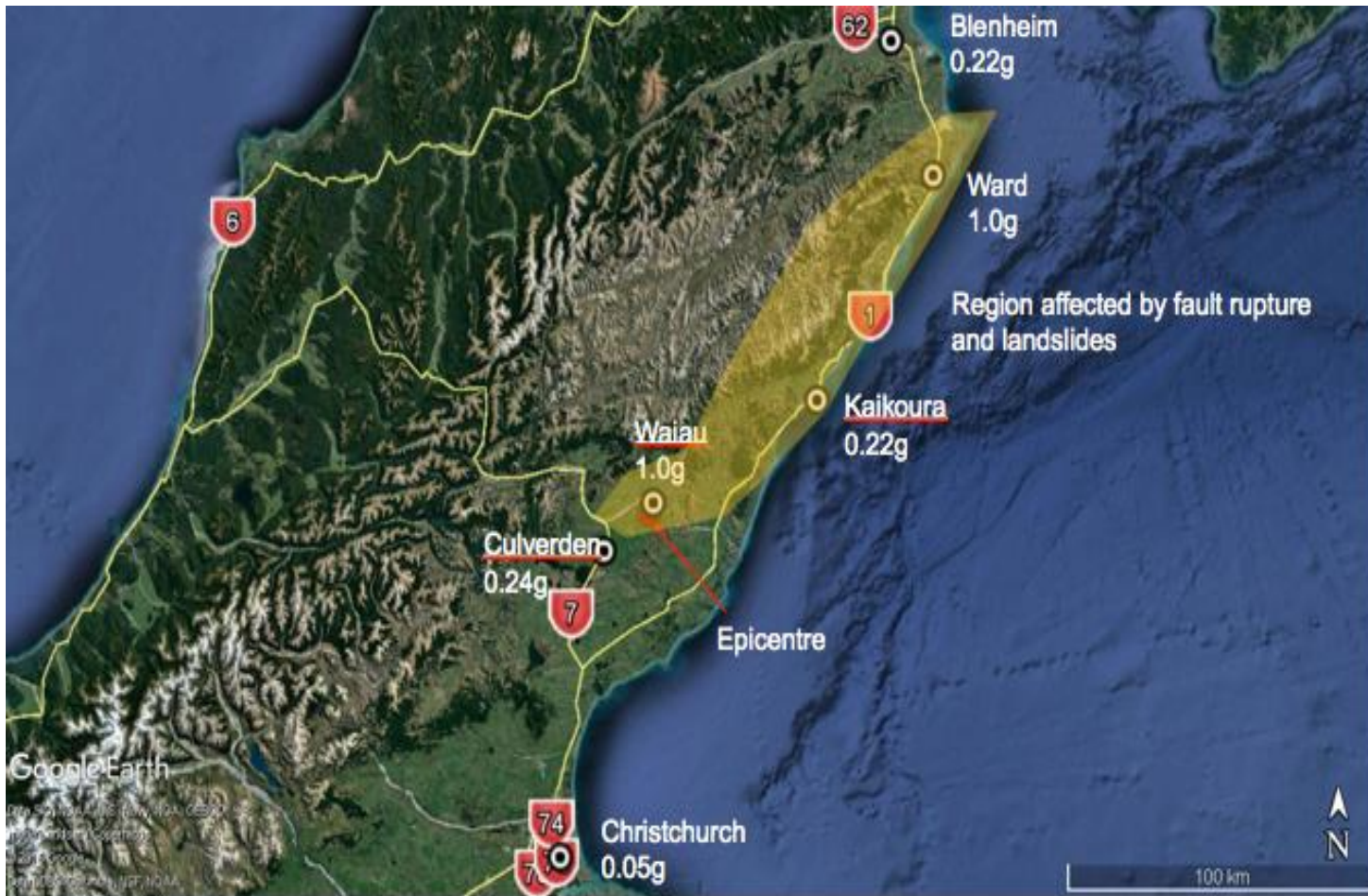
**RESILIENCE AND FRAGILITY OF THE TELECOMMUNICATION NETWORK TO SEISMIC EVENTS: EVIDENCE AFTER THE KAIKOURA (NEW ZEALAND) EARTHQUAKE SEQUENCE**

**Sonia Giovinazzi, Andrew Austin, Rob Ruiters, Colin Foster, Mostafa Nayyerloo, Nirmal-Kumar Nair and Liam Wotherspoon**

# Overview

- Impact of the earthquake on telecommunications in Kaikoura
- Response, repair and restoration
- Interdependencies
- Resilience and strategic solutions

# Region effected by the earthquake



# Severing of the East Coast Link:

- Main fibre-optic cable running from top of S. Island to Christchurch and Dunedin and through Kaikoura



- Runs alongside State Highway One
  - Cable severed in a number of places
  - Permanent repairs not possible until ground stabilised
  - Temporary repairs also dependent on road access
- Essentially cut off **all** telecommunications in/out the Kaikoura region (including cell-phones)
  - Redundancy in national telecommunications infrastructure: traffic diverted on to West Coast Link

# Local damage within the Kaikoura region

- Local phone-calls could still be routed through the exchange!
- Some minor damage to exchange buildings: cards shaken from racks
- Stretching and breakage of buried cables (including on bridges)



# Restoration of services

- Damage to East Coast Link was severe: estimated to take weeks/months to repair
- Vodafone aqua-link cable (Wellington-Christchurch) comes ashore in Kaikoura for amplification and was not damaged
  - Not normally connected, but 50 m from exchange
  - Temporary solution: connect this link into the exchange
  - Required cooperation between all service providers
  - Working by Nov 16
- Microwave backhaul links installed in rural areas: Clarence and Waiau
- Emergency calls relayed via satellite phone in exchange

# Interdependencies

- **Transport:** difficult to move equipment until road access re-established
  - Immediate repairs were made by flying in equipment and technicians
- **Power:** backup generators outside exchanges (but only 5-7 days fuel, so also dependent on road access)
  - Roadside cabinets: contain backup batteries, but drain within 24h (replaced with generators if power not restored)
  - Some further damage to equipment when power was re-established

# Resilience and Strategic Solutions

- Raise profile of telecommunications: a vital lifeline after a natural disaster, but not currently given the same priority as water/power
- Collaboration: handled very well after the Kaikoura earthquake, particularly the sharing of the Aqualink cable
- Sourcing extra capacity from dark-fibre (private owned/operated) that may be undamaged
- Plan for cascading effects and smooth interdependencies