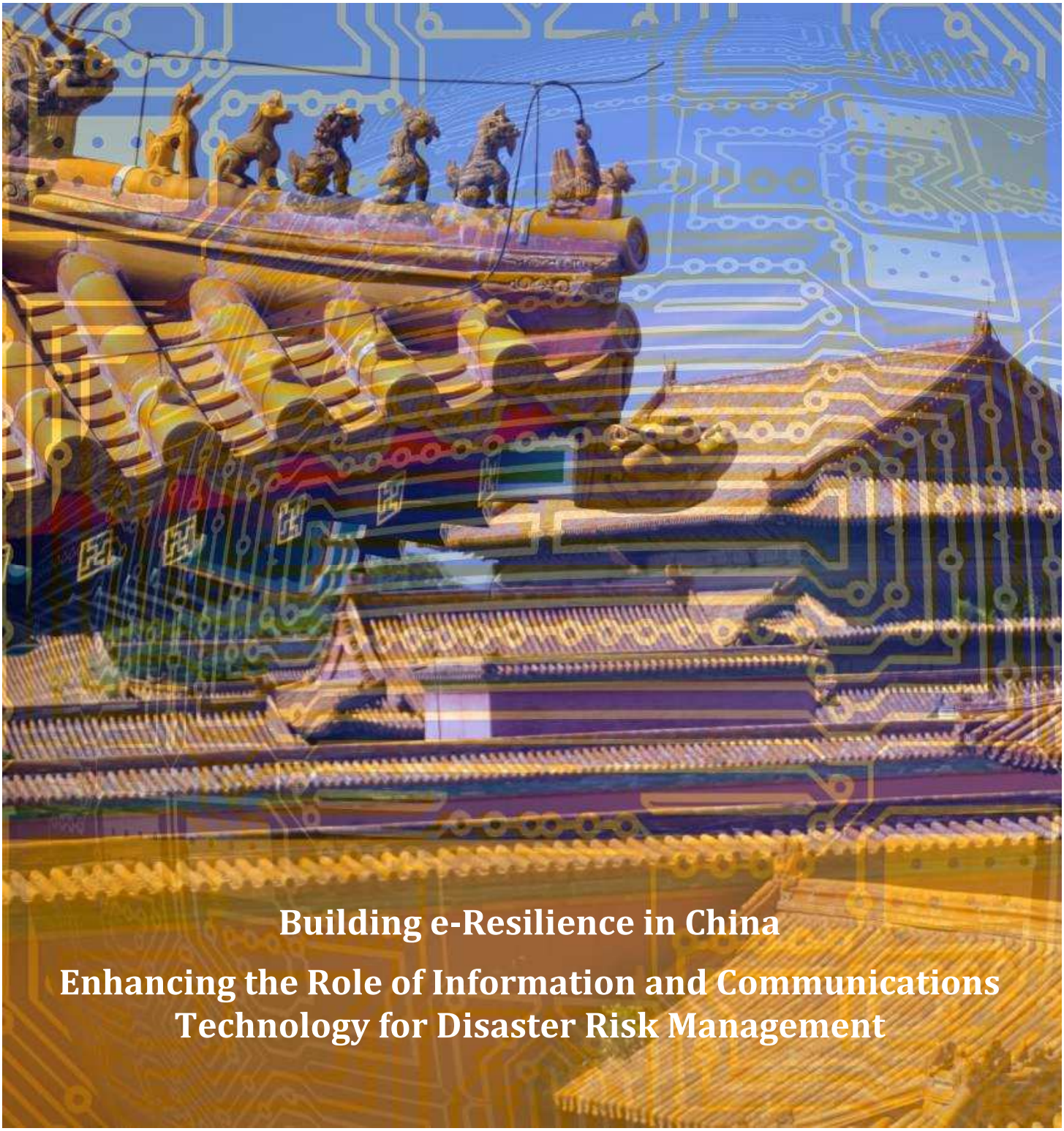

# Building e-Resilience in China

## Enhancing the Role of Information and Communications Technology for Disaster Risk Management

UNITED NATIONS
ESCAP
Economic and Social Commission for Asia and the Pacific

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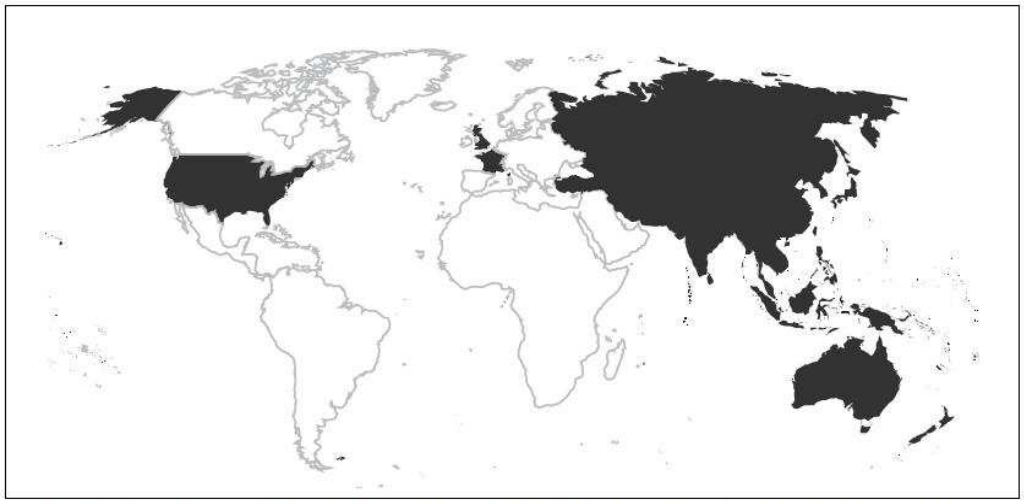

The shaded areas of the map indicate ESCAP members and associate members.

**Building e-Resilience in China: Enhancing the Role of Information and Communications Technology for Disaster Risk Management**



This study was prepared by Peter Lange in 2015.

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## Abbreviations and Acronyms

| | |
|---|---|
| 2G | Second Generation |
| 3G | Third Generation |
| 4G | Fourth Generation |
| CNNIC | China Internet Network Information Centre |
| DRM | Disaster Risk Management |
| DRR | Disaster Risk Reduction |
| DSL | Digital Subscriber Line |
| ESCAP | Economic and Social Commission for Asia and the Pacific (United Nations) |
| FOSS | Free and Open Source Software |
| FttX | Fibre to the X (a generic term for fibre deployment to the premise, home, building, etc.) |
| GIS | Geographic Information System |
| GSMA | Global System for Mobile Communications Association |
| HFA | Hyogo Framework for Action |
| ICT | Information and Communications Technology |
| IP | Internet Protocol |
| MIIT | Ministry of Industry and Information Technology |
| MPLS | Multiprotocol Label Switching |
| NDRC | National Disaster Reduction Centre |
| NGO | Non-Governmental Organization |
| SDG | Sustainable Development Goal |
| SLA | Service Level Agreement |
| SMS | Short Message Service |
| TASIM | Trans-Eurasian Information Super Highway |
| TAE | Trans-Asia-Europe (a terrestrial cable network between Europe and Asia) |
| VoIP | Voice over Internet Protocol |

## Executive Summary

China is one of the world's most disaster-affected countries. This report examines the role of the information and communications technology (ICT) infrastructure, services and applications in disaster risk management (DRM) and disaster risk reduction (DRR). Particular attention is given to the concept of e-resilience, i.e. the ability of ICT systems to withstand, recover from and change in the face of an external disturbance such as a natural disaster. The study looks at the gaps and performance weaknesses in the ICT infrastructure, from its local access networks and national backbone, to its international connectivity. The study also assesses the extent of the 'digital divide' in China, with the aim to identify priorities for future infrastructure deployments and to provide guidance to policymakers.

Key findings in the report include the following:

- There are significant regional differences across China in its deployment of the ICT infrastructure, and the availability and affordability of ICT services to the local population. Most natural disasters in the country affect densely populated areas where, on the positive side, the telecommunications infrastructure is relatively well developed. But even in these areas, their e-resilience can be further enhanced.

- Like in most countries around the world, mobile phones have replaced fixed-line telephones as the preferred means of communication in China, both for voice calls and access to the Internet. Mobile network coverage is available to nearly 100 per cent of the population, while 3G and 4G mobile broadband coverage is still in the process of being extended beyond the urban areas.

- While major cities in China already have mobile and Internet market penetration rates comparable to fully developed countries, a 'digital divide' exists in the country where only around half of the population own a personal mobile phone or have access to the Internet. The divide is mainly caused by differences in disposable income, and this has an impact on the effectiveness of ICT systems for DRM.

- Indicators related to the quality of the ICT services, such as average download and upload speeds and packet loss in China, are mostly in line with regional averages, but significantly lags behind Asia's leading markets. Latency on China's mobile broadband networks is generally not very good. On the positive side, significant improvements have been made in recent years in most categories.

- The mobile market structure in China is not ideal for fostering competition and innovation, which has had negative consequences for the overall e-resilience of the country's mobile infrastructure. The market would benefit from an additional network operator or regional operators in underserved areas.

- China's national fibre optic backbone offers good redundancy in terms of network topology in the more densely populated eastern part of the country, but many important routes are operated by only one dominant carrier. The less populated western part of the country has fewer fibre links and is therefore more vulnerable to disruptions. Licensing additional backbone network operators would increase competition and improve the overall resilience of the national backbone.

- At the international level, China is well equipped with many submarine fibre optic cables landing at various locations along the east coast, providing good diversity to protect against service disruptions. Strengthening terrestrial fibre links to Europe and India would

create additional redundancy and provide additional bandwidth to the underdeveloped regions in the western part of the country.

- China's international Internet bandwidth per Internet user is very low in comparison with the global average; an effect from the country's ban of many international websites, applications and social media platforms. There are good examples of home-grown software, applications, web and social media platforms that have been successfully used in DRM, but the sector would clearly benefit if international platforms were more easily accessible.

- A USD 600 billion expansion and modernization of the power grid is underway, to be completed by 2020, including Smart Grid technology that will make the network more efficient, stable and resilient.