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ITU-T Focus Group on Disaster Relief Systems, Network Resilience and Recovery

Terms and definitions for disaster relief systems, network resilience and recovery

Focus Group Technical Report

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The procedures for establishment of focus groups are defined in Recommendation ITU-T A.7. The ITU-T Focus Group on Disaster Relief Systems, Network Resilience and Recovery (FG-DR&NRR) was established further to ITU-T TSAG agreement at its meeting in Geneva, 10-13 January 2012. ITU-T Study Group 2 is the parent group of FG-DR&NRR. This Focus Group was successfully concluded in June 2014.

Deliverables of focus groups can take the form of technical reports, specifications, etc. and aim to provide material for consideration by the parent group or by other relevant groups in its standardization activities. Deliverables of focus groups are not ITU-T Recommendations.

SERIES OF FG-DR&NRR TECHNICAL REPORTS

Technical Report on Telecommunications and Disaster Mitigation

Overview of Disaster Relief Systems, Network Resilience and Recovery

Promising technologies and use cases – Part I, II and III

Promising technologies and use cases – Part IV and V

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Requirements for Disaster Relief System

Requirements for network resilience and recovery

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ITU-T FG-DR&NRR Deliverable

Terms and definitions for disaster relief systems, network resilience and recovery

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ITU-T FG-DR&NRR Deliverable

Terms and definitions for disaster relief systems, network resilience and recovery

1. Scope

This document contains terms and definitions relevant to providing a common general understanding in the area of disaster relief systems, network resilience and recovery. It also intends to support the harmonized creation of terms and definitions in this area.

2. References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Document. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Document are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Document does not give it, as a stand-alone document, the status of a Recommendation.

[Terminology of ITU] ITU-R/ITU-T Terms and Definitions available at http://www.itu.int/ITU-R/index.asp?redirect=true&category=information&rlink=terminology-database&lang=en&adsearch=&SearchTerminology=&collection=&sector=&language=all&part=abbreviationterm&kind=anywhere&StartRecord=1&NumberRecords=50

[Terminology of UNISDR] United Nations International Strategy for Disaster Reduction (UNISDR) (2009), Terminology on Disaster Risk Reduction, published by The United Nations Office for Disaster Risk Reduction available at http://www.unisdr.org/we/inform/terminology

[ITU-T E.800] Recommendation ITU-T E.800 (1994), *Terms and definitions related to quality of service and network performance including dependability*

[ITU-T H.780] Recommendation ITU-T H.780 (2012), *Digital signage: Service requirements and IPTV-based architecture.*

[ITU-T X.790] Recommendation ITU-T X.790 Amd.1 (1996), *Trouble management function for ITU-T applications, Amendment 1: Implementation conformance statements proformas*

[ITU-T X.791] Recommendation ITU-T X.791 (1996), *Profile for trouble management function for ITU-T applications*

[ITU-T X.860] Recommendation ITU-T X.860 (1997), *Open Systems Interconnection – Distributed Transaction Processing: Model*

[ITU-T Y.2205] Recommendation ITU-T Y.2205 (2008), *Next Generation Networks – Emergency telecommunications – Technical considerations*

3. General definitions on disaster and disaster relief

Dependability [ITU-T E.800]**:** The collective term used to describe the availability performance and its influencing factors: reliability performance, maintainability performance and maintenance support performance.

Dedicated systems [b-FG-DR]: Systems for Disaster Relief and Early Warning that have been designed, implemented and operated only for dedicated purpose.

Disaster preparedness: The state of having been made ready or prepared to counter the effects of a natural hazard (e.g. earth quake, tsunami)

Disaster reconstruction phase: The phase in which the communication infrastructure necessary for the rebuilding of the disaster affected area is provided.

Disaster relief [b-FG-DR]: Information or action designed to be effective for reducing, suppressing, or avoiding impacts caused by disaster.
NOTE -- The disruption may be caused by accidents, natural phenomena or human activity, and results in a significant widespread threat to human life, health, property or the environment.

Disaster relief phase: The disaster relief phase describes the time period for immediate response after a disaster has occurred to overcome the immediate effects of the disaster.
NOTE – Such relief work includes providing food, clothing, shelter, and medical care to victims. Emergency communication links for connecting people to each other and conveying damage status information are most important. For disasters, such as earthquakes or tsunamis this phase may last for weeks or months.

Disaster relief radiocommunication [Terminology of ITU]: Radiocommunication used by agencies and organizations dealing with a serious disruption of the functioning of society, posing a significant, widespread threat to human life, health, property or the environment, whether caused by accident, nature or human activity, and whether developing suddenly or as a result of unexpected complex, long term process.

Disaster restoration phase: The restoration phase covers efforts to establish evacuation shelters for people, to restore the administrative functions of local communities, and to rebuild the basic infrastructure of daily life.

Disaster relief for individual [b-FG-DR]: To notify individual persons of the latest disaster relief information and/or collect the latest situation of the individuals.

Disaster relief for general public [b-FG-DR]: To notify general public of the latest disaster relief information.

Disaster relief system [b-FG-DR]: A system that supports related parties including victims, rescue workers.

Disaster response [Terminology of UNISDR]: The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.
NOTE – Disaster response is predominantly focused on immediate and short-term needs and is sometimes called "disaster relief". The division between this response stage and the subsequent recovery stage is not clear-cut. Some response actions, such as the supply of temporary housing and water supplies, may extend well into the recovery stage.

Early warning system [Terminology of UNISDR]**:** The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.
NOTE – This definition encompasses the range of factors necessary to achieve effective responses to warnings. A people-centred early warning system necessarily comprises four key elements: knowledge of the risks; monitoring, analysis and forecasting of the hazards; communication or dissemination of alerts and warnings; and local capabilities to respond to the warnings received. The expression "end-to-end warning system" is also used to emphasize that warning systems need to span all steps from hazard detection through to community response.

Reconstruction: The act or process of long term rebuilding of the telecommunication infrastructure and/or parts of it.

Recovery [ITU-T X.860]: Action taken after a failure to remove undesired consequences of the failure.

Shared systems [b-FG-DR]: Systems that are commonly used for both usual services and urgent services such as Disaster Relief and Early Warning

4. Definitions on network resilience and recovery

4.1 General

Network recovery [b-FG-NRR]: The process of recovering the level of services of a given communication network after a disaster.

Network resilience [b-FG-NRR]: The ability to provide and maintain an acceptable level of service in the face of faults and challenges to normal operation of a given communication network, based on prepared facilities.

4.2 Definitions related to network architecture

Delay tolerant networks (DTN) [b-FG-NRR]: DTN technology stores the information when it is connected to the source (e.g. mobile terminal), and delivers the information to the destination when it finds the end-user.

Local wireless mesh network [b-FG-NRR]: a local-area network which consists of multiple relay-capable nodes connected with each other via wireless links (i.e., in a mesh form), governed by de-centralized control for discovering communication paths from among available nodes and wireless links, and provides information relay services to the user terminals (which are typically WiFi terminals).
NOTE – The relay nodes are assumed to be placed on the top of the buildings or ground with good visibility in preparation for disaster, installed where needed, or transportable by car or plane. Local communication service in a relatively limited area provided by a private company or local government (rather than public network operators) is an initial design target.

Movable and deployable ICT resource unit (MDRU) [b-FG-MDRU]: a collection of information and communication resources that are packaged as an identifiable physical unit, movable by any of multiple transportation means, and workable as a stand-in for damaged network facilities and so reproduce their functionalities as a substitute.
NOTE – Packed into a container or box, an MDRU accommodates equipment for reproducing ICT services such as switches/routers, wired/wireless transmitters/receivers, servers, storage devices, power distribution unit, and air conditioners.

Telecommunications for disaster relief [ITU-T Y.2205]: Telecommunications for disaster relief (TDR) is an international and national telecommunications capability for purposes of disaster relief. It can make use of international permanent, shared network facilities already in place and operational, temporary network facilities that are provisioned specifically for TDR, or a suitable combination of the two.

4.3 Definitions related to functional elements and interfaces

Digital signage [ITU-T H.780]: A system that sends information, advertising and other messages to electronic devices (e.g., displays, speakers) in accordance with the time of day and the location of the display, or the actions of audience. Contents and their relevant information, such as display schedules, are delivered over networks.

4.4 Definitions related to application level aspects

Business continuity plan [b-FG-DR]: A plan that enables managers and relevant people to continue to operate their businesses even in a disaster.
NOTE – The plans are made before a disaster occurs and are used mainly in public organizations to save victims' lives.

Disaster Message Board System [b-FG-DR]: A disaster relief system that enables people to input text messages into network facilities as a message board for delivery to or retrieval by other people.

Disaster Relief Guidance System [b-FG-DR]: A disaster relief system that provides location information about 1) the current location of the user, 2) user-specified sites (e.g., his or her home or office), and 3) other sites (e.g., evacuation shelters, hospitals, stations, and public facilities), and route information that guides the user to these sites.

Disaster Voice Delivery System [b-FG-DR]: A disaster relief system that enables people to input packetized voice messages into network facilities for delivery to or retrieval by other people.

Emergency call [b-Sup. 47 to Q-Ser. (03), 3.1]: A call requesting emergency services. A caller is given a fast and easy means of giving information about an emergency situation to the appropriate emergency organization (e.g. fire department, police, and ambulance). Emergency calls will be routed to the emergency services in accordance with national regulations.

Safety confirmation [b-FG-DR]: Information about the safety of users who might be affected by a disaster, or actions taken to gather and manage this information.
NOTE – Safety confirmation information should be gathered and managed at more than one site, and be reported to a specified person.
Safety confirmation and message broadcast system [b-FG-DR]: A disaster relief system that confirms the safety of people in public agencies or discrete groups and broadcasts messages to them regarding their relief activities.

5. Definitions related to power supply

Outage [ITU-T X.790] [ITU-T X.791]: Unavailability of a service or resource.

Power outage: An outage of the electric power to an area.
NOTE – The loss can be short term or long term, also called blackout.

Annex 1

Terminology developed by UNISDR

(Excerpts from UNISDR Terminology on Disaster Risk Reduction,
published by The United Nations Office for Disaster Risk Reduction)

The United Nations International Strategy for Disaster Reduction (UNISDR) develops basic definitions on disaster risk reduction to promote a common understanding on the subject for use by the public, authorities and practitioners.

This Annex contains excerpts of the terminology [Terminology of UNISDR].

Disaster

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

Comment: Disasters are often described as a result of the combination of: the exposure to a hazard; the conditions of vulnerability that are present; and insufficient capacity or measures to reduce or cope with the potential negative consequences. Disaster impacts may include loss of life, injury, disease and other negative effects on human physical, mental and social well-being, together with damage to property, destruction of assets, loss of services, social and economic disruption and environmental degradation.

Disaster risk

The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.

Comment: The definition of disaster risk reflects the concept of disasters as the outcome of continuously present conditions of risk. Disaster risk comprises different types of potential losses which are often difficult to quantify. Nevertheless, with knowledge of the prevailing hazards and the patterns of population and socio-economic development, disaster risks can be assessed and mapped, in broad terms at least.

Disaster risk management

The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

Comment: This term is an extension of the more general term "risk management" to address the specific issue of disaster risks. Disaster risk management aims to avoid, lessen or transfer the adverse effects of hazards through activities and measures for prevention, mitigation and preparedness.

Disaster risk reduction

The concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Comment: A comprehensive approach to reduce disaster risks is set out in the United Nations-endorsed Hyogo Framework for Action, adopted in 2005, whose expected outcome is "The substantial reduction of disaster losses, in lives and the social, economic and environmental assets of communities and countries." The International Strategy for Disaster Reduction (ISDR) system provides a vehicle for cooperation among Governments, organizations and civil society actors to assist in the implementation of the Framework. Note that while the term "disaster reduction" is sometimes used, the term "disaster risk reduction" provides a better recognition of the ongoing nature of disaster risks and the ongoing potential to reduce these risks.

Early warning system

The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.

Comment: This definition encompasses the range of factors necessary to achieve effective responses to warnings. A people-centered early warning system necessarily comprises four key elements: knowledge of the risks; monitoring, analysis and forecasting of the hazards; communication or dissemination of alerts and warnings; and local capabilities to respond to the warnings received. The expression "end-to-end warning system" is also used to emphasize that warning systems need to span all steps from hazard detection through to community response.

Emergency management

The organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps.

Comment: A crisis or emergency is a threatening condition that requires urgent action. Effective emergency action can avoid the escalation of an event into a disaster. Emergency management involves plans and institutional arrangements to engage and guide the efforts of government, non-government, voluntary and private agencies in comprehensive and coordinated ways to respond to the entire spectrum of emergency needs. The expression "disaster management" is sometimes used instead of emergency management.

Preparedness

The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.

Comment: Preparedness action is carried out within the context of disaster risk management and aims to build the capacities needed to efficiently manage all types of emergencies and achieve orderly transitions from response through to sustained recovery. Preparedness is based on a sound analysis of disaster risks and good linkages with early warning systems, and includes such activities

as contingency planning, stockpiling of equipment and supplies, the development of arrangements for coordination, evacuation and public information, and associated training and field exercises. These must be supported by formal institutional, legal and budgetary capacities. The related term "readiness" describes the ability to quickly and appropriately respond when required.

Prevention

The outright avoidance of adverse impacts of hazards and related disasters.

Comment: Prevention (i.e. disaster prevention) expresses the concept and intention to completely avoid potential adverse impacts through action taken in advance. Examples include dams or embankments that eliminate flood risks, land-use regulations that do not permit any settlement in high risk zones, and seismic engineering designs that ensure the survival and function of a critical building in any likely earthquake. Very often the complete avoidance of losses is not feasible and the task transforms to that of mitigation. Partly for this reason, the terms prevention and mitigation are sometimes used interchangeably in casual use.

Response

The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.

Comment: Disaster response is predominantly focused on immediate and short-term needs and is sometimes called "disaster relief". The division between this response stage and the subsequent recovery stage is not clear-cut. Some response actions, such as the supply of temporary housing and water supplies, may extend well into the recovery stage.

Recovery

The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.

Comment: The recovery task of rehabilitation and reconstruction begins soon after the emergency phase has ended, and should be based on pre-existing strategies and policies that facilitate clear institutional responsibilities for recovery action and enable public participation. Recovery programmes, coupled with the heightened public awareness and engagement after a disaster, afford a valuable opportunity to develop and implement disaster risk reduction measures and to apply the "build back better" principle.

Resilience

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

Comment: Resilience means the ability to "resile from" or "spring back from" a shock. The resilience of a community in respect to potential hazard events is determined by the degree to which the community has the necessary resources and is capable of organizing itself both prior to and during times of need.

Vulnerability

The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

Comment: There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors. Examples may include poor design and construction of buildings, inadequate protection of assets, lack of public information and awareness, limited official recognition of risks and preparedness measures, and disregard for wise environmental management. Vulnerability varies significantly within a community and over time. This definition identifies vulnerability as a characteristic of the element of interest (community, system or asset) which is independent of its exposure. However, in common use the word is often used more broadly to include the element's exposure.

Risk

The combination of the probability of an event and its negative consequences.

Comment: This definition closely follows the definition of the ISO/IEC Guide 73. The word "risk" has two distinctive connotations: in popular usage the emphasis is usually placed on the concept of chance or possibility, such as in "the risk of an accident"; whereas in technical settings the emphasis is usually placed on the consequences, in terms of "potential losses" for some particular cause, place and period. It can be noted that people do not necessarily share the same perceptions of the significance and underlying causes of different risks.

See other risk-related terms in the Terminology: Acceptable risk; Corrective disaster risk management; Disaster risk; Disaster risk management; Disaster risk reduction; Disaster risk reduction plans; Extensive risk; Intensive risk; Prospective disaster risk management; Residual risk; Risk assessment; Risk management; Risk transfer.

Risk assessment

A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.

Comment: Risk assessments (and associated risk mapping) include: a review of the technical characteristics of hazards such as their location, intensity, frequency and probability; the analysis of exposure and vulnerability including the physical social, health, economic and environmental dimensions; and the evaluation of the effectiveness of prevailing and alternative coping capacities in respect to likely risk scenarios. This series of activities is sometimes known as a risk analysis process.

Risk management

The systematic approach and practice of managing uncertainty to minimize potential harm and loss.

Comment: Risk management comprises risk assessment and analysis, and the implementation of strategies and specific actions to control, reduce and transfer risks. It is widely practiced by organizations to minimise risk in investment decisions and to address operational risks such as those of business disruption, production failure, environmental damage, social impacts and damage from fire and natural hazards. Risk management is a core issue for sectors such as water supply, energy and agriculture whose production is directly affected by extremes of weather and climate.

Bibliography

[b-Sup. 47 to Q-Ser. (03), 3.1]   Recommendation ITU-T Q.Supplement47 (2003), Emergency services for IMT-2000 networks –Requirements for harmonization and convergence

[b-FG-DR]   ITU-T Focus Group on Disaster Relief Systems, Network Resilience and Recovery, FG-DR&NRR-O-078 (2014), *Requirements for Disaster Relief System.*

[b-FG-NRR]   ITU-T Focus Group on Disaster Relief Systems, Network Resilience and Recovery, FG-DR&NRR-O-079 (2014), *Requirements for network resilience and recovery.*

[b-FG-MDRU]   ITU-T Focus Group on Disaster Relief Systems, Network Resilience and Recovery, FG-DR&NRR-O-080 (2014), *Requirements on the improvement of network resilience and recovery with movable and deployable ICT resource units.*

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