Trilogy Emergency Relief Application (TERA) v2.4
Product Description
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1. Introduction

**In times of disaster and crisis**, communicating with those affected is vital. It allows the Red Cross and Red Crescent to provide communities with life-saving and life changing information. It helps the Red Cross and Red Crescent to manage the demand on its services and ensure a greater quality of aid delivery. It gives those affected a voice and makes the Red Cross and Red Crescent accountable for the services it delivers. Perhaps most important of all is, it gives hope. Mobile telephony is one of the most effective, direct and timely methods of communication.

However mobile communication with disaster affected communities can be very difficult. Often the mobile communication networks themselves will have been damaged and be congested because of the surge in demand as survivors attempt to locate family and friends.

The TERA system is a communications system that is specifically designed to meet this challenge. The TERA is based on SMS (short text messages) technology which enables messages to be sent using the minimum network capacity allowing messages to be forwarded within the community. The system manages outgoing and incoming SMS between the Red Cross and Red Crescent and disaster affected people. It helps to save lives, to improve conditions for survivors and to efficiently manage the overall aid effort.

Outgoing messages are used for a number of reasons:
- To deliver flood, hurricane and other natural disaster warnings;
- To deliver targeted information about where to find medical help, clean water, food and shelter;
- To provide information to affected people on specific aid services being provided;
- To give detailed advice on a range of issues including hygiene, avoiding fraud, caring for the injured or sick;
- To communicate directly with affected people on how the Red Cross and Red Crescent can provide better services.

Incoming messages are used:
- To help affected people to provide the Red Cross and Red Crescent with information of their needs and locations;
- To allow the Red Cross and Red Crescent to plan responses based on affected population’s feedback.
2. Overview

The TERA is an SMS based communications system which has been designed to meet the needs of the Red Cross and Red Crescent whilst, at the same time, minimising the use of the host mobile operator’s network. The TERA detects active mobile phones on the network and the Cell Site that they are connected to. This means that messages can be sent to people in specific areas. Localised information can be sent without “spamming” the entire country. It also means that any build-up of undelivered messages is avoided and that the overall number of messages sent is reduced.

The TERA also manages incoming SMS using a key word recognition function. This allows responses to be automatically sent to subscribers to assist in the management of a high number of requests. This allows responses to be automatically sent for a wide range of common enquiries, helping the aid team to handle high numbers of messages.

The TERA was originally designed in response to the Haiti earthquake and the needs which subsequently emerged from communication with affected populations. The TERA has been in continuous use in Haiti since 2010 providing support for several million disaster affected people.

The TERA v2.4 goes further and allows more than one user to interact with multiple mobile telecommunication networks at the same time via a web link. This means that regional centres with trained staff can support messaging across several countries. When deployed in advance of any disaster, this provides immediate support.

Aware of the key advantages of such an approach, the International Federation of Red Cross and Red Crescent Societies has committed to deploying the TERA system across its National Society network.
3. Architecture

The TERA is composed of three main modules: Client, NGO Center and one or more TELCO Satellites.

The Client translates user requests into a XML syntax language that is understandable by the NGO Center. The NGO Center is the "bridge module" and provides the link between multiple Clients and multiple TELCO Satellites.

Web Based Client: compatible with Firefox or Internet Explorer.

Both NGO Center and Telco modules contain a web-service layer that manages the interaction with the Web-based Client and Telco modules. A security layer is also provided with both modules. The exchange of information between modules is via an SSL channel.

The Reporting Module, contained within the NGO Center, reports on all (aggregated) incoming and outgoing SMS via the TERA, from and to all the mobile operator modules. The Reporting Module contained in the mobile operator (Telco) Satellite reports on the SMS that were sent or received from that specific mobile operator.
An Operations Module within the NGO Center allows users to create, modify or delete various defined actions such as:

- **Operation**: Information on the Telco Operators that are connected to the system.
- **ORG**: Information on the aid agency such as name, description.
- **Subdivision**: For each ORG level, separate entities can be defined including Aid Centers, Group, Keywords and Answers.
- **Aid Center**: Represents the local centres established by the aid agency and the personnel groups associated with each one.
- **Group**: Lists of personnel that have a common role such as: Doctors, First-Line team and Volunteers.
- **Personnel**: Are the NGO or aid agency staff. Please note that each NGO staff member must be also a subscriber of at least one of the Telco Operators that are associated with the system.
- **Keyword**: Predefined words that any subscriber might send to the system.
- **Answer**: Predefined sentences that can be associated to one or more keyword.
- **Report**: Integrated statistics regarding incoming and outgoing SMS from and via the TERA.

A Services Module is provided inside the NGO Center which allows the user to send early-alert warning and Cell-Site SMS to the subscriber.

The Data Integration Component retrieves subscriber information, including their geo-position, from the last call or message sent or received by the subscriber.

The Batch Scheduling component, contained within the Telco Module, determines the time at which each SMS will be sent. The delivery date and time of the SMS can be readily adjusted.

The SMS Delivery component interacts with the SMS Gateway to send messages to the Telco’s SMSC. The SMS Gateway interacts with the SMSC via SMPP protocol v3.4.
4. Deployment diagram

As shown in Figure 4.1, the Telco Satellite module needs to be deployed inside each participating mobile network. This module includes an embedded SMS Gateway that connects to the SMSC via SMPP protocol. Alternatively the system can use an existing SMS Gateway if preferred.

The mobile operator controls the delivery of Cell Site geo-positions from the Telco module to the ORG module. If the mobile operator chooses not to deliver this information, cell sites will not be displayed on the map. This ensures that no information on cell sites is visible to aid agency users, however it also means that the polygon feature, used to send messages to specific locations, will not work.
5. Key system features

5.1. “Last call” position integration
The TERA notes the last interaction of the mobile subscriber with the Telco operator; this interaction gives the geographical position of the subscriber, enabling the sending of messages to subscribers in specific locations.

5.2. Multi telco operator
The system supports multiple mobile operators.

5.3. Web service layer integration
Via the TERA’s WS integration layer, it is possible for any other WS friendly system to interact with it. It also means that the TERA system can be remotely managed, allowing aid agencies to implement regional control centres.

5.4. Optional out-list
Subscribers can individually decide to opt in or opt out of the service.

6. Integration layers

Most of the TERA modules are accessible via XML interface:

6.1. NGO center integration layer
Any user-request can be translated into XML commands that are passed to the NGO Center; via this feature it is possible to integrate the TERA with other systems.

6.2. Telco integration layer
Telco Satellites are accessible via SOAP interfaces, therefore it possible to attach to it other telco-related systems.
7. Operations

Targeted messaging: SMS messaging to subscribers based on their geo-position according their “last-call”.

SMS delivery to groups: SMS messaging to NGO’s personnel group.

Early warning alerts: Through this tool it is possible to send immediate emergency alert messages.

Keywords and auto reply: Availability to set up predefined answers for specific keyword inputs.

Optional out list: Unsubscribe option for the user in order to not receive any messages from the TERA.

8. Reporting

8.1 Outgoing report
Provides statistics regarding SMS sent to subscribers via the TERA.

8.2 Incoming report
Provides statistics regarding SMS received from subscribers.
9. Administration

Figure 9.1 Architecture

As shown on the Deployment Diagram (Figure 9.1), each Telco Satellite can be used to work with more than one NGO at the same time. And each NGO contains Subdivisions, Aid Centers and personnel groups, respectively.
10. Security

Different user accounts can be configured on the system. There are three types of accounts:

**Root**: Allows user to configure all entities  
**Administrator**: Allows user to configure all entities related to a specific subdivision  
**User**: Allows use of functions but no configuration of entities.

As shown in Figure 10.1, all communication between the NGO Center and TELCO Satellites is secured using SSL encryption and user/password constraints. Mobile operators can also opt to hide Cell Site information from aid agency users.

### Figure 10.1 Architecture

![Figure 10.1 Architecture](image)

**Key points on the TERA security:**

- Secure communications (SSL) is used between NGO and TELCO TERA modules.
- Send SMS to polygon is optional, depending on the Cell Site List accessibility feature configured on the TELCOM module.
- Detailed information remains in TELCO module. Only summary information regarding the number of delivery/received messages is transferred to the NGO module.
- Considering that all delicate data (detailed) is stored into the TELCOM module (under TELCOM NETWORK), the TELCOM has full control of its confidential information.
- Subscriber-site confidential information is never transferred to the NGO module. It is kept on Telco module under TELECOM control.
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11. Alarms

As shown in Figure 11.1, the TERA is deployed with an alarm system called, TRUMP. This alarm system can send email alerts if anything stops the TERA module from operating normally.

Figure 11.1 Alarm system integration

How we work

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Saving lives, changing minds.

Strategy 2020 voices the collective determination of the IFRC to move forward in tackling the major challenges that confront humanity in the next decade. Informed by the needs and vulnerabilities of the diverse communities with whom we work, as well as the basic rights and freedoms to which all are entitled, this strategy seeks to benefit all who look to Red Cross Red Crescent to help to build a more humane, dignified, and peaceful world.

Over the next ten years, the collective focus of the IFRC will be on achieving the following strategic aims:
1. Save lives, protect livelihoods, and strengthen recovery from disasters and crises
2. Enable healthy and safe living
3. Promote social inclusion and a culture of non-violence and peace

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