



**Project Number:**

**Project Title:** Resilient National Emergency Communications Network

**Estimated Start Date:** September 2012

**Estimated End Date:** September 2014

**Regional Cooperation Agencies:** Trinidad and Tobago Amateur Radio League (TTARL) and Trinidad and Tobago Amateur Radio Society (TTARS)

**Implementing Agency:** The University of the West Indies (UWI), Trinidad and Tobago Amateur Radio League, Trinidad and Tobago Amateur Radio Society and International Telecommunication Union

**Beneficiary Countries:** Trinidad and Tobago

**ITU Project Manager:**

<b>SUMMARY OF CONTRIBUTIONS</b>		
<b>A) Project Budget (minus matching contributions)</b>		
<i>Description</i>		<b>US\$</b>
Project Personnel		30,000
Equipment		40,000
Training		10,000
Communication Services		5,000
Monitoring & Evaluation		20,000
External Services		10,000
Miscellaneous and Other Costs		25,000
<b>Total:</b>	<b>USD</b>	<b>140,000</b>
<b>B) Cost Sharing</b>		
USD140,000		
<b>C) Contributions from Beneficiary Country:</b>		
<u>In-kind</u> : as specified in this PRODOC		

**Brief Description:**

This project aims to design, implement and monitor a national emergency telecommunications network infrastructure which can (i) be accessed by wifi-supported mobile communication devices in the absence of an operational cellular network and can (ii) provide access to the Internet in the event that the local ISP infrastructure is unavailable. The emergency network will supplement existing Amateur Radio equipment to connect to the Internet via two different digital technologies on two independent networks. This multi-network operation will facilitate both redundancy in emergency situations and increased reach amongst local amateur radio operators. If access to the global Internet is compromised, satellite communications will be facilitated by the proposed network to enable connection to the rest of the world. Personnel will be able to access the emergency network facilities using computers or WiFi-equipped mobile devices such as smartphones and ipads.

<b>For the</b>	<b>Signature</b>	<b>Date</b>	<b>Name/Title</b>
ITU:	_____	__/__/____	
Partner(s):	_____	__/__/____	
	_____	__/__/____	

# 1. Background and Context

## General Introduction

Natural and man-made disasters may occur at any time. It is important that countries with limited resources be able to swiftly respond to such events by making prior arrangements to minimize the effects on citizens. In recent years, the Internet has been heavily utilized in the management of crisis situations, to upload damage assessment information, for command and control functions, to allow citizens to learn of the status of family and friends, to alleviate congestion on any remaining cellular or wire-line networks and to inform the world of the nature of the damage through photos, videos and interviews. Unfortunately during such disasters both the wireless and wire-line infrastructures may be heavily damaged. Furthermore, repair of this infrastructure may take several days and even temporary solutions (e.g., mobile base stations for cellular communications) may also take days.

The Amateur Radio Communities throughout the world have played a significant role in emergency communications during disasters. However in many countries, as in the case of Trinidad and Tobago, this communications is still in the form of analog voice. The development of a dual-technology Amateur Radio based data network infrastructure is proposed that will provide enhanced functionality through the use of digital technologies. The infrastructure can be quickly activated during major disasters and can be used to exchange vital information both within the country as well as with the outside world. Simple means of accessing the proposed network will be provided and alternate means of accessing the global Internet will also be provided in cases where external access routes are affected.

## Present Situation

Trinidad and Tobago's National Response Framework (2010) involves the coordination of several agencies to provide the various services necessary in the case of an impending or existing disaster. In particular, 8 core agencies coordinate matters relating to early warning; 5 core agencies coordinate matters relating to assessment; 8 core agencies coordinate matters relating to emergency operations and 11 core agencies coordinate matters relating to emergency operations relief. In addition to these core agencies, the National Response Framework explicitly relies on the support of individuals, communities and civil society in general. The National Disaster/Emergency Standard Operating Procedures and Contingency Plans 2000 of the Government of Trinidad and Tobago, National Emergency Management Agency and Ministry of National Security, pays a great deal of attention to voice communications with less attention paid to data communications. Yet, very many of the resources relating to national emergency response are data sources such as field data, analytical data, relief requirements, community data (including population, resources, mutual aid agreements etc), databases of key resources (human and material) etc.

The tremendous opportunities for ready data communications and applications support have not generally been leveraged for Caribbean emergency communications. While the Trinidad and Tobago Office of Disaster Preparedness and Management utilizes the "WebEOC" incident and event management system, it can only do so when traditional access to the Internet is available. Currently there is no, nor are there plans for, redundant access to the Internet. Manual procedures and voice communications over handheld radios currently provide redundancy.

Amateur radio technology provides opportunities for the basic support of data as well as redundant access to the Internet. There is interest among local amateur operators to incorporate such facilities into their portfolio of emergency communications tools and there have been a number of related activities. The Trinidad and Tobago Amateur Radio League (TTARL), for example, has a keen interest in promoting the use of packet radio amongst its members and was recently awarded a grant from the Telecommunications Authority of Trinidad and Tobago to provide the Brasso Venado Government School and community members (on the school premises) with wireless Internet access. Access will be facilitated via a point to point backhaul radio link between the TTARL headquarters in Arima and the school's LAN, using commercial off the shelf equipment. The equipment will comprise a pair of base stations and antennae. At the Arima end, the link will terminate on a commercial Internet source. The League is also keen to utilize packet radio to access the Internet during local network downtime in crisis situations.

Both the TTARS and the TTARL have worked closely with the Office of Disaster Preparedness in the Ministry of National Security on matters relating to emergency communications. The TTARL, the TTARS and The University of the West Indies are keen to partner with the ITU to demonstrate and operationalize Amateur Radio based network infrastructure that can be quickly activated during major disasters. This infrastructure can be used to provide redundant Internet access to facilitate incident and event management via WebEOC for first responder agencies in Trinidad and Tobago. It can be readily replicated in other Caribbean countries which have amateur radio operators and associations: Anguilla, Antigua, Aruba, Bahamas, Barbados, Belize, British Virgin Islands, Cayman Islands, Curaçao, Dominica, Dominican Republic, Cuba, Grenada, Guadeloupe, Guyana, Jamaica, Montserrat, Puerto Rico, Haiti, Bermuda, St. Kitts and Nevis, St. Lucia, St. Maarten, Saba, St. Eustatius, St. Vincent and the Grenadines and the Turks and Caicos.

### **Problem Statement**

The problem at hand is that Trinidad and Tobago needs to integrate data communications technologies to enhance its response to national disasters. Current facilities are heavily focussed on (i) voice communications and (ii) limited data communications that relies on traditional access to the Internet. The systems in place therefore do not (i) capitalize on readily available technologies which could facilitate non-traditional access to the Internet (ii) leverage the opportunity for tremendous improvements in functionality and efficiency (iii) have the capability for Internet communications once local network infrastructure is down nor (iv) derive maximum benefit from the active Trinidad and Tobago Amateur Radio operator organizations, whose commitment to emergency communications is well established. Other Caribbean countries generally share this circumstance.

### **National Commitment**

The Government of Trinidad and Tobago has worked closely with the Caribbean Disaster Emergency Management Agency (CDEMA) to produce a portfolio of key draft national plans and protocols 2011 and is urging stakeholders to provide inputs. These plans and protocols supplement the existing framework for disaster preparedness as captured in documented operating procedures and plans as well as the National Response Framework. The Government has committed to the continued development of a robust system for disaster preparedness and management. It recognizes the importance of Internet communications for this purpose as demonstrated by its commitment to use the "WebEOC" incident and event management system. The proposed project will add the vital component of redundant Internet connectivity to the significant investment that the Government of Trinidad and Tobago has made in the area of disaster preparedness.

### **Process Followed in Project Formulation**

The authors of this project proposal recognize that an optimum strategy for emergency networks in developing countries is to ensure that users are technically fluent with the communications equipment and that the equipment is maintained on an ongoing basis. They also recognize that the provision of emergency communications typically involves a broad eco-system of stakeholders. On this basis, the authors' interests have focused on the community of local amateur radio operators.

This project follows on a prior collaboration between the Department of Electrical and Computer Engineering at UWI and the Trinidad and Tobago Amateur Radio Society (TTARS) and also on the Department's prior association with the Trinidad and Tobago Amateur Radio League (TTARL). In the early nineties the Department collaborated with local amateur radio operators in the TTARS to demonstrate the feasibility of a packet radio network. The network was implemented and used to provide email access for these amateur radio enthusiasts. At that time, there were no local ISPs so email communication by other means was not possible. More recently, the TTARL has graciously responded to the call to present on, and demonstrate, their technologies, applications and activities to undergraduate and postgraduate students in the Department of Electrical and Computer Engineering and the Department of Computing and Information Technology at UWI.

The UWI team has been engaged in a variety of activities that relate directly and indirectly to the problem and solution at hand. These include extensive theoretical and practical work on wireless data and voice communications, as well as mobile and fixed ICT application development. Activities broadly span the areas

of teaching, research, local deployment, assessment and extensive stakeholder engagement. Key related areas of interest include emergency communications and increased communications coverage for local fisher folk at sea.

### **Relationship to other past and current BDT programs/activities**

The ITU has a long-standing commitment to the area of emergency communications. It is a member of the Emergency Telecommunications Cluster (ETC), which comprises UN agencies and other humanitarian partners. The Union also operates a Framework for Cooperation in Emergencies, the IFCE, which the proposed project seeks to leverage. The Union has also held various workshops on emergency communications and information management and has published widely on the subject. Local training on procedures such as the Common Alerting Protocol (CAP) standard for public alerting and hazard notification in disasters and emergency situations would strengthen the impact of the proposed project and aligns importantly with project objectives.

### **National/Regional Strategy**

The national strategy will be to formally engage key boundary partners whose mandates include various responsibilities with respect to emergency communications, as articulated in the National Response Framework. The regional strategy will be to make case study; design and implementation guidelines; and analytical resources publically available to other Caribbean jurisdiction.

### **Project Strategy**

The trial network will consist of 5 packet radio and 5 DSTAR nodes. Each will be WiFi accessible and route traffic (via a repeater if necessary) through a satellite base station to the Internet under local network outage conditions. The project strategy is one of participatory appraisal, design, implementation, operations and assessment. Broad stakeholder engagement will be used to determine the requirements of the proposed network; the design and implementation teams will be constituted by personnel representing academia, ITU, TTARS, TTARL, Government and the private sector and students. The installation and testing of equipment will also engage students and personnel from the TTARS and TTARL. Key boundary partners will be engaged as the on-going operations and maintenance agencies. Training will be delivered on packet radio by The UWI and TTARL representatives while training will be delivered on D-STAR by The UWI and TTARS, both with the assistance of the ITU and interested volunteers. Various aspects of the project will be included in university curricula in the form of both theoretical and practical work. The focal points for the activities will be the University of the West Indies Departments of Electrical and Computer Engineering and Computing and Information Technology as well as the Trinidad and Tobago Amateur Radio Society and the Trinidad and Tobago Amateur Radio League.

## **2. Project Objective**

To design, implement and monitor a national emergency telecommunications network infrastructure which can (i) be accessed by wifi-supported mobile communication devices in the absence of an operational cellular network and can (ii) provide access to the Internet in the event that the local ISP infrastructure is unavailable.

## **3. Expected Results**

A national network that would be fully functional under the assumptions of a countrywide power failure, no telephone, cable or commercial wireless Internet connectivity and no cellular communications.

## **4. Main Activities**

- Broad stakeholder engagement in order to determine the general requirements of the proposed network;
- Establishment of a baseline through determination of details of present and future plans of the Government and the Amateur Radio operator organizations;

- Constitution of a team of personnel with representation from academia in various local universities, TTARS, TTARL, Government and the private sector with the expertise needed to collaborate on the development of the proposed network;
- Preliminary Appraisal, comprising inter alia:
  - Evaluation of available equipment and personnel (e.g., the actual number of amateur radio operators with packet radio expertise and interests who are willing to participate)
  - Determination of additional equipment needed (e.g., wifi modems at each packet radio node powered via a generator or batteries)
  - Determination of international links to the Internet (e.g., using satellite communications or island to island microwave communications).
  - Determination of relevant IP address allocations
  - Confirmation of packet routing particulars.
- Collaborative design of network
- Procurement of equipment
- Collaborative development of a maintenance plan and protocol
- Collaborative installation of equipment
- Collaborative Testing:
  - Design of network activation plan under a given worst case scenario;
  - Establishment of necessary infrastructure and processes;
  - Conduct of regular drill exercises to detect and remedy any flaws.
- Training of key operational personnel
- Demonstration to stakeholders
- Analysis
- Documentation
- Dissemination.

## 5. Input

### UWI, TTARL and TTARS Contributions (in kind):

- Salaries of subject experts & professional staff
- Unsalaries time of subject experts, professional staff and operators
- Trainers
- Training and meeting rooms
- General communication facilities
- Laboratory facilities
- General infrastructure
- Personal amateur radio equipment and related computer equipment

## 6. RISKS

The primary risk for this project is that in-country activities may suffer delays due to unforeseen local events and circumstances. Getting the commitment from the government in early stages of planning will minimize this risk of failure. Another factor of risk for the project is the possibility of inadequate budget, and/or competency of staff, which would increase the time to completion. This risk could be reduced by provision of training courses and support by ITU and partners.

## **7. SUSTAINABILITY**

Sustainability of the project will be guaranteed by Trinidad and Tobago and stakeholders, through continuous support and supervision of the project, also Trinidad and Tobago shall commit itself to take necessary measures and allocate resources in order to keep the project in operation.

## **8. MANAGEMENT**

The project will be managed by the Steering Committee and Project Manager. The Steering Committee (SC) will consist of:

- Representative(s) from the UWI;
- Representative(s) from the TTARS;
- Representative(s) from the TTRAL, and
- ITU Representatives including the ITU Regional Office for America.

The role of the SC will include, but not limited to, the followings: e.g.

- i. Approve the annual action plan as proposed by the Project Manager;
- ii. Approve all substantial changes to the annual action plan;
- iii. Evaluate and approve periodic progress and Project closing reports;
- iv. Provide advice and directives concerning the progress of the Project.

The SC will meet at least once a year or/and by teleconference, while all decisions of the SC will be taken on a consensus. The SC will oversee the Project for its implementation process, whilst the Project will be managed by the ITU appointed Project Manager. Project will be managed by a project team composed of the Project Manager and staff as appropriate.

The Project Manager will manage the project in accordance with the current ITU-BDT rules and procedures as well as manage the project as following

- i. Coordinate with Project partners;
- ii. Provide direct assistance to countries;
- iii. Monitor the Project activities on a daily basis; and
- iv. Prepare the annual action plan, periodic progress reports, and project closure report and submit them to the SC.

## **9. MONITORING AND EVALUATION**

The Project Manager will coordinate preparation of, in collaboration with UWI and other stakeholders, progress reports, which will provide a summary of the project progress, the challenges as well as any necessary change management requests that may be required for the successful project implementation.

The progress of the project will be monitored through periodic evaluation reports issued by the project and an evaluation report will be prepared at the end of the project.

Upon conclusion of the project, the Project Manager will prepare a final project closure report with future recommendations that will be submitted to partners.

## **10. BUDGET**

The estimated budget is attached as Annex 1.

## **11. WORK PLAN**

The work Plan is attached as Annex 2.

## Annex 1: Estimated Budget

	USD
Project Personnel	30,000
Equipment	40,000
Training	10,000
Communication Services	5,000
External Service	10,000
Monitoring & Evaluation	20,000
Miscellaneous and Other Costs	25,000
<b>Total</b>	<b>140,000</b>

## Annex 2: work Plan

		Year1	Year2
1	Broad stakeholder engagement		
2	Establishment of a baseline- details of present and future plans		
3	Constitution of a team of personnel		
4	Preliminary Appraisal, comprising inter alia:		
	Evaluation of available equipment and personnel		
	Determination of additional equipment needed		
	Determination of international links to the Internet		
	Determination of relevant IP address allocations		
	Confirmation of packet routing particulars		
5	Collaborative design of network		
6	Procurement of equipment		
7	Collaborative development of a maintenance plan		
8	Collaborative installation of equipment		
9	Collaborative Testing:		
	Design of network activation plan		
	Establishment of necessary infrastructure		
	Conduct of regular drill exercises to detect and remedy any flaws		
10	Training		
11	Demonstration to stakeholders		
12	Analysis		
13	Documentation		
14	Dissemination		
15	Closure		

