

REGIONAL ASSOCIATION V
(SOUTH-WEST PACIFIC)

ITEM: 3

WORKING GROUP ON PLANNING AND
IMPLEMENTATION OF THE WWW IN REGION V

ENGLISH ONLY

FOURTH SESSION

APIA, SAMOA, 30 NOVEMBER – 3 DECEMBER 2005

**WWW support to Early Warning Systems, and, in particular, Tsunami Warning Systems in
the Pacific and Indian Ocean**

(Submitted by the Secretariat)

Summary and purpose of document

This document contains a project document for Strengthening the WMO Global Telecommunication System (GTS) in the Indian Ocean region to serve as Backbone Communication Network for the Exchange of Warnings and Related Information in Support of Tsunami Warning System and Multi-hazard Early Warning Systems, which summarizes related WMO's action.

ACTION PROPOSED

The Working Group is invited to:

- (a) Note the information contained in the document;
 - (b) Discuss action required to further strengthen WWW support to EWS, including TWS in the Pacific.
 - (c) Make recommendations to the fourteenth session of RA V on the necessary follow-up actions.
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Strengthening the WMO Global Telecommunication System (GTS) in the Indian Ocean

1. SUMMARY

Project Title: Strengthening the WMO Global Telecommunication System (GTS) in the Indian Ocean region to serve as Backbone Communication Network for the Exchange of Warnings and Related Information in Support of Tsunami Warning System and Multi-hazard Early Warning Systems

Implementing International Organization: World Meteorological Organization

Beneficiary Countries: Bangladesh, Maldives, Myanmar, Pakistan, Sri Lanka, Yemen; Comoros, Djibouti, Kenya, Madagascar, Seychelles, Somalia and Tanzania

Duration: As soon as possible

(Total Funding Needs: 3,000,000 USD)

Funding sought: 1,800,000 USD

WMO Points of Contact:

M. Golnaraghi, Chief, Natural Disaster Prevention and Mitigation, E-mail:

mgolnaraghi@wmo.int

JM Rainer, Chief, Information Systems and Services, World Weather Watch, E-mail:

jrainer@wmo.int

2. BACKGROUND AND MOTIVATION

The WMO Global Telecommunications System (GTS), comprised of a dedicated network of surface-based and satellite-based telecommunication links and centres operated by countries, interconnects all NMHSs for the *round-the-clock* rapid and reliable collection and distribution of all meteorological and related data, forecasts and alerts. The GTS already provides for the exchange of weather, water and climate-related warnings, and also supports the current Tsunami Warning System in the Pacific basin and the developing TWS in the Indian Ocean, as well as Environmental Emergency Response. In many countries, early warning mechanisms are a direct part of the NMHSs infrastructure and thus are a natural conduit for all natural hazard warnings. WMO is ensuring that the GTS supports the distribution of multi-hazard alerts and advisories and exchange of related information.

The GTS is already fully operational in many countries and interconnects all NMHSs, but some serious shortcomings still exist in some Regions at the regional and national levels. Funding is required for necessary upgrades for strengthening the GTS where needed, in particular for NMHSs of developing and less-developed countries in at-risk regions, to ensure the full operational support to the exchange and distribution of Early Warning System alerts and related information.

3. OBJECTIVES/EXPECTED IMPACT

Regional/ inter-regional coordinated implementation Planning, national GTS upgrade projects (equipment and installation), technology transfer, support for implementation and deployment and related capacity building are required to enable all countries to fully participate and take benefit from the GTS as part of multi-hazard alert and response mechanisms.

The project will ensure that all NMHSs get timely warnings and information, especially Tsunami Watch and Warnings, to support an efficient national EWS. Beneficiaries are Governments and their NMHSs, in particular from developing and less-developed countries in the areas concerned.

4. ACTIVITIES

The typical requirements of NMHSs from developing and less-developed countries are:

- o PC-based GTS message switching system and workstation (double-system) compliant with WMO recommendations, including Internet functions (E-mail, Web);
- o GTS satellite-based data-distribution receiver;
- o Upgraded GTS link and Web interface;
- o Support for implementation, training and related capacity building.

The relevant countries' support requirements are given in the Annex.

The activities, which would be articulated with regular coordination and development activities of WMO Programmes, include:

1. Upgrade of national GTS components where needed in developing and less-developed countries;
 - 1.1. Experts team missions to developing and less-developed countries for on-site assessment of upgrading/strengthening of national GTS components – **Completed (except in Somalia and Yemen)**;
 - 1.2. Technical development of national projects proposals for sustainable upgrade of GTS components, where needed, in the framework of a coordinated regional & inter-regional planning – **Requirement definition phase completed**;
 - 1.3. Procurement of equipment and installation of national GTS upgrade projects including technology transfer, support for implementation and deployment, training and related capacity building;
2. Consolidation of the sustainable GTS support to multi-hazard early warning system
 - 2.1. Training seminars on GTS procedures and practices specific to EWS;
 - 2.2. Organization/coordination and follow-up of operational tests and monitoring of the exchange of EWS alerts and information – **initial phase implemented**;
 - 2.3. Regional implementation-coordination meetings on GTS support to multi-hazard early warning system – **initial phase implemented**.

The WMO Multidisciplinary Workshop and Expert Meeting on the Exchange of Early Warning and Related Information including Tsunami Warning in the Indian Ocean (Jakarta, 14-18 March 2005), endorsed the WMO Action Plan and developed the technical and operational plan, including immediate, short-term and longer term actions, for making GTS fully operational in all IO countries to support the TWS. The meeting also identified the IO countries needing assistance for GTS upgrade.

WMO Expert team missions were carried out for on-site assessment for upgrading national GTS components to Sri Lanka, Bangladesh, Maldives, Myanmar, Pakistan, Djibouti, Kenya and Tanzania. Survey and projects information that was developed in the framework of the Tropical Cyclone Programme in the S-W Indian Ocean was used as regards Comoros, Madagascar and Seychelles.

A Coordination meeting on GTS upgrade in the Indian Ocean to support multi-hazard EWS, including TWS (17-19 October 2005, Geneva) reviewed and consolidated the proposed projects for ensuring a consistent GTS upgrade and implementation plan for the whole Indian Ocean rim. Summary GTS project requirement for each IO country was delivered. Some donors announced their firm or imminent decision to fund several projects.

5. IMPLEMENTING AGENCIES

WMO will be the implementing agency, in partnership with Governments and NMHSs concerned. Procurement of equipments and services will be carried out through International Tenders, in compliance with WMO regulations and internationally agreed recommended practices and procedures. In some cases, the implementation may be carried out in the framework of bilateral agreements between donors and recipient countries, but in full coordination with the overall GTS upgrade plan for the Indian Ocean rim.

6. MONITORING AND EVALUATION

WMO Technical Commission for Basic Systems, WMO Regional Associations and their relevant sub-ordinate bodies review on a regular basis the status of implementation and operation of the GTS, and identify shortcomings; Complementary to these regular activities, they will establish Implementation Coordination Team which are tasked to monitor and evaluate project implementation and recommend corrective actions, as necessary, to assure that the project goals are met. In the framework of regular WMO Programmes, quarterly and annual monitoring of GTS operation is carried out with the involvement and participation of each NMHS.

7. SUSTAINABILITY

The WMO Global Telecommunications System (GTS), coordinated and planned through the WMO Programmes, is implemented and operated by the NMHSs of the respective countries, thus ensuring a fully shared ownership and mutual benefits. Recipient NMHSs of WMO cooperation programme projects commit their responsibility and support to the sustained operation. The implementation support, training and related capacity building components of the project would provide the assistance required for facilitating the technical ability of NMHSs for sustained operation and maintenance. Regular WMO Programme activities support the international coordination, cooperation and support for an overall efficient GTS.

8. BUDGET

The total budget that is required to upgrade of the WMO Global Telecommunication System (GTS) where needed, in developing and less-developed countries in the Indian Ocean rim, including assessment and coordination, is estimated at US\$ 3,000 K, complementing the respective national NMHSs budgets and regular WMO Programmes budget. The budget will cover procurement and installation of equipment (70%) and expert missions, training, capacity building and technology transfer through seminars and implementation coordination meetings (30%).

9. FUNDING SOUGHT

The funding of US\$ 1,800 K is sought to cover the national implementation for GTS upgrade projects, including support, training and related capacity building, in IO developing and less-developed countries that are not yet funded (see below).

10. FUNDING AND OTHER INPUTS REQUESTED AND/OR SECURED FROM OTHER SOURCES

The project for the upgrade of the GTS in the Indian Ocean to support EWS including TWS, has received the support from ISDR (US\$ 500 K from flash appeal funds) for implementing assessment and coordination activities, including US\$ 100 K earmarked for implementing the highest priority GTS component upgrade needs in relevant countries' NMSs. Some donors announced their firm or imminent decision to fund several projects; in particular, France supports a €550 K GTS upgrade project in Kenya, Madagascar and Tanzania, from a total donation of some €1.6 million towards the IO-TEWS, and USA indicated intention of an important donation for the GTS upgrade.

The project, through a truly multi-hazard Early Warning approach, greatly benefits from GTS upgrades in the South-West Indian Ocean (Comoros, Madagascar, Mauritius, Seychelles) that were already implemented in the framework of the WMO Tropical Cyclone Programme. Specific upgrade projects are also supported on a case-by-case basis through the WMO Voluntary Cooperation Programme (VCP).

ANNEX
Strengthening the GTS in the Indian Ocean rim
to meet data exchange requirements for multi-hazard Early Warning Systems and
especially Tsunami Warnings.
Requirements for GTS upgrade projects

GTS to fully support IO-EWS, especially TWS, for reception of warnings and information, and exchange of related data:		
<i>Status</i>	National actions	Support Requirements
Bangladesh:		
<ul style="list-style-type: none"> ▪ Existing message switch at NMC Dhaka is more than 6 years old with equipment becoming unreliable. The system is duplicated but one is not running; ▪ Connected to RTH New Delhi via a low speed (2.4 kbps) analogue leased line using an old protocol (X.25); ▪ Connected to Internet via a slow speed dial up connection with no security or firewall; ▪ GTS Satellite receiving system is inoperable. 	<ul style="list-style-type: none"> • Upgrade of GTS link to RTH New Delhi from 2.4kbps to 64 kbps expected late 2005. • Reception and handling of seismic data by BMD; • Tidal gauge data from Bangladesh Inland Water Transport Authority (BIWTA). • Establish Internet link with RTH New Delhi • Upgrade of national data communications to 64 kbps TCP/IP between Dhaka and Chittagong, Bogra, Sylhet, Barisal and Khulna. 	<ul style="list-style-type: none"> • Implementation of a new message switching system with specifications compliant with WMO recommendations and guidelines, including WAN & LAN connectivity and WMO standard TCP/IP security guidelines. • ICT training and capacity building • Selected spare parts for key critical systems; • Recurrent costs for hardware and software maintenance for a period of 5 years; • Long term sustainability plan;
Comoros:		
<ul style="list-style-type: none"> ▪ NMC System: TRANSMET message switching system and SYNERGIE visualization workstation ▪ GTS link: via Internet to La Reunion ▪ GTS satellite-based components: RETIM-Africa receiving system ▪ EUMETCAST receiving system 	<p>Maintenance of current system</p>	<ul style="list-style-type: none"> • Training for capacity building • More cost-effective Internet connection, e.g. via VSAT (current costs are high)
Djibouti:		
<ul style="list-style-type: none"> ▪ Limited capability with no message switching system. ▪ No direct GTS links with observations sent via email to Reunion for manual input 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Installation of VSAT GTS link between NMC Djibouti and RTH Nairobi; • Implementation of a message switching system with specifications compliant with WMO

<p>into GTS link.</p> <ul style="list-style-type: none"> ▪ GTS data is received via Meteorological Data Dissemination system; ▪ New EUMETCAST reception system was out of service for 3 months; ▪ Internet access (128 kbps) available but shared with other services of the Airport; 		<p>recommendations and guidelines, including WAN & LAN connectivity and WMO standard TCP/IP security guidelines.</p> <ul style="list-style-type: none"> • ICT training and capacity building • Selected spare parts for key critical systems; • Recurrent costs for hardware and software maintenance for a period of 5 years; • Long term sustainability • RETIM-Africa receiver or equivalent system. • Visualization workstation system (Synergie or equivalent).
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Status	National actions	Requirements
India:		
<ul style="list-style-type: none"> ▪ GTS fully operational 	<ul style="list-style-type: none"> • Implementation of new upgraded message switching system at RTH New Delhi (2006) • Further upgrade of GTS links to Bangkok, Beijing, Tehran, Dhaka, Cairo (2005-2006) • Implementation of GTS links to Myanmar and Sri Lanka when countries are ready. • Implementation of INSAT/DMDD satellite receiver at Colombo and Male 	--
Indonesia:		
<ul style="list-style-type: none"> ▪ Connected via GTS to RTH Melbourne and NMC Singapore via TCP/IP Frame Relay dedicated links; ▪ ISCS satellite receiving system. ▪ No external Internet connection. 	<ul style="list-style-type: none"> • Indonesian government has committed to upgrading communication systems at BMG Headquarters, 5 existing Regional Centres as well as developing 5 new Regional Centres over the period 2005 to 2007. This includes upgrading the MSS. Commitment is of the order of: <ul style="list-style-type: none"> o 2005 830K USD o 2006 500K USD o 2007 700K USD • Upgrade of national data communications to 128 kbps links to Ciputat, Yogyakarta and Denpasar and 128 kbps VSAT links to Medan, Makassar, Jayapura, Padang, Kupang, Ambon and Manado. 	<ul style="list-style-type: none"> • ICT training and capacity building are needed to support maintenance and operations of MSS and to enable local updating of changes to meet existing and future GTS requirements (6 people from Headquarters and 10 people from the Regional Centres). • Upgrade of GTS TCP/IP links between NMC Jakarta and RTH Melbourne and NMC Singapore;
Kenya:		
<ul style="list-style-type: none"> ▪ Existing message switch at RTH Nairobi is more than 12 years old with equipment becoming unreliable. ▪ Kenya is devolving marine functions to Mombassa which is connected via VSAT 64 kbps TCP/IP; ▪ Connected to RTH Offenbach, Toulouse via 64 	<ul style="list-style-type: none"> • Kenya Met. Department upgrading the message switch at RTH Nairobi as a matter of priority; • VSAT network recently installed to be further extended. 	<ul style="list-style-type: none"> • Implementation at RTH Nairobi of a new message switching system with specifications compliant with WMO recommendations and guidelines, including WAN & LAN connectivity and WMO standard TCP/IP security guidelines. <i>Provided by joint project France-Kenya</i> • Implement in coastal provincial centre Mombassa of a message

<p>kbps leased line via TCP/IP;</p> <ul style="list-style-type: none"> ▪ Connected to RTH Cairo via slow (9.6 kbps) analogue leased line using old protocol. ▪ EUMETCAST receiving system ▪ VSAT network. 		<p>switching system, RETIM-Africa receiving system and Visualization workstation (Synergie or equivalent). <i>To be provided by France</i></p> <ul style="list-style-type: none"> • Implement in coastal provincial centres Malindi and Lamu of RETIM-Africa receiving system and Visualization workstation (Synergie or equivalent) • ICT training and capacity building • Selected spare parts for key critical systems; • Recurrent costs for hardware and software maintenance for a period of 5 years; • Long term sustainability plan;
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Status	National actions	Requirements
Madagascar:		
<ul style="list-style-type: none"> ▪ NMC System: TRANSMET message switching system and SYNERGIE visualization workstation ▪ GTS link: 9.6 kbps to La Reunion and 19.2 kbps to Dakar ▪ GTS satellite-based components: RETIM-Africa receiving system ▪ EUMETCAST receiving system 	Maintenance of current system	<ul style="list-style-type: none"> • Implement in coastal provincial centre Tamatave of a message switching system, RETIM-Africa receiving system and Visualization workstation (Synergie or equivalent). To be provided by France
Malaysia:		
<ul style="list-style-type: none"> ▪ GTS fully operational ▪ Recent upgrade of GTS circuits to Bangkok, Singapore and (via Internet) Melbourne and Tokyo 		--
Maldives:		
<ul style="list-style-type: none"> ▪ Limited capability with no message switching system. ▪ GTS link: Connected to RTH New Delhi via Internet (ADSL wireless internet lease line). Connection speed 512 kbps shared with 8 users. Uses TCP/IP (WMO Socket). ▪ Internet, not reliable ▪ GTS satellite-based components out of operation. 	<ul style="list-style-type: none"> • INSAT/DMDD provided by IMD and likely to be upgraded late 2005. • Establish additional Internet access link • Improved Internet link between NMC Male and RTH Delhi for exchange of data. • Upgrade national provision of data and products to users via Internet services 	<ul style="list-style-type: none"> • Implementation of a message switching system with specifications compliant with WMO recommendations and guidelines, including WAN & LAN connectivity and WMO standard TCP/IP security guidelines. • ICT training and capacity building • Selected spare parts for key critical systems; • Recurrent costs for hardware and software maintenance for a period of 5 years;
Mauritius:		
<ul style="list-style-type: none"> ▪ NMC System: TRANSMET message switching system and SYNERGIE visualization workstation ▪ GTS link: 9.6 kbps to La Reunion ▪ GTS satellite-based components: RETIM-Africa receiving system ▪ EUMETCAST receiving system 	Maintenance of current system	<ul style="list-style-type: none"> • Training for capacity building
Mozambique: GTS fully operational		
Myanmar:		

<ul style="list-style-type: none"> ▪ Limited capability with no message switching system, manual operation. ▪ GTS connection to RTH New Delhi and RTH Bangkok via very low speed 50 baud; ▪ PCVSAT receiver recently provided by CMA to allow reception of GTS data. No capacity to transmit data. ▪ GOES-9 satellite reception for WEFAX low resolution cloud imagery; 	<ul style="list-style-type: none"> • Upgrade national network with PCs and PSTN use. • Support to upgraded GTS link 	<ul style="list-style-type: none"> • Improved GTS link to RTH New Delhi and RTH Bangkok via 64 kbps TCP/IP; • Implementation of a new message switching system with specifications compliant with WMO recommendations and guidelines, including WAN & LAN connectivity and WMO standard TCP/IP security guidelines. • ICT training and capacity building • Selected spare parts for key critical systems; • Recurrent costs for hardware and software maintenance for a period of 5 years; • Long term sustainability plan;
<p>Oman: GTS fully operational</p>		
<p><i>Status</i></p>	<p>National actions</p>	<p>Requirements</p>
<p>Pakistan:</p>		
<ul style="list-style-type: none"> ▪ Limited capability with no message switching system. ▪ Connected to: <ul style="list-style-type: none"> ○ RTH New Delhi via 64 kbps leased lines; ○ RTH Tehran via 50 baud link; ○ No connection to RTH Tashkent. ▪ Internet via low speed dialup (40 kbps) not reliable ▪ GTS satellite based components out of operation. 	<ul style="list-style-type: none"> • Upgrade to 64 kbps of link to RTH Tehran is planned; • Upgrade of seismic network approved by Government • Improved Internet link between Karachi and RTH New Delhi and RTH Tehran for exchange of data. 	<ul style="list-style-type: none"> • Reception of IO-Tsunami Watch messages issued by JMA and PTWC via New Delhi; • Automatic dissemination of these messages to a number of national agencies including: <ul style="list-style-type: none"> ○ 5 or 6 important disaster reduction centres; ○ PTV (Government TV station) and other electronic media ○ Radio station. • Implementation of a message switching system with specifications compliant with WMO recommendations and guidelines, including WAN & LAN connectivity and WMO standard TCP/IP security guidelines. • ICT training and capacity building • Selected spare parts for key critical systems; • Recurrent costs for hardware and software maintenance for a period of 5 years; • Long term sustainability plan;
<p>Seychelles:</p>		
<ul style="list-style-type: none"> ▪ NMC System: : TRANSMET message switching system and SYNERGIE visualization workstation ▪ GTS link: via Internet to La Reunion 	<p>Maintenance of current system</p>	<ul style="list-style-type: none"> • Training for capacity building

<ul style="list-style-type: none"> ▪ GTS satellite-based components: RETIM-Africa receiving system ▪ EUMETCAST receiving system 		
Somalia:		
<ul style="list-style-type: none"> ▪ No GTS implementation 		<ul style="list-style-type: none"> • Comprehensive systems for the National Meteorological Service, to be assessed.
Sri Lanka:		
<ul style="list-style-type: none"> ▪ Limited capability with no message switching system. ▪ GTS connection to RTH New Delhi at very low speed (50 baud link); ▪ Internet link via 64 kbps leased line not available for operational data. ▪ Current GTS satellite-based components out of operation. 	<ul style="list-style-type: none"> • INSAT/DMDD provided by IMD and likely to be upgraded late 2005 • Improved GTS link to RTH New Delhi via 64 kbps leased link; • Upgrade to 64 kbps link between NMC Colombo and International airport. 	<ul style="list-style-type: none"> • Implementation of a message switching system with specifications compliant with WMO recommendations and guidelines, including WAN & LAN connectivity and WMO standard TCP/IP security guidelines. • ICT training and capacity building • Selected spare parts for key critical systems; • Recurrent costs for hardware and software maintenance for a period of 5 years; • Long term sustainability plan;

Status	National actions	Requirements
Tanzania:		
<ul style="list-style-type: none"> ▪ Existing message switch at NMC Dar Es Salaam is old with equipment becoming unreliable; Software version is old and not supported; ▪ Connection to RTH Nairobi via medium speed (9.6 kbps) link which is unreliable and prone to failure; ▪ A number of issues related to equipment failure and software licenses due to move of systems from the Airport; satellite access to GTS data is limited; ▪ Internet connection is slow (32 kbits/s) and limited; ▪ EUMETCAST receiving system. 	<ul style="list-style-type: none"> • Installation of 8 VSAT systems to collect and provide meteorological data. Recommended stations include Pemba, Tanga, Kilwa or Mutwara. <ul style="list-style-type: none"> • Upgrade connection between NMC and airport. 	<ul style="list-style-type: none"> • Replacement of GTS link between Dar-Es-Salaam and Nairobi by a 64 kbps VSAT link. • Implementation at NMC of a new message switching system with specifications compliant with WMO recommendations and guidelines, including WAN & LAN connectivity and WMO standard TCP/IP security guidelines; <i>To be provided by France</i> • ICT training and capacity building • Selected spare parts for key critical systems; • Long term sustainability plan; • RETIM-Africa receiving system or equivalent; <i>To be provided by France</i> • Visualization workstation (Synergie or equivalent); <i>To be provided by France</i> • Recurrent costs for hardware and software maintenance for a period of 5 years; • Implement in coastal provincial centres Zanzibar and Pemba of RETIM-Africa receiving system and Visualization workstation (Synergie or equivalent).
Thailand:		
<ul style="list-style-type: none"> ▪ GTS fully operational 	<ul style="list-style-type: none"> • Implementation of new upgraded message switching system at RTH Bangkok (2006); • Further upgrade of GTS links to Singapore, New Delhi (2005-2006), Beijing, Jeddah; • Implementation of GTS links to Myanmar and Cambodia when countries are ready. 	--
Yemen:		
<ul style="list-style-type: none"> ▪ GTS link via Internet to RTH Jeddah. 		<ul style="list-style-type: none"> • Upgraded systems, to be assessed.

"Tsunami Watch Information" (TWI) bulletins from JMA and PTWC are routed over the GTS, including via its satellite-based data distribution systems RETIM-Africa and EUMETCast (West IO), CMA PCVSAT (N-E IO), ISCS and EMWIN (East IO), to Indian Ocean rim countries. Operational tests are routinely performed.

Fig.1 - Network of GTS circuits to be used for dissemination of Tsunami watch information (TWI) for the Indian Ocean issued by Tokyo (JMA) and Honolulu (PTWC)

