PACIFIC METEOROLOGICAL COUNCIL

SPREP Secretariat of the Pacific Regional Environment Programme

Weather and Climate Services for Sustainable Development in the Pacific Region

Third Meeting of the Pacific Meteorological Council (PMC-3)

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Nuku'alofa
The Kingdom of Tonga

Agenda Item 10.1: Radio Internet (RANET) Communications

Purpose

1. To report on activities and achievements conducted under the auspices of the RANET Project supported by the US since PMC-2.

Background

2. The following is a brief status update on RANET and other activities providing or demonstrating communication systems in the Pacific / WMO Regional Association V. While there is a great diversity of communication and information technologies utilized by the meteorological community at large, the emphasis here is on systems more appropriate for National Meteorological and Hydrological Services (NMHSs) of Small Island Developing States (SIDs) and territories. Furthermore, the systems covered here are those that support basic data and product access for meteorological services, as well as systems designed to for dissemination of information from, or communication between, meteorological services, emergency management entities, and remote communities.

3. Chatty Beetle

Description: Developed in 2009 by RANET, the Chatty Beetle is a short text messaging device utilizing the Iridium constellation of telecommunication satellites. It relies on the Short Burst Data (SBD) service on the Iridium network. The devices developed for the Chatty Beetle system are intended to operate in difficult environmental conditions and when power sources are unreliable. In short the Chatty Beetle is intended to support alert applications and short messaging when other communications fail. During its deployment it has been utilized in several instances to alert individuals to change to a HF radio or satellite phone system during a perceived emergency, operated when all other communications failed, and assisted with search and rescue operation. Despite the primary purpose of aiding in emergencies and hazard events, it also has been successfully utilized to increase reports and timeliness of remote meteorological observations.

The Chatty Beetle effort is for the most part supported by the USAID Office of Foreign Disaster Assistance (OFDA).

Challenges: Initial deployments involved only 2-3 units in most countries / territories / independent states for purposes of demonstration. As a result many recipients failed to deploy units given the limited applicability to large geographic areas of responsibility. Additionally, while the device is relatively easy to operate, many recipients insisted on further training.

On the unit production side, it takes months to manufacture the units, as the supplier of the terminals is a small shop. Additionally small production runs are difficult to produce, as these cannot take advantage of larger manufacturing processes.

Finally, as with any physical device, the Chatty Beetle, particularly in early deployments, suffered from several design weaknesses that affected their function. Many of these weaknesses have been addressed through successive generations. The major remaining design issue involves battery type; switching from 4 volt batteries to more available 6 and 12 volt batteries.

Development Needs and Activities (Next Steps): Addressing some of the challenges, the RANET program is seeking to develop new form factors (models) of the Chatty Beetle terminals. Some designs are intended to cater to less environmentally harsh conditions, reduce costs, etc. Other form factor concepts hope to address production delays or otherwise cater to small 'runs'. One hope with the new form factors is to also address initial deployment shortfalls; providing a greater number of units for existing and new recipients.

As for training needs, it does not seem immediately possible to provide face-to-face training, except where opportunities arise at workshops or when a technician or engineer is visiting a recipient for other purposes but can provide additional training support. Effort will be made, however, to produce training videos, as well as to update manuals. In addition, when available, training may also be delivered via distance learning using both synchronous and asynchronous technologies.

Currently most terminal costs, personnel, and ongoing Iridium service fees are covered by USAID OFDA. While there is no intent or sign of this support ending, the reality is the operators of the system, and USAID OFDA resources, are not intended for ongoing operational support. It is recommended that the Pacific community explore development of a 'fund', which can be supported by multiple donors and/or the community itself. It is not recommended that the individual states pay ongoing fees, as this would greatly intensify the administrative burden for what is designed as a shared network.

4. EMWIN

Description: The Emergency Managers Weather Information Network (EMWIN) is a U.S. National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) operated system, which primarily utilizes the NOAA GOES West and East satellites,

although it is also available via internet, and where developed locally, via terrestrial radio rebroadcast. EMWIN provides a highly reliable stream of basic warning messages, low resolution graphics, and a variety of text products (e.g.- METAR) suitable for emergency managers. Software associated with EMWIN supports a number of internet and other rebroadcast / distribution and alert functions. Users are not just emergency managers, but meteorological services as well. For some without enough infrastructure to support other systems, EMWIN is a primary data source. For others it is a critical back up when other large dish solutions or terrestrial internet fails.

When the GOES-N generation of satellites came online, there was a Pacific wide effort to upgrade EMWIN systems at NMHSs. Years since it is not clear how many remain in operation, and of those in disuse, if the issue is related to equipment failures, training, or diminishing relevance as the internet and other communications have improved. Nonetheless, a highly reliable system as EMWIN should be a part of all NMHS communication strategies.

Challenges: Aside from assessing current use of EMWIN systems deployed with the GOES-N transition, EMWIN faces a challenge in the next few years of transitioning to the GOES-R generation of satellites. Associated with this transition is timing. As of yet NOAA has not determined whether the first GOES-R generation satellite will be placed in the GOES West or GOES East position. Where logistics are difficult in the Pacific, this presents some timing challenges to ship equipment, provide training, and to organize technician / engineer visits for initial installation. Additionally, on GOES-R satellites, EMWIN will merge with LRIT into a single service; HRIT-EWMIN. Overall this should be viewed as highly advantageous for most existing EMWIN and LRIT users. A major change associated with this merge is that EMWIN will be broadcast as a series of flat files instead of a bit stream. Again, this should not be of great concern as most manufactures and software developers will handle such issues, but for any customized interfaces or side software applications, resources will need to be dedicated for updates. Also, while a number of manufactures have expressed interest in development of ground stations for HRIT-EMWIN, there is a chance that spectrum issues in the continental U.S. may erode such interest, or increase unit costs, if the effective potential user base shrinks.
In short the major challenge revolves around logistics and preparations necessary for the GOES-R transition.

Development Needs and Activities (Next Steps): Next steps largely involve the Pacific community planning for the GOES-R transition. This should include identification of site upgrades and/or new sites, followed by funding requests, in FY16. Equipment procurement will need to occur in 2017 to ensure the region is prepared for a scenario in which GOES West receives the first GOES-R generation satellite.

5. NOAA LRIT

Description: Low Rate Information Transmission (LRIT) is a standard adopted by the WMO for rebroadcast of meteorological satellite imagery. In addition to being a standard, LRIT is often shorthand for the service provided by operators of meteorological satellites. In the Pacific the U.S. National Oceanic and Atmospheric Administration (NOAA) provides an LRIT service on its GOES satellite. For users in the western Pacific

the Japan Meteorological Agency (JMA) provides an LRIT service on commercial satellites.
LRIT is a powerful tool for many meteorological services. The software utilized by ground stations allows for considerable image analysis. On NOAA LRIT, in addition to imagery, a number of other text and graphic products are broadcast.

Challenges: Like EMWIN, LRIT will require a ground station refresh with the transition to GOES-R generation of satellites. LRIT and EMWIN will combine into a single service call HRIT-EMWIN. For many users this will provide tremendous advantages and benefits. Logistics and training associated with the transition will present a challenge. See the discussion in EMWIN for further details.

Development Needs and Activities (Next Steps): See the discussion in EMWIN for further details.

6. HF and VHF Networks

Description: With support from USAID, AusAID, and NZAID, RANET has over the years supported the deployment of HF and VHF digital networks. These support search and rescue operations, remote communication, and data collection. In the northern Pacific the network went through a refresh roughly three years ago. The southern network has largely ceased to operate, although RANET is reinvesting in its re-development and expects operations to begin again in late 2015 and early 2016. Despite being an old technology, it is reliable when operated correctly, and it allows easy cross operation with other organizations and entities, such military and coast guard / search and rescue units.

Challenges: While some upkeep issues have arisen, a lot of this is associated with training for hub and station operators.

Development Needs and Activities (Next Steps): RANET is currently focusing on refurbishing the southern Pacific HF network, and it is exploring another refresh and assessment of the northern network for 2016. Training is a high priority, and options are being explored.

7. RANET SMS Alert Watcher

Description: The RANET SMS Alert Watcher began shortly after the 2004 Indian Ocean tsunami. It receives messages from the Pacific Tsunami Warning Center (PTWC) and pulls out key information --such as earthquake magnitude, timing, message type, and location – to be sent as a 140 character SMS (text message) to mobile subscribers. In short it operates as a heads up system alerting users to seek more detailed information from the PTWC and other authoritative sources. Subscribers are limited to professionals such as national watch authorities or emergencies managers. In October 2014, the service stopped due to significant message format and terminology changes with the PTWC released messages. The hope is to restart the service in late 2015 with new features, as well as the ability of national points of contact to assign and manage users via a web interface.

Challenges: Mobile networks do not always have peering relationships with other external (foreign) networks. Therefore it has often been challenging to send message to some users as networks change or relationships between network alter.

Looking to the future, the use of SMS may diminish over time as other internet based messaging applications and services become popular, such as Twitter. While these require a smart phone to receive, as well as mobile data services, even remote user networks are moving in this direction. The service needs to explore these services as additional distribution pathways.

Development Needs and Activities (Next Steps): The system is currently in re-development and it is hoped that this popular service is restored in late 2015.

8. RAPIDCast

Description: RAPIDCast is a satellite broadcast service on GE-23 Ku-band footprints. Like GEONETCast and other systems, it utilizes DVB-S (digital video broadcast on satellite) to broadcast a data stream. Data on the system includes a variety of text and graphic products designed to support NMHSs. Despite some issues with rain fade, RANET chose to operate the system on Ku-band to make deployment easier with smaller ground stations. While operating the broadcast, the system has yet to have wide spread ground station deployment.

Challenges: RANET had hoped that the relatively easy ground station deployment and size would make installation of the network easy. This has not turned out to be the case. Users still request and require training.

Development Needs and Activities (Next Steps): RANET is looking to support a ground network deployment in late 2015 or early 2016, through a series of training workshops. includes support for the distributed RCC concept and proposal that is now evolving in the region.

9. MapTack

Description: Maptack is not so much a system, but rather an effort to map out communication networks with details on equipment type, installation date, etc. The eventual development goal is to help identify network gaps, as well as automate identification of needed system updates and upgrades. The project is being developed at www.maptack.org.

Challenges: The effectiveness of this system depends upon participation of the nations in the Pacific Region to update NOAA and participate in the system.

10. Cell Broadcast

Some mobile phone carriers have developed their capacity to operate cell broadcasts to carry emergency messages from their governments. Within the U.S. the Federal Emergency Management, the Federal Communications Commission, and the NOAA National Weather Service have worked with mobile telecommunications to establish a Wireless Emergency Alert (WEA) cell broadcast of emergency messages. This takes advantage of the radio technology in smart phones for dissemination of short, text message length, emergency messages to every smart phones with that carrier's cell tower.

Within the U.S., it has been successful in the penetration of emergency alerts to every smart phone enabled in an area under threat of a severe meteorological or tsunami event. It is hoped that other Pacific island National Meteorological and Hydrological Services are able to work with carriers and National Disaster Management Offices to establish the capability to deliver emergency alert messages to the wider community. It is a broadcast, and thus avoids the congestion of SMS text messaging.

Recommendations

11. The Meeting is invited to:

1) Establish mechanism with SPREP Pacific Met Desk Partnership to explore the establishment of a fund for Pacific emergency meteorological communications development which can be supported by multiple donors, countries, and local stakeholders, focusing on SIDS and LDC countries.
2) Establish mechanism with SPREP Pacific Met Desk Partnership to explore opportunities with mobile phone carriers additional distribution pathways for emergency communications messages.
3) Recommend PMC3 respond to the International Pacific Training Desk as it is surveying SIDS NMHSs of the Pacific to determine the type of communications systems training that is deemed a priority, and if so, what specific subtopics are of interest. Complete survey to collect and update Maptak via: http://wfoinventory.uhtasi.org/forms