W O R L D M E T E O R O L O G I C A L O R G A N I Z A T I O N

REGIONAL ASSOCIATION V

IMPLEMENTATION COORDINATION MEETING

ON THE GTS IN REGION V

(NOUMEA, 7 - 10 DECEMBER 1999)

FINAL REPORT

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LIST OF PARTICIPANTS

Mr Mike Hassett (RA V coordinator of GTS Sub.group)
Bureau of Meteorology
P.O. Box 1289K
MELBOURNE 3001
Australia
Tel: 61 3 9669 4224
Fax: 61 3 9669 4673
Email: m.hassett@bom.gov.au

Mr Leonard Bale
Fiji Meteorological Service
Private Mail Bag Nap 0351
NADI Airport
FIJI
Tel: 679 724 888
Fax: 679 720 430
Email: leonard.bale@met.gov.fj

Mr Sawito Koesnohadi
Meteorological and Geophysical Agency
Jl. Angkasa I No. 2
Kemayoran
JAKARTA 10720
Indonesia
Tel: 62 21 654 5769
Fax: 62 21 424 6703
Email: sawito@indosat.net.id

Mr Voon Fook Sun
Malaysian Meteorological Service
Jalan Sultan
46667 PETALING JAYA
Malaysia
Tel: 603 756 9422
Fax: 603 755 0964
Email: william@kjc.gov.my

Mr Kevin Alder
Meteorological Service of New Zealand
30 Salamanca Road
PO Box 722
WELLINGTON
New Zealand
Tel: 64 4 4729379
Fax: 64 4 4735231
Email: alder@met.co.nz

Mr Yves Bouteloup
Mr Sébastien Chêne
Mr Benoit Broucke
Mr Laurent Mezières
Mr Ludovic Lesca

Météo-France
Direction Interrégionale de la Nouvelle Calédonie
5 rue Vincent Auriol
BP 151 98845 Noumea CEDEX
Nouvelle Calédonie
Tel: 687 279300
Fax.687 279327
E-mail yves.bouteloup@meteo.fr
E-mail sebastien.chene@meteo.fr
E-mail benoit.broucke@meteo.fr
E-mail laurent.mezieres@meteo.fr
E-mail ludovic.lesca@meteo.fr

Mr Sixto Fontano

Philippine Atmospheric, Geophysical
and Astronomical Services Administration
(PAGASA)
Asiatrust Bank Bldg.
1424 Quezon Avenue
QUEZON CITY
Philippines
Tel: 632 926 3151
Fax: 632 926 3151
Email: sfontano@hotmail.com

Mr Xavier Marescot

Météo-France
Direction Interrégionale de la Polynésie française
BP 6005 Faaa
Tahiti
Polynésie française
Tel: 689 80 33 81
Fax. 689 80 33 09
E-mail xavier.marescot@meteo.fr

Mr Eseese Ah ken

Ministry of agriculture Forests
Fisheries and Meteorological Division
P.O. Box 3020
APIA
Samoa
Tel: 685 20855/56
Fax: 685 20857
Email: management@meteorology.gov.ws

Mr Miow Koon Yong

Meteorological Service Singapore
P.O.Box 8
Singapore Changi Airport
SINGAPORE 918141
Singapore
Tel: 65 381 3156
Fax: 65 381 3619
Email:yong_miow_koon@MSS.gov.sg

Mrs Seluvaia Finaulahi

Ministry of Civil Aviation
P.O. Box 845
Queen Salone Road

NUKU'ALOFA
Tonga
Tel: 676 23 401
Fax: 676 24 145
Email: tongamet@candw.to

Mr Edward Young

NOAA National Weather Service
Pacific Region Headquaters
737 Bishop street, Suite #2200
Honolulu, Hawaii 96813
USA
Tel: 808 532 6412
Fax: 808 532 5569
Email: edward.young@noaa.gov

Mr Wilson Vuti

Vanuatu Meteorological Service
Private Mail Bag 054
PORT VILA
Vanuatu
Tel: 678 22331
Fax: 678 22310
Email: meteo@vanuatu.com.vu

Other Organizations

Mr Edward Lysakov

ICAO
Regional Officer, Aeronautical Meteorological
Asia and Pacific Regional Office,
BANGKOK 10900
Thailand
Tel. 662 537 8189
Fax 662 547 8199
E-mail: lysakov@icao.or.th

Mr Colin Schulz

South Pacific Regional Environmental Programme
(SPREP)
P.O. Box 240
APIA
Samoa
Tel. 685 21 929
Fax 685 20 231
E-mail sprep@sprep.org.ws
cschulz@squirrel.com.au

WMO Secretariat

7 bis, Avenue de la Paix
CP No 2300
CH-1211 Genève 2
Switzerland

Mr Jean-Michel Rainer

Chief, Telecommunications and
Monitoring Unit (TEM)
Tel. 41 22 7308 219
Fax. 41 22 7308 021
E-mail jmrainer@wmo.ch

Local secretariat

Mr Laurent Blaize
Mr Yvon Barbou
Mr Maurice Le Van Sau
Mr Edouard Pelleau

Météo-France
Direction Interrégionale de la Nouvelle
Calédonie
Noumea
Nouvelle Calédonie
Tel: 687 279300
Fax. 687 279327
E-mail laurent.blaize@meteo.fr

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. ORGANIZATION OF THE MEETING

1.1 Opening of the meeting

1.1.1 At the kind invitation of the Government of France and of New Caledonia, the Implementation Co-ordination Meeting on the GTS in Region V was held in the conference facilities of the Park Royal hotel in Noumea, New Caledonia, from 7 to 10 December 1999. The session was opened at 10.00 a.m.

1.1.2 Mr Maresca, representing the Government of New Caledonia, extended a warm welcome to the participants in the meeting. He expressed his appreciation for WMO organizing this important meeting in New Caledonia and stressed the importance of efficient and modern telecommunications for meteorology for ensuring services that are of crucial importance. He wished the meeting every success, and wished the participants a pleasant stay in Noumea.

1.1.3 Mr M. Hassett (Australia), Coordinator of the regional subgroup on the GTS, welcomed all participants at the meeting. He thanked the Meteorological Service of New Caledonia for hosting this Implementation Co-ordination Meeting on the GTS in Region V. He recalled that the last regional meeting on the GTS was held in Nadi in 1997, and stressed the importance of the meeting for co-ordinating the further development and upgrade of the RMTN. He emphasized that the meeting was expected to review the actual implementation of all elements of the RMTN and to develop proposals for overcoming deficiencies, and for further developing its implementation with a view to further enhancing telecommunication services provided to the National Meteorological Services in the Region. He invited all the participants to frankly and actively participate in the discussions, to ensure that realistic and efficient recommendations be developed by the meeting.

1.1.4 On behalf of the Secretary-General of WMO, Mr. J.-M. Rainer welcomed all participants at the meeting. He thanked the Government of New Caledonia and the Meteorological Service of New Caledonia for hosting this Implementation Co-ordination Meeting on the GTS in Region V and for providing excellent conference facilities. He said that the World Weather Watch is the fundamental programme of WMO, which also supports all other WMO programmes, including the Tropical Cyclone Programme of particular importance for a large part of the Region. He stressed the importance of the Regional Meteorological Telecommunication Network (RMTN) in the overall GTS of the WWW. He recalled that RA V at its twelfth session (Denpasar, 1998) agreed upon an implementation plan for the further development of the RMTN, including specific plans for the South Pacific islands. The outcome of the meeting will be a major contribution to the activities of the working group on planning and implementation of the WWW in Region V. He wished the meeting every success, and wished the participants a pleasant stay in Noumea.

1.1.5 Mr. Yves Bouteloup, Director of the Meteorological Service of New Caledonia welcomed to New Caledonia all the colleagues attending the meeting. He emphasized that the topic under discussion for the meeting was of paramount importance to Region V. He underlined the rapid introduction of modern telecommunications systems for the development of the RMTN, and stressed that operational requirements should drive the further upgrade of the RMTN. He wished the participants a successful meeting and invited them to take advantage of their presence for this meeting to visit some interesting places that New Caledonia is famous for.

1.1.6 Mr M. Hassett (Australia), in his capacity as co-ordinator of the regional subgroup on the GTS, chaired the meeting. There were 20 participants from 13 Members of RA V, and from 2 organizations. The list of participants is given at the beginning of the report.

1.2 Adoption of the agenda

The meeting adopted the provisional agenda without changes. The agenda is reproduced at the beginning of the report.

1.3 Working arrangements

The meeting agreed on the organization of its work and on its working hours. The documentation was available in English only. The session was held in English, with consecutive/whispered interpretation from/into French.

2. REVIEW OF THE STATUS OF IMPLEMENTATION AND OPERATION OF THE REGIONAL METEOROLOGICAL TELECOMMUNICATION NETWORK

2.1 RTHs and NMCs

The meeting reviewed the status of implementation of the two RTHs of the Region and of NMCs which were represented at the meeting. It also noted with particular attention the WMO contingency plan developed for the potential Year 2000 problems. In the framework of this contingency plan WMC/RTH Melbourne acts as a situation centre and also makes all critical observational data available on its FTP server for back-up purposes around the 1st January 2000.

2.2 Point-to-point circuits

2.2.1 The meeting reviewed and updated the information concerning the status of implementation of the GTS Point-to-point circuits in Region V. Relevant details of the circuits are given in the table and the diagram included in the Annex to this paragraph. Significant progress has been made in the development of the RMTN since the previous ICM (Nadi, 1997) and since RA V-XII (Denpasar, 1998). The RMTN implementation comprises circuits distributed as indicated in the table below:

	High speed (19.2 kb/s and above)	Medium-speed (1200 -9600 b/s)	Low-speed (50 -300 baud)	Not Operational (Not Implemented)	Total
MTN	1			0	1
Interregional	2	2	1	2	7
Regional	4* + 1**	7		0	12
Total	7 + 1**	9	1	2	20

* including 3 circuits operated via Frame Relay services
** circuits operated through Internet

2.2.2 The meeting noted with appreciation that a Frame Relay network was recently implemented for linking WMC/RTH Melbourne and NMCs Jakarta and Singapore, and that it was the first operational FR network being part of the GTS. The selected provider is BT Australasia. The connections through the Frame Relay network were established on 23 July 1999 for Melbourne-Singapore, 15 September 1999 for Melbourne-Jakarta and 21 October 1999 for Singapore-Jakarta. The administrative arrangements under which the three Centres are co-operating in the use of the network were set out in a Memorandum of Understanding. The Frame Relay network has proven a reliable and cost effective alternative to fixed bandwidth lines. All three Centres have achieved significant savings and underlined the high cost-effectiveness and flexibility of this data-communication service.

2.2.3 The meeting also noted with appreciation that TCP/IP, which was recently adopted by CBS (1998) as the recommended protocol for the GTS, was already introduced on several circuits of the RMTN.

2.2.4 The meeting also noted that several additional circuits, Melbourne - Honiara, Honolulu – Guam, Honolulu - Pago-Pago and Honolulu - Micronesia that were not included in the RMTN, were playing an important role in the operation of the GTS in Region V. The status of implementation of these circuits was included in the Annex to paragraph 2.2.1.

2.2.5 The meeting noted that the plan for upgrades to RMTN point to point links and introduction of TCP/IP procedures as adopted by the twelfth session of Regional Association V (Denpasar, 1998) was already mostly implemented.

2.3 Other telecommunication systems and services, including satellite-based systems and radio-broadcasts

Radio broadcasts

2.3.1 WMC/RTH Melbourne is operating two radio facsimile broadcasts (using each five HF frequencies) which are actually transmitted from Darwin and Canberra. RTH Wellington is operating one radio facsimile broadcast (using four HF frequencies) from Auckland. NMC Honolulu is also operating a radio facsimile broadcast. These radio facsimile broadcasts are mainly used by maritime users. The two RTHs informed the meeting that they plan to continue operation of their radio facsimile broadcast until around the year 2002. The situation beyond that date is uncertain.

Satellite-based distribution systems

ISCS and SADIS

2.3.2 The meeting reviewed the status of implementation of the International Satellite Communication System (ISCS) over the Pacific (GTS component) operated by USA, which was integrated into the RMTN as a regional complementary component of the GTS. The meeting noted that the three virtual circuits (PVCs) for GTS data RMTN which are also available on the ISCS data distribution system over the Pacific actually contains data in the framework of the RA IV RMTN. Significant spare capacity is however available on these GTS virtual circuits to accommodate additional data and products, provided that the additional traffic would not interfere with the peak loads which occur when the GRIB WAFS products are transmitted (around 03-04 and 15-16 UTC).

2.3.3 The meeting noted that only five NMCs were currently equipped with an ISCS receiving station (VSAT and workstation) which would be potentially used as a complementary component of GTS point-to-point circuits. WMC/RTH Melbourne and RTH Wellington were also equipped. The meeting also noted that four ISCS receiving stations (in Fiji, Papua New Guinea, Philippines and Vanuatu) were currently being implemented. Some centres have experienced some technical difficulties in implementing the ISCS VSAT. SADIS receiving stations are also implemented in the western part of the region in the framework of the WAFS.

MTSAT

2.3.4 The meeting noted with deep regret that the first launch of the next generation of the GMS satellite series, known as MTSAT, failed in 1999. The next launch being planned in 2001 at the earliest, the meeting stressed the importance of an extended lifetime for the current GMS.

Emergency Management Weather Information Network (EMWIN)

2.3.5 The meeting reviewed the implementation status of the EMWIN - Emergency Managers Weather Information Network, which uses a dedicated channel of the GOES satellites for the distribution of meteorological information related to emergency situations, including warnings. The

Annex to this paragraph includes a detailed description of the EMWIN system and the status of implementation in Pacific countries. The meeting noted with appreciation that EMWIN systems were implemented in 18 Pacific countries, and that additional installations were planned subject to funding in the future. It noted that the relatively low cost of the equipment, its simple installation, operation and maintenance had greatly facilitated its implementation, even in very small pacific islands. The EMWIN implementation has dramatically improved the distribution of meteorological information and warnings of vital importance for the Pacific countries. The meeting expressed its appreciation and grateful acknowledgements to the US National Weather Service, the European Union South Pacific Cyclone Warning Upgrade Project and the South Pacific Regional Environment Program (SPREP) for their support to the Pacific island states in making the EMWIN system available and in funding installation of receiving equipment.

GMS and GOES Data collection System

2.3.6 The meeting noted that an increasing number of DCPs were implemented in Region V, that were transmitting via the GMS satellite, operated by Japan, or via the GOES satellite, operated by the USA. The DCP messages are relayed to Region V and the originating NMC via the GTS.

Data-communication networks and services (e.g. PSPDN, PSTN, INTERNET).

2.3.7 The meeting noted that several NMSs in the Region are regularly using Public Data Networks or the Public Switched Telephone Network or the Internet for receiving data and products from other GTS centres, as a complement to the GTS exchange. Some GTS circuits are implemented through the Internet, which was complemented in some cases by an ISDN back-up which is activated when required. RTH Wellington also uses Internet for the collection of observational reports from several Pacific islands and their relay onto the GTS. This has significantly improved the reliability of observational data collection.

Inmarsat and Coastal Radio stations

2.3.8 The Inmarsat system, and in particular Inmarsat C ship earth stations, is increasingly used for the collection of ship reports from voluntary observing ships; At the same time, the number of ship reports collected through the coastal radio stations is regularly decreasing. The Perth and Singapore Land Earth Station receive ship reports from Inmarsat C and A stations at no cost for ships. The Inmarsat C multipoint broadcast service 'SafetyNet' is used for the broadcast of marine forecasts and warnings to shipping on the high seas. These broadcasts service shipping in Met-areas 10, 11 and 14 and are operated by Australia, New Zealand and Japan. Small Inmarsat M terminal earth stations were planned to be implemented in some centres as back-up communication systems.

2.4 Review of the exchange of meteorological data and products, including review of monitoring results

1999 annual global monitoring

2.4.1 The Secretariat received results of the 1999 annual global monitoring from 9 centres located in Region V, and most centres provided monitoring results on electronic media (diskette or via Internet). The number of participating centres from Region V was noted with appreciation, and all centres were urged to actively contribute by monitoring at least the part of the global data set that they are responsible to collect and forward onto the GTS, and to provide the monitoring results preferably on diskette or via Internet. Table A includes a short summary of the analysis of the results of the 1999 annual global monitoring of the operation of the WWW. The percentages of reports received on the MTN, the percentages of so-called silent stations and the percentages of reports expected to be prepared at stations implemented in accordance with the information given in Volume A of WMO Publication No. 9 (the percentages are calculated with the Regional Basic Synoptic Network (RBSN) as the reference) are given in columns (a), (b) and (c) respectively.

Table A

	(a)	(b)	(c)
Type of data	Reports received	Silent stations	Reports expected to be prepared
SYNOP	63 per cent	19 per cent (76 stations)	63 per cent
Parts A of TEMP	57 per cent	16 per cent (15 stations)	71 per cent
Parts A of PILOT	53 per cent	19 per cent (6 stations)	71 per cent

2.4.2 The availability of reports from some parts of Region V on the MTN was not satisfactory. No SYNOP reports were received from East Timor (2 stations), Niue (1 station), Papua New Guinea(12 stations), Southern Line Islands (Malden Island 91902). Twelve per cent of the expected reports from New Zealand were received at MTN centres.

2.4.3 The meeting noted that the apparent low percentage of SYNOP reports from some Region V countries resulted from stations which were not making their observations at main standard hours (i.e. 00, 06, 12, and 18 UTC). In compliance with procedures for the annual global monitoring of the operation of the WWW, the reports at non-standard hours were not taken into consideration. This special problem affects stations from Australia (34 silent stations) and Papua New Guinea (12 silent stations). This situation had improved compared to previous monitoring, due to the introduction of observations at standard hours at 95 of Australia's 130 RBSN stations. New Zealand also stopped making observations at the main synoptic hours after implementing summer time on 3 October, which lead to the 12 % availability (i.e. from 1-3.X only) during the period 1-15 October. In spite of this problem, monitoring result indicates an efficient collection on the RMTN and transmission onto the GTS.

2.4.4 The list of silent stations is included in the Annex to this paragraph. With respect to silent stations among stations that are implemented (according to Volume A), the meeting noted that some stations were replaced by neighbouring stations (e.g. Niue, Kuala Lumpur), but that the change was not yet taken into account. The meeting invited WWW centres concerned to notify the Secretariat of any change, and also to review and update relevant information included in WMO Publication No 9.

Special MTN Monitoring

2.4.5 The Special MTN Monitoring exercises are very instrumental in identifying deficiencies in the operation of the GTS, such as incorrect use of abbreviated headings of bulletins, incorrect compilation of reports within bulletins, incorrect routing of bulletins, etc. Files containing the SMM data and the results of the SMM analysis are available on the WMO FTP server. All RTHs are invited to further analyse the SMM data and results and to liaise with their associated NMCs with a view to mitigating deficiencies. WMC/RTH Melbourne is now participating in the SMM. The periods for the SMM exercises were 1-15 April, 1-15 July and 1-15 October, and were extended by CBS-Ext. 98 to include1 to 15 February, at the same time as the specific monitoring on the exchange of Antarctic meteorological data. The evaluation of the operation of the WWW at this period is of specific interest for the cyclone season in the south Pacific.

Routeing catalogues

2.4.6 The meeting noted with appreciation that the two RTHs in the region were providing their routeing catalogue on their FTP server. It re-emphasised the importance of routeing catalogues for ensuring and monitoring the consistent and efficient GTS data exchange, and for the NMCs to easily access to the information on the availability of bulletins at RTHs.

2.4.7 The three centres WMC/RTH Melbourne, NMC Jakarta and NMC Singapore which were recently interconnected through a Frame Relay network reviewed the transmission programme of the three GTS circuits concerned in order to optimize the exchange and flow of information.

Catalogue of meteorological bulletins

2.4.8 The meeting noted the conclusions of CBS-Ext. (98) that WMCs/RTHs on the MTN had the responsibility of updating the part of the catalogue of meteorological bulletins with respect to bulletins issued from the zone for which they are responsible for the collection, exchange and distribution of data, and also including data from the Antarctica as appropriate. The WMCs/RTHs' involvement would ensure that the catalogue is an operational document which provides adequate information on the bulletins actually exchanged (or required for exchange) on the GTS. MTN centres should provide the relevant Catalogue information on their FTP server and notify changes via FTP to the WMO Secretariat, which maintains the comprehensive catalogue on its FTP server. RTH Offenbach implements and operates a mirror site of the WMO FTP server for the catalogue of meteorological bulletins, with a view to ensuring a full operational service. Noting that the implementation of the required arrangements at MTN centres and the Secretariat would be progressive, CBS-Ext.(98) invited Members concerned to start implementation as from 1 March 1999.

2.4.9 The meeting noted with appreciation that WMC/RTH Melbourne was implementing the necessary arrangements for providing the relevant part of the catalogue of meteorological bulletins in accordance with the new procedures. The necessary co-ordination on bulletins headers and content was carried out between WMC/RTH Melbourne and most NMCs in Region V, and needs to be completed with a few NMCs (Jakarta and Manila).

3. IMPLEMENTATION PLAN FOR THE FURTHER DEVELOPMENT OF THE REGIONAL METEOROLOGICAL TELECOMMUNICATION NETWORK

3.0 Two ad hoc groups were established to consider in detail implementation plans for the further development of the various components of the RMTN. One group focused its activities on the Pacific area, and the other on the western part of region V.

3.1 Telecommunication techniques and procedures

3.1.1 The meeting stressed that NMCs should fully comply with the procedures as given in the Manual on the GTS (WMO publication No 386), in particular for the format of GTS bulletins in order to ensure that the messages and observational reports are not rejected, and thus lost, by the automated computer facilities at RTHs. The importance of complying with the agreed format and principles for the abbreviated heading line of the messages was particularly stressed.

3.1.2 The meeting recalled that CBS-Ext. (98) agreed that the TCP/IP protocols should replace X.25 for supporting GTS operations in the future. The transition to TCP/IP was considered appropriate because:

- Vendor support for X.25 technology was declining and becoming more expensive due to industry concentration on TCP/IP;

- Vendor support for TCP/IP was widely available, and was included in the whole range of hardware/firmware platforms;

- TCP/IP was supporting numerous application utilities available off the shelf, which offered solutions to information communications needs of Members, such as file transfer, electronic mail and other applications;

- TCP/IP provided connectivity between Members in a more flexible and versatile manner than the X.25 based equivalent.

CBS felt that those benefits equated to direct savings in financial and human resource to Members by reduced costs for communications equipment purchase and maintenance, as well as reduced software development work through use of industry standard software systems. CBS however emphasized the need for strong security measures and equipment (firewall, systems configuration) to protect the GTS from the Internet when the two coexist. The Expert Team on Data Communication Systems and Techniques (ET-DCST) developed guidance in this respect.

3.1.3 CBS agreed on the inclusion of the new Attachment II -15 "Use of TCP/IP on the GTS" into the Manual on the GTS, which provides recommended procedures and guidelines for the introduction of TCP/IP on the GTS. Members were strongly advised to take account of the adoption of the TCP/IP based strategy for the future development of the GTS in planning the future development of systems within their national Centres.

3.1.4 The meeting was also informed of the further development of the guidelines for the use of TCP/IP and associated protocols on the GTS, which was carried out by the ET-DCST. It noted with interest that DCST information resources would be included on the WMO server in the near future to provide actual examples of the implementation of TCP/IP and related equipment at WWW centres, and it welcomed this initiative.

3.1.5 The meeting noted that CBS-Ext. (98) agreed that the existing limit of 3800 octets on alphanumeric messages should be increased to 15000 octets on 6 November 2000. The meeting was informed that the two RTHs were taking the necessary measures, and it urged all GTS centres to make the necessary implementation changes in due time. CBS-Ext. (98) also agreed that sets of information, which exceed 250000 octets, should not be transmitted using segmentation into a series of bulletins, but should rather use the file transfer technique.

3.2 Upgrade of MTN circuits, inter-regional and regional circuits

3.2.1 The meeting reviewed the requirements and possibilities for upgrading the RMTN circuits. The implementation plan for upgraded RMTN point-to-point circuits is given in the Annex to this paragraph and also in the Annex to paragraph 2.2.1. The implementation plan includes in particular the interregional circuit Nadi -Washington. The meeting considered this circuit to be very efficient for inserting RSMC Nadi products and warning into the ISCS and EMWIN, and it invited RSMC Nadi and WMC/RTH Washington to consider the possible implementation.

3.2.2 The meeting recommended that the circuits Melbourne - Port Vila, Melbourne - Honiara, Honolulu – Guam, Honolulu - Pago-Pago, Honolulu - Micronesia and Pago-Pago - Apia be included in the RMTN. The meeting was also informed that New Caledonia and French Polynesia were planning the implementation of Frame Relay links Toulouse - NMC Noumea and Toulouse - NMC Tahiti. Further the direct Noumea-Tahiti link would be replaced by an equivalent link via Toulouse.

3.2.3 Noting the high cost-effectiveness of a Frame Relay network for the implementation of GTS links, several NMCs including Manila, Kuala Lumpur and Nadi were considering the possibility of joining the current Frame Relay network established between Melbourne, Singapore and Jakarta. The meeting agreed upon the technical feasibility of such a project and its beneficial impact on GTS operation. Noting the possible administrative difficulties at national level, the meeting agreed that a

Memorandum of Understanding or an umbrella contract established by WMO with the service provider would considerably facilitate the required administrative and contractual arrangements to be set up by each NMHS concerned. The Memorandum of Understanding or umbrella contract would define ceiling prices for potential NMCs joining the Frame Relay network, but would not include financial commitments. The meeting invited the Secretariat and WMC/RTH Melbourne to study and develop these arrangements for the benefit of several Members in the region.

3.3 Systems based on multipoint telecommunication services via satellite and radio-broadcasts (including co-ordination aspects with the ICAO/WAFS satellite-based system)

ISCS and EMWIN operated by the USA

3.3.1 The meeting recalled that XII RA V agreed that the GTS component, consisting of three virtual channels, of the ISCS over the Pacific be integrated into the RMTN of Region V as a regional complementary component of the GTS for facilitating the distribution of meteorological data and products. The meeting noted that the inclusion, for Region V purposes, of WWW data and products on the GTS channels of the ISCS shall be duly coordinated with the US National Weather Service to ensure effective traffic management, in particular at peak hours, in the framework and limits of the specifications of the ISCS supporting the WAFS requirements and the Region IV RMTN. The meeting invited WMC Washington to consider the possibility of differentiating the GTS channels on the ISCS over the Pacific from those of the ISCS over the Atlantic, with a view to facilitating traffic management and increasing the system capabilities.

3.3.2 The meeting also recalled that XII RA V agreed upon an implementation plan fulfilling the special requirements in the South Pacific, including the implementation in various South Pacific islands of EMWIN systems for facilitating the distribution of meteorological products to centres. The meeting appreciated the considerable benefit for South Pacific islands of the implementation of EMWIN systems and recommended their further extension to additional countries and islands. The meeting also noted the difficulties faced by both Indonesia and the Philippines in the dissemination of urgent meteorological warnings and forecasts to the remote parts of their large territories. The meeting recognised the usefulness of the EMWIN system for such purposes and noted the interests of Indonesia and Philippine to acquire 10 EMWIN systems each (through VCP). The meeting also recognized the requirement for the development of a much simpler and low cost mini EMWIN terminal for use in those areas, such as the smallest inhabited islands, that do not require the full EMWIN capability. This could include a simple display, alarm system and printer to just show and print routine forecasts and warnings for remote communities. This unit should be considerably cheaper and could be solar powered for use in areas where continuous mains power supply is not available.

3.3.3 The meeting underlined that XII RA V requested its Working Group on Planning and Implementation of the WWW to co-ordinate the programme of WWW data and products to be transmitted on the EMWIN and on the GTS component of the ISCS with a view to meeting NMHSs requirements to the extent feasible. The meeting noted that several countries were willing to insert data and products into the EMWIN and/or ISCS programmes. The meeting recommended to the RA V Working Group on Planning and Implementation of the WWW that an appropriate ad-hoc group of the WG-PIW be established for that purpose. This ad-hoc group may include the regional Coordinator on GTS, the regional Rapporteur on Data management and codes, a representative of the Pacific area and the focal point of WMC/RTH Washington. The ad-hoc group would be expected to carry its work mainly by correspondence, including E-mail, and would consult Pacific countries concerned on their requirements.

3.3.4 The meeting also agreed that the ad-hoc arrangements required for routing the data and products from Region V to WMC/RTH Washington for insertion in the ISCS could be easily implemented, taking benefit of the 64 kbit/s MTN circuits Melbourne-Tokyo-Washington and the inter-regional circuit Nadi-Washington, when implemented.

Meteorological satellite-based data collection system

3.3.5 The meeting agreed that Data Collection Platforms (DCPs) transmitting via the GMS satellite, operated by Japan, or via the GOES satellite, operated by the USA should be further implemented in Region V to improve data collection from observing stations, and also to insert data from small NMCs into the GTS. The meeting noted the needs of Philippines to acquire 5 DCPs via GMS (through VCP) to enhance the existing data observation collection systems in its remote eastern coastal territory. The meeting expressed the need for DCPs, in particular with manual data entry, to enhance existing observation collection systems from small islands in the South Pacific.

Public satellite-based telecommunication systems

3.3.6 The Inmarsat international system of satellites provides high performance global satellite communication services. The Inmarsat-C small earth stations are very compact with a small antenna, and support two-way transmission of text and binary messages. Some fax capability is also under planning. Inmarsat-C stations would resist a cyclone, and could be considered as one of the most efficient telecommunication system for application by islands in the South Pacific area, both for the collection of observational data and the distribution of a selection of products and warning. Unfortunately, the recurrent costs for transmission, which are based on the data volume, are quite high and may not be affordable by most of the small countries in the South Pacific. It may be possible to develop appropriate cost sharing mechanisms. The Inmarsat M terminal earth stations are also efficient telecommunication systems for implementing a two-way GTS connection, either as a primary or back-up link.

Implementation plans for satellite-based systems in the South Pacific area

3.3.7 The meeting considered in detail the particular needs of several South Pacific countries, and developed the recommended implementation plan of satellite systems at these locations, which is included in the Annex to this paragraph. The need for mini EMWIN terminals (ref. Paragraph 3.3.2) was also identified for several locations.

3.4 Plans for radio-broadcasts

The meeting noted that the regional radio facsimile broadcast operated by the two RTHs might be discontinued beyond the year 2002. The meeting urged the countries operating radio facsimile broadcast systems to plan suitable replacement systems to meet the need of maritime users, in the event that radio facsimile broadcast are closed down.

3.5 Supplementary telecommunication and data-communication services

The meeting expressed the opinion that the use of Public Data Networks and Public Switched Telephone Networks were cost-effective when the traffic is limited, depending upon the tariff policies of the national telecommunications providers involved. These services are efficient for complementing point-to-point GTS circuits, or even for establishing GTS links where leased circuits are not available or not cost-effective. The meeting also noted that the use of the Internet, complemented by appropriate back up (e.g. ISDN), could be an effective solution in some cases. The meeting also noted that telecommunication services, including the Internet and leased circuits services used for GTS and AFTN circuits, may be discontinued in a cyclone situation for islands in the South Pacific area, since satellite earth stations providing these services are switched off and place in a gale stow position.

3.6 Automation of centres

The meeting noted that a wide range of GTS computer systems for NMCs and RTHs, including PC-based systems running under Windows NT or UNIX, were available from various companies, and that this situation was facilitating the automation of NMCs. The meeting stressed the importance of integrating (through a LAN) the interfaces between the various components in an NMC or RTH, i.e.

GTS circuits, national circuits, satellite earth station(s), data-processing equipment and the GTS computer system. The meeting particularly encouraged NMCs willing to implement automated GTS facilities and related equipment to benefit from the experience gained by other centres, and to consult at least with their associated RTH before selecting any equipment.

4. IMPLEMENTATION COORDINATION AND SUPPORT ACTIVITIES

The meeting agreed upon the following priorities for co-operation activities, including in particular VCP projects:

- Further implementation of EMWIN receiving systems;
- Further implementation of DCPs for upgrading observational data collection;
- Implementation of computer-based systems (e.g. PC-based) at small NMCs for GTS function as well as handling and display of data and products.

5. RADIO-FREQUENCIES FOR METEOROLOGICAL ACTIVITIES

5.1 The meeting was informed that threat to the radio frequency bands allocated to Meteorological aids (radiosondes), and also to Meteorological satellites (Met-Sat), was continuing at least until the next World Radiocommunication Conference (2000). The development of new systems (Low-Earth Orbiting satellites- LEOs) of the Mobile Satellite Service (MSS) is exerting pressure for new frequency allocation to MSS below 3 GHz, including in part of the band 401-406 MHz for " little LEOs" and of the band 1675-1690 MHz for " big LEOs". WRC-97 urged ITU Member countries and requested ITU-R (Radiocommunication Study Group 7), with the participation of WMO, to assess the current and future spectrum requirements for Met-aids in the band 401-406 MHz, with a view to a possible removal out of the band 405-406 MHz.

5.2 The active participation of WMO, including NMHSs experts and the WMO Secretariat, and the effective co-ordination activities undertaken by the Steering Group on Radio-Frequency Co-ordination (SG-RFC) was instrumental in ensuring that meteorological issues had been recognized and supported in ITU-R. The final report for the WRC-2000 Conference Preparatory Meeting reflects the results of the technical studies carried out by ITU-R with the deep involvement of WMO, which confirm the continued requirement for the bands 401-406 MHz and 1675-1710 MHz for Met-Sat and radiosondes operation.

5.3 A new threat is developing to the band 2700-2900 MHz allocated to the operation of meteorological radars, with the consideration of the band as a candidate band for new mobile services (International Mobile Telecommunication 2000).

5.4 A band allocation plan above 71 GHz for space-based passive remote sensing has been developed and submitted to WRC-2000 with a view to securing frequency bands in response to observational requirements determined by specific physical characteristics of the atmosphere. Protection criteria (i.e. power limit constraints) were also developed with a view to a common worldwide primary allocation for space-based passive remote sensing in the band 18.6 - 18.8 GHz, that would ensure a global satisfactory operation of spaceborne passive remote sensing in this band.

5.5 NMHSs were invited to note and to use this information when co-ordinating these issues and seeking protection of frequency bands for meteorological activities with their national radiocommunication authorities, in the framework of the national preparation of WRC-2000.

ANNEXES

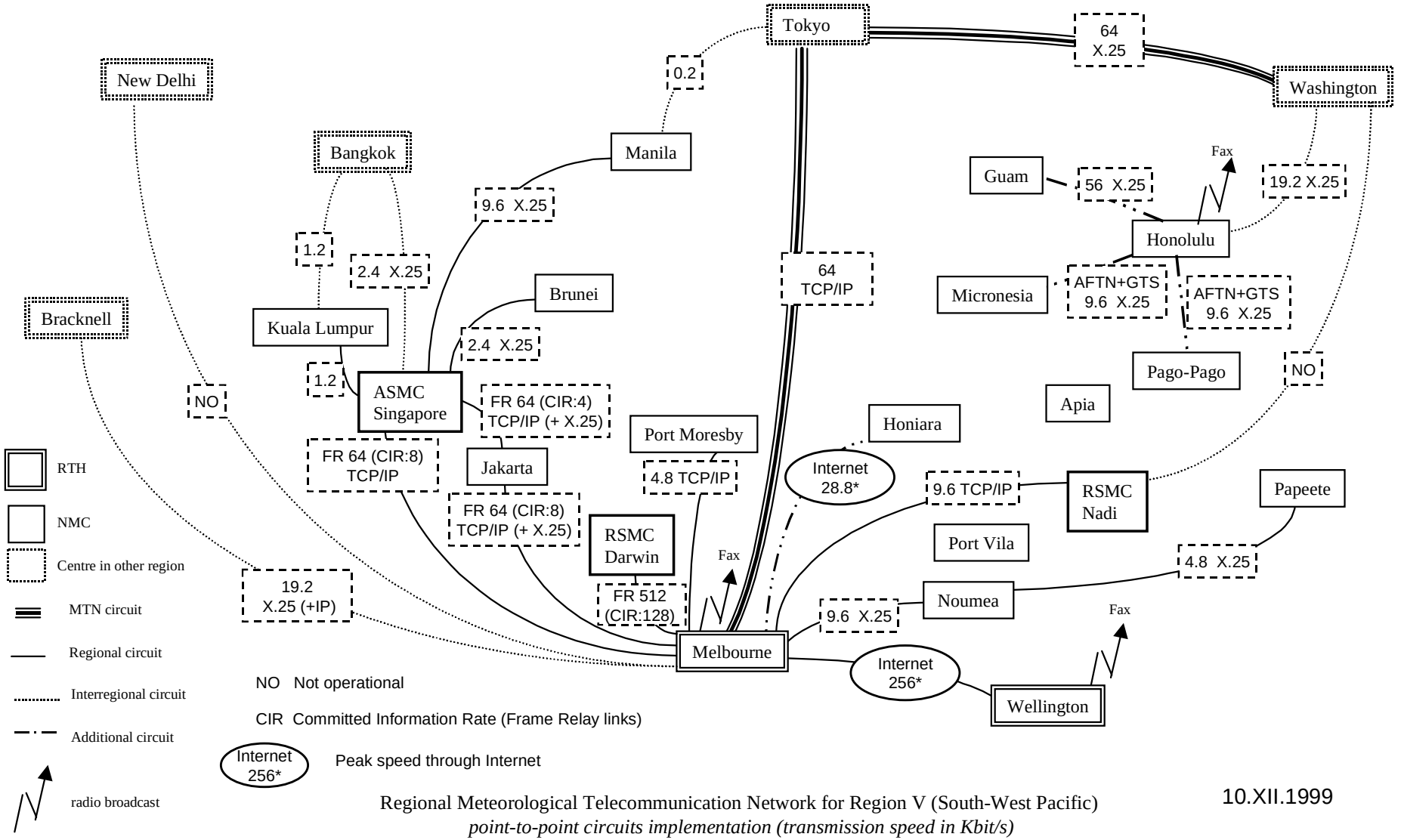
Annex to paragraph 2.2.1	Status of implementation of the RMTN
Annex to section 2.3	Status of implementation of systems via satellite
Annex to paragraph 2.3.5	Description of the EMWIN and status of implementation
Annex to paragraph 2.4.4	Silent stations
Annex to paragraph 3.2.1	Plan for upgraded RMTN point-to-point circuits
Annex to paragraph 3.3.7	Implementation plans for satellite-based systems in the South Pacific

Annex to paragraph 2.2.1

Status of the implementation of the GTS in RA V and plans for the near future

Link	Speed (Kbit/s)	Type	Communication Protocol	MSS Application Protocol	Future plans
MTN and Inter-regional					
Melbourne-Tokyo	64	LL	IP	Sockets	Frame Relay in 2000-01
Melbourne-Bracknell	19.2	LL	X.25,IP over X.25	PVC	IP, Sockets, Frame Relay early 2000
Melbourne-New Delhi	n/o				IP, Sockets via Internet when new MSS installed in New Delhi
Washington-Honolulu	19.2	LL 1540	X.25		56, TCP/IP
Washington-Nadi	n/o	LL 56			9.6, X.25 on existing 56 kb/s NADIN 2 link through connection between RSMC Nadi with AFTN centre
Kuala Lumpur-Bangkok	1.2	LL	Async		4.8, TCP/IP – 64/4 FR upon agreement of both centres
Singapore-Bangkok	2.4	LL	X.25	PVC	TCP/IP – 64/4 FR upon RTH Bangkok agreement
Manila-Tokyo	0.2	LL	Async		64/4 FR, TCP/IP upon RTH Tokyo agreement
RMTN					
Melbourne-Wellington	256*	Internet+	IP	Sockets	Frame relay under consideration
Melbourne-Singapore	64/8	FR[1]	IP	Sockets	
Melbourne-Jakarta	64/8	FR[1]	X.25 over IP	PVC	Conversion to pure IP early 2000.
Melbourne-Noumea	9.6	LL	X.25	PVC	64/8 FR, TCP/IP mid 2000
Melbourne-Nadi	9.6	LL	IP	Sockets	Conversion to Frame Relay desirable.
Melbourne-Port Moresby	4.8	LL	IP	FTP	Internet based link early 2000.
Melbourne-Honiara	28.8*	Internet			inclusion in RMTN
Melbourne - Pt Vila	n/o				Internet based circuit 1st Qtr 2000, inclusion in RMTN
Noumea - Papeete	4.8	LL	X.25	PVC	FR, TCP/IP via RTH Toulouse
Honolulu - Guam	56	LL	X.25		inclusion in RMTN
Honolulu - Pago-Pago	9.6	LL	X.25		inclusion in RMTN
Honolulu - Micronesia	9.6	LL	X.25		inclusion in RMTN
Pago-Pago - Apia					56, TCP/IP, inclusion in RMTN
Singapore-Manila	9.6	LL	X.25	PVC	64/4 FR end 2000
Singapore-Jakarta	64/4	FR[1]	X.25 over IP	PVC	Conversion to pure IP planned early 2000.
Singapore-Brunei	2.4	LL	X.25	PVC	
Singapore-Kuala Lumpur	1.2	LL	Async		4.8, TCP/IP,64/4 FR end 2000 upon agreement of Kuala Lumpur

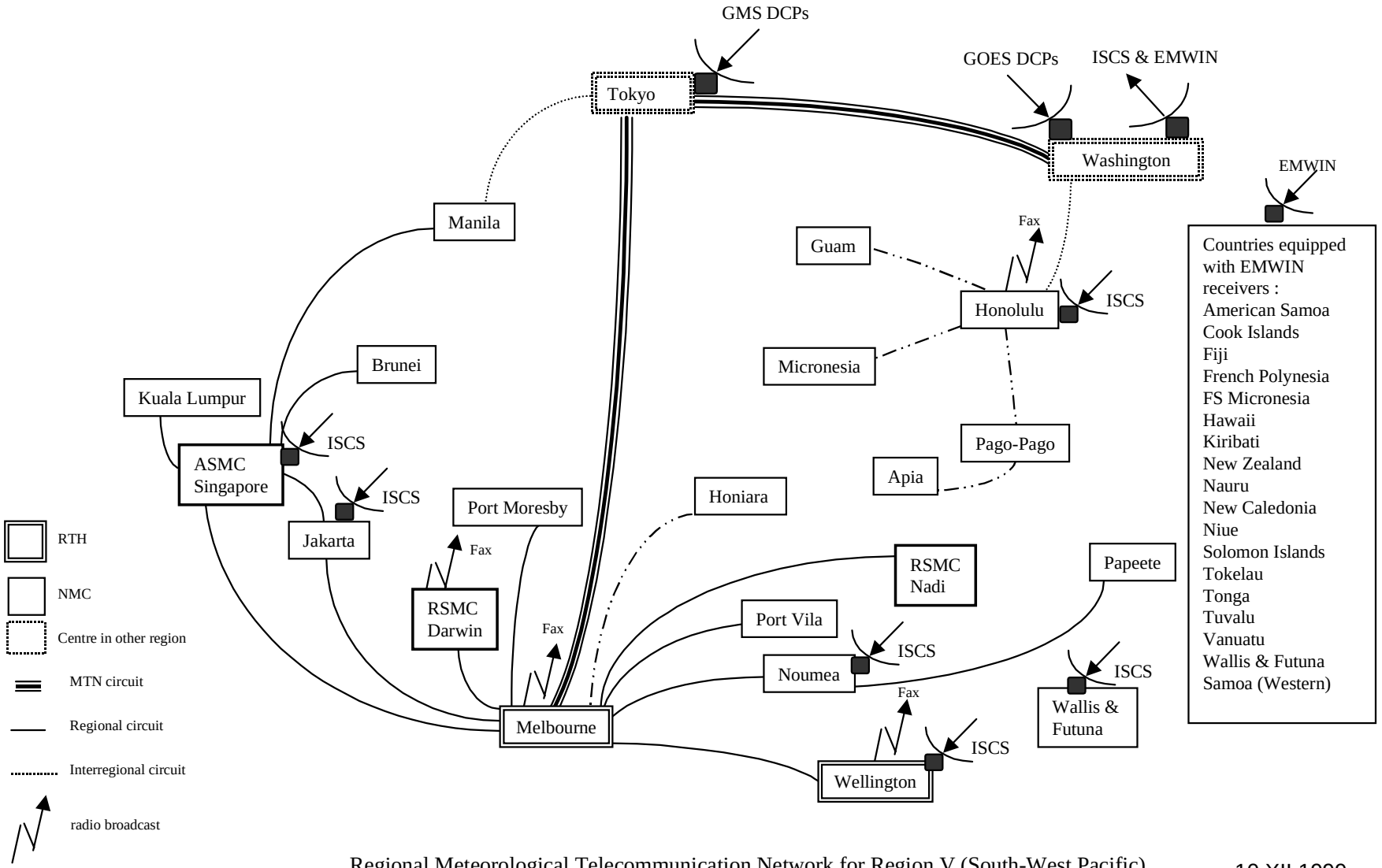
Legend n/o: Not in operation LL: Leased line FR: Frame Relay 64/4: Access speed/Committed Information Rate
[1] operated by BT Australasia * peak speed available through Internet Internet+: Internet + ISDN back-up



Regional Meteorological Telecommunication Network for Region V (South-West Pacific)
point-to-point circuits implementation (transmission speed in Kbit/s)

10.XII.1999

Annex to section 2.3



Regional Meteorological Telecommunication Network for Region V (South-West Pacific)
Implementation of telecommunication systems via satellite

10.XII.1999

Annex to paragraph 2.3.5

Description of EMWIN and Status of Implementation within the Pacific region

Overview

The United States National Weather Service (NWS) broadcasts a live 9600 bit/s EMWIN data stream of weather and critical emergency management information on the U.S. geostationary meteorological GOES-8 (75 degrees West) and GOES-10 (135 degrees West). Data is uplinked to the satellites from the NOAA Command and Data Acquisition (CDA) Station at Wallops Island, Virginia. The GOES downlink frequency used for the EMWIN satellite broadcast is 1690.725 MHz, which is 275 kHz lower than the standard WEFAX 1691.0 MHz signal. The satellite EMWIN broadcast signal is received using a small 1.5 – 2 meter grid antenna, passed through a down convertor and then demodulated to 9600 bit/s.

The EMWIN (Emergency Managers Weather Information Network) was an outgrowth of a process developed by the NWS, in partnership with the U.S. Federal Emergency Management Agency (FEMA), state and local emergency managers, and other public and private organizations, which has greatly assisted the NWS fulfill an integral part of its mission, i.e. to provide the emergency management community with an alternate, inexpensive, and reliable delivery method to receive NWS warnings, watches, forecasts, advisories, and other products at no recurring cost.

On the U.S. mainland, in addition to the live broadcast EMWIN data stream on GOES-8 and GOES-10, partnership efforts with other public and private agencies have resulted in the re-transmission of the EMWIN data stream on dedicated terrestrial VHF and UHF frequencies to users within a 40 – 50 mile line of site broadcast area, using an inexpensive radio receiver, a demodulator, and a personal computer. This has made it possible for some agencies to further extend the EMWIN broadcast within their local areas of jurisdiction, including the capability to decrease receipt of products from outside the region, and add locally collected data and emergency management information. Most of the re-transmission sites use software provided by commercial vendors of EMWIN products, and generally operate at 1200/2400 baud.

Support to Pacific Island Meteorological Services

It became apparent that in addition to the western EMWIN broadcast's reach westward well past the Hawaiian Islands, that EMWIN provided the capability for national meteorological services in small Pacific Island countries to improve their receipt of meteorological bulletins from the Nadi Regional Forecast Centre. The EMWIN Program managers received feedback via INTERNET e-mail about EMWIN's potential use in the greater Pacific from interested parties in the South Pacific.

In July, 1997 the South Pacific Regional Environment Programme (SPREP) annual Meeting of National and Regional Meteorological Services Directors Meeting in Apia, Samoa, after receiving information about the EMWIN satellite broadcast, tasked SPREP to work with the U.S. National Weather Service to facilitate access to the EMWIN broadcast into their countries. In many South Pacific countries, deployment of PC based WEFAX systems was already being planned to enhance the receipt of low resolution meteorological satellite pictures and weather charts, so receipt of the EMWIN signal from the western GOES broadcast became very feasible.

A lot of effort, enhanced through the support of SPREP and the European Union funded Cyclone Warning System Upgrade Project, resulted in deployment of EMWIN systems at national meteorological and disaster management offices in the Pacific Island states, including coordination for the addition of Pacific area METARs, TAFs, meteorological forecasts, warnings, tsunami bulletins, meteorological satellite imagery, etc. tailored to meet the expanded request for service.

In September, 1998, the 12th Session of Regional Association V (South-west Pacific) in Bali, Indonesia, endorsed implementation plan fulfilling the special requirements for communications in the South Pacific, including the implementation in various Pacific Islands of EMWIN systems " for facilitating the distribution of meteorological products to centres, as appropriate."

EMWIN Expansion on PEACESAT

The U.S. NWS Pacific Region Headquarters (PRH) has signed a Memorandum of Understanding with the University of Hawaii PEACESAT Project, with the expressed goal to use the PEACESAT satellite to disseminate hydrometeorological data to Pacific Island meteorological offices. The PEACESAT Project currently has use of the NOAA GOES-2 satellite. GOES-7 is moving westward and is expected to reach 175W in February 2000, and become the official PEACESAT satellite.

Current plans are to have the EMWIN data stream rebroadcast on GOES-7 by September, 2000, which will allow locations west of 145 degrees East (the westward reach of GOES-10) the capability to capture the EMWIN broadcast. Uplink satellite modulating and demodulating equipment have already been procured. Testing times will be announced on the GOES-10 broadcast and via Internet e-mail when ready.

EMWIN Capture Hardware and Software

The ground station equipment required to capture EMWIN data transmissions is very simple and uses a microwave antenna with a diameter or 1 - 2 metres with a suitable feed and down converter operating in the 1690 MHz Meteorological band. After down conversion to 137.225 MHz the signal is processed by the ESP-96 Signal Processor to extract the 9600 bit/s data stream which uses V35 encoding for transmission efficiency. This unit is readily configured to allow remote operation, various power feed options and multiple feeds to a number of computers. In many instances the EMWIN demodulator has been added to existing QFAX (WEFAX) receiving systems in use in most Pacific Islands Meteorological Services. Suitable PC software for the capture and display of EMWIN data is freely available at a reasonable price from a number of vendors in the USA.
A simple stand alone EMWIN system with antenna, down-converter, ESP-96 and software costs in the order of $US 1500 not including computer.

An EMWIN display module has been written specifically for the Pacific EMWIN data and this is in use throughout the region. This software has also been customised to display French titles for use in the French speaking territories. As well as the local Pacific module, other modules are in use for display and printing of images, and US Mainland data and charts. Alarms may be set on any particular product to alert the operators of the receipt of a new set of data. The inbuilt alarm and print modules in Weathermode have not proven very satisfactory in this regard due to complexity of setup and management.

A new Pacific LOCAL module is being developed which will incorporate auto alarms and printing as well as being fully user configurable. It is expected that this will be available for distribution early in 2000. This module will make it easy to use it with languages other than English, with most items being set up by configuration files.

Present Status of EMWIN Installations in the Pacific Island States.

EMWIN receiving equipment has been installed in the following Pacific countries as at end of November 1999.

Country	Weather Service	NDMO and Others
American Samoa	1 NWS	1 NDMO
Cook Islands	1 NWS	
Fiji	1 NWS	1 NDMO, 1 SOPAC
French Polynesia	1 NWS	
FS Micronesia	1 NWS	
Hawaii	Systems in use by NWS HQ and Forecast Offices	Systems in use by various agencies, DMO, Navy etc
Kiribati	1 NWS	1 Bonriki Intl Airport
New Zealand	1 NWS HQ.	
Nauru	1 ARM ARCS station	
New Caledonia	1 NWS	
Niue	1 NWS	
Solomon Islands	1 NWS	1 NDMO
Tokelau	1 NWS	
Tonga	1 NWS	1 NDMO
Tuvalu	1 NWS	1 NDMO/NSC
Vanuatu	1 NWS	1 NDMO
Wallis & Futuna	2 NWS	
Samoa (Western)	1 NWS Mulinuu	1 Faleolo Intl Airport 1 NSC, 1 SPREP

It is intended to install additional systems in PNG, Guam and other locations further west when GOES 7 (PEACASAT) re-transmission commences.

EMWIN Datastream Products

The EMWIN system contains many categories of weather data products, with over 6,500 unique products. The current EMWIN datastream contains hydrometeorological products received over the GTS by RTH Washington DC, which include text products, graphical products from the NWS that include those displaying clouds, dewpoint, fronts, humidity, lightning, marine, precipation, primarly for North America, and image products including geostationary and polar orbiting images, national radar, etc.

Product categories are: Analyses, Climate products, Forecasts, AFOS and other graphics, GOES-8 and 10, GMS-5 and METEOSAT images, Meteorological Reports (Radar, Seismic, Synoptic, Hydrological river, Drifting Buoy, Ice), and warnings (Tsunami, Tornado, River Flood, Lakeshore/Marine, Typhoon/Hurricane, Marine/Coastal Flood, Severe Thunderstorm, etc.) These products can then be classified by EMWIN software modules for display using EMWIN " display" types, plus their 3-character product " filename" abbreviations. A list of commercial vendors of EMWIN products can be found at the NWS EMWIN Homepage at http://www.iwin.nws.noaa.gov/emwin/winven.htm.

The Working Group is invited to review the dataset currently broadcast on GOES-10. EMWIN as an official NWS Dissemination system, will come under the NWS Configuration Management System by mid 2000, requiring more formal submission of data product changes.

This list defines the filenames reserved for use on the EMWIN system.

Prefix	Name
AFD	Area Forecast Discussion
AIR	Upper Air (Data)
APT	Polar Orbiter Images
ASH	Volcanic/FIRE Warnings and reports
AWS	Area Weather Summary
CEM	Civil Emergency Message
CFW	Coastal Flood Warning
CHT	Charts DIFAX/WEFAX
CLI	Climate Reports
CMP	Composite Images(CMPALLUS.GIF)
CMP	Compressed Files (CMPMxxxx.ZAG)
CWF	Coastal Waters Forecast
DY1	Day One Convective Outlook
DY2	Day Two Convective Outlook
ELN	El 'Nino images
EMA	Emergency manager activation msg.
EPH	Ephemeris data for satellite orbits
EQR	Earthquake Data
ESF	Flood Potential
ESS	Water Supply Forecast
FAA	Aviation Reports (Pilot briefs)
FEE	Feedback to all users
FFW	Flash Flood Warning
FFA	Flash Flood Advisory
FFS	Flash Flood Statement
FLN	National Flood Summary
FLW	Flood Warning
FWF	Fire Weather Forecast
GLF	Great Lakes Forecast
GLO	Great Lake Outlook
GLS	Great Lakes Summary
GMS	GMS Satellite Images
GO9	GOES 9 Satellite Images
G10	GOES 10 Satellite Images
GPH	Graphic Files (AFOS Graphics)
HAA	Hurricane Probabilities Atlantic
HAD	Hurricane Discussion Atlantic
HAF	Hurricane Forecast Advisory Atlantic
HAM	Hurricane NCEP Model Comparison Atlantic
HAP	Hurricane Public Advisory Atlantic
HAS	Hurricane Monthly Summary Atlantic
HAT	NCEP Tropical Discussion Atlantic
HAW	Tropical Weather Outlook Atlantic
HEA	Hurricane Probabilities East Pacific
HED	Hurricane Discussion East Pacific
HEF	Hurricane Forecast Advisory East Pacific
HEM	Hurricane NCEP Model Comparison East Pacific
HEP	Hurricane Public Advisory East Pacific
HES	Hurricane Monthly Summary East Pacific
HET	NCEP Tropical Discussion East Pacific
HEW	Tropical Weather Outlook East Pacific
HFF	High Seas Forecast
HLS	Hurricane Local Statement
HNA	Hurricane Probabilities North Pacific
HND	Hurricane Discussion North Pacific
HNF	Hurricane Forecast Advisory North Pacific
HNM	Hurricane NCEP Model Comparison North Pacific
HNP	Hurricane Public Advisory North Pacific
HNS	Hurricane Monthly Summary North Pacific
HNT	NCEP Tropical Discussion North Pacific
HNW	Tropical Weather Outlook North Pacific
HSA	Hurricane Probabilities South Pacific
HSD	Hurricane Discussion South Pacific
HSF	Hurricane Forecast Advisory South Pacific
HSM	Hurricane NCEP Model Comparison South Pacific
HSP	Hurricane Public Advisory South Pacific
HST	NCEP Tropical Discussion South Pacific
HSS	Hurricane Monthly Summary South Pacific
HSW	Tropical Weather Outlook South Pacific
HWA	Hurricane Probabilities West Pacific
HWD	Hurricane Discussion West Pacific
HWF	Hurricane Forecast Advisory West Pacific
HWM	Hurricane NCEP Model Comparison West Pacific
HWP	Hurricane Public Advisory West Pacific
HWS	Hurricane Monthly Summary West Pacific
HWT	Hurricane NCEP Tropical Discussion West Pacific
HWU	Hazardous Weather Update
HWW	Tropical Weather Outlook West Pacific
HTM	HTML Documents
ICE	Ice Statement
IMG	General Images (IMGALLUS.GIF)
INT	International Overviews
LFP	Local Forecast
LGT	Lightning Images
LSH	Lake Shore Forecast
LSR	Local Storm Report
MET	METEOSAT Images
MIS	Miscellaneous Products

MOD	Model Run Images
MWS	Marine Weather Statement
NAH	Agriculture Products (Intn'l /National)
NSH	Near Shore Forecast
NOW	NOWCAST (Short Term Forecast)
NPW	Non-precipitation Warning
NWX	National Weather Summary
OBS	Pacific Synoptic Observations
OFF	Offshore Forecast
OMR	Other/Offshore Marine Reports
PAA	Pager Messages
PAF	Pacific Aviation (Area) Forecast
PCF	Pacific Country Forecasts
PMF	Pacific Marine Forecasts
PNS	Public Information Statements
PRO	Propagation Reports
PSR	Post Storm Report
RAD	Radar Images (RADALLUS.GIF)
REC	Recreation Forecasts
RER	Record Event Reports
RFW	Red Flag Warning (Fire Warning)
RVA	River Summary
RVR	River Forecast
RVS	River Statement
RWS	Regional Weather Summary
SAH	Surface Observations (Data)
SAO	SAORCMUS.TXT Contains Regional Coded Messages
SAW	Selected Area Watches
SCS	Selected cities (scs11-scs14)
SEL	Watch areas
SES	Seismic/Earthquake Images
SFD	State Forecast Discussion
SFP	State Forecast
SHP	Live Ship Reports
SIX	Six to Ten day outlook
SLS	Areal update
SKY	SKYWARN Activation Message
SMW	Special Marine Warning
SPS	Special Weather Statement
STP	State Temp & Precip Reports
SUM	State Weather Summary
SVR	Severe Thunderstorm Warning
SVS	Severe Weather Statement
SWO	Severe Weather Outlook
SWR	State Weather Roundup
SWX	Space Weather (solar activity)
TAF	Aviation Terminal Forecasts/airports
TID	Tide Data
TOR	Tornado Warning
TRK	Tracking Files (storm tracks)
TSU	Tsunami
TVL	Travelers Forecasts
UVI	National Ultra-Violet index
WSW	Winter Storm Warning
WWA	Weather Watch
ZFP	Zone Forecast

Annex to paragraph 2.4.4
List of silent stations for in Region V

No Reports ***at main synoptic hours*** were available at MTN centres during the monitoring period 1 - 15 October 1999 from the following stations:

SYNOP report

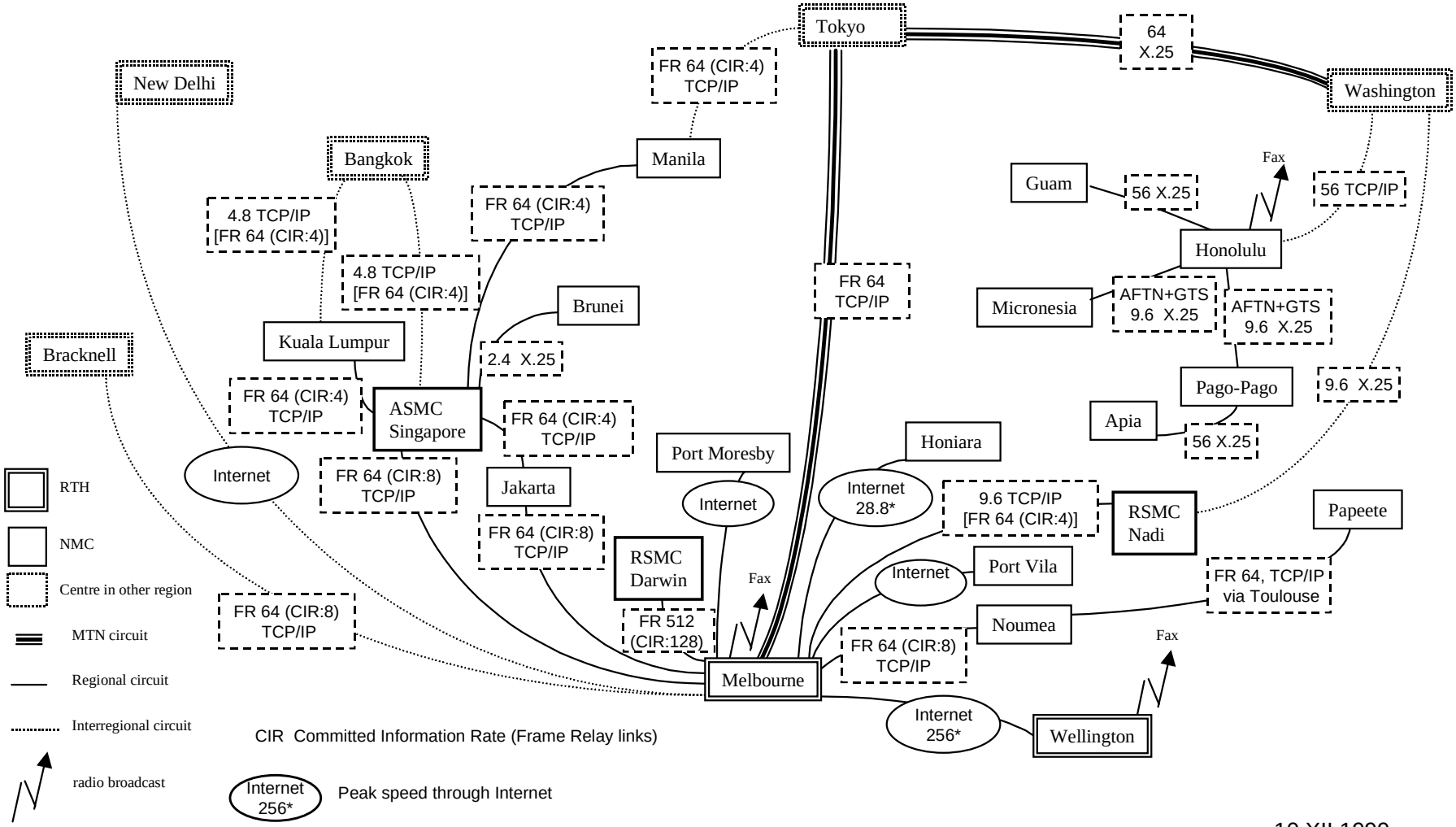
Country	*Stations index number*
AUSTRALIA	94103 94122 94132 94146 94184 94185 94200 94211 94236 94248 94267 94275 94283 94313 94324 94327 94333 94366 94388 94451 94477 94482 94488 94492 94500 94642 94643 94700 94711 94893 94983 95111 95322 95637
COOK ISLANDS	91809 91826
EAST TIMOR	97385 97390
FRENCH POLYNESIA	91952
INDONESIA	97810
ISLANDS IN THE PACIFIC OCEAN NORTH OF THE EQUATOR	
	91066 91159 91166 91168 91194 91204 91222 91251 91259 91275 91287 91315 91328 91338 91343 91352 91355 91365 91377
NIUE	91822 X
PAPUA NEW GUINEA	92001 92003 92004 92014 92035 92044 92047 92071 92076 92077 92087 92100
SAMOA AND AMERICAN SAMOA	91768
SOUTHERN LINE ISLANDS	91902

TEMP report Part A

Country	*Stations index number*
AUSTRALIA	94750 94767 94865
FRENCH POLYNESIA	91944
INDONESIA	97724 97014
ISLANDS IN THE PACIFIC OCEAN NORTH OF THE EQUATOR	
	91217
MALAYSIA	48648 [X]
NAURU	91530
PAPUA NEW GUINEA	92014 92035
PHILIPPINES	98429
PHOENIX ISLANDS	91701
SOLOMON ISLANDS	91517

X replaced by a close-by station, but not yet notified

Annex to paragraph 3.2.1



Regional Meteorological Telecommunication Network for Region V (South-West Pacific)
implementation plan for point-to-point circuits (transmission speed in Kbit/s)

10.XII.1999

Annex to paragraph 3.3.7

Implementation plans for satellite-based systems in the South Pacific area
(plans for point-point circuits are also mentioned where appropriate)

Country	Plans
American Samoa	Complete 56 K link and AFTN/GTS link between Apia and Pago Pago[1] Install additional EMWIN[2] and Mini EMWIN terminals[3]
Commonwealth of the Northern Mariana Islands	Install EMWIN and Mini EMWIN terminals[3]
Cook Islands	Switch local products onto the GTS for EMWIN broadcast Install DCP for manual data entry at Rarotonga[3] Install additional EMWIN and Mini EMWIN terminals[3] Install Inmarsat M communications system[3] Add DCP communications to AWSs[3] Install ISCS system[3] Install PDUS reception system for GOES imagery[3]
Federated States of Micronesia	Implement 3 GRIB display systems[2] Install additional EMWIN and Mini EMWIN terminals[3] Install 3 DCP for manual data entry[3] Install 3 PDUS reception systems for GMS imagery[3]
Fiji	Implement Frame Relay on circuit to Melbourne[2] Connect Nadi RSMC to the Nadi - Washington AFTN/GTS link[2] Switch products onto the GTS for EMWIN broadcast Install Inmarsat M communications system[2] Install Mini EMWIN terminals for remote locations[3]
French Polynesia	Switch products onto the GTS for EMWIN broadcast Install HRPT receiving system[2] Install Inmarsat M communications system[3] Install Mini EMWIN systems for remote locations[3]
Kiribati	Formalise use or ERL profiler DCP as a backup transmission system Install DCP systems for manual data entry at Betio[2] Install 2 AWS with DCP communications[3] Install Mini EMWIN terminals for remote locations[3]
Marshall Islands	Implement GRIB display system[2] Install DCP for manual data entry[3] Install additional EMWIN and Mini EMWIN terminals[3] Install PDUS reception system for GMS/GOES imagery[3]
Nauru	Implement DCP transmission of AWS, TEMP and PILOT data[1]
New Caledonia	Switch products onto the GTS for EMWIN and ISCS broadcast Implement cyclone warning graphics transmission to Vanuatu
Niue	Install Inmarsat M communications system[3] Install DCP with manual data entry[3]
Palau	Implement GRIB display system[2] Install DCP for manual data entry[3] Install EMWIN and Mini EMWIN terminals[3] Install PDUS reception system for GMS imagery[3]
Papua New Guinea	Major project (Balus Project) currently in progress[1]

Samoa	Switch products onto the GTS for EMWIN broadcast Complete AFTN/GTS link between Apia and Pago Pago[1] Acquire and implement software systems for display of GRIB data[2] Install 2 DCP systems with manual data entry[3] Install Inmarsat M communications system[2] Install PDUS reception system for GOES imagery[3]
Solomon Islands	Switch products onto the GTS for EMWIN broadcast Install EMWIN terminal at Henderson Airport[3] Install DCP with manual data entry at National Met Centre[3] Install PDUS reception system for GMS imagery[3] Install Mini EMWIN terminals for remote locations[3]
Tokelau	Install 2 Mini EMWIN terminals[3]
Tonga	Implement dial-up internet e-mail access for Fua'amotu Airport[3] Install EMWIN systems at Vavau and Fua'amotu airports[3] Install DCP with manual data entry at Vava'a and Fua'amotu airports[3] Install Inmarsat M communications system[2] Install 1 AWS with DCP communications[3] Install Mini EMWIN terminals for remote locations[3] Install PDUS reception system for GOES imagery[3]
Tuvalu	Install Inmarsat M communications system[2] Install DCP with manual data entry at Funafuti[3] Install Mini EMWIN terminals for remote locations[3] Install 2 AWS with DCP communications[3]
Vanuatu	Implement Internet based circuit from Port Vila to Melbourne[2] Install Inmarsat M communications system[2] Install Mini EMWIN terminals for remote locations[3] Switch products onto the GTS for EMWIN broadcast Install PDUS reception system for GMS imagery[3] Install DCP systems for manual data entry (up to 6 locations) [3]
Wallis and Futuna	Acquire and implement software systems for display of ISCS data[2] Install Inmarsat M communications system [2]

Notes

1. Project already commenced
2. Project already funded
3. Project requires funding
   Mini EMWIN terminals should be developed.