WORLD METEOROLOGICAL ORGANIZATION
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REGIONAL ASSOCIATION V

RA V WORKING GROUP ON THE PLANNING AND IMPLEMENTATION OF THE WWW

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ITEM 2.2

ENGLISH only

REPORT OF THE SUB-GROUP ON THE GTS

(Submitted by the coordinator of RA V WWW sub-group on the GTS)

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Summary and Purpose of Document

To provide a report on the status and plans RMTN in RA V

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Action proposed

The session is invited to note the information herein

1 Introduction

This report summarises the status of the RA V RMTN and developments since the previous PIW in Wellington in February 1998.

2 Status of the RMTN

2.1 Point to point circuits

The RMTN comprises sixteen circuits operating at medium or high speed (from 2.4 to 64 kbit/s). Connections to the MTN and other regions are provided through eight inter regional or MTN circuits.

Three RMTN circuits and one inter-region circuit are implemented through a common Frame Relay network operated by BT Australasia. Four RMTN circuits and one inter-region circuit are implemented through the Internet, one of which has ISDN backup capability.

Details of the GTS in RA V are at Annex 1.

2.2 Telecommunication systems via satellite

The International Satellite Communication System (ISCS) operated by USA, was implemented in 1995 to support the WAFS distribution. The ISCS provides a 38.4 kbit/s one-way multipoint telecommunication service via satellite over the Pacific. The ISCS system over the Pacific is already carrying some GTS data, mainly relating to RA III and IV. Significant spare capacity is available to accommodate additional RA V data and products. Nine ISCS systems have been installed in RA V in Honolulu, Wellington, Melbourne, Noumea, Pt Vila, Nadi, Jakarta, Manila and Singapore.

The Emergency Management Weather Information Network (EMWIN), uses the WEFAX channel of the GOES satellites for the distribution of a variety of meteorological products, including warnings and information related to emergency situations. Over 30 EMWIN systems have been installed in the Pacific, in the following countries: American Samoa, Cook Islands, Fiji, French Polynesia, Federated States of Micronesia, Hawaii, Kiribati, Nauru, New Caledonia, New Zealand, Niue, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wallis and Futuna and Western Samoa. In many countries, both the Meteorological Service and the national disaster management organisation have EMWIN systems. These installations were carried out with funding support from the South Pacific Region Environment Program (SPREP) and the European Union Pacific Tropical Cyclone Warning Upgrade Project.

The **Inmarsat** system is used for the collection of ship reports from voluntary observing ships. The Perth and Singapore Land Earth Station receive ship reports from Inmarsat C and A stations at no cost for ships. Over 90% of ship observations received in Melbourne are received via Inmarsat C. The Inmarsat C multi point broadcast service ' SafetyNet' is used for the broadcast of marine forecasts and warnings to shipping on the high seas. These broadcasts service shipping in Metareas 10, 11 and 14 and are operated by Australia, New Zealand and Japan.

2.3 Radio facsimile broadcasts

Radio facsimile broadcasts are operated by Australia and New Zealand as follows:

Country	Call sign	Frequencies (Khz)
Australia	AXM	2628, 5100, 11030, 13920, 20469
Australia	AXI	5755, 7535, 10555, 15615, 18060
New Zealand	ZKLF	5807, 9459, 13550.5, 16340.1

3 Performance of the RMTN

The performance of the RMTN may be gauged to some extent, by looking at the results of the annual global monitoring (AGM) of the WWW carried out each October by the WMO. The table at Annex 2 summarises the AGM results for Synop and Temp reports for RA V from 1993 to 2000. Some observations that may be drawn from these figures are:

Synops

- The RBSN has remained fairly constant since 1994.
- The actual number of observations received has improved since 1999, due largely to the provision of standard-hour observations at around 95 of Australia's 130 RBSN stations. These reports are synthesised from half-hourly or hourly METAR AWS reports.
- Despite this change, the practical target ('expected reports' in WMO language) has remained unchanged and would appear therefore to be artificially low. This makes the performance of actual reports when measured against the practical target appear artificially high.
- The practical target itself and the actual number of observations received, paint a more pessimistic picture than reality, because Australia, PNG and New Zealand still provide around 160 reports daily at non-standard hours because of long standing local practices. These observations find their way into the GDPS through the ability of models to assimilate asynoptic reports. If the monitoring is to provide an accurate picture of the WWW systems, it would seem that these reports should be counted as they were prior to 1996.

Temps

- The RBSN at around 93 stations, is at its lowest since 1993. However this reduced network is expected to be operating more effectively as the expected number of reports at 131 is the highest since 1993.
- The actual number of observations received in 2000, was 58% of the ideal target, and 82% of the practical target.

The monitoring process does not clearly indicate the reasons for data deficiency because it is probable that the 'real life' observing program actually in operation differs from the 'expected' program based on Vol A by an unknown amount. There may be data loss on the GTS due, among other things, to bulletin formatting errors and omissions in RTH routing tables. The WMO is addressing these problems through:

- Special MTN Monitoring (SMM) whereby a number of MTN centres exchange raw data passing through their centre three times yearly and analyse it in detail. This is proving useful in detecting formatting errors in reports from some NMCs.
- Facilitating the exchange of routing tables to ensure that RTHs are complying with the GTS routing plan.
- Devolving the administration of the catalog of bulletins to RTHs on the MTN. It is hoped this will enable RTHs to ensure all bulletins available are appropriately routed.

4 Developments and improvements in the RMTN

4.1 Point to point circuits

Melbourne-Singapore-Jakarta
The analog V.29 Melbourne-Jakarta was closed on 26 July 1999 as a consequence of being declared obsolete by the telecommunications carriers. In anticipation of this occurrence, and in the light of difficulties in establishing a replacement digital leased circuit, a strategy was adopted to implement a Frame Relay managed network linking Melbourne, Jakarta and Singapore. Singapore was incorporated into the network because of a long-standing intention to establish a direct Melbourne-Singapore link in accordance with the RMTN plan for RA V.

The three Centres cooperated in a tendering process to select a network service provider. 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 19 October 1999 for Singapore-Jakarta.

The administrative arrangements under which the three Centres are cooperating in the use of the network are 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 compared to costs that were being borne previously for fixed bandwidth lines.

Other Centres in RA V who wish to join the network will be most welcome to do so. The MOU has specific provision for additional participating Centres.

Melbourne-Bracknell (inter regional circuit)
The fixed bandwidth 19.2Kbps link was replaced on 16 May 2000, by a Frame Relay Connection through the BT network, which carries the Singapore and Jakarta circuits. The CIR Bracknell to Melbourne is 32Kbps and Melbourne to Bracknell is 64Kbps. The reason for the asymmetric CIR is to allow for GMS imagery files relayed to Bracknell by Melbourne.

Melbourne-New Delhi (inter regional circuit)
The 75 baud telegraph circuit was withdrawn by the international carrier on 1st June 1998 due to technology obsolescence. A new Internet based inter regional circuit was established on 14th May 2001 following the implementation of a new Message Switching System in New Delhi.

Melbourne-Port Moresby
A 4800 bps digital link was implemented in May 1999, replacing a 75 baud telegraph circuit, now closed. This circuit used TCP/IP based file transfer (FTP) for exchange of GTS messages. Pictorial data, mainly NWP graphical products and satellite pictures are sent to Port Moresby in HTTP format by FTP for local display by web browser on a Windows NT PC. The PC and LAN equipment in Port Moresby were provided by the European Union South Pacific Tropical Cyclone Warning Upgrade Project.

The dedicated 4800 bps line was discontinued from 6th April 2001 and replaced by an Internet based link through a dedicated connection between the PNG NWS and an ISP in Port Moresby. This arrangement provides much greater throughput at reduced cost, compared to the leased line link.

Melbourne-Honiara
An Internet based link between Melbourne and Honiara was established in late November 1999. It replaced the one-way satellite DamaNet link that was used for delivering Melbourne NWP and satellite data to Honiara. The system in Honiara is very similar to that in Port Moresby. The PC and LAN equipment in Honiara were provided by the European Union South Pacific Tropical Cyclone Warning Upgrade Project.

Unfortunately, this link has not proved reliable and has been non operational since mid 2001.

Melbourne-Port Vila
An Internet-based GTS link was implemented between Melbourne and Port Vila in October 2000. It is similar in design to the Port Moresby system. Funding support was provided by the European Union South Pacific Tropical Cyclone Warning Upgrade Project.

Noumea-Papeete
This link was discontinued on 9th August 2001 and replaced by a Frame Relay connection to Toulouse. Noumea is also connected to Toulouse by Frame Relay. This arrangement has improved the communications between both Centres and the GTS as well as between each other. The Frame Relay services also provides Internet connection to both Centres.

Apia - Pago Pago
The EU Tropical Cyclone Warning System Upgrade Project, with Colin Schulz, are working with the Samoa Post and Telecommunications department, the Meteorology Division of Ministry of Agriculture Forests, Fisheries and Meteorology (MAFFM) and the Pacific Region Office of the US National Weather Service, to install a digital point-to-point circuit between the Meteorology Division of MAFFM and the NWS office at Pago Pago. When established, this link will be the primary communications circuit for Apia to access the GTS via the USA. Funding for this upgrade will be provided jointly by the EU Tropical Cyclone Warning System Upgrade Project and the US National Weather Service. The US Federal Aviation Agency will provide interfaces to the AFTN and GTS systems via their existing links between Pago Pago and Honolulu.

Singapore-Kuala Lumpur
This link has been upgraded from 1200 bps to 4800bps X.25. Further upgrade to Frame Relay is expected in 2002.

Singapore-Bangkok
A new 4800bps X.25 inter-regional link has been established. Plans to establish a Frame Relay link are under discussion between the two Centres.

Singapore-Manila
This link has been upgraded from 200 bps to 9600bps X.25. Plans to establish a Frame Relay link are under discussion between the two Centres.

Note: Singapore Meteorological Service commissioned a new Message Switching System (MSS) on 1st August 2001. The Malaysian Meteorological Service has also recently completed a major upgrade of its MSS and forecast support systems. These new systems have provided the capability for the circuit upgrades described above.

4.2 Satellite based systems

Inmarsat M

Inmarsat M systems were to be implemented as a back-up communications link in the event that the primary means of communications for a NMHS is disrupted. RA V PIW 1998 proposed that the implementation of Inmarsat M systems complete with Mini-Sat terminal, a personal computer, fax machine, and UPS be given a high priority. Proposed recipients funded through the EU project were Vanuatu, Tuvalu, Kiribati, Solomon Islands, Wallis Island, Papua New Guinea, Tonga, and Samoa. Meteo France was to fund systems for New Caledonia and French Polynesia. Funding needed to be found for installations for the Cook Islands and Niue.

It appears that this initiative has lapsed and that only Meteo France has proceeded with its component in that two systems have been installed in Tahiti – one at the Meteorological Office and one at the Civil security Protection Service.

EMWIN

Activation of GOES 7 to provide a Western Pacific EMWIN data stream is now undergoing testing and should be fully operational early 2002. Delays have occurred while a suitable low cost tracking antenna was developed; necessary because GOES 7 is operating in an inclined orbit. Production of an antenna controller has just commenced. As soon as these can be installed, EMWIN systems will be operating in Guam, Palau, and other Western Pacific areas. The next step will be to provide a truly Pacific data stream originating from Honolulu. Currently GOES 7 data is a straight re-broadcast of data received from GOES 10 in Honolulu and uplinked without change to GOES 7. It is the intention of the NWS Pacific Region to filter the GOES 10 data stream and only insert relevant data with additional Pacific products on GOES 7.

As the GOES series of Geostationary satellites will change over to LRIT in the next few years, the effects that this will have on the EMWIN data stream are being evaluated with a view to continuing the simple EMWIN type service, but with possible speed increases. The present system is becoming fairly heavily loaded and there is some concern that the system may become saturated if growth of data products transmitted is not carefully controlled. Moving the Pacific stream to GOES 7 will help.

The GOES 8 and 10 EMWIN data stream is now regarded by NWS as a fully operational system within their respective coverage areas.
(EMWIN report courtesy of Colin Schulz)

ISCS

The current ISCS will continue until September 2003. A new system is planned to take over from this time following a tendering process now proceeding in the US NWS. The new system will provide TCP/IP and X.25 capability as well as increased communications bandwidth.

4.3 Implementation of TCP/IP

Considerable progress has been made in planning and implementing TCP/IP in RA V. TCP/IP based socket procedures are now operating between MSS systems on the following links: Melbourne-Singapore, Melbourne-Nadi, Melbourne-Wellington and Melbourne-Tokyo, Melbourne-Bracknell, Melbourne-Jakarta and Singapore-Jakarta links.

TCP/IP based file transfer procedures are operating on the Melbourne-Port Moresby, Melbourne-Pt Vila and Melbourne-Honiara links. TCP/IP based procedures are planned to be implemented on the Melbourne-Noumea circuit during 2002.

4.4 Radio Facsimile Broadcasts

Australian radio facsimile broadcasts as outlined in 2.3 above, will continue until at least June 2007. A contract has been placed for the construction of two new HF broadcast stations (one in WA and one in Queensland) to transmit radio facsimile and voice marine forecasts and warnings for the Bureau of Meteorology. These stations will also provide HF services supporting marine search and rescue for the Australian Maritime Safety Authority. The new stations are scheduled to commence service in July 2002. The call signs AXM and AXI will be replaced by VMC and VMW respectively. The content of the broadcasts will remain essentially the same as at present.

5 Conclusion

The RA-V RMTN has improved steadily in the period since the previous RA-V WWW WG meeting in February 1998. The improvements entail:

- Modernised computing and MSS systems especially in the SE Asian part of the Region;
- Introduction of small modern PC-based systems in the Pacific region, with funding support from the European Union South Pacific Tropical Cyclone Warning Upgrade Project;
- Extensive adoption of TCP/IP based procedures;
- Implementation of managed Frame Relay networks.

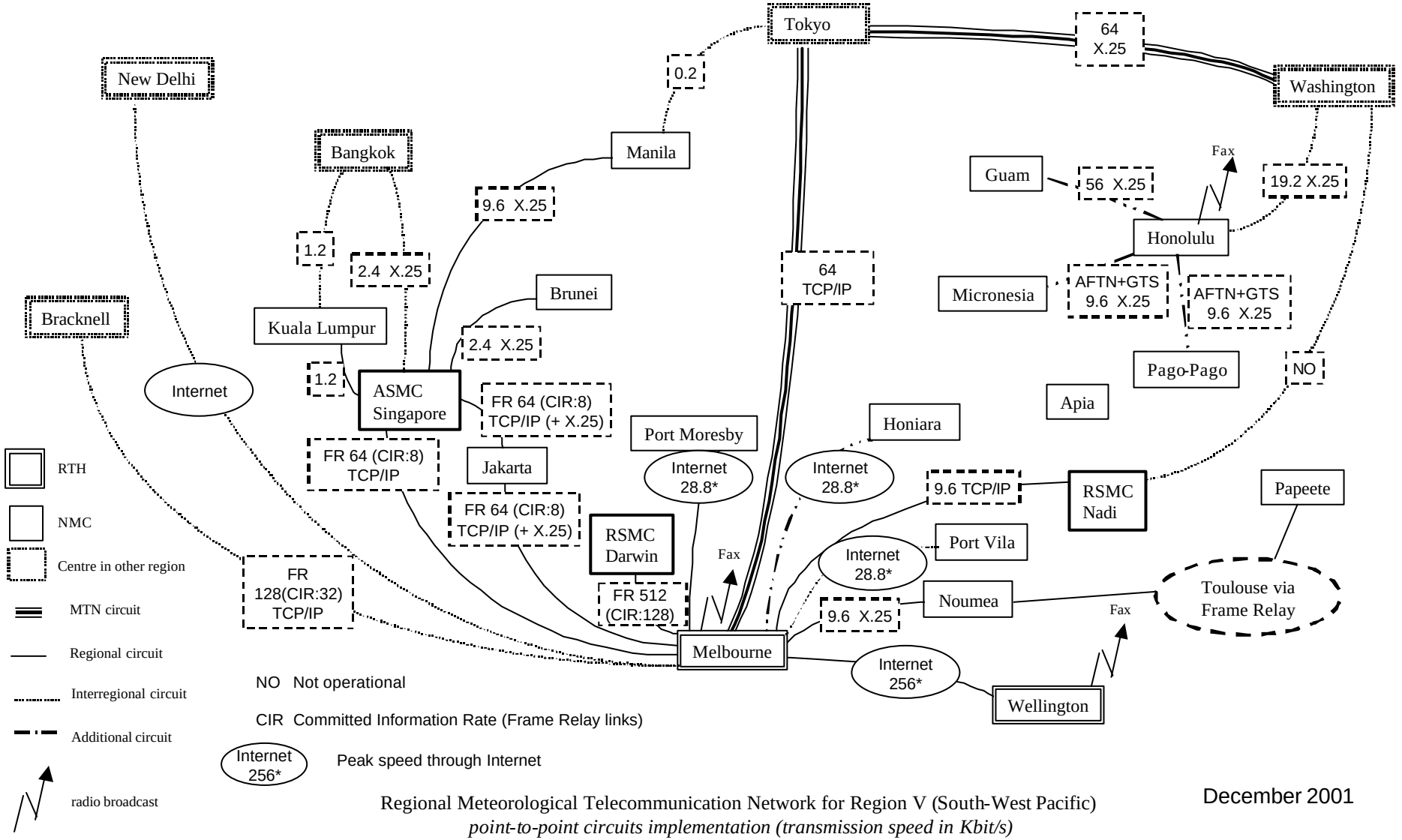
These advances have improved the effectiveness and reliability of the RMTN. They have made access to processed products more widely available, which should facilitate improvements to services by a number of NMSs in the Region. However, to date, we have not seen a marked improvement in the availability of observational data. This suggests that attention needs to continue in the support and improvement of the RA-V observing network.

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, comments
MTN and Inter-regional					
Melbourne-Tokyo	64	LL	IP	Sockets	Frame Relay in 2002
Melbourne-Bracknell	128/32	FR[1]	IP	Sockets and FTP	
Melbourne-New Delhi		Internet			
Washington-Honolulu	19.2	LL 1540	X.25		56Kbps, TCP/IP
Washington-Nadi	n/o				9.6, X.25 on existing 56 kb/s NADIN 2 link through connection between RSMC Nadi with AFTN centre, Oakland
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	*	Internet+	IP	Sockets	
Melbourne-Singapore	64/8	FR[1]	IP	Sockets	
Melbourne-Jakarta	64/4	FR[1]	IP	Sockets	
Melbourne-Noumea	9.6	LL	X.25	PVC	64/8 FR, TCP/IP mid 2002. Noumea also connected to RTH Toulouse via FR 128/32
Melbourne-Nadi	9.6	LL	IP	Sockets	FR 64/8 planned 2002
Melbourne-Port Moresby	*	Internet	IP	FTP	
Melbourne-Honiara	*	Internet			Formal inclusion in RMTN
Melbourne - Pt Vila	*	Internet			Formal inclusion in RMTN
Noumea - Papeete	128/32	FR			FR, TCP/IP via RTH Toulouse
Honolulu - Guam	56	LL	X.25		Formal inclusion in RMTN
Honolulu - Pago-Pago	9.6	LL	X.25		Formal inclusion in RMTN
Honolulu - Micronesia	9.6	LL	X.25		Formal inclusion in RMTN
Pago-Pago - Apia	n/o				56, TCP/IP early 2002, Formal inclusion in RMTN
Singapore-Manila	9.6	LL	X.25	PVC	64/8 FR 2002
Singapore-Jakarta	64/8	FR[1]	IP	Sockets	
Singapore-Brunei	2.4	LL	X.25	PVC	
Singapore-Kuala Lumpur	1.2	LL	Async		64/8 FR 2002

Legend n/o: Not in operation LL: Leased line FR: Frame Relay: Access speed/Committed Information Rate, e.g 128/32

[1] operated by BT Australasia * Speed depends on Internet access at each end. 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)

December 2001

	1993	1994	1995	1996	1997	1998	1999	2000
SYNOPS								
Actual number received	1052	1188	1171	832	805	857	1008	1001
Practical target	1225	1383	1423	1027	1036	1033	1009	1030
Ideal target (from RBSN)	1436	1628	1628	1624	1644	1644	1592	1584
RBSN stations	359	407	407	406	411	411	398	396
Percentage rec'd	73%	73%	72%	51%	49%	52%	63%	63%
% rec'd vs practical target	86%	86%	82%	81%	78%	83%	100%	97%
TEMPS								
Actual number received	102	103	104	106	109	101	106	108
Practical target	119	120	119	120	121	121	132	131
Ideal target (from RBSN)	200	192	192	192	194	194	186	186
RBSN stations	100	96	96	96	97	97	93	93
Percentage rec'd	51%	54%	54%	55%	56%	52%	57%	58%
% rec'd vs practical target	86%	86%	87%	88%	90%	83%	80%	82%