WMO's Activities in Relation to the Indian Ocean Tsunami Early Warning System

Bali, 31 July 2006

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WMO Contributions to ICG-TWS

I. **Upgrade of WMO's GTS**

II. Support of Regional Warning Centers

III. IOC/WMO/ISDR Assessments

IV. Multi-Agency Consortium in support of national plans

V. Multi-hazard approach to ocean-related early warning systems

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WMO's GTS

Through various tsunami-related international coordination meetings, WMO Global Telecommunication System (GTS), linking National Meteorological Services of 187 countries and territories, has been established as the backbone for exchange of tsunami related information and warnings.

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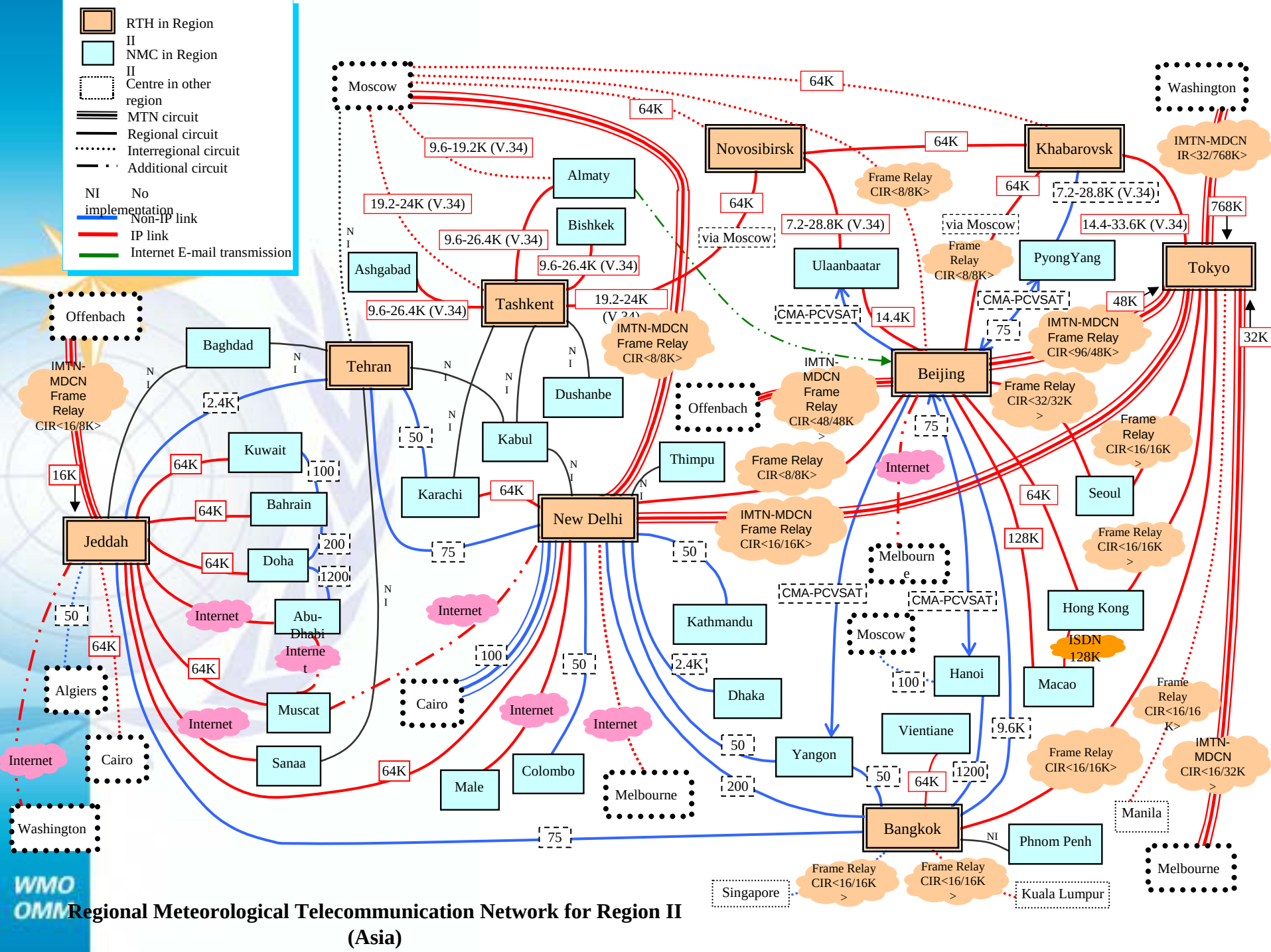
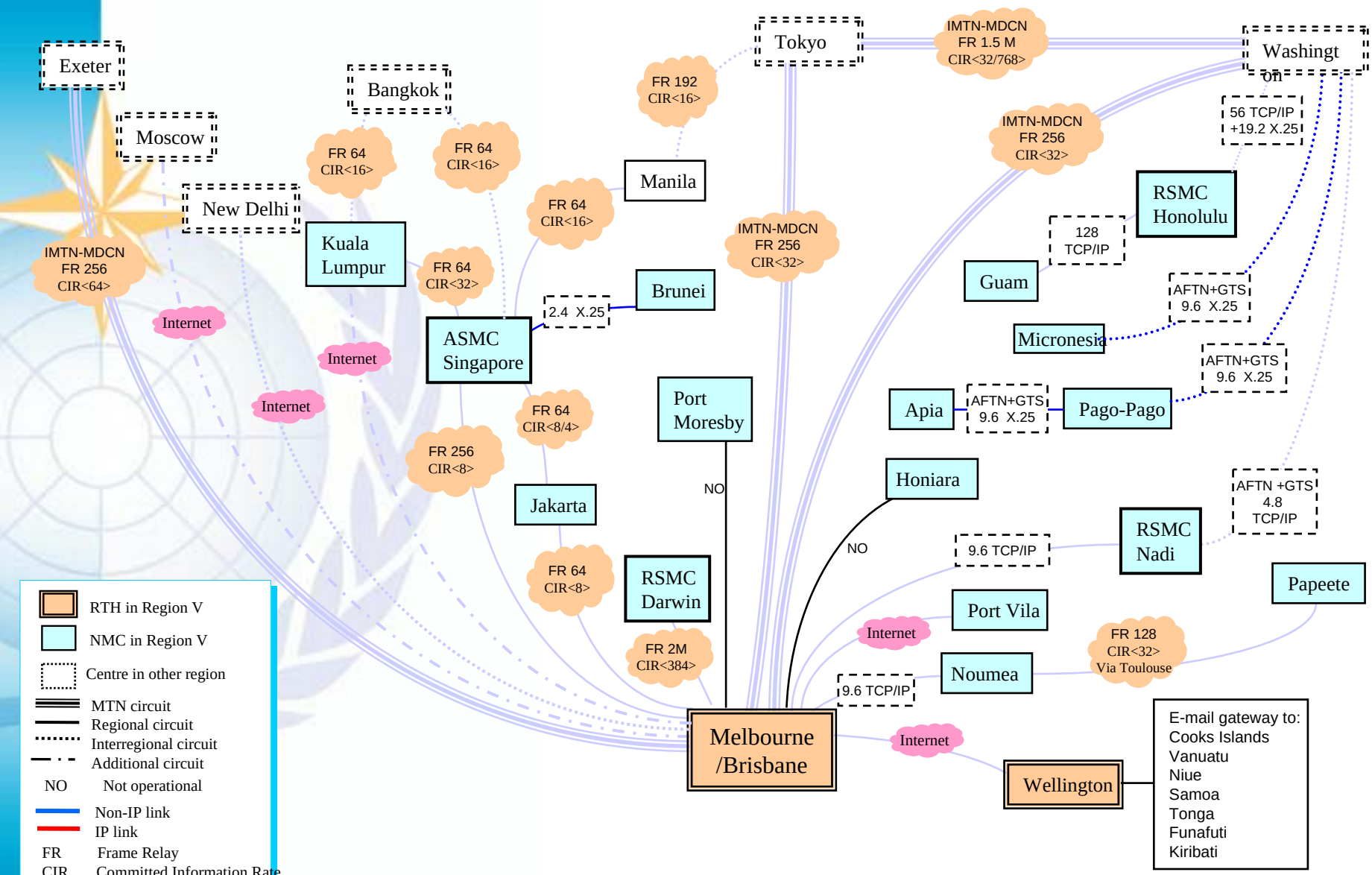


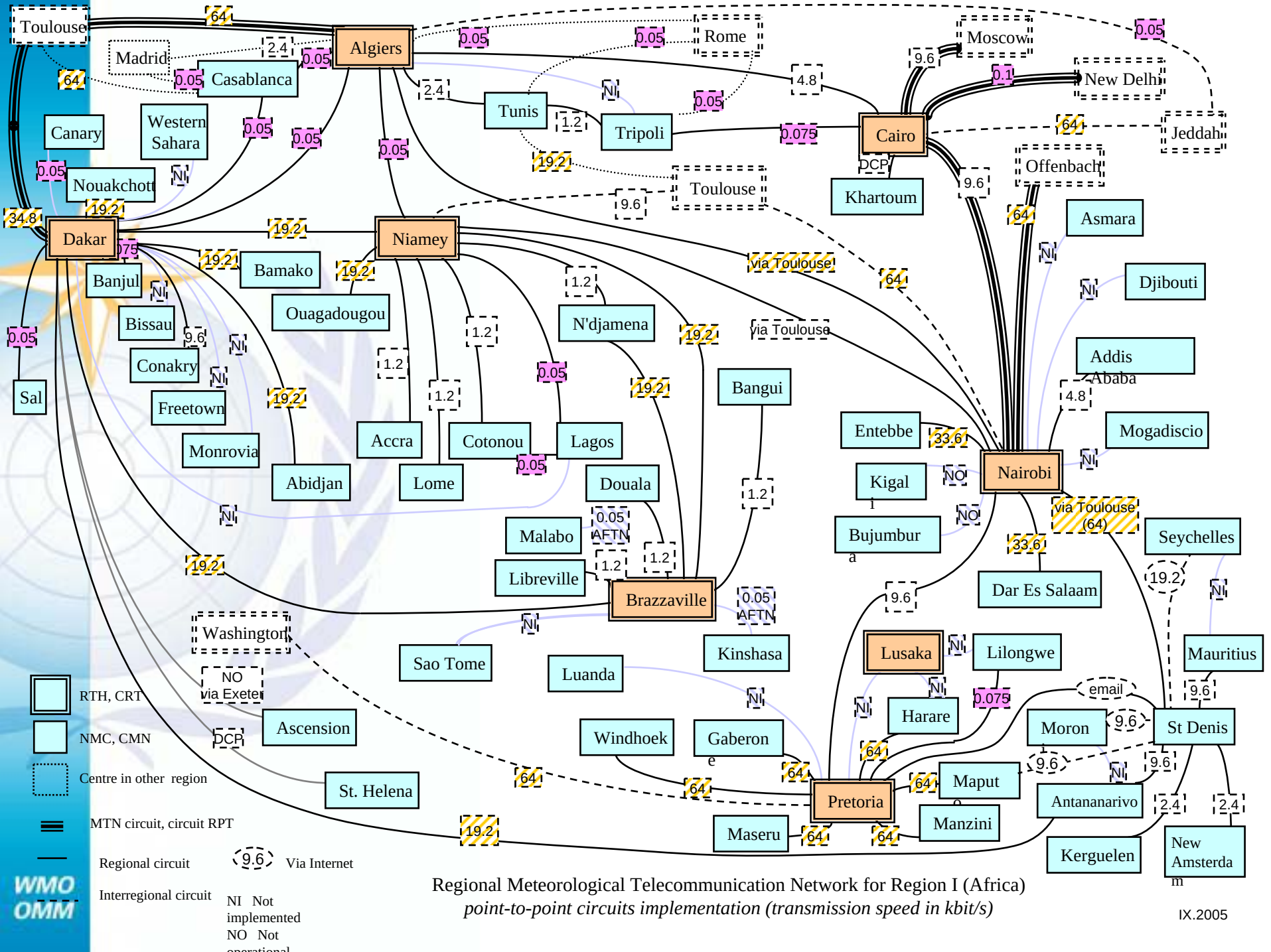
Regional Meteorological Telecommunication Network for Region II (Asia)



Regional Meteorological Telecommunication Network Plans for Region V (South-West Pacific)

point-to-point circuits implementation (transmission speed in kbit/s)

XII.2005



Regional Meteorological Telecommunication Network for Region I (Africa)

point-to-point circuits implementation (transmission speed in kbit/s)

IX.2005

WMO's Action Plan for a Fully Operational GTS for the IOTWS

Step 1 - Multidisciplinary workshop (Jakarta, March 2005) – Completed

Step 2 - GTS operational arrangements & tests for interim TWS – Completed

Step 3 - WMO GTS Expert missions to NMHSs – Completed

Step 4 - Implementation of upgrade to NMHSs' GTS capabilities (On-going, Expected completion Dec. 2006)

Step 5 - WMO Training on GTS operations (On-going on country-by-country basis after completion of GTS Upgrade)

Step 6 - Operational tests (In coordination with IOC)

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GTS technical arrangements to distribute TWS messages to NMHSs:

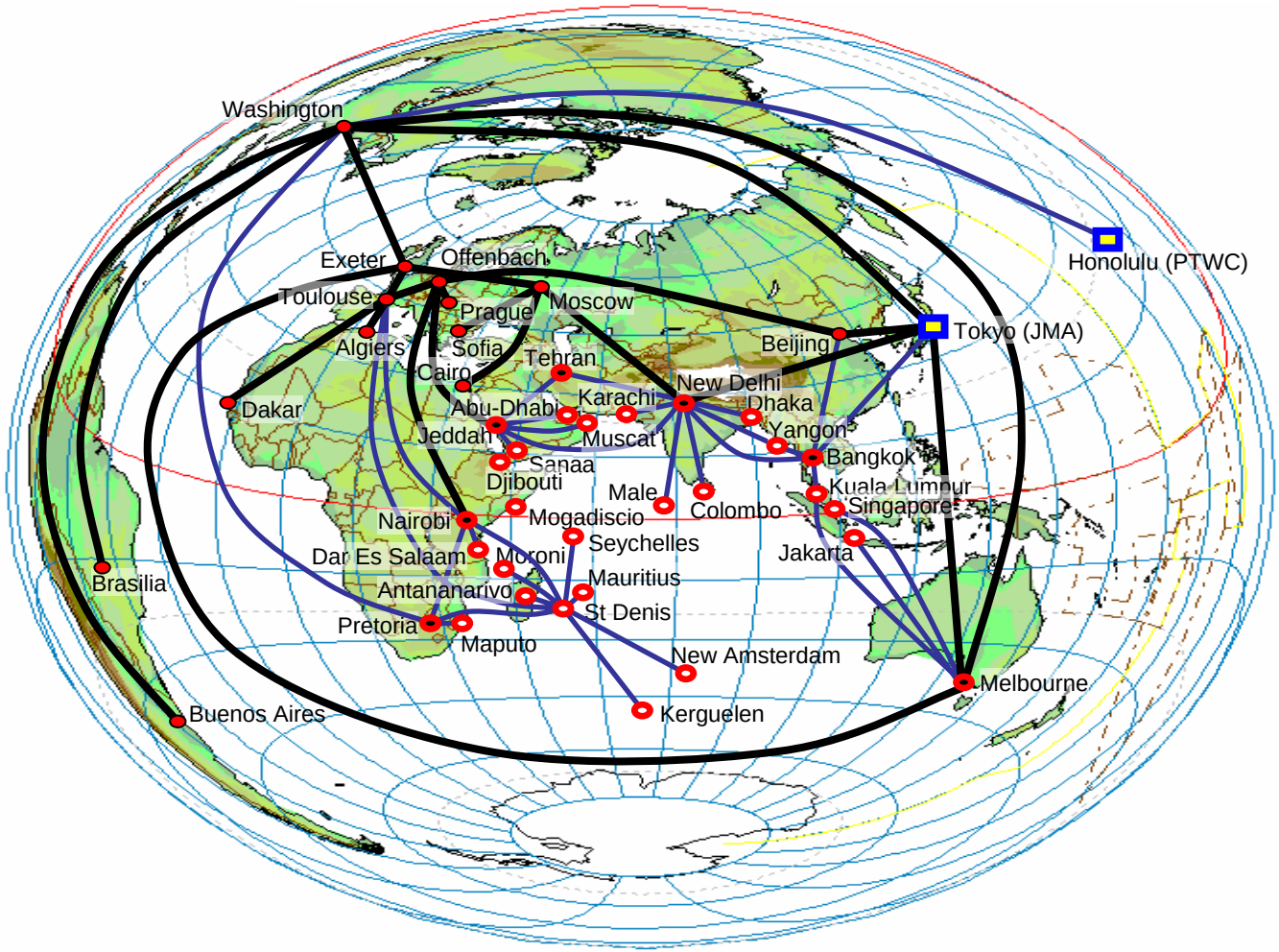
- ***Use of WMO/GTS links interconnecting Regional Telecommunication Hubs and National Meteorological Centres***

- ***Use of WMO/GTS satellite-based data distribution systems, including :***
  - ***RETIM-Africa, EUMETCast (West IO)***
  - ***CMA PCVSAT (N-E IO)***
  - ***ISCS and EMWIN (East IO)***

- ***Adoption of special GTS message headers for watch and warnings ensuring highest priority routeing, and also acknowledgment procedures*** *(underway)*

- ***Adoption of unified GTS message headers for sea-level data facilitating collection and exchange via the GTS*** *(underway)*

WMO GTS dissemination of Tsunami Watch Information (TWI) for the Indian Ocean issued by Honolulu (PTWC) and Tokyo (JMA)



Tsunami Watch Information center

National Meteorological Center in the Indian Ocean Rim

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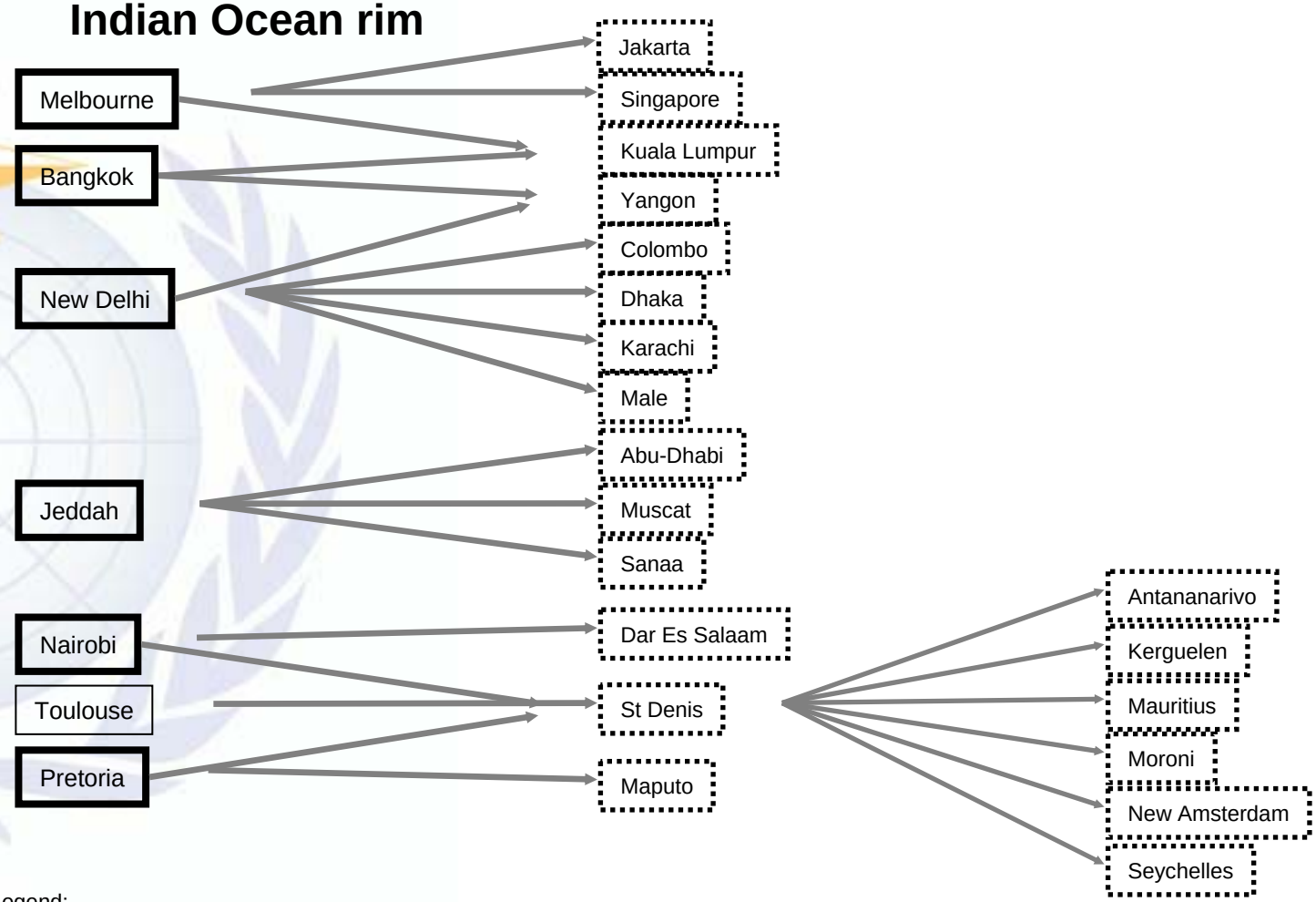
Plan for routing TWI from the associated RTH to NMCs in the Indian Ocean rim



Legend:

RTH associated with NMCs in the Indian Ocean rim

NMC in the Indian Ocean rim

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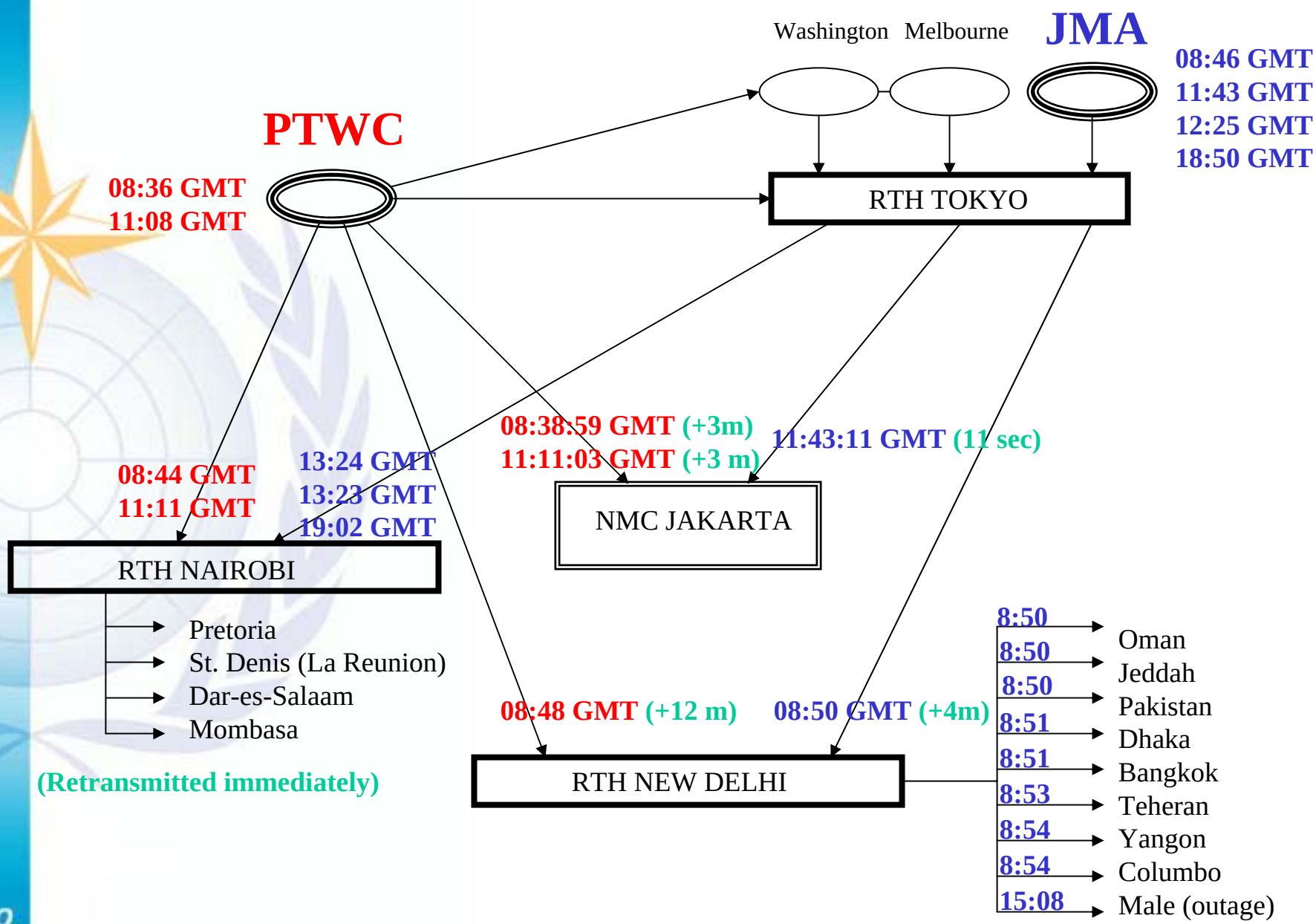
Real Tsunami Watch messages on 17th July 2006



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Status of GTS Upgrades
(As of July 2006)

Country	Implemented By	Status
Kenya	France	Completed
Tanzania	France	Completed
Madagascar	France	Initiated
Sri Lanka	USA/NOAA	Initiated in February 2006 - Underway
Maldives	USA/NOAA	Will be initiated in August 2006 – Experts will visit Maldives during first two weeks of August
Bangladesh	ISDR Flash Appeal, managed by WMO Secretariat-WWW	Underway - Completion planned in December 2006
Pakistan	ISDR Flash Appeal, managed by WMO Secretariat-WWW	Underway - Completion planned in December 2006
Myanmar	ISDR Flash Appeal, managed by WMO Secretariat-WWW	Underway - Completion planned in December 2006
Yemen		under consideration

GTS/ICT trainings are arranged on a country-by-country basis following the completion of the upgrades in each country.

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WMO Supported ICG-IOTWS by Providing Advice and Recommendations Related to Operational Requirements of Regional Warning Centers

- WMO held a Workshop on Multi-Hazard Early Warning Centres: Concept of Operations (November 2005, Singapore)
- Provided recommendations to 2nd ICG-IOTWS on:
  - Organizational arrangements,
  - Operations and Procedures, Standards,
  - Communications,
  - Output coordination,
  - International collaboration
- WMO has shared its operational manuals and accreditation process for regional centres with IOC

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IOC/WMO/ISDR Assessment Missions

- Mission Objective:
  - To identify current capabilities, gaps, needs and problem areas wrt TWS
- 16 IOC/WMO/ISDR missions held in 2005 – Report distributed at 2nd ICG-IOTWS
  - A questionnaire was circulated among NMHSs to determine needs prior to the missions
- 4 new missions scheduled in 2006
  - Yemen, Maldives, Iran and South Africa
- Analyses leading to projects addressing gaps and needs

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ISDR Consortium in Support of:
Development of National Tsunami Warning and Response Plans

- **Membership -** Seven international agencies
  - IOC, WMO, UNDP, World Bank, UNEP, IFRC, OCHA
- **Goal -** provide a package of advisory services in support of development of national tsunami warning and response plans
- **Launched in April 2006–**
  - by UN Special Envoy for Tsunami Recovery

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Role of WMO in the Consortium

- Strengthening of operational 24/7 national warnings capacities of the National Meteorological Services (NMS) as part of multi-hazard approach to national warning systems. [Lead partner: WMO]
  - Upgrading of GTS
  - Assisting NMS with development of modernization plans in support of their mandate for hydro-meteorological hazard warnings (if national plans are build upon a multi-hazard strategy)

WMO Contributions to ICG-TWS

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WMO's Role related to EWS for Ocean-related Hazards

- Tropical cyclones and associated phenomena such as storm surge
- High sea and swell (Extreme Waves)

WMO through the NMHSs has operational EWS responsibility for Tropical Cyclones, Storm Surges and High Seas and Swell warnings.

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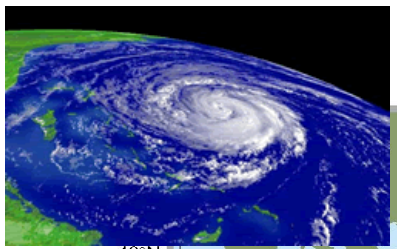
WMO's Global Tropical Cyclone Early Warning System

- **6 Regional Centres designated by WMO to provide advisories for countries in region**
- **6 regional tropical cyclone committees**



Wave and Storm Surge Warnings

- Joint Commission on Oceanography and Marine Meteorology (WMO/IOC)
- Technical guidelines
  - Wind waves and storm surge forecasting
  - Regional approaches
  - Capacity building

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Warnings for Enhanced Coastal Risk Management

- Enhanced technical capacities linking tropical cyclones, storm surges and coastal flooding forecasts and warnings
  - Interdisciplinary methodologies and models
  - WMO Tropical Cyclone, Marine Meteorology and Oceanography and Hydrology programmes
  - Role of JCOMM and other key WMO Technical Commissions (Basic Systems and Hydrology)

IOC – Ad Hoc Working Group on the Framework for a Global Tsunami and other Ocean-Related Hazards Early Warning System

- **Resolution:** XXIII-15
- **ToR:** To address global issues common to four ICGs related to tsunami and ocean-related hazard warning systems
- **First meeting:** at IOC EC-39 (24 June 2006)
- **Outcome:** Develop technical guidance for governments for pursuit of ocean-related hazards

WMO will support the IOC-Ad Hoc Working related to ocean-hazards under its mandate.

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Utilization of Space-based Data and Services for TEWS

- Goals:
  - Use of WMO Space Programme in TWS
  - Increased capacity of NMHSs to utilize satellite services
- Partners:
  - International space agencies and key national agencies
- Actions:
  - Educational and users workshops

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Thank you!

http://www.wmo.int/disasters

Courtesy of Hans Erni

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Consortium Towards Development of National Tsunami Warning and Response Plans

Country	Status	WMO Assistance
Sri Lanka	Ministry for Natural Disaster Risk Management, national plan, "Towards a Safer Sri Lanka, Road Map for Disaster Risk Management"	With assistance from USA-NOAA: Upgrading of GTS for exchange of tsunami warnings and information and development of concrete modernization plan.
Pakistan	National Plan	Upgrading of GTS for exchange of tsunami warnings and information and advise for concrete modernization plan.
Maldives	Plan under development; IOC-WMO-ISDR mission is scheduled on 29-31 August 2006.	With assistance from USA-NOAA: Upgrading of GTS for exchange of tsunami warnings and information
India	National Plan existing, nothing is requested from the Consortium	No assistance has been requested
Indonesia	National Plan existing, no update available	
Thailand	National Plan needed, no update available	
Mozambique	Government still requires assistance in formulating its interest this regard	
Tanzania	National consultation meeting 19 July 2006	With assistance from Meteo-France: Upgrading of GTS for exchange of tsunami warnings and information , **other needs fall under UNESCO-IOC mandate**
Kenya	High level meeting 25-26 July 2006	With assistance from Meteo-France: Upgrading of GTS for exchange of tsunami warnings and information ,
Mauritius	Requested assistance but no specific request; key stakeholders have met to prepare a national action plan	
Madagascar	Requested assistance but no specific request; met with Consortium partners (7 July 2006)	With assistance from Meteo-France: Upgrading of GTS for exchange of tsunami warnings and information ,

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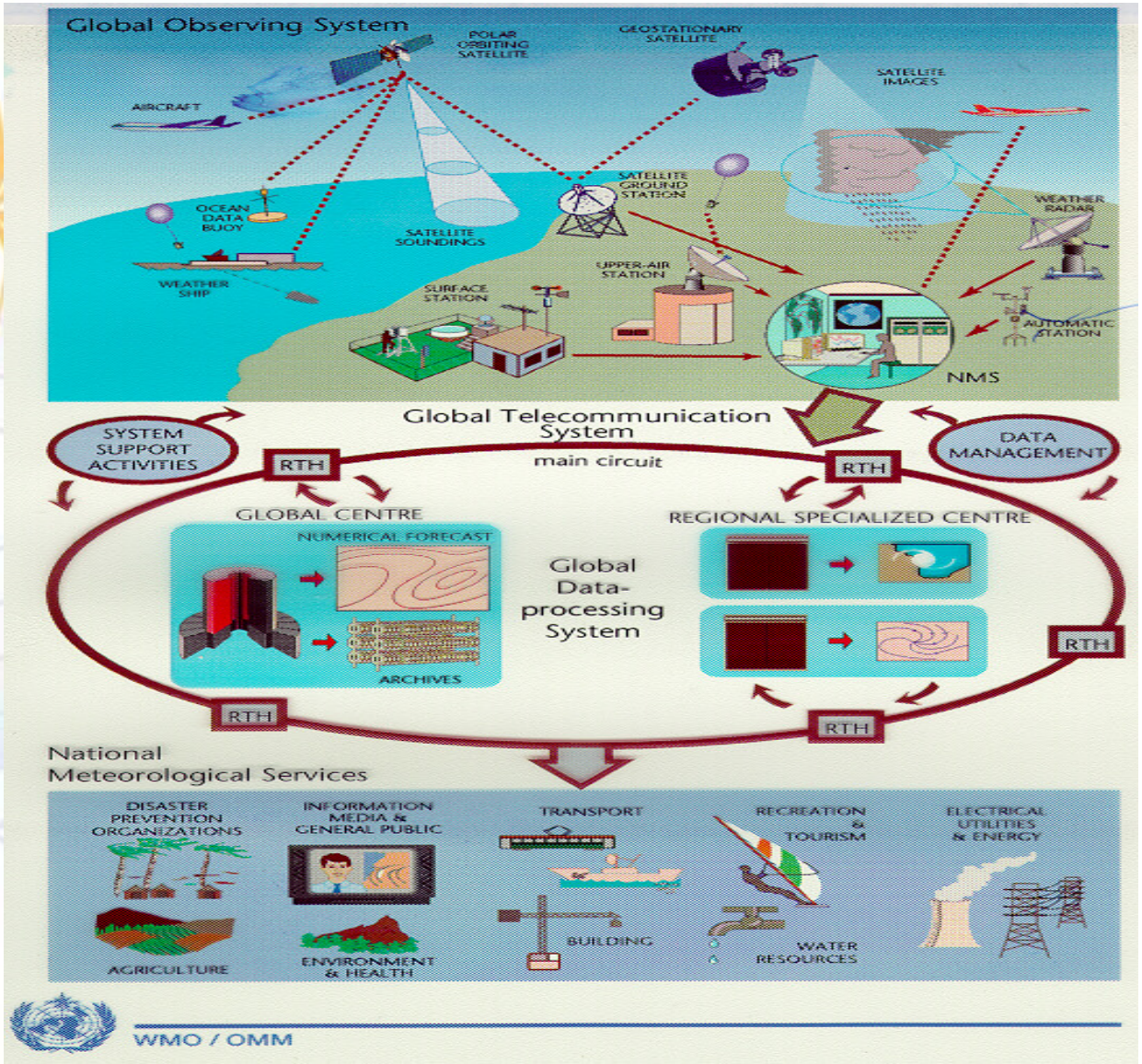
How Does the Global Operational Network of WMO Operate?



NMHSs of 187 countries contribute to Global Observing System every day

Global Telecommunication System- 32 Regional Tele-communication Hubs

3 World Meteorological Centres

40 Regional Specialized Centers

NMHSs deliver data and early warning services

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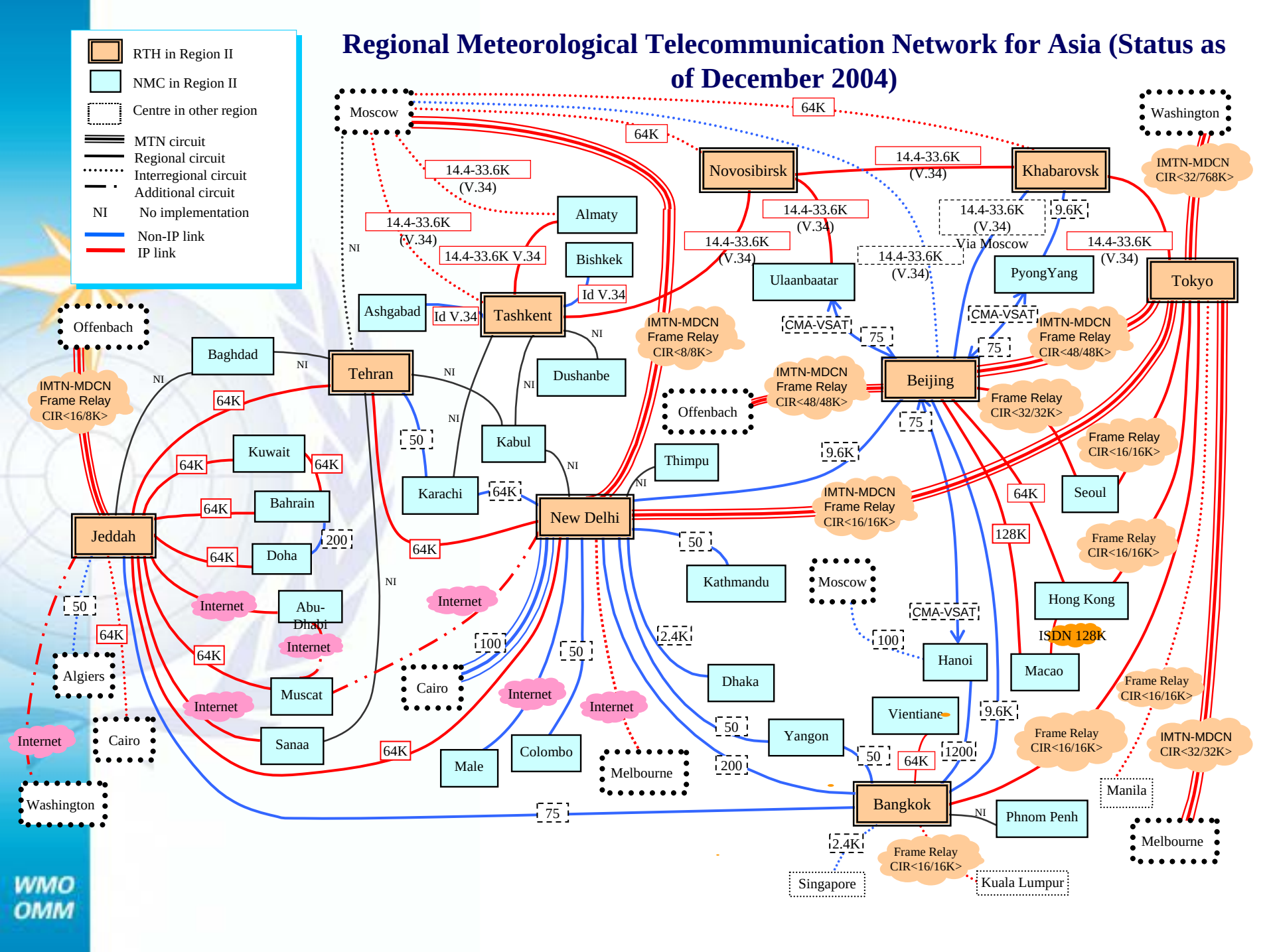
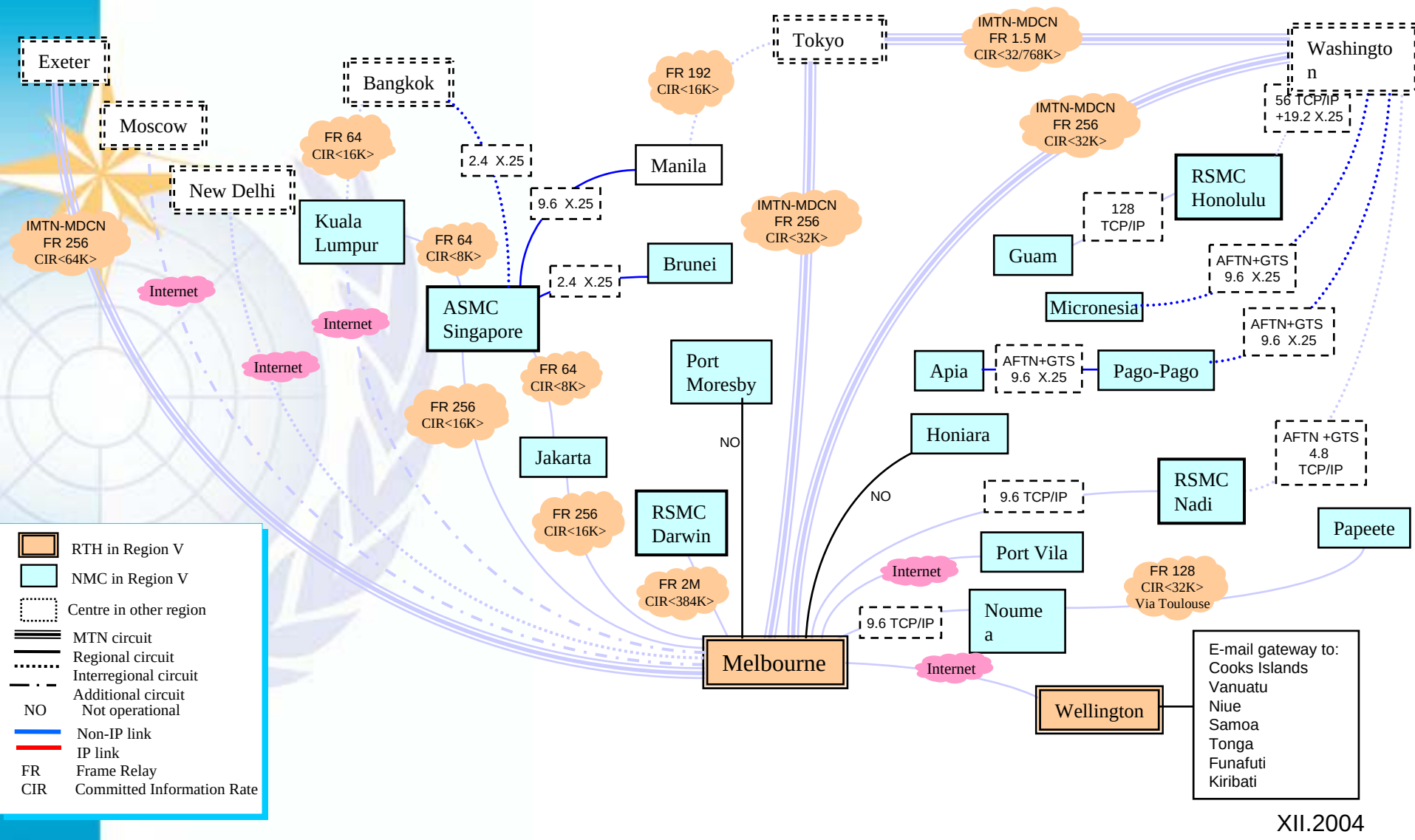
Regional Meteorological Telecommunication Network for Asia (Status as of December 2004)



Regional Meteorological Telecommunication Network Plans for Region V (South-West Pacific)



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