WEATHER – CLIMATE – WATER

WMO

The Global Telecommunication System

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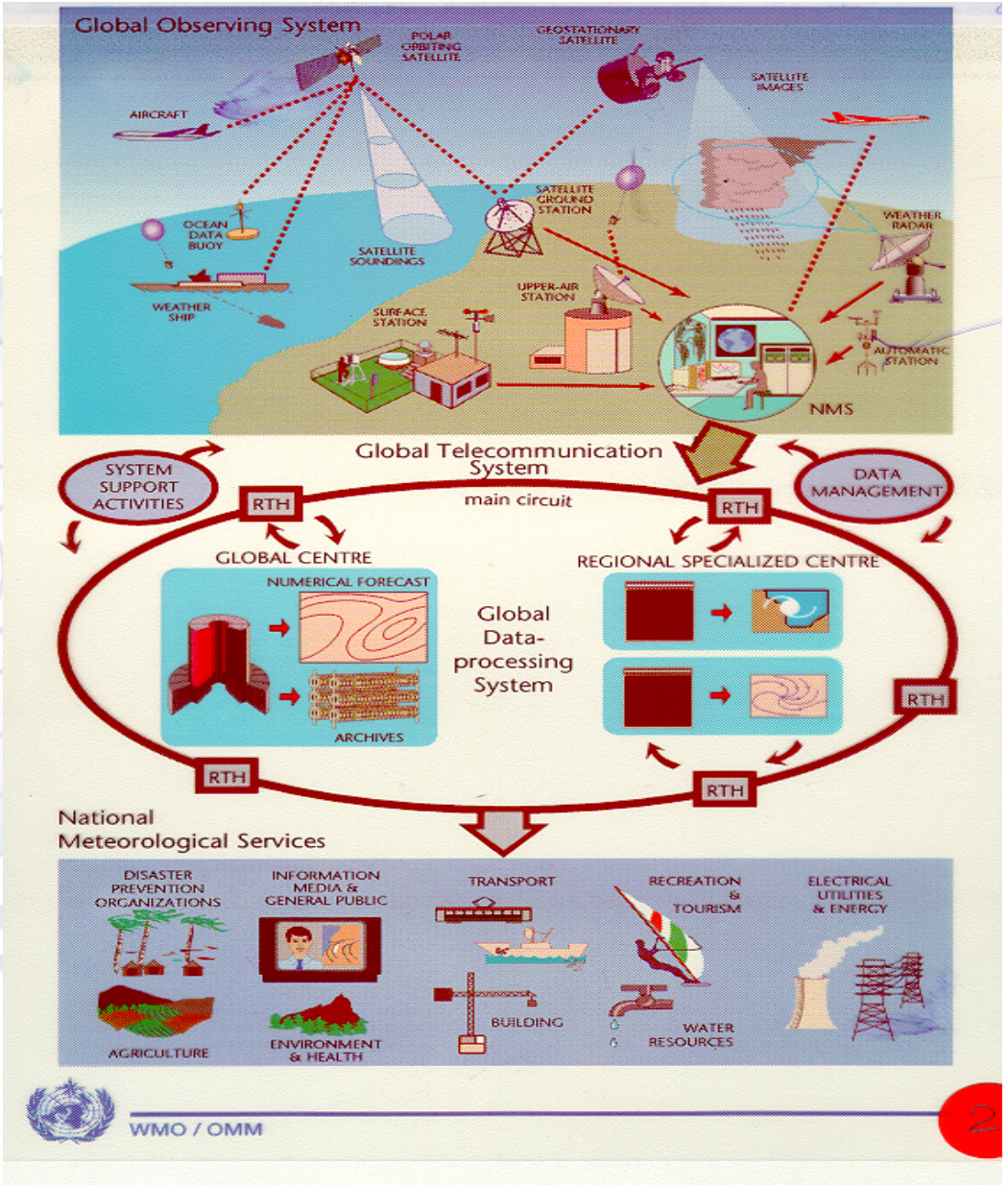
ITU/ESCAP
Disaster Communications Workshop
12-15 December 2006
Bangkok, Thailand

The Global Telecommunication System (GTS) in its context



The World Weather Watch

Integrated Observing systems

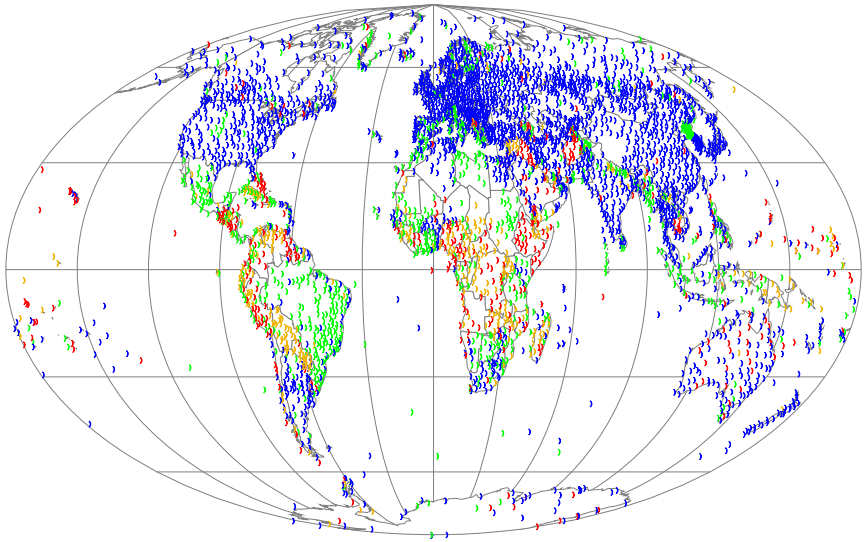
Information systems and services: GTS

Data-Processing and Forecasting System

NMHSs services users

Availability of SYNOP reports from RBSN stations

Monitoring period: 1 to 15 October 2005



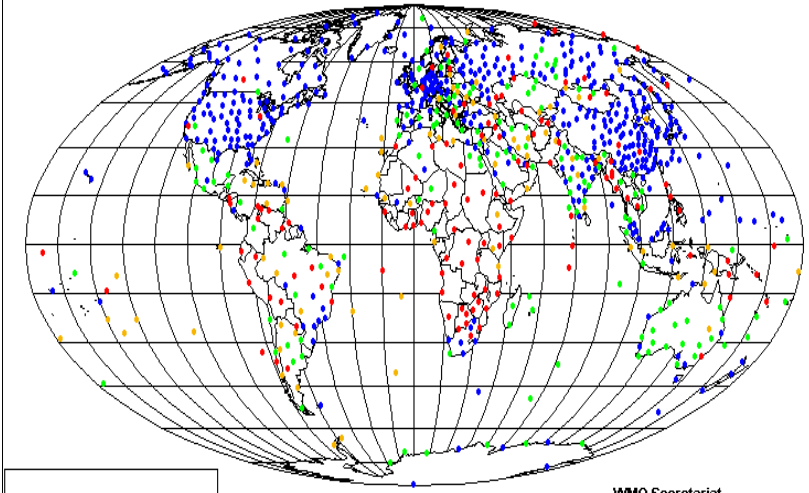
- 90%to100% (2617)
- 45%to 90% (786)
- 1%to 45% (362)
- silent station (404)

The designations employed and the presentation of material in this chart do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Meteorological Organization concerning the legal status of any country.

WMO Secretariat

SMM 1-15/1/2006

Parts A of TEMP reports made at 00 and 12 UTC at RBSN stations



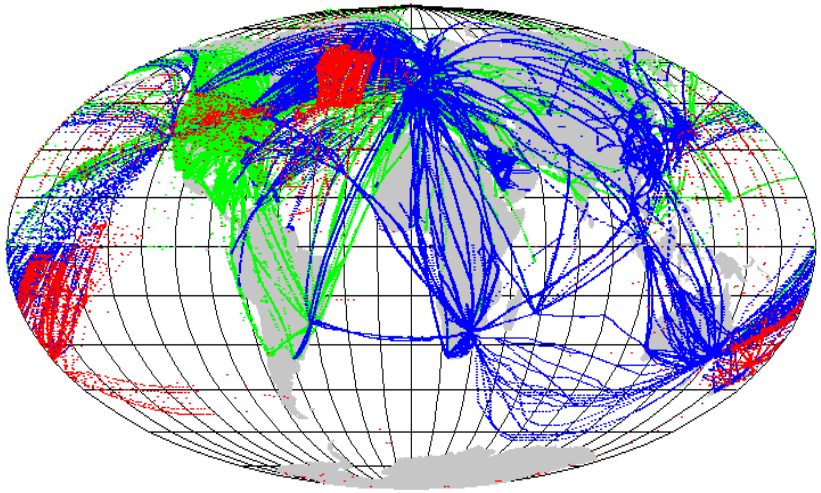
WMO Secretariat

Percentage of reports received:

- 90 to 100 per cent (443 stations)
- 45 to 90 per cent (145 stations)
- Less than 45 per cent (83 stations)
- Silent stations (128 stations)

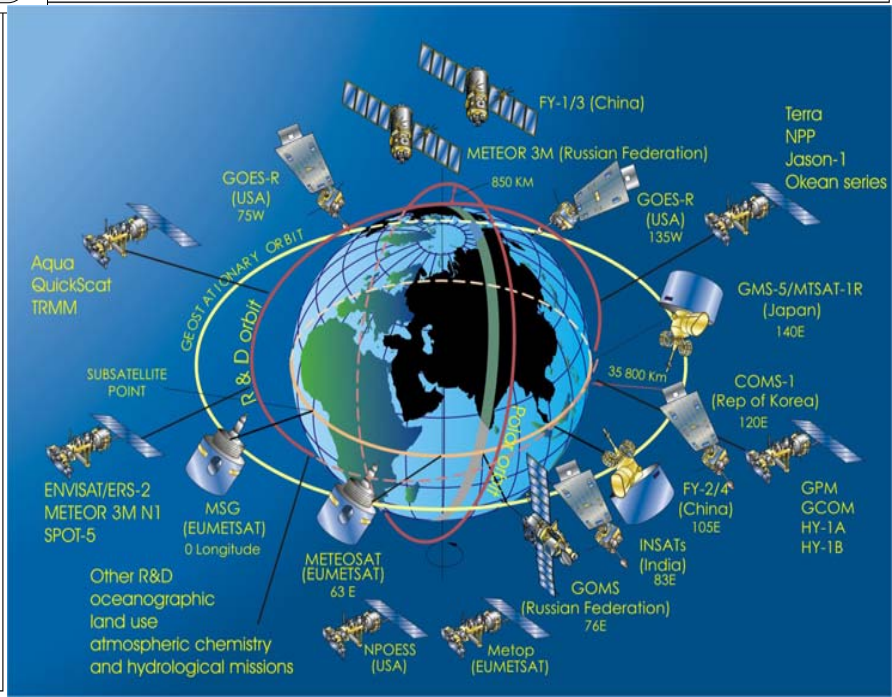
(the percentage of reports received is based on the main synoptic hours 0000, 0600, 1200 and 1800 UTC)

AIREP, AMDAR and BUFR aircraft reports



WMO Secretariat

- 4930 AIREP reports received on average each day
- 40063 AMDAR reports received on average each day
- 141094 BUFR aircraft reports received on average each day



WMO
OMM

Global Data Processing and Forecasting Centres

GDPFS - One System of World, Regional, National Centres, and Regional Specialized Meteorological Centres (RSMC) of the World Weather Watch System

- **Severe Weather Early Warnings & Forecasting**
- **Real-time functions and responsibilities**
- **Sustained 24/7/365 operations; people and infrastructure**
- **Built-in reliability, continuity of operations; standing operational procedures; contingencies**

Environmental Emergency Response Activities
WMO "ERA" PROGRAMME

- **8 RSMCs – specialized atmospheric dispersion products for environmental emergencies – global Numerical Weather Prediction Centres;**
- **Assistance to NMHSs, IAEA, National Competent Authorities for nuclear EER;**
- **Strategic Direction – ERA to support broader area of EER for Disaster Prevention and Mitigation:**
  - **Chemical accidents or spills,**
  - **Emissions from volcanic eruptions,**
  - **Smoke from large fires,**
  - **Biological hazards;**

The Global Telecommunication System (GTS)

- integrated system of:
  - data communication networks
  - point-to-point circuits
  - satellite-based systems
- interconnects meteorological centres worldwide
- decentralized, well-structured
- agreed procedures and services

Function of the GTS

- to ensure that all WMO Members have access, in a timely and cost-effective way, to observational data and products (analysis, warnings, forecasts) they need to provide Weather services
- It also gives telecommunications support to other programmes, as decided by the WMO Congress or the Executive Council.

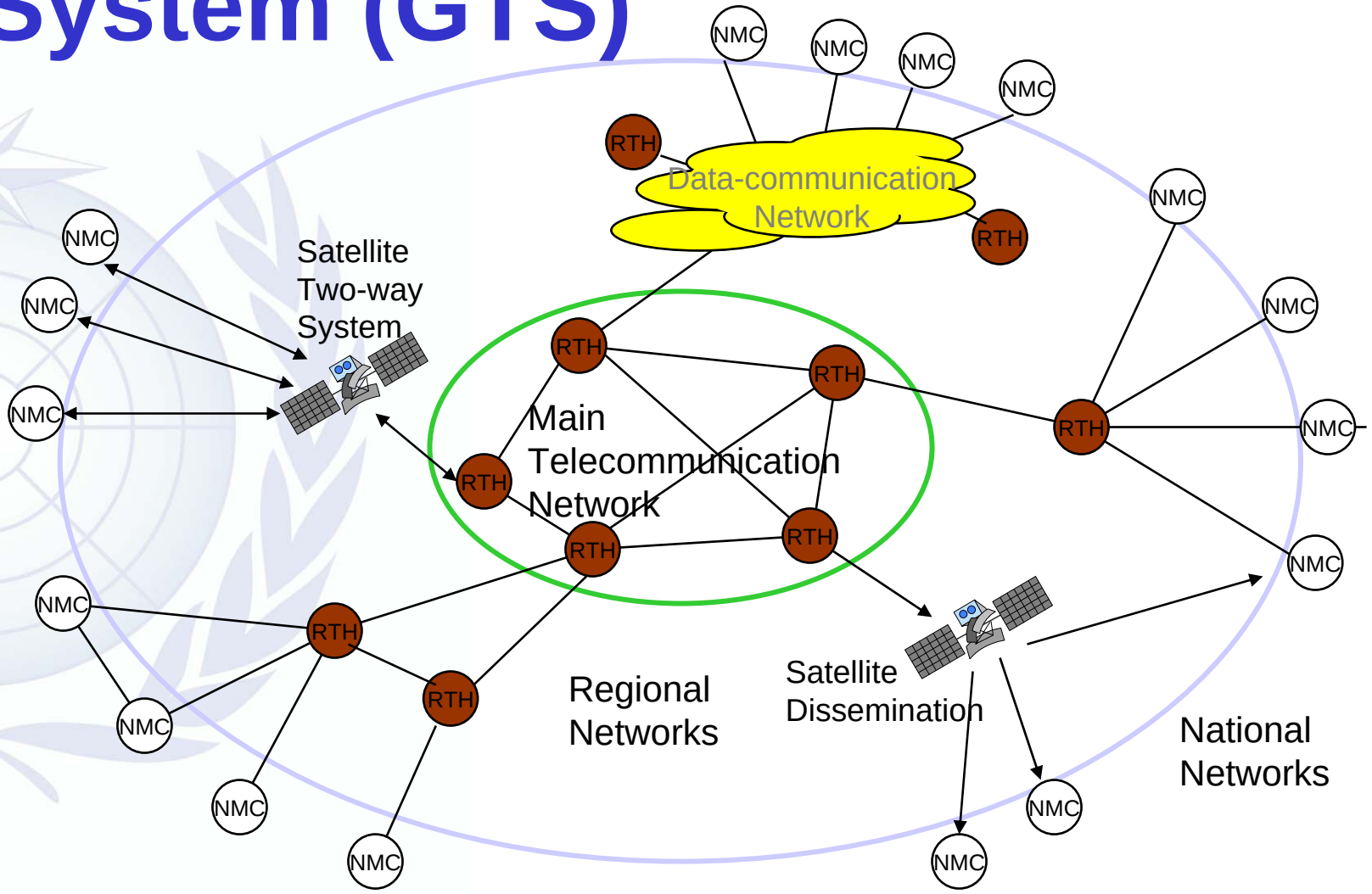
Organisation of the GTS

- The GTS has a three-tier structure:
  - The Main Telecommunication Network, its core;
  - 7 Regional Telecommunication Networks
  - National networks
- WMO coordinates GTS implementation, operation and development:
  - WMO/CBS: globally agreed structure, techniques, procedures and monitoring; coordination of MTN
  - Regional Associations: Coordination of Regional Networks
- WMO Members implement and operate

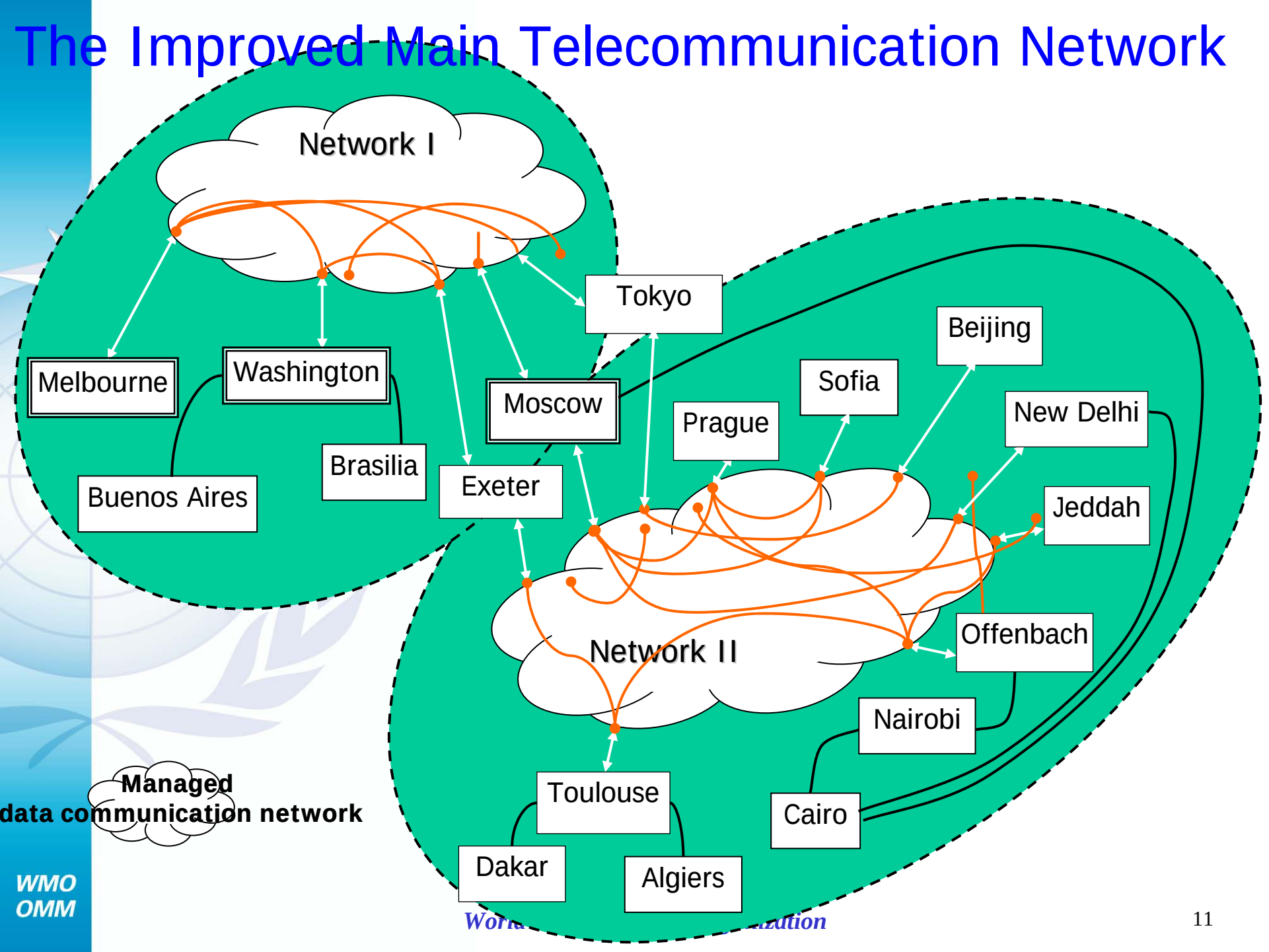
GTS Implementation

- Point to point circuits operating over leased lines
- Point to multi-point circuits operating over satellite, including DVB, DAB”datacast”
- Managed Data Networks (Frame Relay, MPLS)
- Internet
- Other techniques adequate for specific conditions (digital HF)

Global Telecommunication System (GTS)

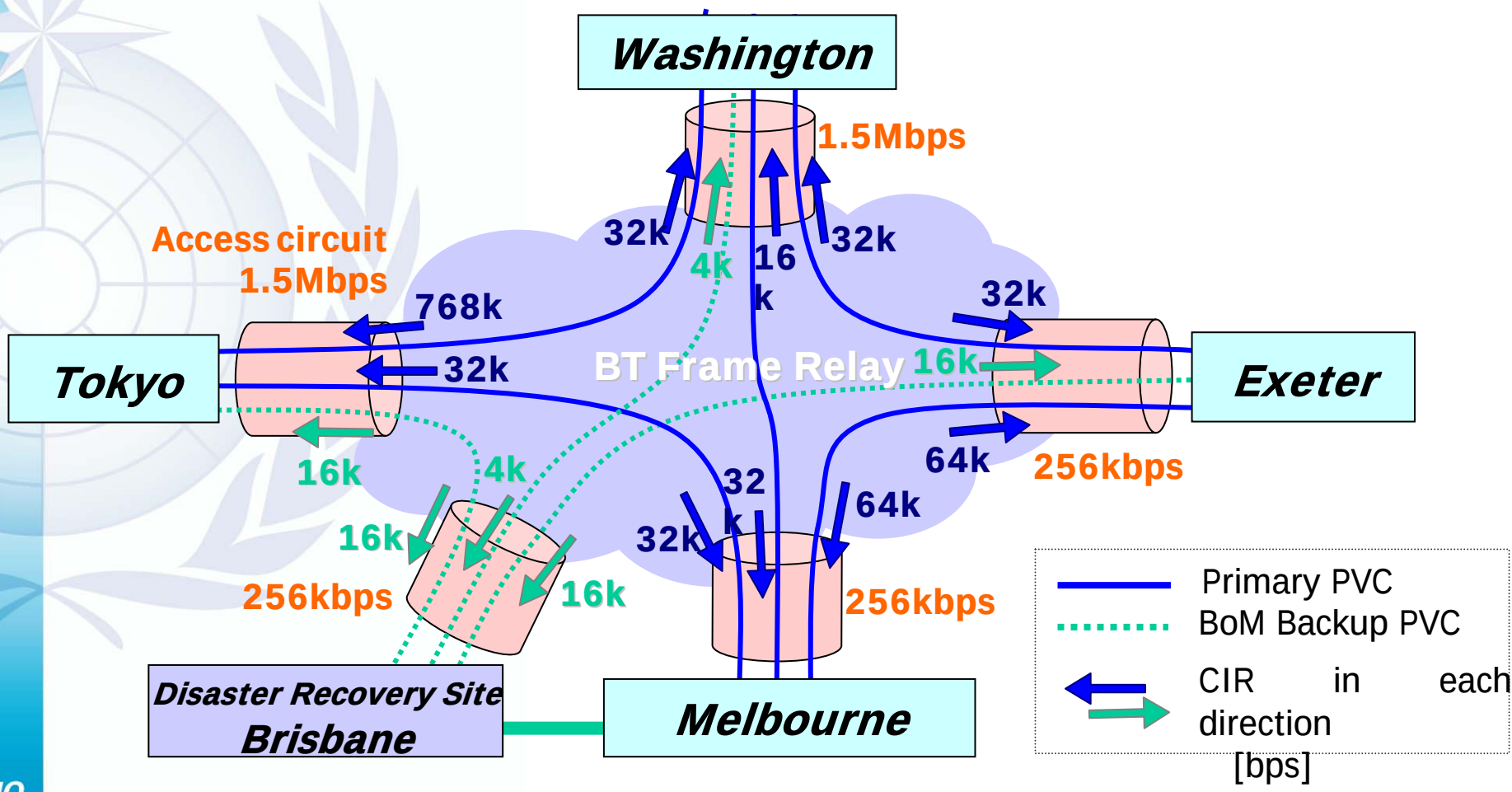


The Improved Main Telecommunication Network



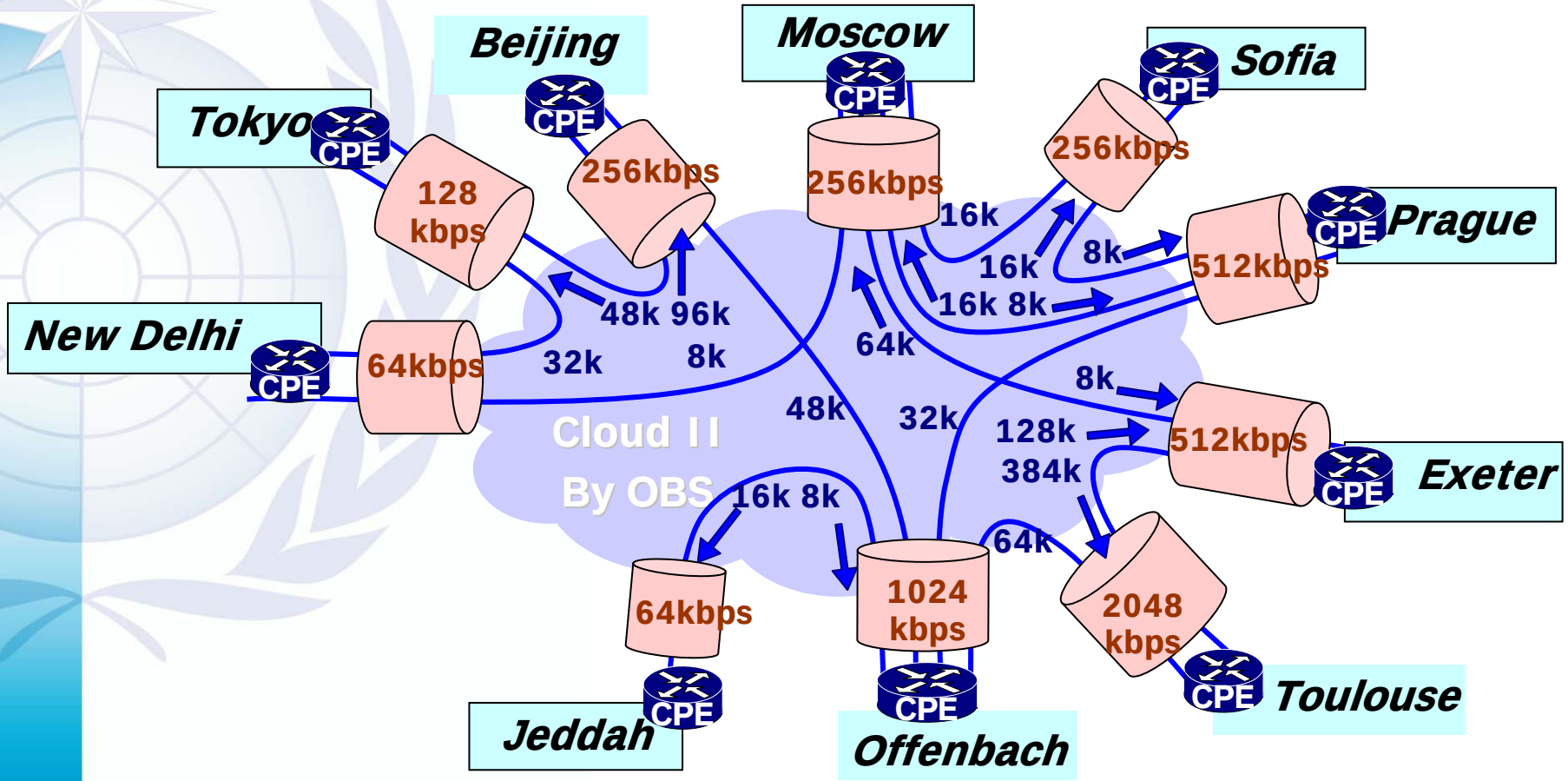
Details of Network I

- Logical connections (PVC: Permanent Virtual Circuit) through BT Frame Relay network

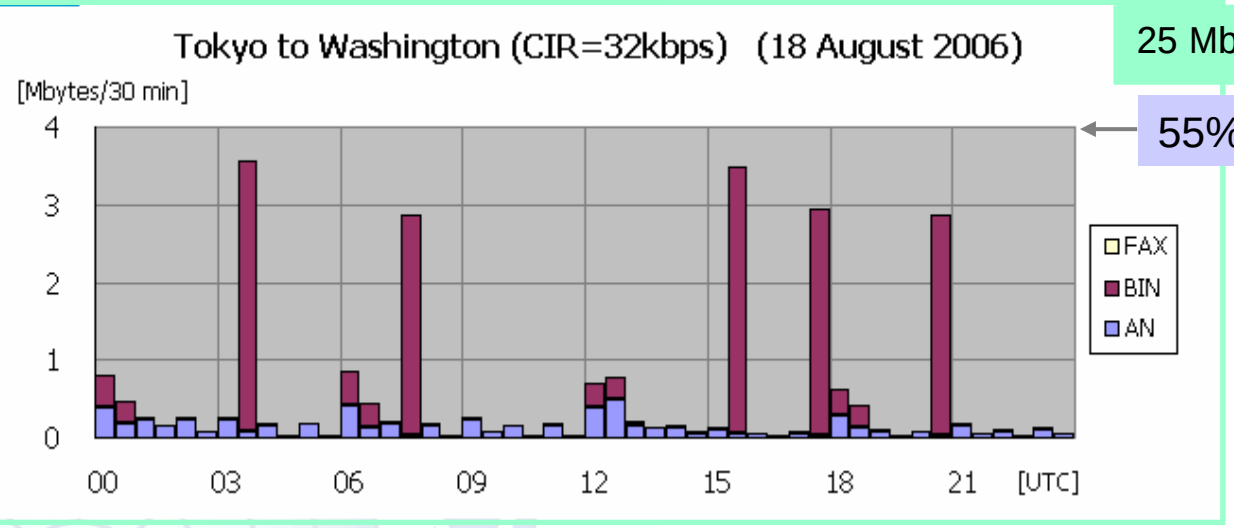


Details of Network II

- Logical connections (PVC) through OBS Frame Relay network

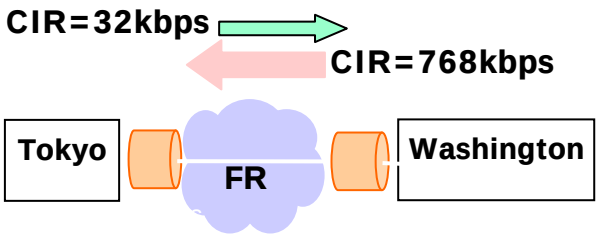


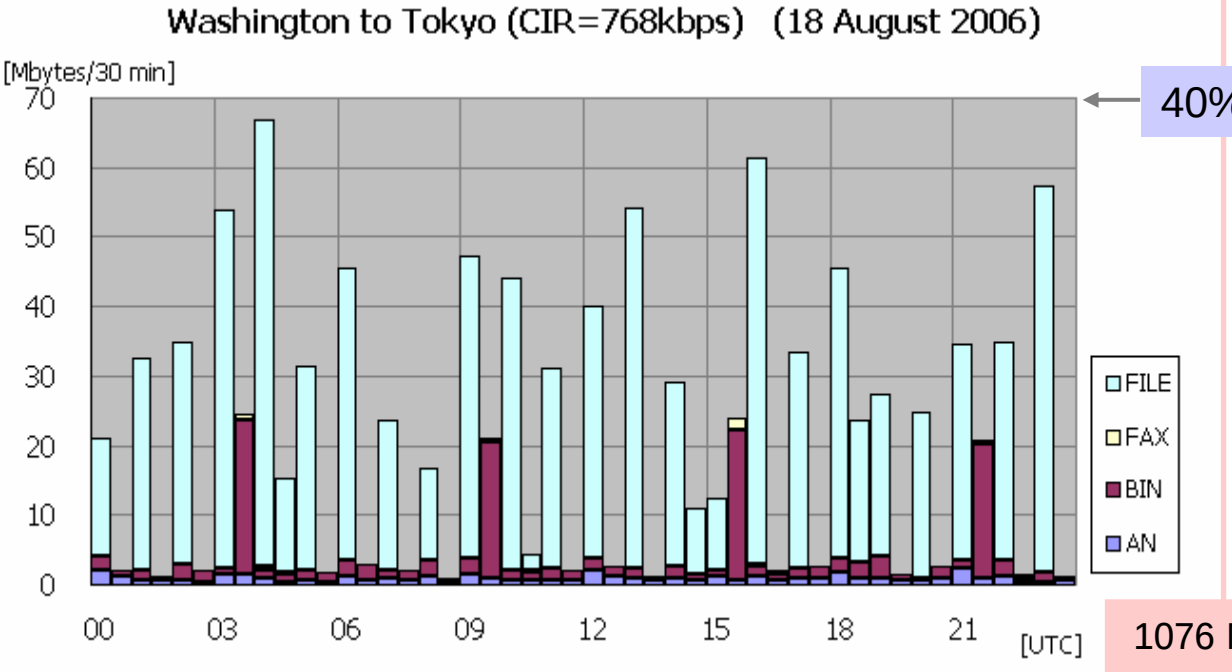
Example of traffic



25 Mbytes/day

55% of CIR

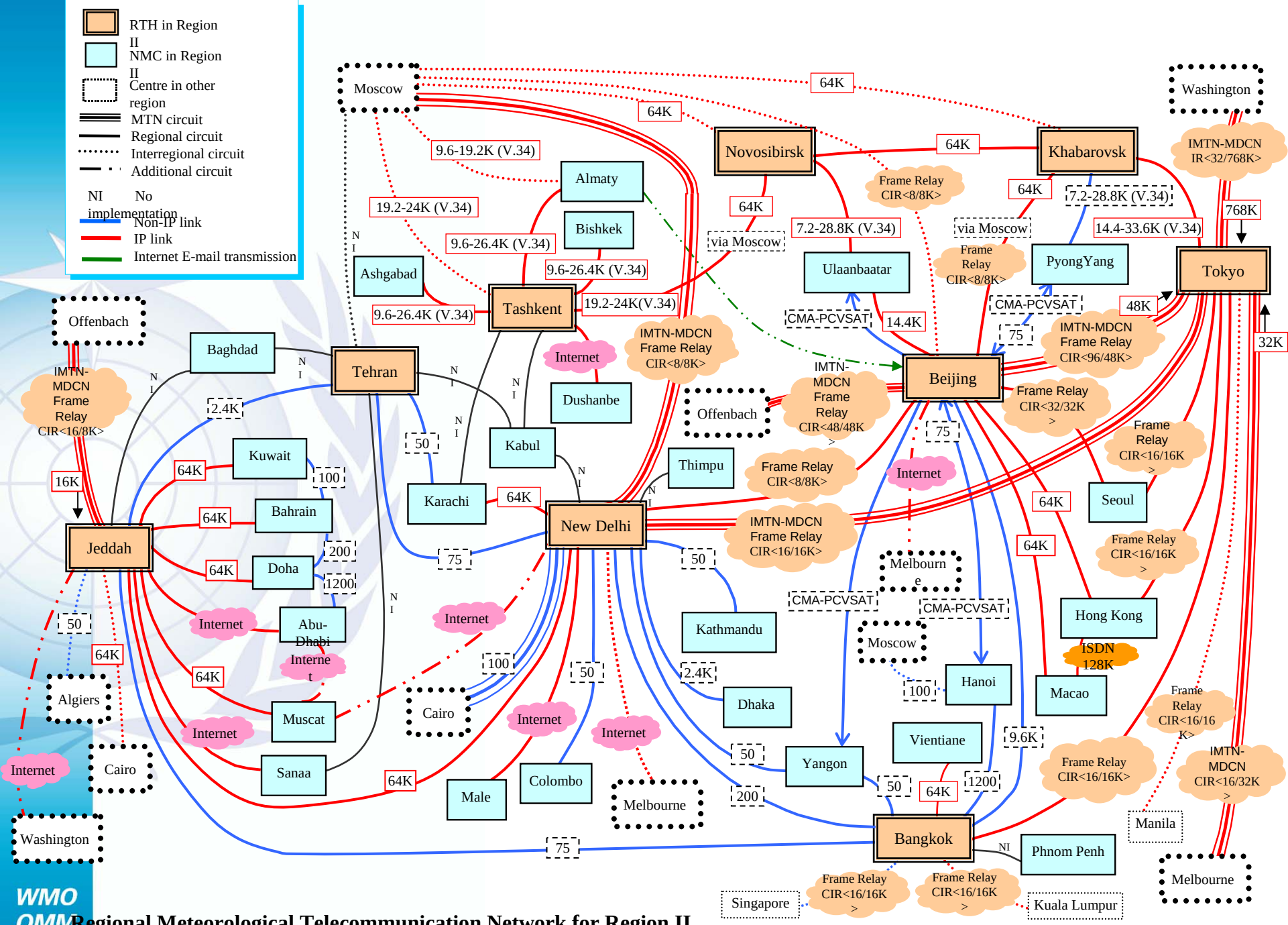


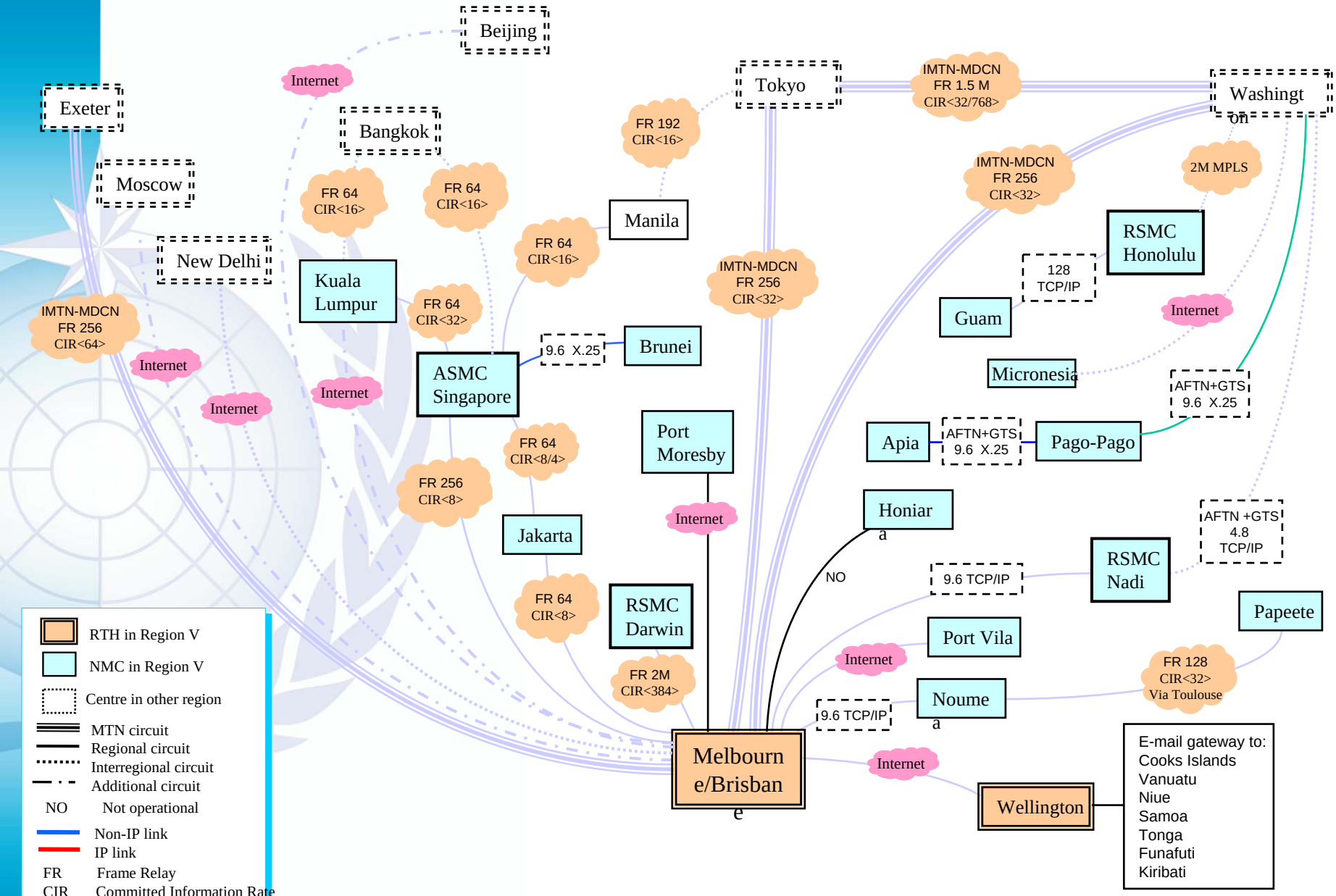


40% of CIR

Each centre pays for its local access circuit and an incoming CIR

1076 Mbytes/day


RTH in Region II
NMC in Region II
Centre in other region
MTN circuit
Regional circuit
Interregional circuit
Additional circuit
NI No implementation
Non-IP link
IP link
Internet E-mail transmission
Moscow
Washington
Novosibirsk
Khabarovsk
Almaty
Bishkek
Ashgabad
Tashkent
Ulaanbaatar
PyongYang
Tokyo
Offenbach
Baghdad
Tehran
Dushanbe
Kabul
Beijing
Kuwait
Karachi
Thimpu
New Delhi
Seoul
Bahrain
Jeddah
Doha
Abu-Dhabi
Kathmandu
Melbourne
Hong Kong
Moscow
Hanoi
Macao
Algiers
Muscat
Cairo
Dhaka
Vientiane
Yangon
Sanaa
Male
Colombo
Melbourne
Bangkok
Phnom Penh
Manila
Melbourne
Singapore
Kuala Lumpur
Washington
Cairo
Internet
64K
9.6-19.2K (V.34)
19.2-24K (V.34)
9.6-26.4K (V.34)
19.2-24K(V.34)
7.2-28.8K (V.34)
14.4-33.6K (V.34)
768K
32K
48K
14.4K
CMA-PCVSAT
via Moscow
Frame Relay CIR<8/8K>
IMTN-MDCN IR<32/768K>
IMTN-MDCN Frame Relay CIR<8/8K>
IMTN-MDCN Frame Relay CIR<96/48K>
IMTN-MDCN Frame Relay CIR<48/48K>
IMTN-MDCN Frame Relay CIR<16/8K>
IMTN-MDCN Frame Relay CIR<16/16K>
IMTN-MDCN CIR<16/32K>
Frame Relay CIR<32/32K>
Frame Relay CIR<16/16K>
Frame Relay CIR<16/16K>
Frame Relay CIR<16/16K>
Frame Relay CIR<16/16K>
Frame Relay CIR<16/16K>
ISDN 128K
2.4K
16K
50
75
100
200
1200
9.6K
N I



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

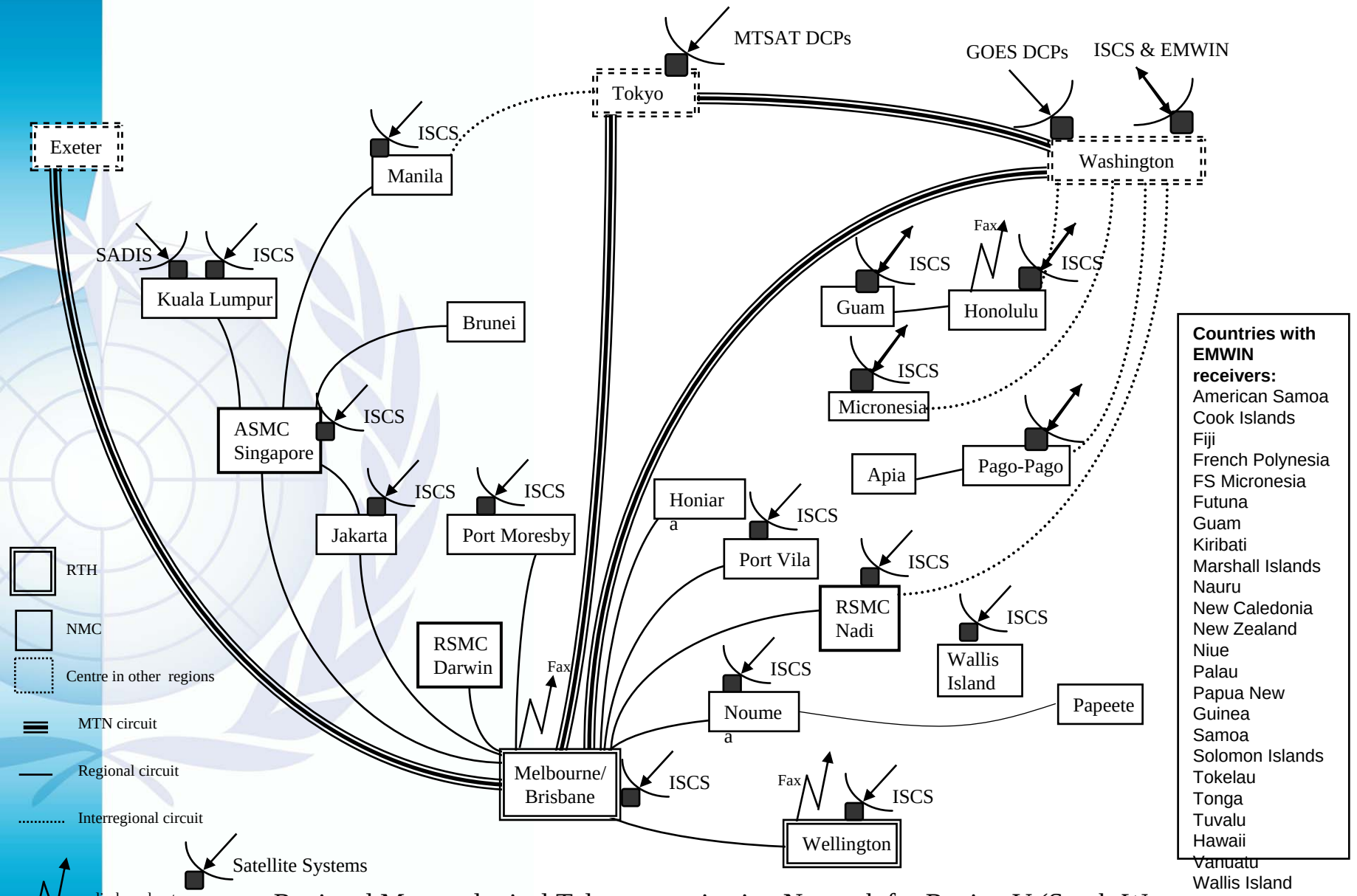
point-to-point circuits implementation (transmission speed in kbit/s)

IX.2006

Satellite-based data-collection and data-distribution systems

The GTS includes systems via satellite, covering all Regions, based on advanced techniques (e.g. Digital Video Broadcasting DVB-S) for distributing large volume of information.

It also integrates satellite-based data-collection services, in particular via meteorological satellites.



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

IX-2006

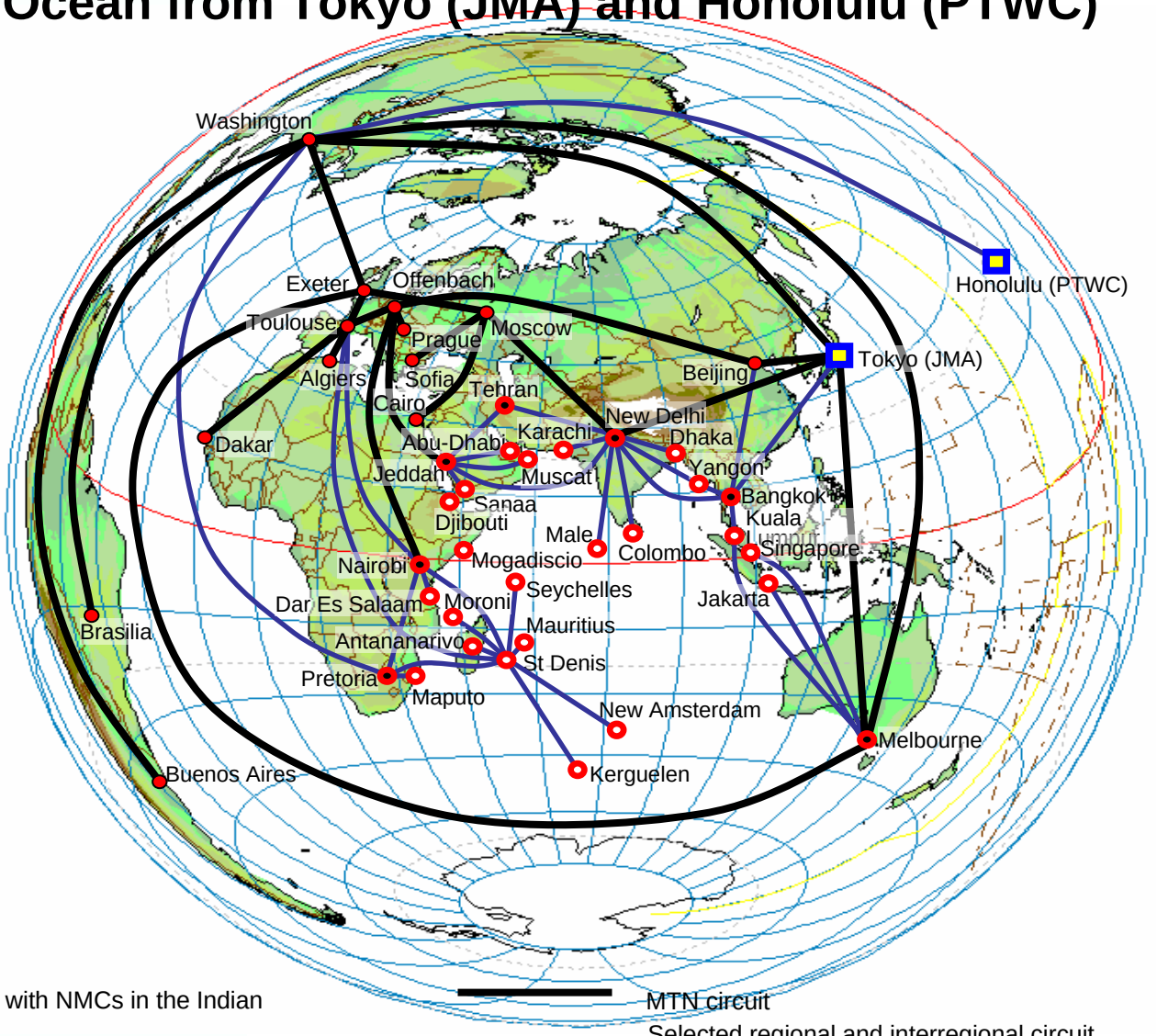
Implementation of telecommunication systems via satellite and radiobroadcasts

The GTS provides flexible, reliable and high-security 24/7 operations for the international quasi real-time distribution of information

GTS technical arrangements to distribute TWS messages to NMHSs:

- ***Use of WMO/GTS links and routeing***
- ***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 acknowledgment procedures***
- ***Adoption of unified GTS message headers for sea-level data facilitating collection and exchange via the GTS***

Dissemination of Tsunami watch information (TWI) for the Indian Ocean from Tokyo (JMA) and Honolulu (PTWC)



TWI center

RTH associated with NMCs in the Indian Ocean rim

NMC in the Indian Ocean rim

RTH on the MTN

MTN circuit

Selected regional and interregional circuit

Source:JMA

Status of GTS Upgrades

for the IO-TWS

Country	Implemented By	Status
Kenya	France	Completed
Tanzania	France	Completed
Madagascar	France	Completed
Sri Lanka	USA/NOAA	Underway
Maldives	USA/NOAA	Underway
Bangladesh	ISDR Flash Appeal, managed by WMO Secretariat-WWW	Underway - Completion planned in January 2007
Pakistan	ISDR Flash Appeal, managed by WMO Secretariat-WWW	Underway - Completion planned in January 2007
Myanmar	ISDR Flash Appeal, managed by WMO Secretariat-WWW	Underway - Completion planned in January/February 2007
Yemen		under consideration

GTS/ICT trainings are arranged on a country-by-country basis as part of the implementation.

The next generation GTS

WMO Information System (WIS)

Managing & Moving
Weather, Water and Climate Information
in the 21st Century

WIS

Overarching and Integrated approach for all WMO Programmes:

- **Routine collection and dissemination of time-critical and operation-critical data and products:**
  - Real-time "push" through dedicated telecommunication
- **Data Discovery, Access and Retrieval service:**
  - "Pull" through the Internet (HTTP, FTP,…), unified user interface
- **Timely delivery of data and products:**
  - Delayed mode "push" through dedicated telecommunication means and public data networks, especially the Internet
- **Unified procedures**
  - More efficient data exchange
- **Coordinated and standardized metadata**
  - Interoperability between programmes
  - Improved data management
  - ISO 191xxx series for geographic information

Structure of WIS

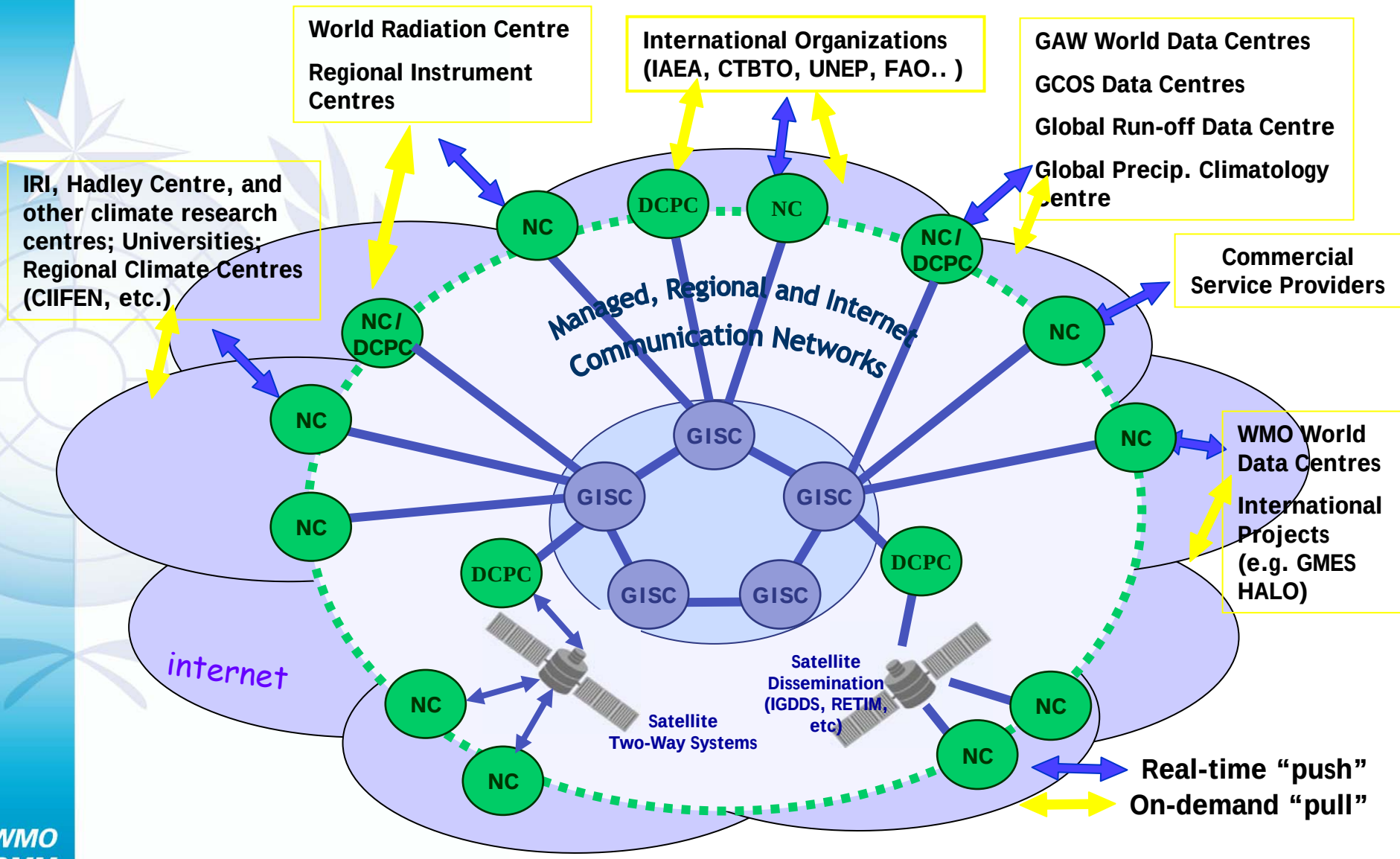
Functional centres:

- National Centres (NC)
- Global Information System Centres (GISC)
- Data Collection and Production Centres (DCPC)

and

- Data communication networks

WIS


World Radiation Centre
Regional Instrument Centres
International Organizations (IAEA, CTBTO, UNEP, FAO..)
GAW World Data Centres
GCOS Data Centres
Global Run-off Data Centre
Global Precip. Climatology Centre
IRI, Hadley Centre, and other climate research centres; Universities; Regional Climate Centres (CIIFEN, etc.)
Commercial Service Providers
Managed, Regional and Internet Communication Networks
NC
DCPC
NC/ DCPC
GISC
WMO World Data Centres
International Projects (e.g. GMES HALO)
internet
Satellite Two-Way Systems
Satellite Dissemination (IGDDS, RETIM, etc)
Real-time "push"
On-demand "pull"

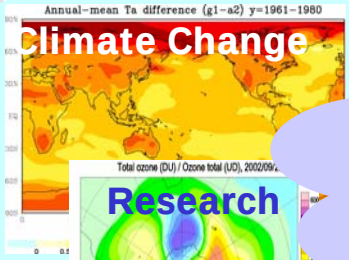
WIS implementation

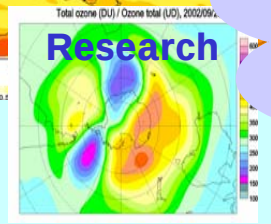
- **Phase A: GTS Evolution into WIS**
  - Provides consolidation/improvement for time-critical and operation-critical data
  - Includes extension to meet operational requirements of WMO programmes in addition to World Weather Watch (including improved management of services);
- **Phase B: Migration to WIS**
  - Provides for an **extension of the information services** through flexible data discovery, access and retrieval services to all users, as well as flexible timely delivery services;

World Weather Watch

GTS
Realtime Data Exchange

Evolution





Metadata
Data Portal
Request / Reply
Discovery

Multi-Hazard Warnings

WIS
WMO Common Infrastructure

Data Collection / distribution

Thank you