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ICTP - URSI - ITU/BDT WORKSHOP ON THE USE OF RADIO FOR DIGITAL COMMUNICATIONS IN DEVELOPING COUNTRIES

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"Real-Time Retransmission of Meoteosat Grid Point Data Using Radio: an Effort in Nigeria"

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REAL-TIME RETRANSMISSION OF METEOSAT GRID POINT DATA USING RADIO:AN EFFORT IN NIGERIA

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1. NEED FOR REAL-TIME DATA ACQUISITION AND TRANSMISSION

The state of the lower troposphere as characterised the prevailing levels and gradients of meteorological variables determines weather.Weather systems and associated meteorological hazards can traverse large distances(including transnational) in their lifetimes. Hence the need for their early detection and monitoring(tracking)(fig. 1).

The denser the grid points of data sources the better the accuracy of forecasts.

The longer the lead times(fig. 2) the better the level of disaster response, preparedness and mitigation.

The need for real-time transmission of data and products(processed data) cannot be over-emphasised. Meteorological satellites(e.g METEOSAT) are used to ensure ease of coverage of large distances in the transmission of data as well as dissemination of products.

2. METEOSAT OPERATIONAL PROGRAMMES

The operational programmes of Meteosat consists of :

2.1 Data Collection Mission

The system uses Data Collection Platforms(DCPs) located in the field of view of the Meteosat satellite. Data from DCPs are uplinked to the satellite for relay towards the central earth station where they are monitored and selected for further reformatting as necessary and onward transmission on to the Global Telecommunication System(GTS) of WMO. A DCP can support either a fully automatic station or a data input keyboard for manned stations.

2.2 Retransmission Mission

The Data retransmission system(DRS) provides for the retransmission of selected DCP reports to users' station via satellite. A computer-based DCP/DRS(Unix environment) facility is installed in the Lagos Central Forecast Office(CFO).

2.3 Data Distribution System

The Meteosat data distribution(MDD) mission(fig. 3) provides two telecommunication channels for the distribution of World Weather Watch(WWW) data. One channel disseminates processed products in chart form while the other disseminates alphanumeric meteorological data including observational bulletins and processed products.

3. Non co-location of MDD with CFO

The meteorological services in many countries in Africa tend to be directed towards meeting the needs of the aviation industry. MDD facilities are mostly donated by Western governments(including EU), intergovernmental organisations like WMO, UNEP, World Bank, etc. MDDs are mostly installed in the international airports of a good number of African countries.

But meteorological services are also needed in agriculture, health, marine security, hydrology, tourism as well as by the general public. Hence the need for an all embracing Central Forecast Office(CFO).

Data from the MDD should therefore be available at the CFO on real-time!

4. The Nigerian pilot project experience

In Nigeria the MDD is installed at the international airport in Lagos which is about 10 km away from the Central Forecast Office that is located in Oshodi.

Options considered in the efforts to transmit the MDD data to the CFO on real-time:
a. acquire a NITEL telephone line.

problems: unreliable subsciber loop
recurrent bills(NITEL's)

b. procurement a radio link

problems: get a spectrum licence
interferences(EMI)
lightning discharges

5. Solution.
Radio was used. It is currently fully operational(fig. 4).

(6 months of full availability)

Technical Steps taken:

- procurement of a pair of UHF transceiver sets designed for a base- multiple subscriber rural telephone service
- use of a CDC 14.4kbps modem at each end

- use of a dedicated computer at the MDD end to access the split output of the EUMETSAT switch
- the MDD data in the dedicated computer is uploaded via modem to the CFO automatically.

6. Future Plan

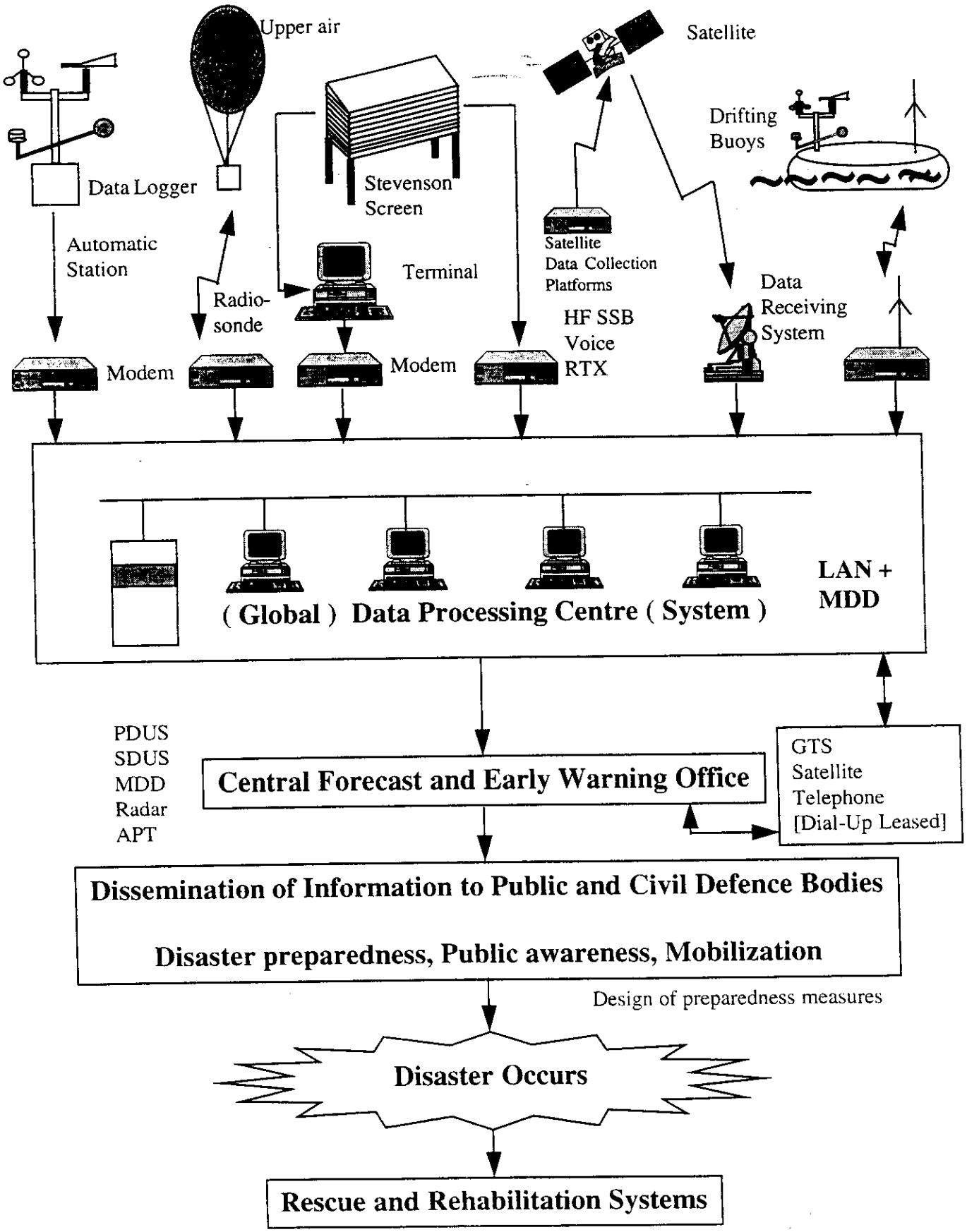
As a result of the success recorded in the digital radio link between the MDD and the CFO plans are under way to replicate the link in remotely located meteorological stations(i.e between a remote station and the nearest automated station). This will also include off-shore stations.

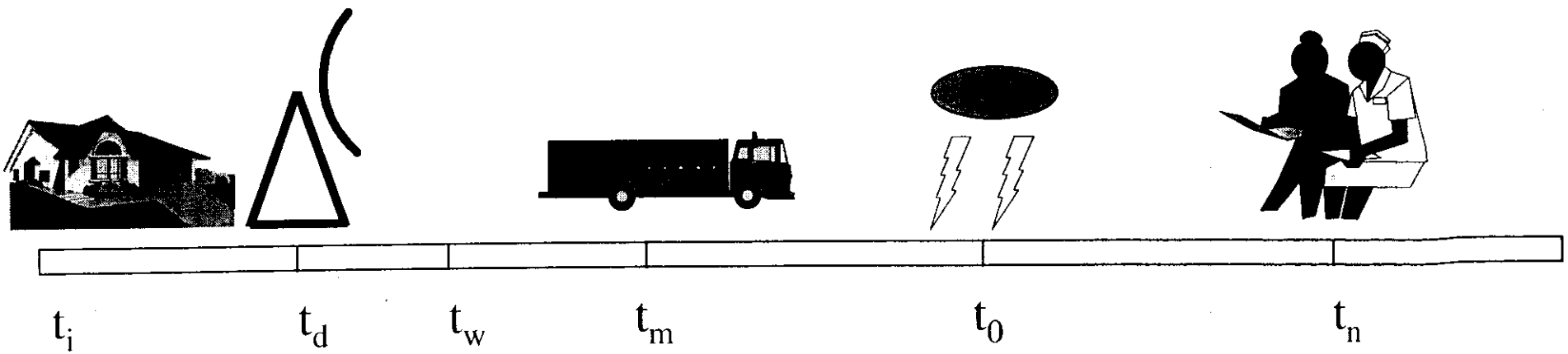
7. Acknowledgement

The assistance of the ICTP in providing relevant technical capacity building to our staff as well as equipment is acknowledged. Similar acknowledgement goes to the World Meteorological Organisation(WMO) and the Meteorological Administration of the Peoples Republic of China.

Fig.1: Instrument and Equipment Elements of Public Weather Service

(For Disaster Management Systems)





t_i = Starting Time

t_d = Event / Potential disaster detected

t_w = Issuance of forecast / early warning

t_m = Preparedness of the Civil Defence agencies

t_0 = Event / disaster occurs

t_n = Civil Defence agencies successfully complete rescue operations

Fig.2: Concept of Lead-Time in Real-Time

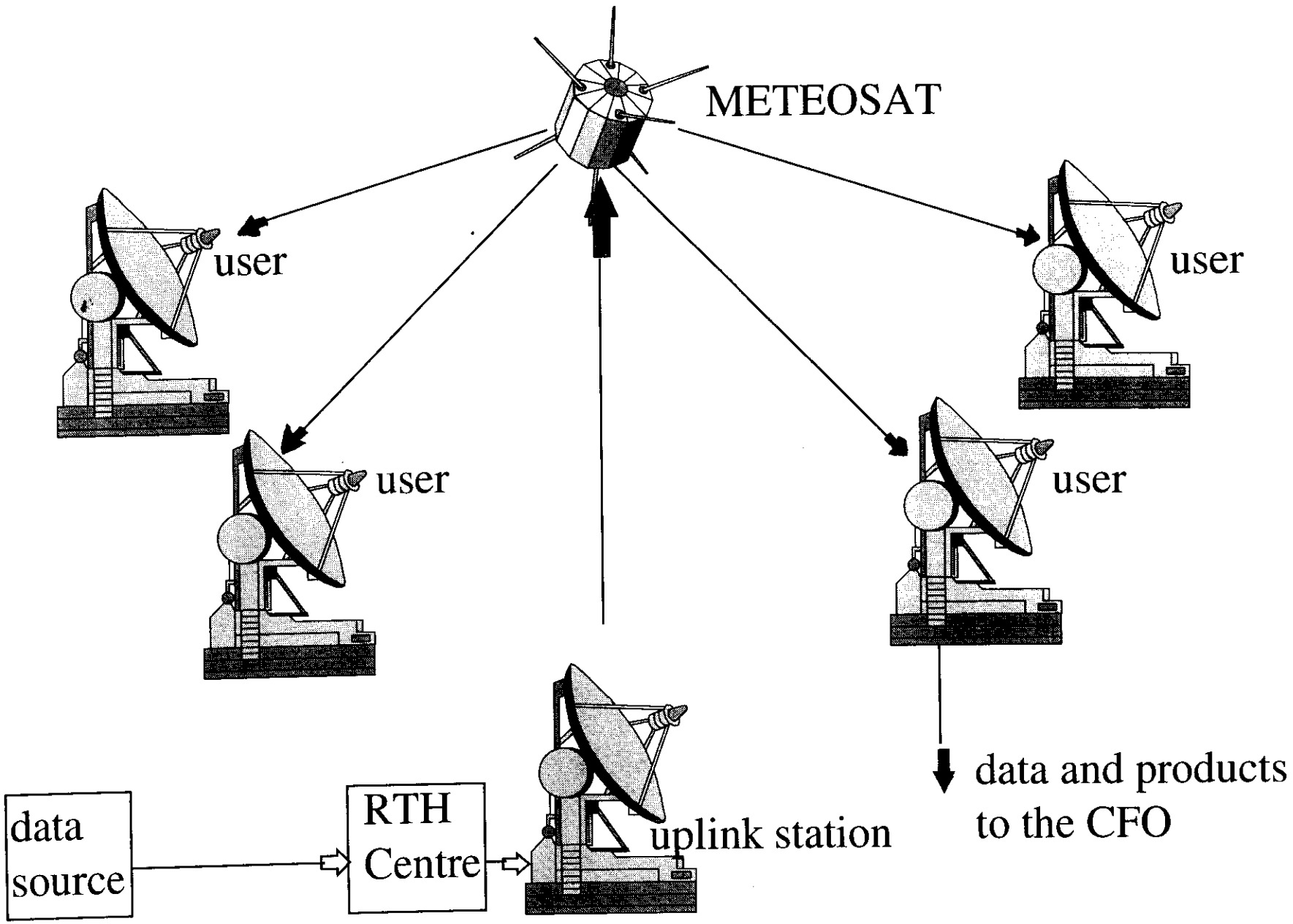


Fig. 3:Data distribution using MDD

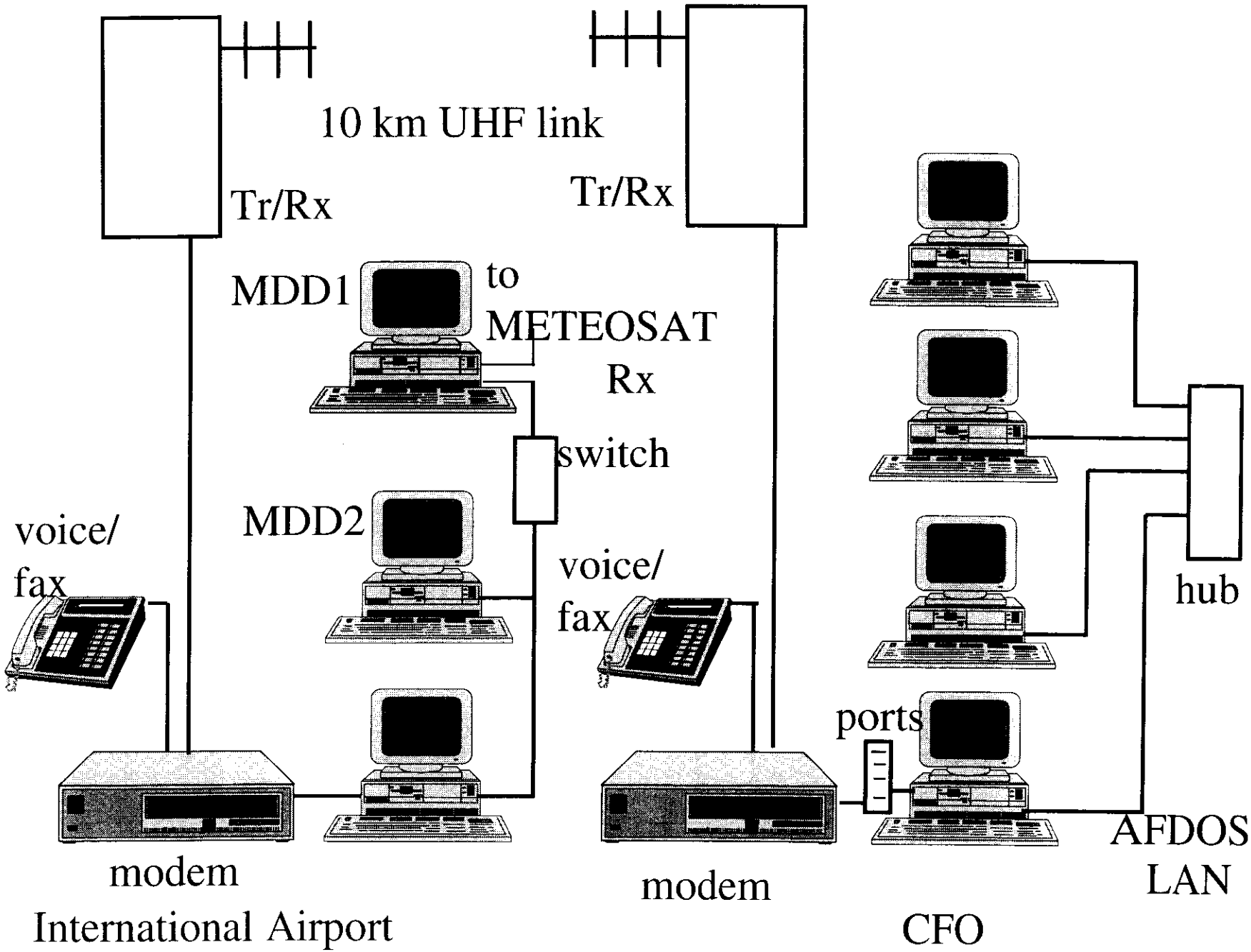


Fig. 4: Airport-CFO Radio Link