

## 8 Communications

as of 20 May 1999

### 8.1 Overview of MAP Communications

Support of MAP activities has required the design and implementation of a number of communications links to support various project activities. This section provides some details about some of the more important links. Fig. 8-1 presents an overview schematic of the communications capabilities being used in MAP. Primary and back-up links have been established to assure that critical information is received and disseminated in a timely fashion. Critical project telephone numbers and contacts are listed in ### Appendix C.

#### 8.1.1 POC Telecommunication

The general layout of telecommunication lines to/from POC is depicted in Fig. 8-2. Non-GTS information (surface data and radar images) is normally sent by the providers to CMR via CNMCA, through otherwise existing operational ISDN connections. In some cases, and as back up, transmission can occur directly to CMR via ISDN or PSTN links. This information is inserted into CMRLAN through the 64 kb/s line joining CMR in Milano and CNMCA in Pratica di Mare (Roma). Other local information can be received via ISDN links directly at the POCLAN communication hub: this is the case for Ronsard, S-Pol, Monte Lema, Spino d'Adda and Bric della Croce radars and could be done also for other field instruments, like radio soundings, sodars, vertical profilers. CMRLAN then feeds the POCLAN server and the Oracle DB.

The data exchange between POC and MOC occurs via the Internet: for this reason, a 128/256 kb/s CDN connection to the INFN-GARR backbone (2Mb/s) via Milano University (available only for SOP and tests) will allow the POC server to be addressed with an assigned static IP number. The same connection is also intended to serve as Internet access for research teams at POC and for e-mail exchange with MOC and other MAP relevant sites or research agencies. A back up access to an alternate provider, even if of limited capability, is also planned.

POC dedicated Telecom lines will allow efficient communications by phone and fax.

The coordination of Wet MAP ground and air operations by the POC requires this real-time data flow (Fig. 8-2). Three-dimensional volume-scan data from 7 radars (S-Pol, RONSARD, Monte Lema, Bric della Croce, Fossaloni di Grado, Pisa, and Teolo) must be transmitted to the POC in real time. At the POC, the data from the 7 radars will be processed to the point that they are mapped to a navigated Cartesian grid and converted to netcdf format. The netcdf files will be ingested into MountainZebra, where they will be displayed on common maps and cross sections, in a form that will facilitate the coordination of Wet MAP aircraft by the POC Aircraft Coordinator. Aircraft position data will be received from air traffic control and ingested into MountainZebra so that the aircraft tracks of the Wet MAP aircraft can be plotted on the radar echo maps displayed in MountainZebra. The combined aircraft-track/radar-echo maps in MountainZebra will be the POC Aircraft Coordinator's primary visual aid in guiding the Wet MAP aircraft in real time.

**Status:** *The Oracle DB will be installed before the end of May. Doubling of the 64kb/s connection CMR/CNMCA has been proposed but still not approved. Possibility of tele- and videoconference between POC and MOC are under test.*

as of 20 May 1999

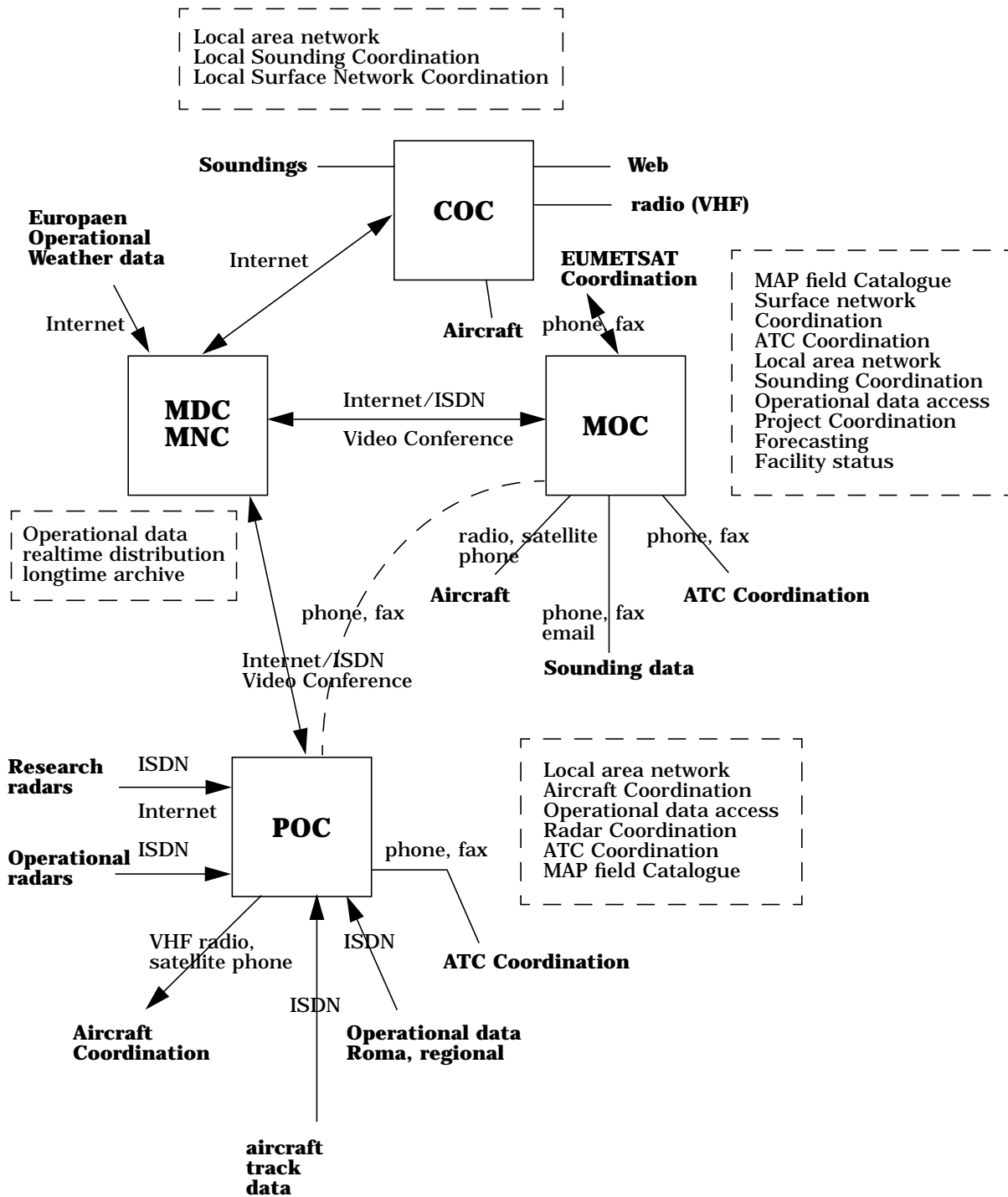


FIGURE 8-1. MAP overall telecommunication set-up. Each Operation or Data Centre is in a solid box with all communications flowing in and out of them. The information in the dashed boxes are "functions" requiring the communications shown.

### DATA Transmission to POC

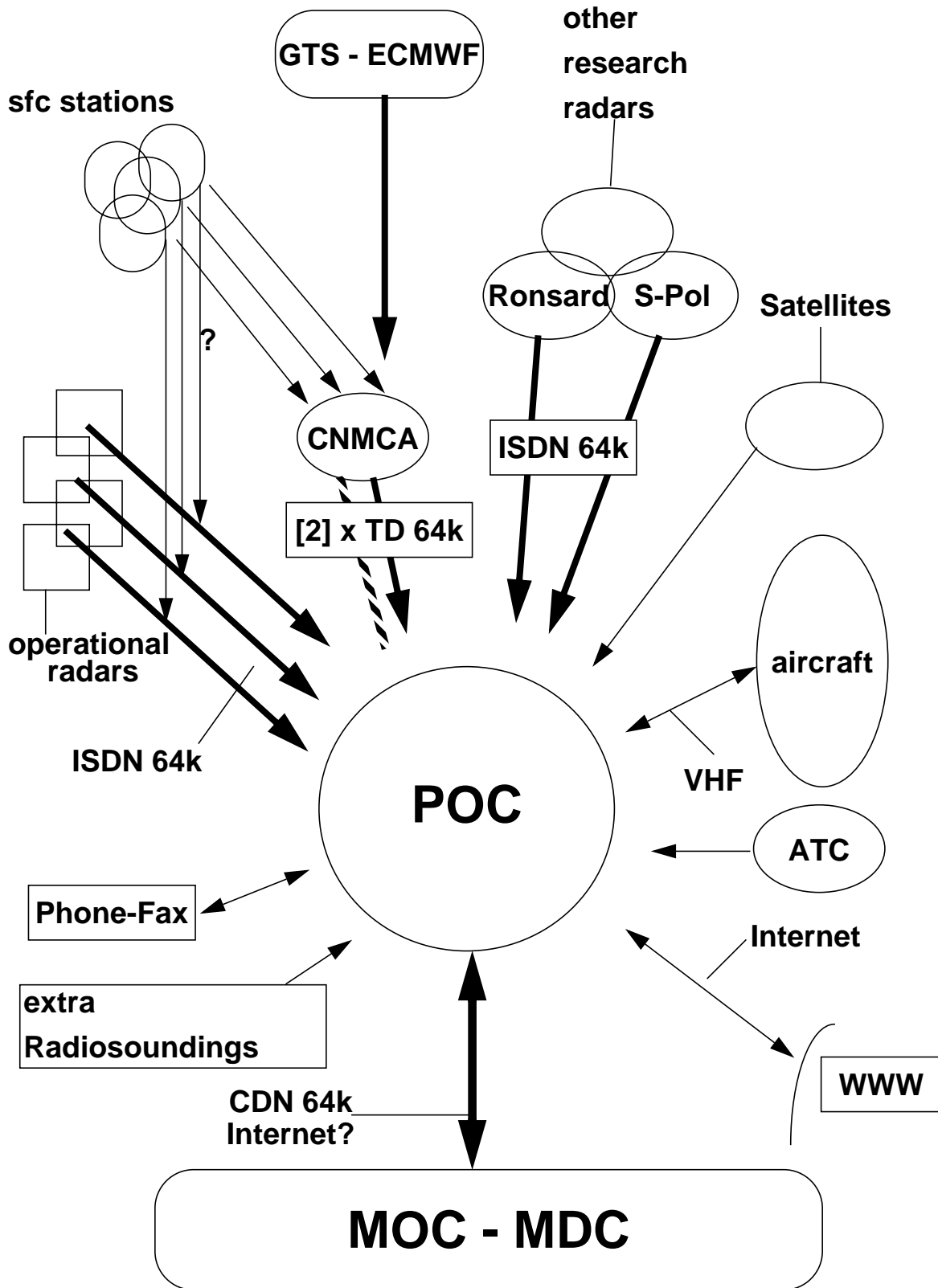


FIGURE 8-2. General outline of POC telecommunication connections.

## 8.2 Ground to aircraft communication

*as of 20 May 1999*

To efficiently guide MAP aircraft during the IOPs the VHF frequency 136.8 MHz has been selected and agreed by the interested Alpine countries. Therefore, it will be possible for scientists at MOC and POC to be in contact with pilots and scientific crews on board through ATC radio equipment: MOC and POC are both located on airports where important ATC offices operate.

This radio link will allow leading scientists guiding MAP aircraft in real time into the best suited flight tracks on the basis of last surface and radar observations available at POC, strongly improving the possibility of best exploitation of resources and instruments.

### 8.2.1 Radio links and antennae at the MOC

*as of 20 May 1999*

The installation and operation of fixed radio communications hardware in Austria is a lengthy, involved and costly process. Anyone wishing to use radio communications other than CB requires an Air Radio Operators Licence (AFZ), for which an exam and several weeks of training is usually required. We therefore strongly discourage the idea to install individual radio links other than those already present in aircraft.

A special MAP VHF communications frequency (136.8 MHz) is currently being reserved in all participating states and communications to the aircraft from MOC will have to be handled by ATC staff passing on Pilot reports. If ground-to-air messages need to be relayed, special arrangements with ATC Innsbruck will be required. Anyone wishing to have such a possibility should contact MOC/H.Puempel well in advance of the SOP.

### 8.2.2 Radio links and antennae at the POC

At the POC (see Section 10.2), a direct link will be available to the VHF ATC repeaters covering the Milano FIR (Northern Italy plus Ticino, south of the Alps). The radio repeaters will be equipped with the selected frequency and could be used to contact any time any MAP aircraft flying in the region south of the Alps (some problems could arise only for very low level flights in the innermost alpine valleys).

This radio link will allow scientists to guide MAP aircraft in real time into the best suited flight areas on the basis of latest surface and radar observations available at POC, thus, greatly improving exploitation of resources and instruments. The necessary instrumentation should be set up at POC before June, and immediately followed by tests.]

### Status: Instrumentation for VHF communications should be set up at POC in June, and immediately followed by tests. Details of communication procedures POC-A/c and POC-MOC have still to be discussed and defined.

(###Note: National acceptance of the selected frequency 136.8 MHz is still missing from one country.)

## 8.3 MOC-POC communication

The primary link between the POC and MOC is provided through the regional Internet system. Both MOC and POC tap into the Internet via dedicated ISDN lines through nearby universities.

*as of 20 May 1999*

#### **8.4 Communication to groups in the field**

Several communications systems will be put in place to assure all participants are kept informed about MAP SOP activities (cf Section 1.5.4). As indicated in Fig. 9-2, the Internet will provide for rapid dissemination of operational information via the MAP Field Catalogue, e-mail and related services. In addition, the MOC and POC will have a dedicated message phone that will serve to update all MAP participants who do not have access to a computer or the Internet.

