

OSCAR, TRAFFIC MEASUREMENT, MAINTENANCE AND MANAGEMENT OF THE PORTUGUESE TELEPHONE NETWORK

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## INTRODUCTION

The transition from an analog network to a digital network is a common problem for all Administrations. The keyword is "integration" not only in equipments and networks, but also in methods.

The transition strategy depends on multiple factors but one of the most important constraints is the large investment related with the existing network. One expects to have analog exchanges in operation during the next 20 years.

Taking these factors into account, the Portuguese Administration decided to develop a project, called "OSCAR", for the traffic measurement, maintenance and management of the telephone network.

The main aim is that the project must be common, as far as possible, to the present analog network and to the future digital network.

Another aspect is that the development and installation of auxiliary equipments, using new technologies, contribute to the progressive training of personnel both in hardware and software techniques.

This paper describes the main features of "OSCAR" project.

## OSCAR NETWORK

The OSCAR network is a data network with four levels: one level for control, processing and storing the information (level 1); two levels for the utilization of the information (levels 2, 3); one level for collecting the data (level 4).

At the bottom of the network, level 4, one finds the TO3's (Terminal OSCAR 3<sup>rd</sup> hierarchie) which are located at the analog exchanges.

The most important TO3 is the so called MTGC, a traffic measurement equipment with a capacity from 256 to 8000 points. Beside the measurement of the traffic, the MTGC is able to collect information from other TO3's and send it to the different levels of the network.

At the top, level 1, there are minicomputers (Centres OSCAR) where the information is processed and stored. The Centres OSCAR (CO) will be connected to the Portuguese packet switching network, TELEPAC.

The interconnection between the different levels of the network is supported by data links of 1200 bit/s (4 wire).

The levels 2 and 3 are coincident with the traffic engineering and maintenance operational centres, which can control the information related to the exchanges, routes and local networks under its supervision. These levels are known as TO1 and TO2, terminals of 1<sup>st</sup> and 2<sup>nd</sup> hierarchie.

The first CO cut over during 1984 at Picoas, the most important switching center of the trunk network.

## SUBSYSTEMS OF OSCAR NETWORK (TO3)

- MTGC - Traffic measurement equipment of great capacity (256-8000)
- MIPA 250 - Traffic measurement equipment of small capacity (up to 250)
- DETA - Equipment for detection and transference of alarms.
- EVE - Equipment for supervision and testing of analog exchanges (registers, junctors).
- EAR - Equipment for supervision of strowger exchanges.
- TESLA - Equipment for supervision and testing of subscriber lines.
- EJ - Equipment for testing of transmission lines.

All subsystems have been designed and developed at the Portuguese Research Center (CET).

The O/M software of the future digital exchanges will be considered as a TO3.

## FUNCTIONS AND METHODS

The functions performed by the OSCAR network, are mainly based on the collection of traffic data.

The measurement programs are prepared at the TO1's according to the TCBH method or the PSBH method. After programming the MTGC the measurements take place and the data is stored on magnetic tape. The tape is read from the CO and the data is processed in order to obtain the traffic carried on the routes and the related busy hours. The results can be transferred automatically to the network planning systems used in the Administration.

Special traffic measurement programs, for instance dispersion analysis and measurements on routes with peak traffic, are now being studied.

For Maintenance purposes ICUP values are measured on each internal and external route as well as on the common equipment of the exchanges. This action takes place during the morning and the afternoon producing two daily reports. An analysis algorithm allows to produce a list of the equipments with higher probability of being faulty. The algorithm takes into account all the information concerned with each type of equipment, collected via other subsystems of OSCAR network (alarms, routines). Each ICUP report is used to built up and update a distribution function in terms of "mean holding time" and "peg count" for the behaviour of the different types of equipment supervised.

At the same time, this report also gives the total traffic carried by each group or route, which allows the calculation of the loss.

The comparison with the forecasted loss for the route, is used for the management of the network.