Traffic securization in « Ile-de-France »*

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Abstract

After having describing the Paris area telephonic network, the authors examine the appropriate methods of network structuring, to protect from breakdowns due to out in transmission lines and failures in transit switching centres whereas the disturbance should not affect more than 5% of the traffic and should not hinder priority traffic at all. The setting-up of a last choice network based on a specialized transit centre to deal with traffic overloads in normal conditions and with call routing in case of breakdown is recommended. The network design should provide means for directing the communications towards the above mentioned centre.

Key words: Telecommunication network, Telephone network, France, Traffic security, Survival, Stand-by system, Regional network.

I. INTRODUCTION

Traffic fluidity, which is one of the priority objectives set for the Telecommunications administration, depends largely on network dimensioning and on the reliability of the various techniques used in the network.

Subscriber and traffic forecasts, which are indispensable data for network dimensioning, are used to determine the quantities of equipment necessary to provide customers with a good service at the least possible cost.

Whatever the reliability of the equipment, there is always present a risk of serious breakdowns.

We therefore must pose the question, what securization strategy should be adopted, so that customers are nevertheless offered a sufficient availability, 24 hours a day?

The present study aims to define the automatic and manual means which should be put into place to protect against network failures, whether these be due to transmission link interruptions or to switching centre breakdowns. The target objective is that the disturbance should not affect more than 5% of
the traffic and should not hinder the flow of priority traffic for the whole region.

Technico-economic studies and operational constraints are taken into consideration in determining this securization strategy. As it is being unreasonable, from the cost point of view, to provide a network with total securization (100%), we have sought solutions for network securization which do not cause a deterioration in the quality of service of the Paris area (Ile de France) network of more than 5% and which allow the flow of priority traffic at all times.

The analysis has mainly been made without the use of computer network planning tools.

It is therefore worth noting that the preliminary solutions obtained using such tools tend to confirm our conclusion in respect to the inter-switching centre network: the constitution of a stand-by network [1].

This tends to validate the present study and the use of computer tools will therefore be extended beyond studying just the network between class 3 switching centres, to cover the securization of class 4 centres and the failure of transit centres.

II. DESCRIPTION OF THE PARIS AREA NETWORK

II.1. Switching centres.

Subscriber switching centres fall into two main classes:

- main exchanges (ME) or class 3 centres,
- satellite exchanges (SE) or class 4 centres.

In this study, auxiliary switching centres (Elena, SRA, ...) will be assimilated with the subscriber's line.

The transit switching centres may be divided into 3 main families:

- Urban Transit Centres (UTC),
- Interurban Transit Centres:
  - of class 2: Secondary Transit Centre (STC),
  - Outgoing Nodal Centre (ONC),
  - Incoming Nodal Centre (INC),
- of class 1: Primary Transit Centre (PTC).

- International Transit Centres (PIC = Paris International Complex consisting of the switching centres Cadet, Chalne III, Bagnolet...).

II.2. Switching centre hierarchy.

The routing plan and hierarchy of the Paris area network are described in the Figure 1.

Fig. 1. — Routing plan and switching centre hierarchy of the Paris area network PZTC (Peripheral Zone Transit Centre).

a) Long distance traffic  b) Urban traffic.

Plan d'acheminement et hiérarchie des commutateurs dans le réseau de l'Ile-de-France.

a) Trafic interurbain  b) Trafic urbain.


II.3.1. Class 3 switching centre.

A class 3 switching centre has outgoing autonomy with the following types of routing, listed in order of decreasing importance:

1. trunk groups towards the UTC of the zone,
2. large direct trunk groups,
3. trunk groups towards the STC,