sita communications

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Editorial

"The general theory of stability of networks is actually very little understood".

This statement which, at the same time, is an understatement, was found in a recently published book on systems theory. We in SITA, operating one of the largest telecommunications networks transporting information for the air transportation industry, could add a lot to this statement, and this explains why we have chosen a paper published a few days ago by our Operations Department to be reprinted in "sita communications".

It is the experience of the Editor, and of many of his collegues, that professional gatherings such as congresses, symposia, etc. that are dedicated to computer networks, used to present highly theoretical subjects and very few facts and figures on network performance and systems behaviour. In a recent discussion, someone used a medical expression for what can happen in a complex network when component failures coincide. He called this the "psychopathology" of networks, and those of us who helped to create the present network configuration and its protocols remember only too well the chain effects that were capable of bringing network operations to a standstill within a few seconds.

Today these drawbacks have been overcome, and particularly so during 1977 when the quality of SITA services was considerably improved. The following report, which somebody in Operations Department who likes facetious abbreviations called "SINOS" (for "SITA Network Operational Status") might be boring for some of our readers, but gives a very clear insight into the technical and operational problems which one can never totally eliminate, but try to master through continuous efforts.

D.K.

Projects and development

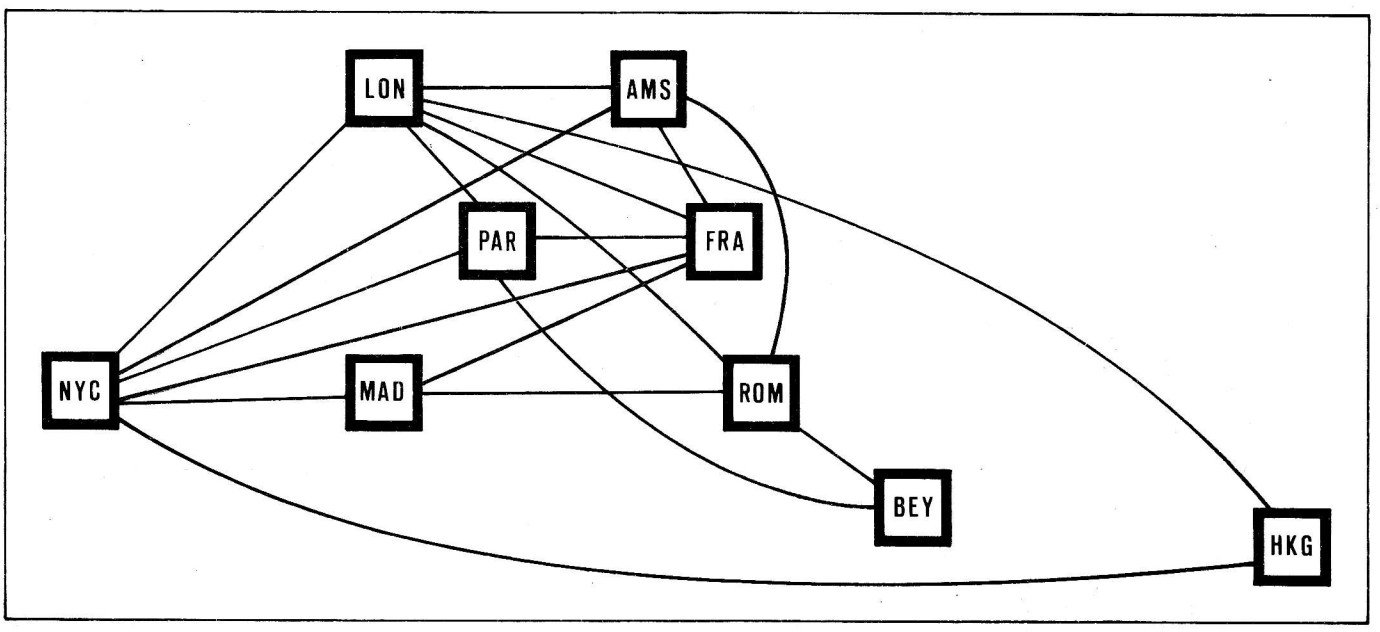
SITA network operational status 1977

As announced in the Editorial the following is an extract from a recent document published by the Operations Department in SITA Head Office.

Introduction

Various measures aiming at improving the quality of service rendered to the SITA Network users have been taken in the course of 1977 :

- Implementation of more powerful systems in our nodes of Frankfurt, Hong Kong and New York, meaning Philips DS714/72, Univac 418/III and Univac 418/III with



front end principle, respectively.

- Implementation of a new High Level Network topology allowing a more homogenous distribution of traffic flows between the High Level Centres with increased circuit transmission speed (see cover page, circuits printed in red).

- Generalisation of the "overall transit block" (OTB) procedure resulting in a noticeable improvement of type A response times.

- Gradual replacement of the satellite processor single systems by dual RDS 500 SPs.

So, this report will illustrate the impact of the above measures on the quality of service. The quality of service concept, as defined in this document, involves the two following elements:

Performance

This notion comprises here the percentage of lost and corrupted messages, as well as the transmission times of messages.

Network reliability

is defined as the ratio of the total down-time to the time during which a system or a set of systems is operational.

1. Performance

Loss and Corruption of Messages

- Type A traffic

a) Message losses are inherent to the principle adopted for Type A transactions exchanged on the SITA Network: "It is an advantage to occasionally face up a 'No Reply' to a given query rather than to regularly obtain a reply after too long a time". For this purpose, a block destruction procedure is implemented in each HLC: it consists in destroying blocks awaiting transmission on a given circuit when the number of these blocks exceeds a given value N2 (adjustable).

Measurements made before and after the implementation of the new HLN topology in June 1977 showed the improvement brought about by this realisation: the number of blocks destroyed decreased by 90% (from 11400 to 1080 blocks destroyed daily on the average, these blocks being Type A and Type B, Type B blocks being logged for retransmission).

A measurement of the same type made in January 1978, after optimisation of the N2 value, gave an average of 210 blocks being destroyed daily.

The following table summarises the results of these three measurements, per HLC (daily average calculated on a week period).

b) Out of 1500 transactions exchanged during the response time measurement campaign of August 1977 at fifteen various sites, the average failure rate was less than 1% (failure = no reply to query, or reply received garbled). This rate decreased to 0.25% on the occasion of our January 1978 verification, confirming the results shown on the above table.

HLC	Number of Dropped Blocks (Type A + Type B)			Percentage of losses January 78
	May 77	July 77	January 78	
AMS	3 627	183	22	0.0019
LON	1 094	355	2	0.0002
PAR	1 390	176	2	0.0002
FRA	1 322	78	3	0.0004
HKG	524	33	120	0.0131
NYC	240	66	43	0.0037
ROM	557	173	13	0.0044
MAD	2 643	21	6	0.0025

- Type B traffic

Recorded losses of Type B messages remain exceptional: statistics on hand on this subject show a ratio of 2 messages lost out of a million offered to the network.

Although we have limited the operation of the medium speed circuits linking a High Level Centre to a Time Division Multiplexer to the minimum required by the volume of traffic in order to minimise the error rate affecting the circuit operation, we are still suffering message corruption on remote TDMs. These corruptions are inherent to the SITA application of Time Multiplexing and should be overcome by adequate error corrective devices.

Response time and delivery time

- Type A Response Time

After the generalisation of the OTB procedure and the implementation of the new HLN topology, a response time measurement campaign was carried out in August 1977: 1400 transactions were performed at 14 various sites (100 transactions of two types per site), and the following result was obtained:

exchange 2/64 characters
- average value 2.5 seconds
- limit values 1.25 and 3.45 seconds

exchange 2/768 characters
- average value 4.95 seconds
- limit values 3.14 and 7.49 seconds

Recent measurements performed in January at MADLH site gave the following:

exchange 2/64 characters
- average value 1.5 seconds
- limit values 1.25 and 2.3 seconds

exchange 2/768 characters
- average value 3.3 seconds
- limit values 3.15 and 3.85 seconds

All above figures represent the transmiss-

ion time from depressing the "Transmit" key up to the reception of the first character of the reply on the screen.

To illustrate the SITA participation we have isolated from our last example the Reservation Computer processing times respectively equal to 0.5 second and 1.5 seconds, as observed by monitoring the ARC/RES P.1024 link.

■ Type B Delivery Time

Depending on the priority indicator, various transmission delays are tolerated per type of message; at the level of our quality control group, investigations are made in case of no respect of these delays; the number of investigations performed shows that the number of delayed messages remains very low, i.e. 3 telegrams out of a million.

A noticeable improvement has been recorded in 1977 with respect to QD traffic delivery time. This improvement is in fact the consequence of the solution found to our circuits and systems overload; in fact, QD traffic being given deferred priority, it was logically used as a temporary volume reservoir, drained out and re-entered at a later stage. This rescue procedure is now rarely applied.

AURORA

The Editor was informed by Aeroflot that their reservation system in Moscow is called "Aurora", which stands for "AUtomatisation of Reservation Operation and Registration of Air Passengers"

SITA/African Airlines Meeting Abidjan 21st/22nd February 1978

SITA's first conference in Africa brought together representatives of eight airlines having their Head Offices in Africa. In this context "Africa" is defined by the regional organisation of SITA, which excludes North and South Africa. The purpose of this conference, held in Abidjan, was to present to the airlines full information on what services SITA is now offering and what they plan to be in a position to offer in the future through the world-wide SITA network, with of course special attention at the meeting being focused on the African part of the network. This presentation was followed by a general round-table discussion covering the airlines' specific requirements in the area and SITA's plans to cater for those requirements, i.e. to adapt developments to suit the needs.

The conference was considered an essential part in the continually improving cooperation between SITA and the African airlines.

C. Lalanne, the General Manager of SITA, chaired the conference, held at the Hotel Ivoire in Abidjan, and opened in the presence of Mr. Kone Bengali, Minister of Telecommunications of the Ivory Coast.

The eight airlines represented at the meeting were: Air Afrique, Air Gabon, Air Malawi, Air Zaire, Cameroon Airlines, Ghana Airways, Kenya Airways, Zambia Airways.

Completing the participants was a delegation from SITA Head Office, plus representatives of the SITA Regional Management in Africa. The items discussed were:

1. SITA and its organisation
2. The SITA network and proposed services
3. SITA in Africa
4. The short and medium-term SITA plans for the region
5. The new SITA cost sharing scheme

During the round-table discussion which followed, the airlines raised their questions on the above subjects and voiced a number of pertinent comments, always helpful in SITA planning, and provided outlines of some of their own developments and requirements.

The whole of the proceedings took place in a specially friendly and positive atmosphere much appreciated by all the participants and which continued on the second day when, at the request of the airlines, a number of informal meetings were devoted to the examination of specific points of interest to individual companies.

This meeting was seen by SITA - and we believe by the airline participants - as an occasion when we made considerable strides in the improving of the already quite strong links between SITA and its members in various regions while adding to SITA's general awareness of the user requirements, obviously a "must" for coherent and harmonious development of SITA services not only in Africa but world-wide.

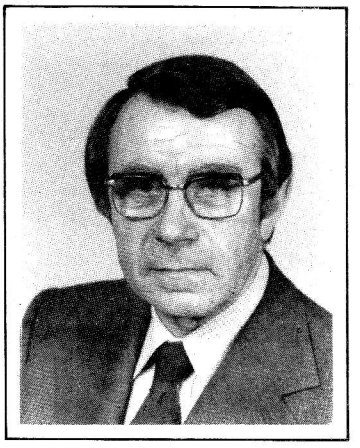
Throughout the organization

Representative in Brussels

Lucien Filbiche finished his studies, which were interrupted by World War II, and joined the Signals Corps of the Belgian Army in 1948. Here he became an instructor in radio-telegraphy. In 1949 he entered the Telecommunications Department of Sabena. In his function as Chief of Centre, he took part in the installation of the UNIVAC switching system in the late 1960s, which later on became part of the SITA High Level Network. In June 1973 he left Sabena and became the SITA representative for Belgium. Three years later, in August 1976, he also assumed responsibility for Luxemburg.

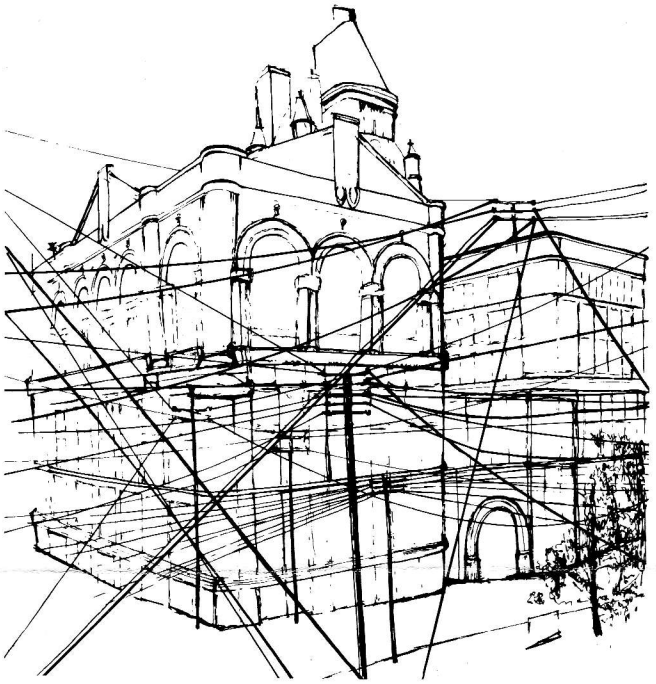
SITA Brussels is now equipped with a Satellite Processor which is linked to Amsterdam.

L. Filbiche is also a very gifted amateur film-maker and, as such, produced the first film on SITA, in the early 1970s, which was then shown to many gatherings and is still used for helping newcomers to obtain a certain "image" of SITA's activities. If time permits, he is ready to produce a second film.



The monthly topic Wired cities

None of us has ever seen one, although the term "wired cities" was coined more than ten years ago. The illustrations on this page give an artist's view of what a wired city (in the true sense of the word) looked like some sixty years ago, and what it looks like today - but both pictures are only presented for fun at first glance. A somewhat deeper analysis can demonstrate the connection between telephone wires and TV antennae on the one hand, and the wired cities as they are supposed to come into being in the future on the other.

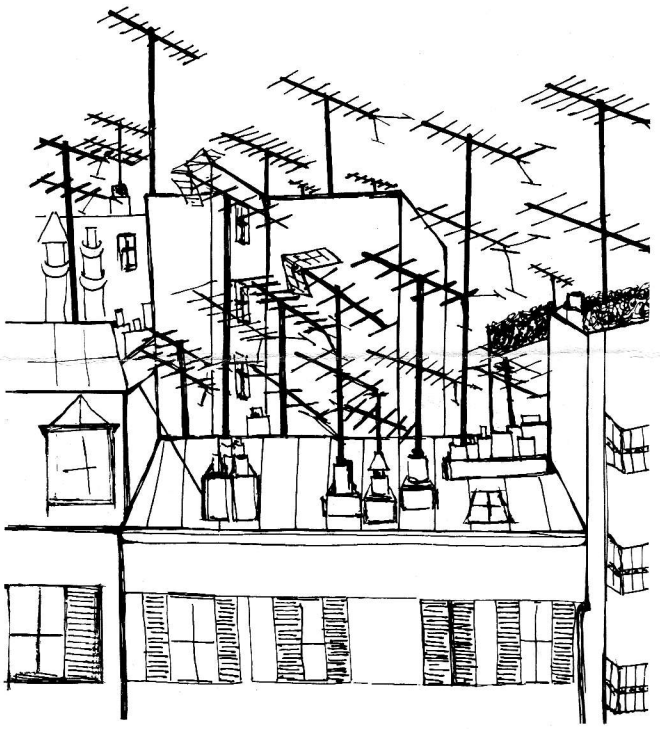


Let us start with the first sketch. It shows a rather fanciful view of a commercial area in London around 1910, with telephone and telegraph wires wildly crossing streets, apparently following no other rule than that calling for the shortest possible distance. The author remembers having seen (but could not make available) an even more attractive picture showing the situation on New York's Broadway around 1910, when the mass of wires literally darkened the sky. One can imagine how these and other places would look today if people had not decided to bury the cables underground. There are altogether 340 million telephone subscribers in the world - making use of the biggest "machine" ever built and the largest investment ever made by mankind.

Our example illustrates the extent to which people are interested in information exchange, both for business and for pleasure, even if we consider verbal communications via the telephone system alone.

The second drawing showing the forest of modern day TV antennae on top of otherwise crumbling buildings goes one step further. It illustrates the present tendency to have information input through radio waves to a rapidly growing number of homes for general information, and entertainment for one-way communication only and not for information exchange. The fact that many people do not consider the installation of a telephone necessary (by not having enough correspondents in town or abroad), but would buy a TV set the minute they can afford it, throws some light on the distinction that can be made between the two communications systems.

These are all well known facts, although they are sometimes not recognized as being significant. This finally explains why some experts predict further revolution in information machines in people's homes, while other experts remain sceptical. We are talking about the revolution that will come about with the two-way terminal - today, mostly as video display units combined with keyboards. These devices, which seem to grow like mushrooms, not only in airline reservation offices, but in many other business fields, will enter people's homes via broad-band and thus will lead to "wired cities" - providing houses and appartments with many more than the existing two wires for the telephone and the receiving TV antenna.



"In 1990 and beyond", says C.E. White, Executive Editor of 'Telecommunications' in the January 1978 issue, "very wide-bandwidth circuits will be available to ordinary homes at quite low costs, but for what use?".....

Obviously, the problem is not a technical one, neither is it necessarily an economical one since government controlled administrations and other bodies may well be prepared to invest large sums of money in these ventures.

The problem is - at least in the eyes of the sceptics - of a purely sociological and psychological nature. As someone put it the other day : "I still prefer to go to bed with a book rather than a terminal".

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