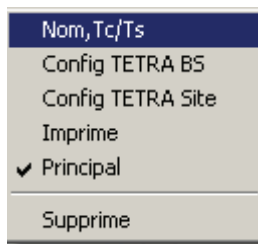


8.1.1.2 IT configuration on the Switch

We will use the network management terminal to identify the link it number to the SWITCH as well as the position in the SWITCH rack of COM3 in charge of the link: Position 1 to 12 for a standard chassis.

In CONFIGURATION / SETTINGS.

Right click on a BS then select Name Tc/Ts.



The window below appears. The G703 link configuration has a red border:

Junction: Link type

Voice/@IP: corresponds to the link it number

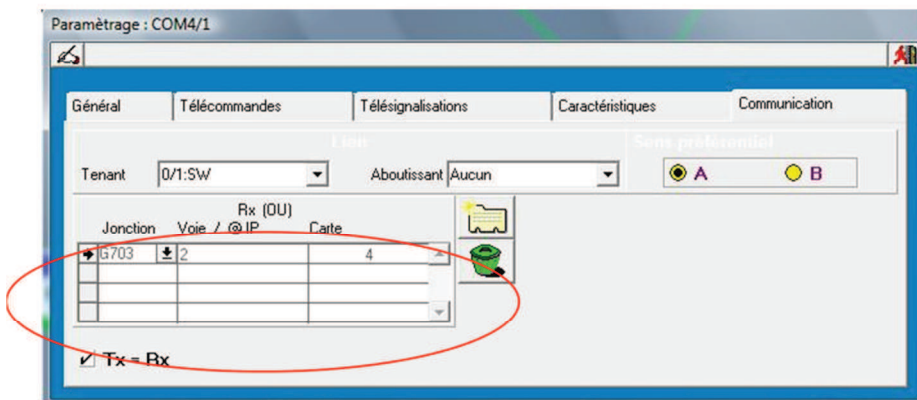
Board: corresponds to the location of the COM3/4 board in the SWITCH (Counting from the SUPIP)

The **Tx=Rx check box** means that the dialogue it is identical for both sides of the link.

For the In and Out settings and the preferred direction refer to paragraph 9.1.2 Ring Network

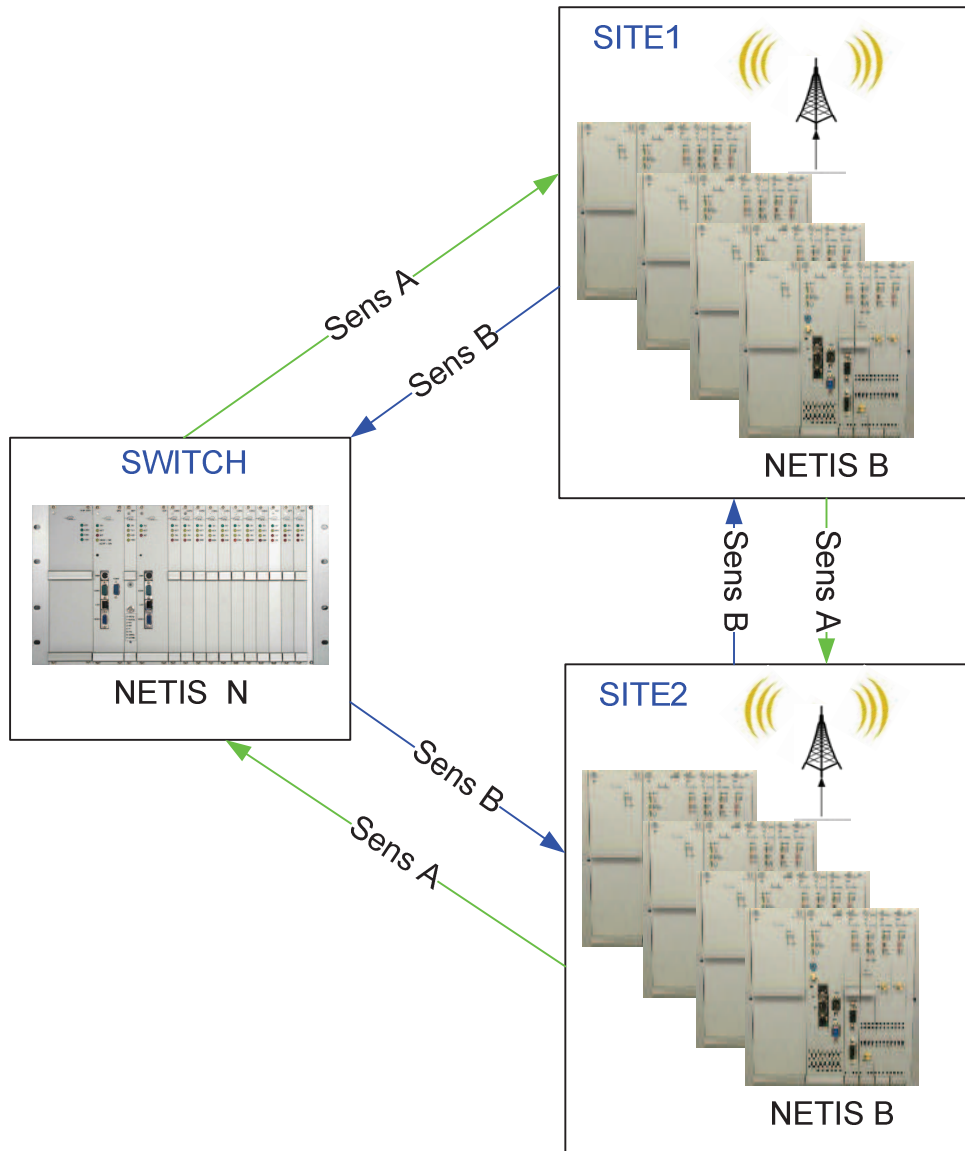
The In and Out list zones must be filled in as in the window:

- Ins: for the link the SWITCH 0/1 SW precedes the BS for consultation
- Outs: for the link, no equipment succeeds the BS for consultation



Fault analyses and diagnosis

8.2 « Ring » network



En général sens normal de la boucle
En général sens secours de la boucle

8.2.1 OPERATING PRINCIPLES

Link type: always G703

Type of module in charge of the link: COM 3/4

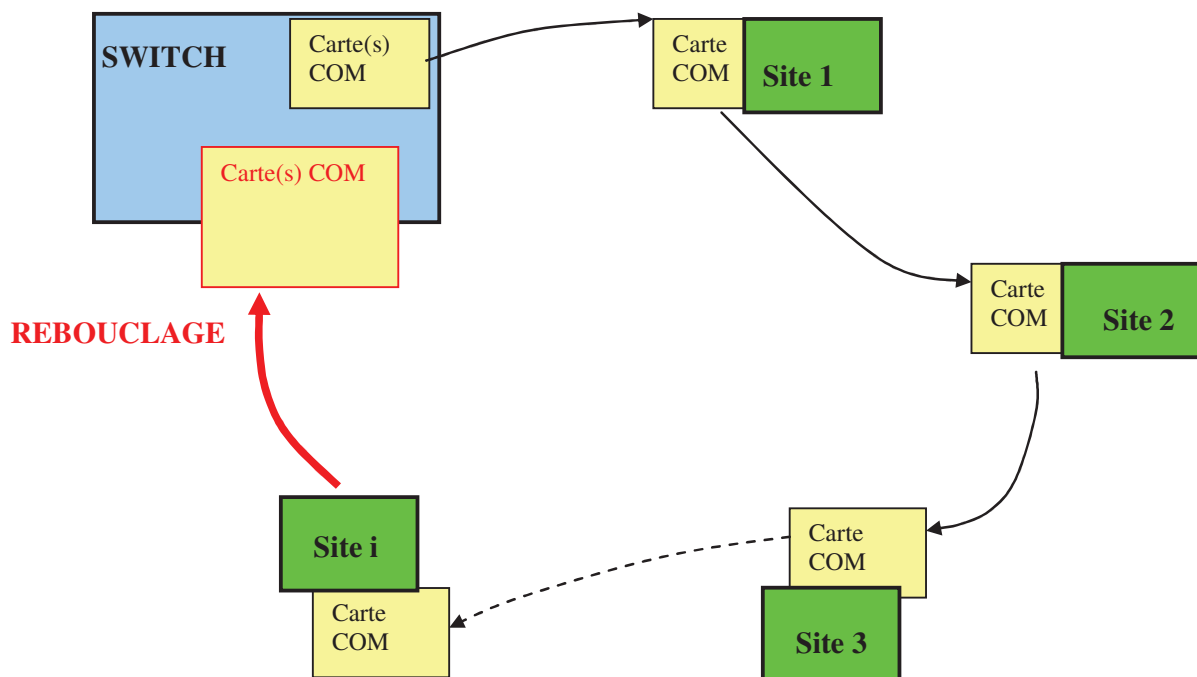
Normal operations: (see §9.1.2.2)

Each NeTIS-N appliance transmits data to the NeTIS-Bs on an it in both directions of the loop and extracts data from the NeTIS-Bs only from one direction at a time

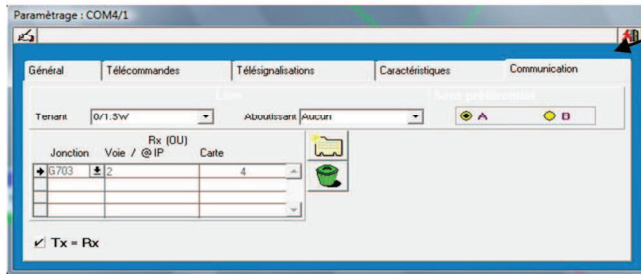
Each NeTIS-B appliance transmits data to the NeTIS-Ns on an it in both directions of the loop and extracts data from the NeTIS-Ns only from one direction at a time depending on the preferred direction selected in the settings

More precisely, the COM3 or COM4 board plays the role of G703 interface on the BS side and the SWITCH side, it permanently transmits on both G703 junctions; The signal received at these junctions are analysed and the indicators on the front face make it possible to know the state of these junctions:

- 'ERR' indicator: red indicator lighting when a line error is detected on the junction or if there is no 2Mb/s signal (disconnection for example).
- Yellow 'Rx' indicator: flashes when a G704 synchronisation is detected; stays on when a synchronisation is detected and the link with the switch is established.



In the case of correct reception on both sides (A and B), the COM board only keeps the signals received from the side declared as preferred (settings on the network management terminal).



The board injects signals corresponding to the TBS11 in the assigned time slot (programming on the rear face of the NeTIS-B see §9.1.1.1) on both junctions A and B at the same time and transparently retransmits the other time slots, in both directions from one junction to the next and vice versa.

8.2.2 FAULT ANALYSES AND DIAGNOSIS

8.2.2.1 Presentation

We are going to study a network composed of:

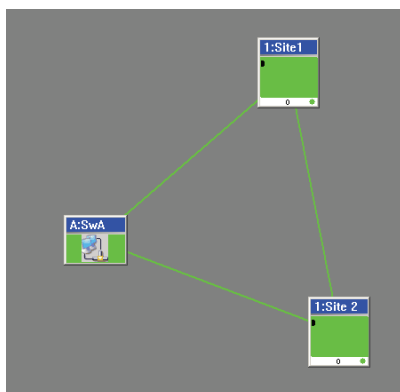
A SWITCH

A one BS SITE N° 1

A one BS SITE N° 2

The network architecture is shown below:

Here its operation is correct



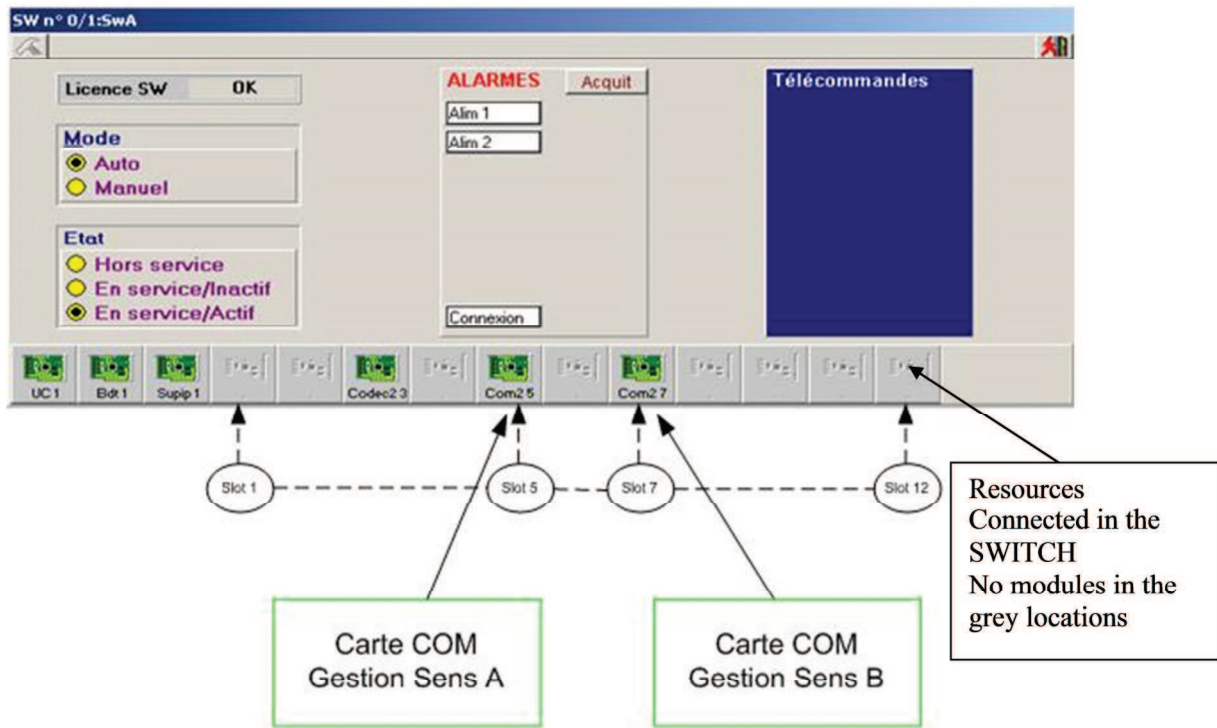
8.2.2.2 NeTIS-B configuration

Each NeTIS-B on the network must be configured to work on an it from the G703 link (see §9.1.1.1)

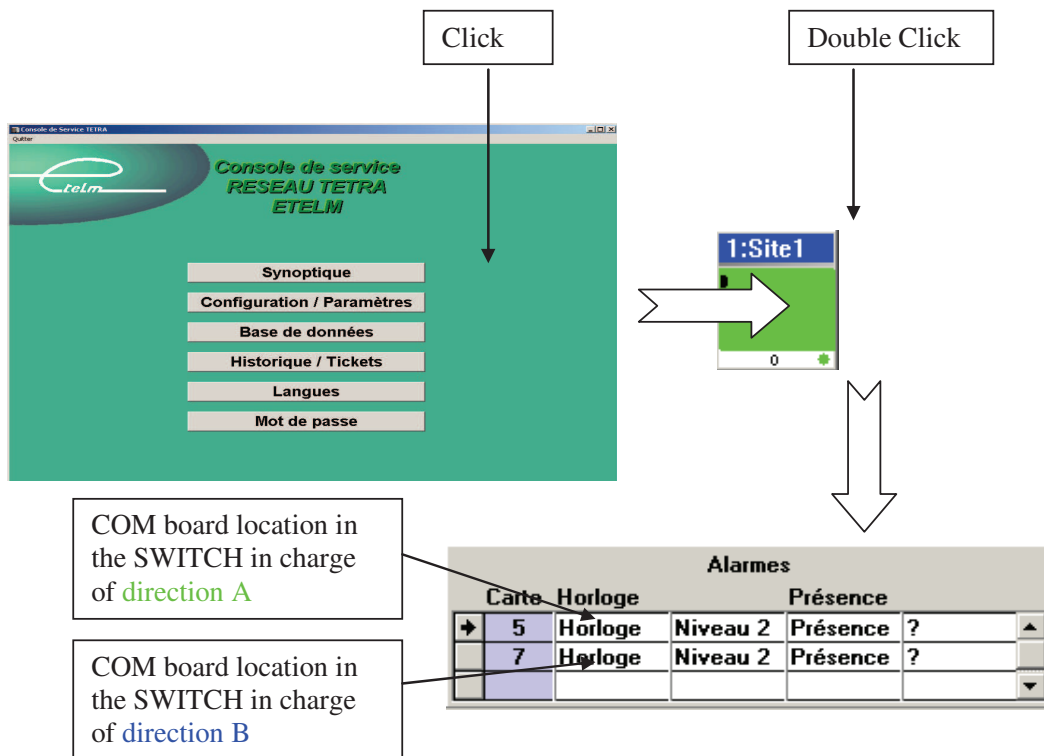
8.2.2.3 NeTIS-N configuration

The SWITCH is configured via the network management terminal

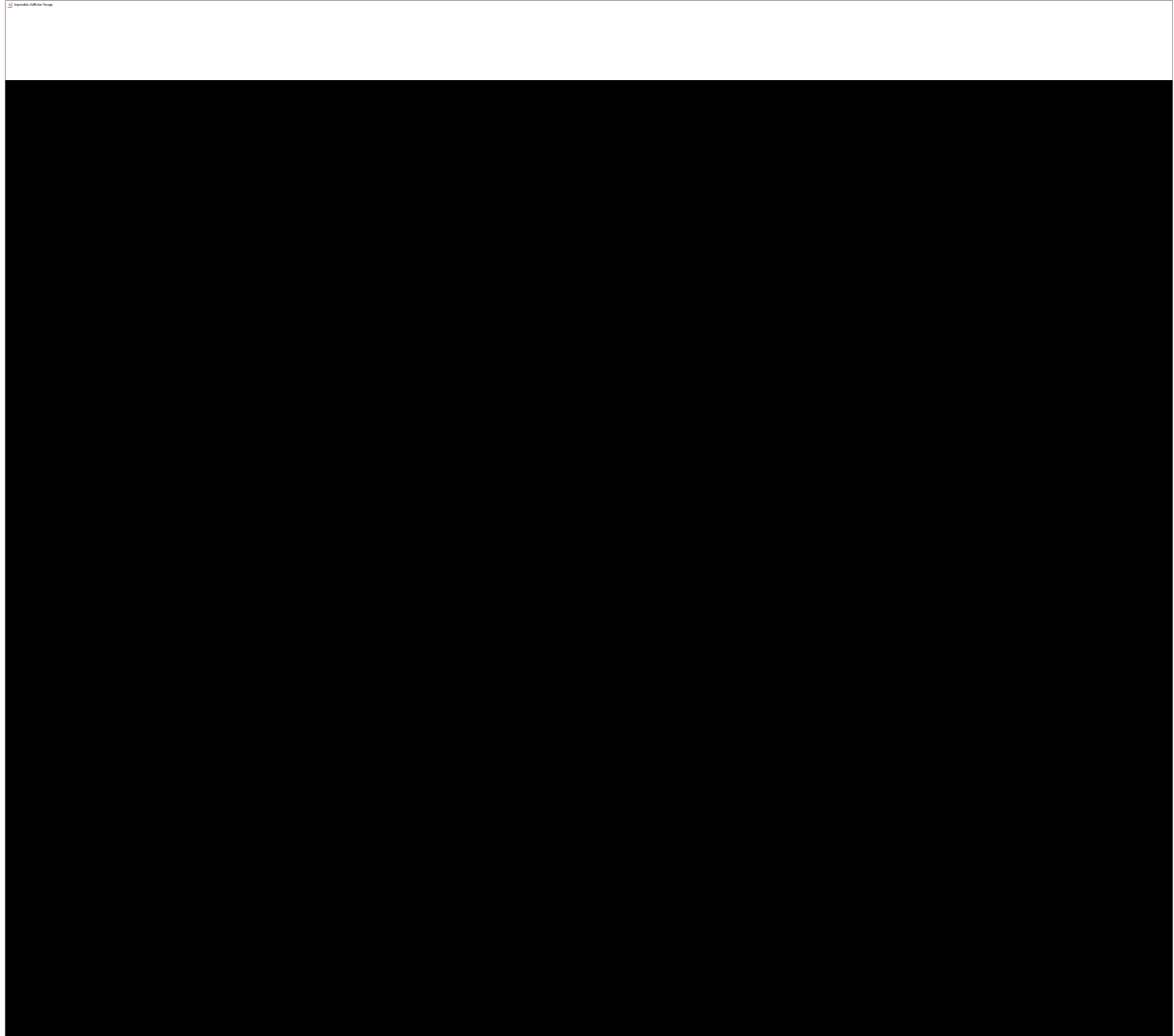
A double click on the SWITCH in monitoring mode displays the following window
All the connected resources in the SWITCH are visible



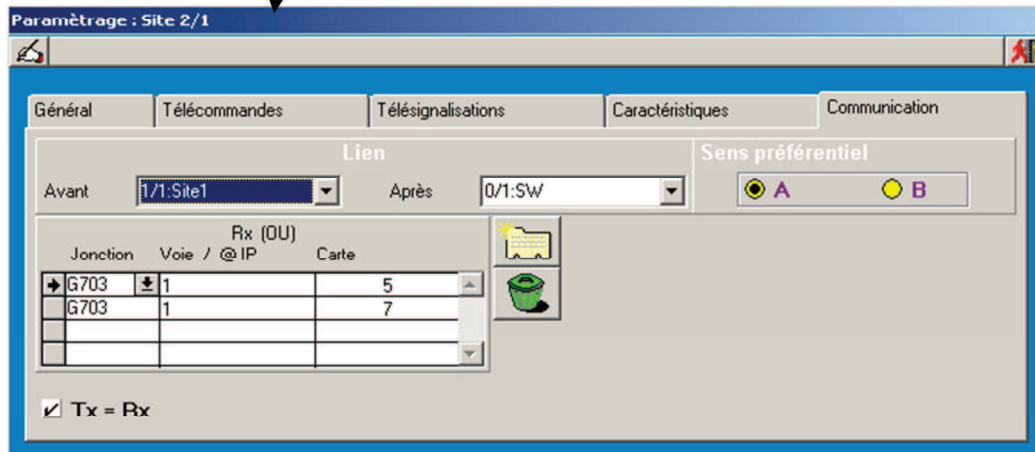
- To find out the role of each of the COM3 or 4 boards, view the BS states
To do this access the SYNOPSIS area of the network management terminal and double click on the BS



- The COM3 and COM4 board locations in the SWITCH and it is used on the network are configured as follows:
 Right click on the BS, and then click on Name TC TS and select the Communications link



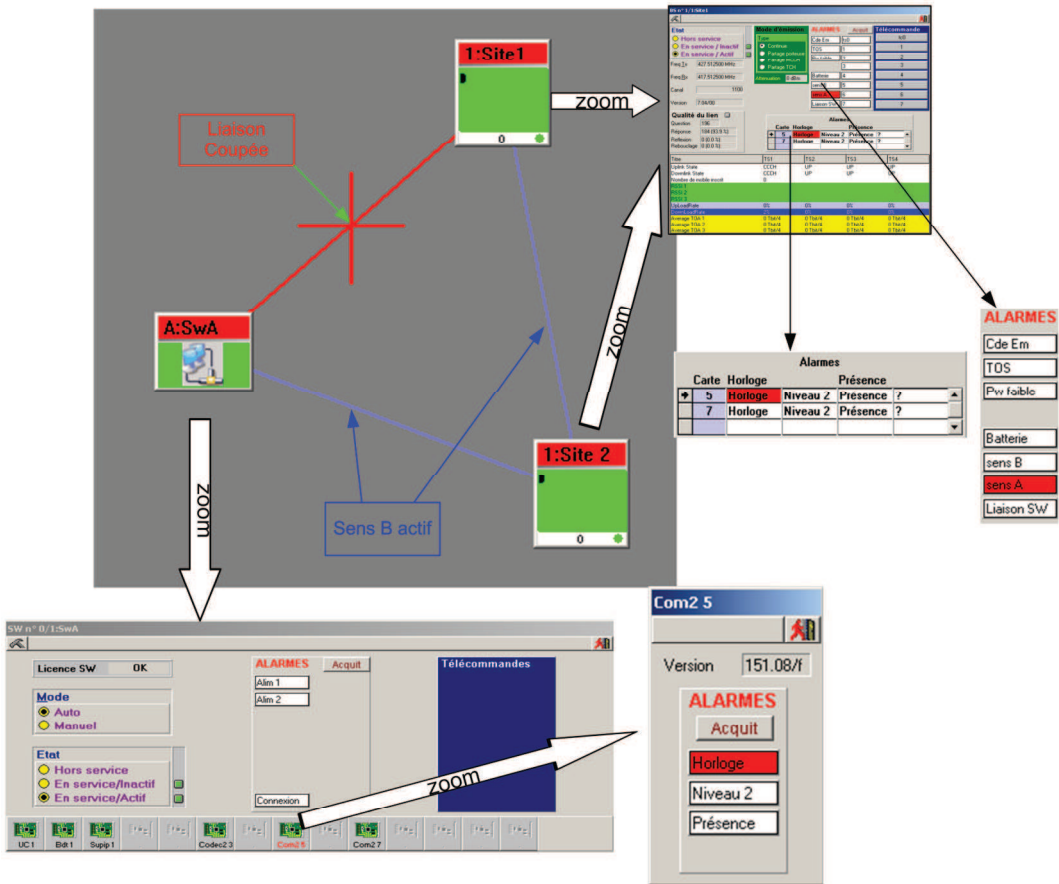
SITE 2 BS N°1



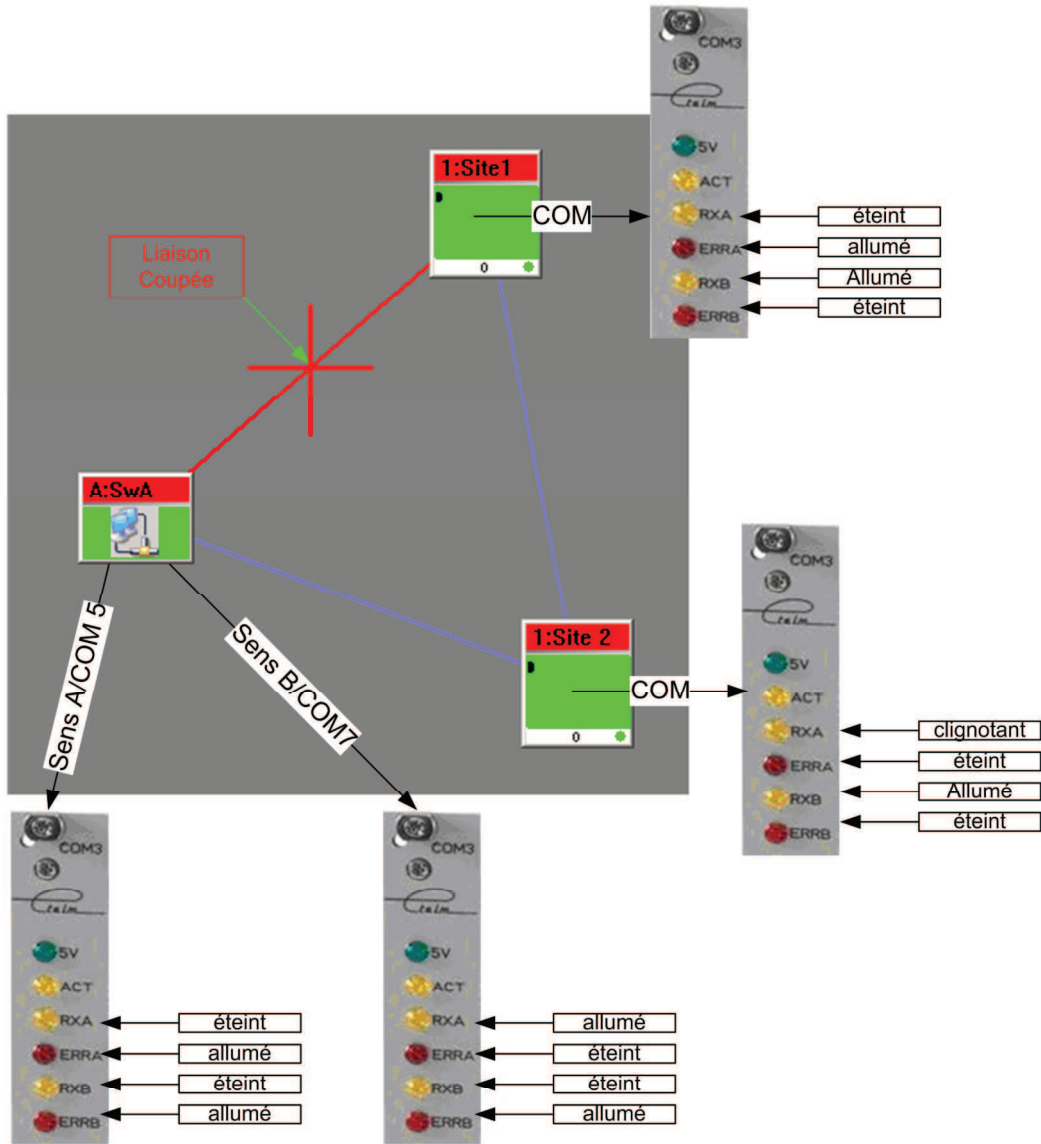
8.2.2.4 Fault N° 1:

Link cut between the SWITCH and the BS for site 1 and the network is operational in the B direction.

- Network management terminal synopsis view



- Direct observation on the COM3 boards:



- Messages in the network management terminal history/tickets

Console de Service TETRA ()

Fichier

Date	Heure	SW	Désignation	Evenements
16-03-11	17:06:24	A	SW : Carte Com2 5 : Alarme Horloge	
16-03-11	17:06:39	A	Site Site 2/01 Alarme sens A	
16-03-11	17:06:44	A	Site Site1/01 Alarme sens A	

COM card clock alarm at location 5 of the SWITCH (Direction A management)

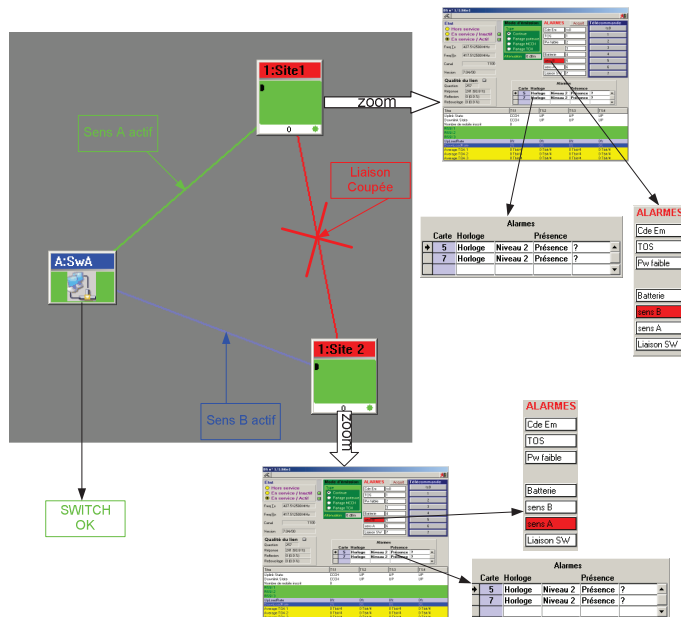
Alarm A direction on Site 2 BS 1 COM card RXA indicator on and ERRa off

Alarm A direction on Site 1 BS 1 COM card RXA indicator off and ERRa on
A direction on the Site 1 BS 1

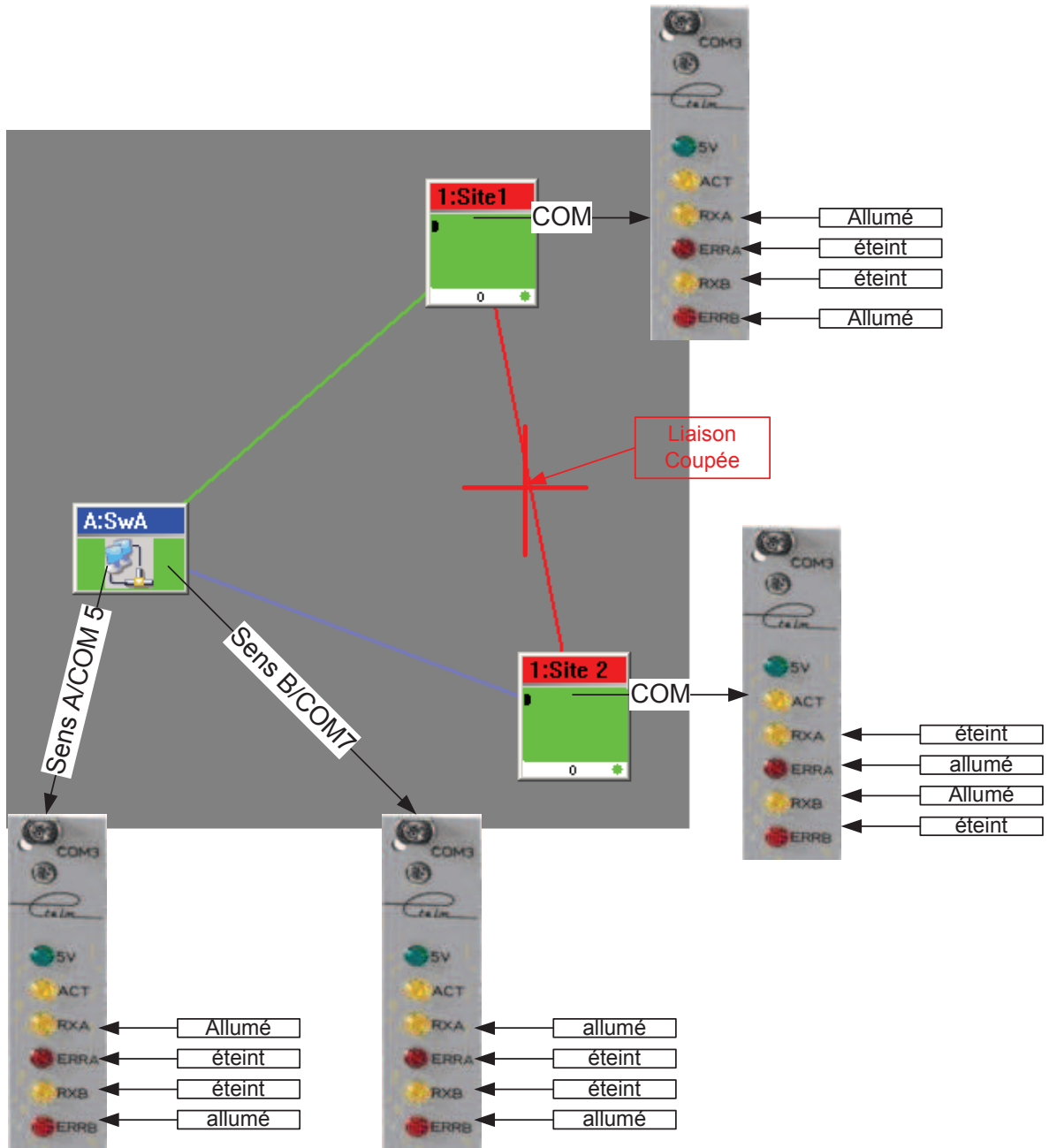
8.2.2.5 Fault N°2:

Link cut between the two radio sites

- Site 1 is connected to the Switch in direction A
- Site 2 is connected to the Switch in direction B
- Network management terminal synopsis view



■ Direct observation on the COM3 boards:



- Messages in the network management terminal history/tickets

**Alarm A direction on Site 2 BS 1
COM board RXA indicator off and
ERRA on**

Date	Heure	SW	Désignation	Evenements
16-03-11	17:12:14	A	Site Site 2/01	Alarme sens A
16-03-11	17:12:21	A	Site Site1/01	Alarme sens B

**Alarm B direction on Site 1
BS 1
COM board RXA indicator
off and ERRB on**

8.2.2.6 Fault N°3

Link cut between the SWITCH and site 2
Both sites are connected to the Switch in direction A

- Network management terminal synopsis view

ALARMES

Carte	Horloge	Niveau	Présence
5	Horloge	Niveau 2	Présence ?
7	Horloge	Niveau 2	Présence ?

ALARMES

- Cde Em
- TDS
- Pw faible
- Lien IP
- Température
- sens B**
- sens A
- Liaison SW

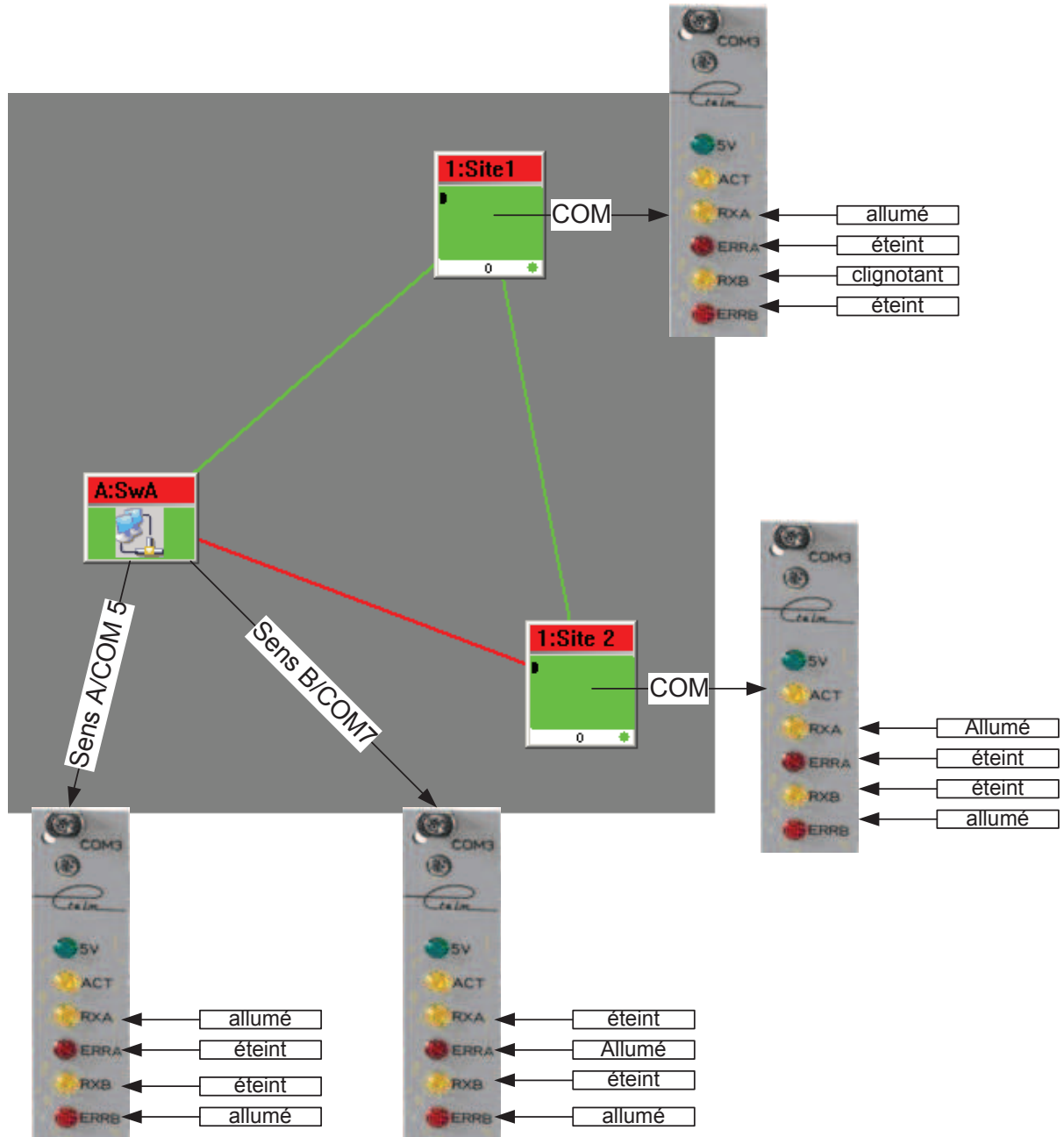
Com2 7

Version 151.08/1

ALARMES

- Acquit
- Horloge**
- Niveau 2
- Présence

■ Direct observation on the COM3 boards



- Messages in the Network management terminal history/tickets

The screenshot shows a 'Console de Service TETRA' window with a menu bar containing 'Fichier' and 'Evenements'. Below the menu is a table with the following data:

Date	Heure	SW	Désignation
16-03-11	17:16:25	A	Site Site1/01 Alarme sens B
16-03-11	17:16:25	A	SW : Carte Com2 7 : Alarme Horloge
16-03-11	17:16:28	A	Site Site 2/01 Alarme sens B

Callouts from external boxes point to the following entries in the table:

- 'Alarm B direction on Site 1 BS 1' points to the first row.
- 'COM board alarm SWITCH slot 7' points to the second row.
- 'Alarm B direction on Site 2 BS 1' points to the third row.

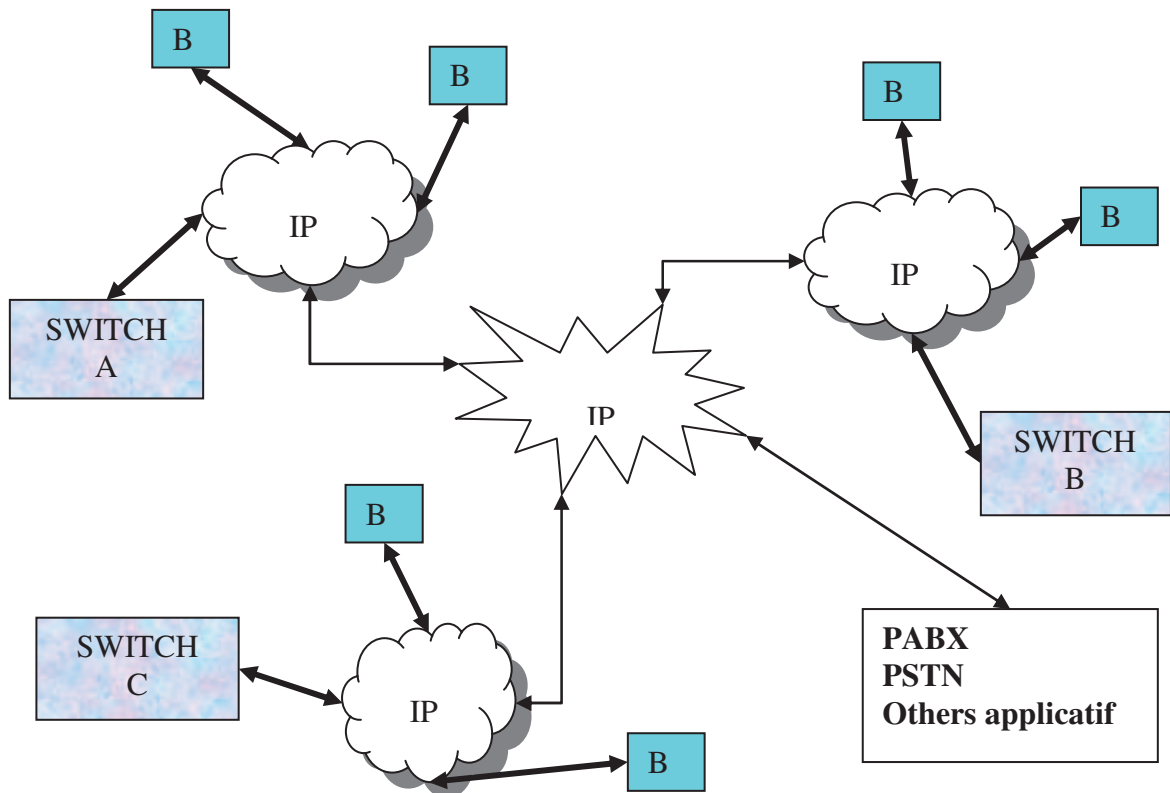
8.3 Ethernet link (IP)

This chapter describes the different types of IP exchanges between the different BSs, Operator stations, Phone gateways, etc... for a TETRA IP network.

8.3.1 GENERAL PRESENTATION

The general architecture of a TETRA network uses several elements:

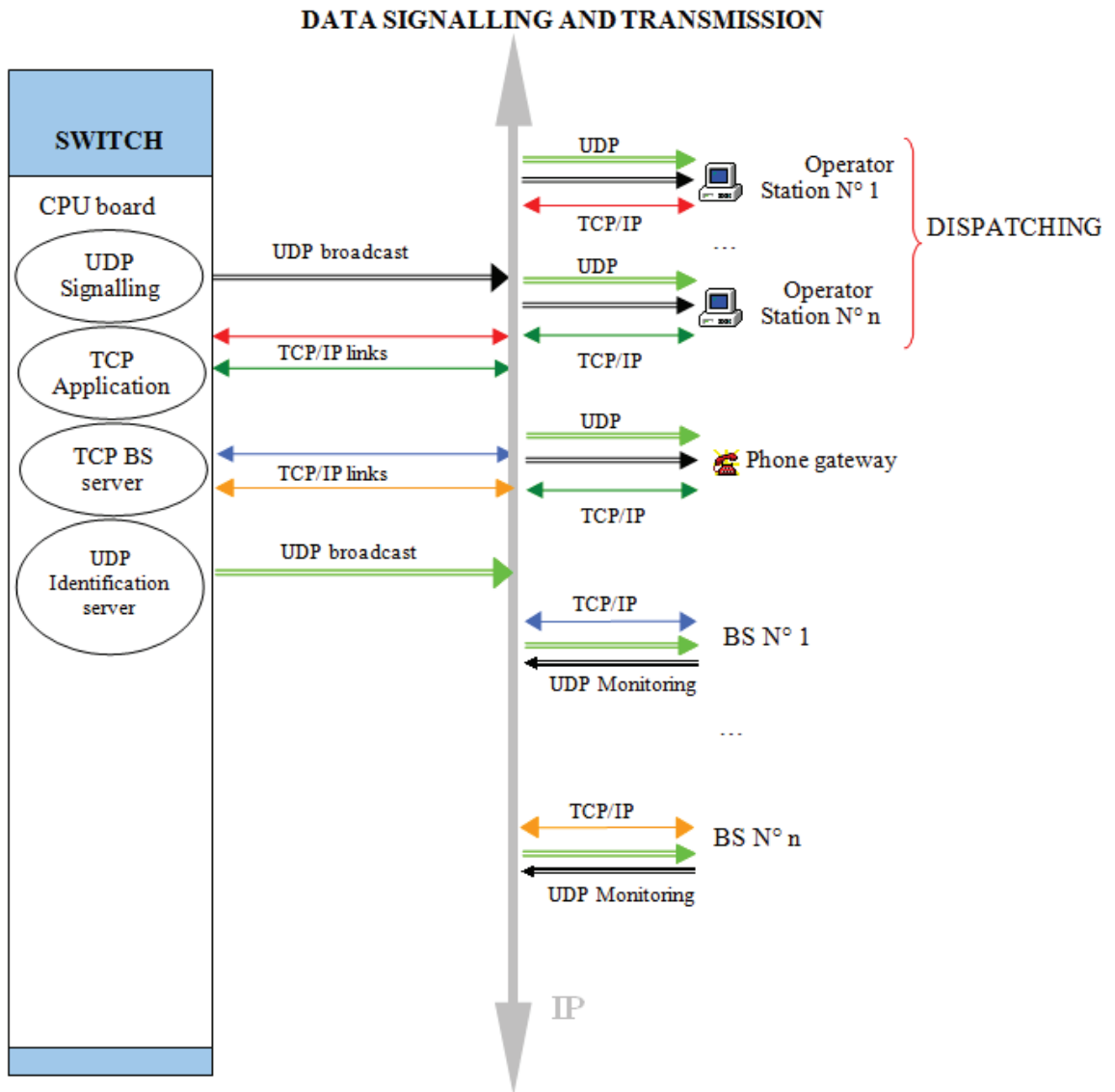
- Base stations communicating with mobiles and linked to the switch(es)
- One or more switches (that can be linked together) eventually interconnected to external networks (phone networks)
- One or more operator stations.
- Various applications (Recorder, phone gateways, etc ...)

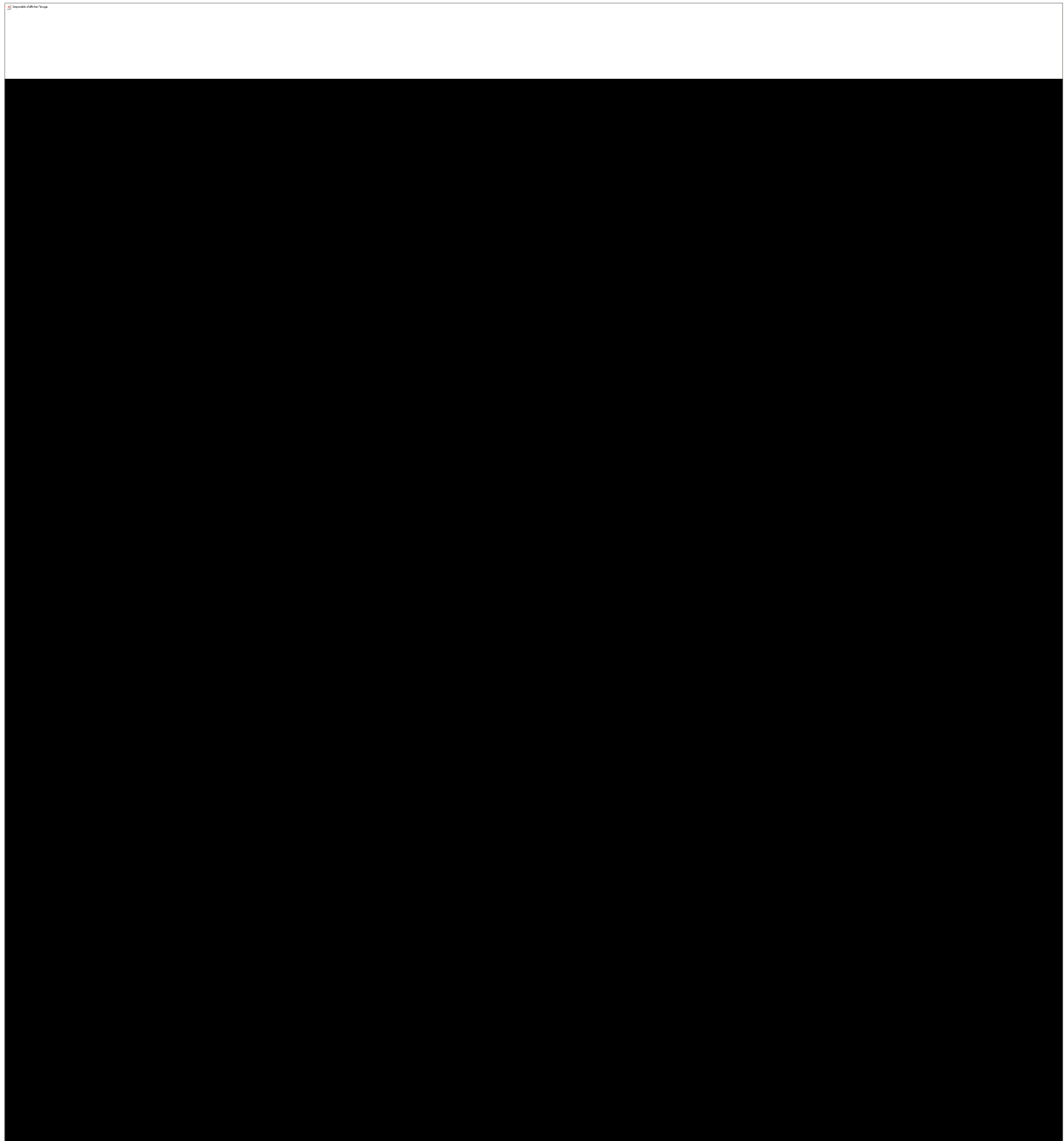


All the elements of the radio network are linked together through an IP network.

The radio network clients (BS, Operator station, etc ...) have a minimum configuration, adding an element must not cause the reconfiguration of existing elements.

8.3.2 COMMUNICATIONS BETWEEN APPLIANCES

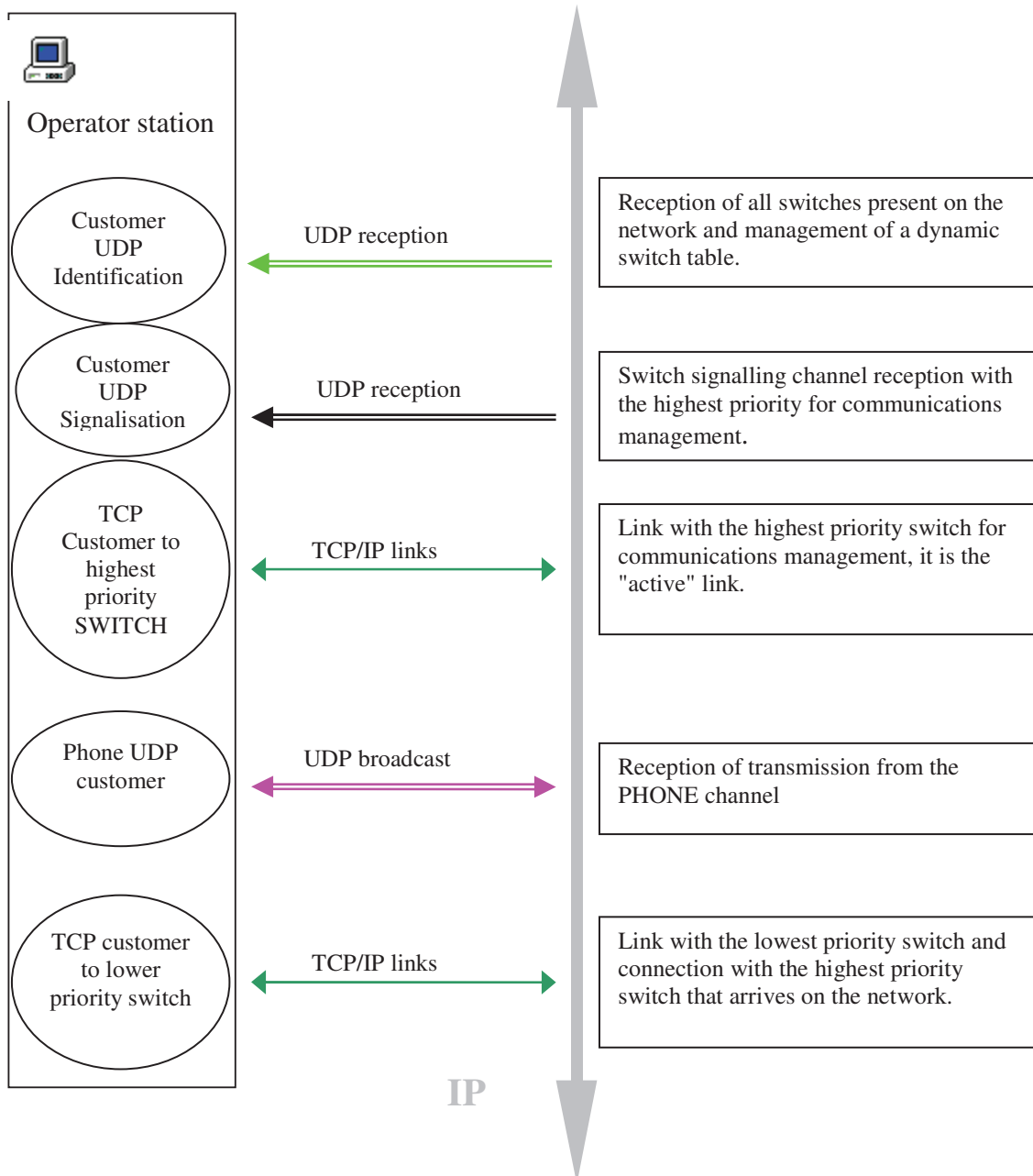




8.3.3 CUSTOMERS

8.3.3.1 Phone applications

These applications need to use signalling and phone.
(Operator stations, Phone gateways, etc.).



8.3.4 NETWORK SETTING

8.3.4.1 Role of the UDP Identification Server

Each switch broadcasts an identification message on a UDP channel permanently (every 5 seconds).

The UDP port number used for this broadcast is therefore part of the minimum information needed in the Clients (NeTIS-B, Operator Station etc...) wanting to connect to the radio network.

This message makes it possible for the BSs to send information about themselves to the servers (NeTIS-N): CPU IP addresses, Switch N°, SUP IP addresses

Then the SWITCHES send the following information to the clients:

IP address and Port of the BS signalling server (see §9.3.4.4)

IP address and Port of the BS Phone server (see §9.3.4.4)

The port used to broadcast this message and the broadcasting address are set via the network management terminal and transmitted to the NeTIS-N by downloading.

A file in the NeTIS-B is used to declare the identification port used by the NeTIS-N(s).

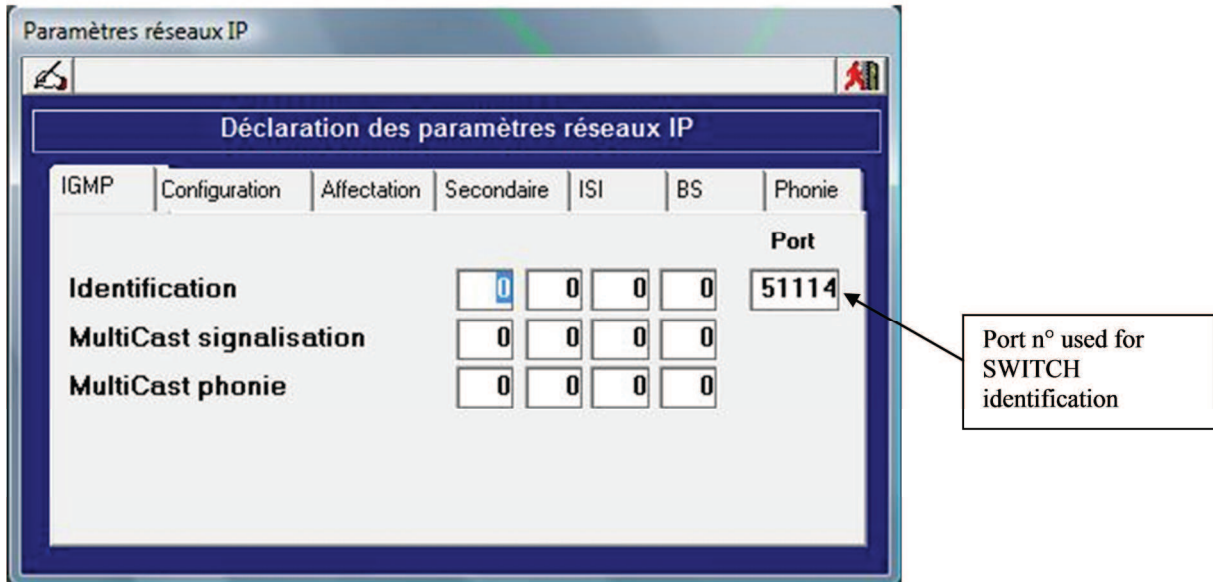
8.3.4.2 UDP identification server configuration

The UDP identification server is in fact the NeTIS-N

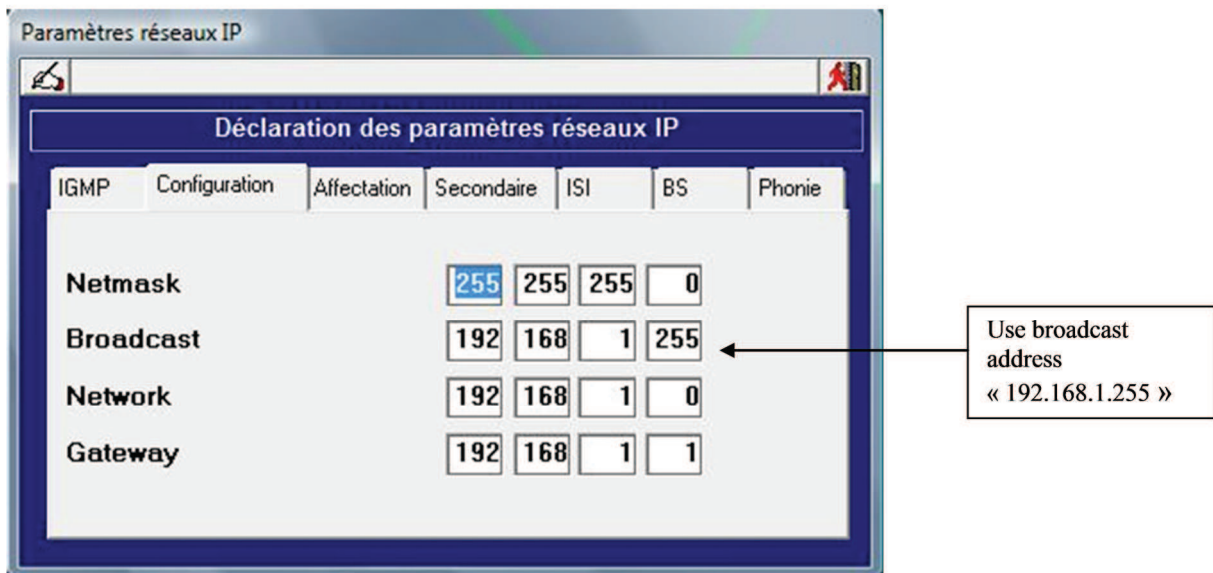
The server is configured from the network management terminal as shown below

In **Configuration / Paramètres**

Select « IGMP » tab



The broadcast of server information (NeTIS-N) to the clients (NeTIS-B) is carried out using a Broadcast address and is defined as shown below
 Select the "Configuration" tab



8.3.4.3 Port identification declaration on the NeTIS-B side

A base station that wants to connect to the tetra network listens on its identification port in order to obtain the information from the different SWITCHES on the network with their priority level.

To declare this port, a configuration file (Text) stored on the NeTIS-B must be read the path of which is /USR/BsLinux/nano CONFIGBS.CFG.

Below the content of the CONFIGBS.CFG file shows that the identification port is "51114"

"Top of file

IP PARAMETERS

PORT_IDENTIFICATION = 51114

[Read 62 lines]

**^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Txt ^T To Spell**

"End of file

IDENTIFICATION
PORT N°

Commands to close
the file for example:
CTRL X(^ X)

8.3.4.4 IP Network without using the identification port

If the port is not filled in in the BS, then port "51114" is used as a default.

It is not mandatory to use the identification port. If you know the SWITCH IP addresses (CPU and SUPIP) and the signalling and phone ports that are used, then they can be added to the CONFIGBS.CFG file as shown below.

"Top of file

IP PARAMETERS

**IP_SWITCH = 192.168.1.100
PORT_SWITCH = 50020
IP_SUPIP = 192.168.1.3
PORT_SUPIP = 50021**

[Read 62 lines]

**^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Txt ^T To Spell**

ACTIVE SW CPU+signalling port

ACTIVE SW SUPIP+Phone port (§9.3.4.5)

"End of file

8.3.4.5 Checking the IP configuration on the BS side

Once the Niveau2 software is running it is possible to activate different network management terminal using the ALT+Fx keys, without disturbing the current application

Connect a screen and keyboard and press the "ALT F2" and "L" keys, the display below appears:

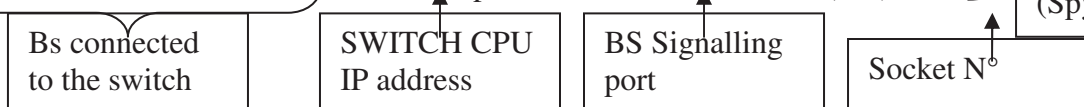
"start of display

* 0 client connected with server 4 on port 55555 , socket 16

*** NbClient=0 found=0

Port used for maintenance (Spy etc.)

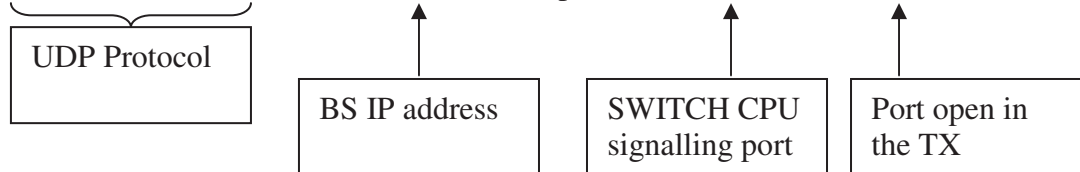
* Connected at server no 0 : 192,168.1.124 port=50400 with socket 14 (69s)



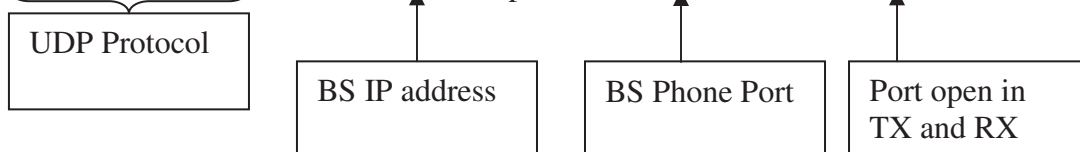
* Connected at server no 1 : 192,168.1.125 port=50401 with socket 15 (69s)

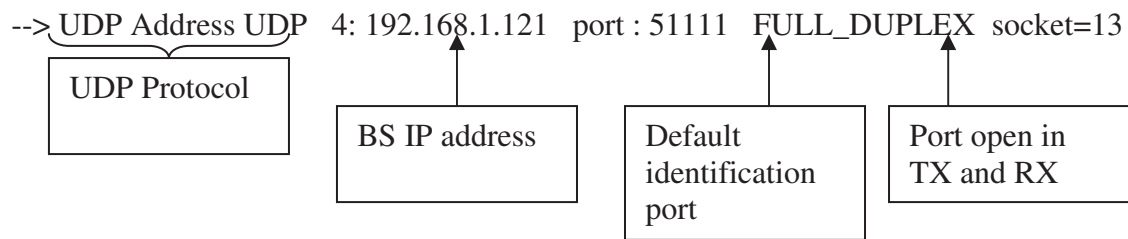


--> UDP Address UDP 0: 192.168.1.121 port : 50300 TX_ONLY socket=19



--> UDP Address UDP 3: 192.168.1.121 port : 50401 FULL_DUPLEX socket=12





"end of display

8.3.4.6 Role and setting of the BS signalling and phone servers

The role of the signalling server is to exchange the following information in TCP:

- Base station operating parameters
- Communications management

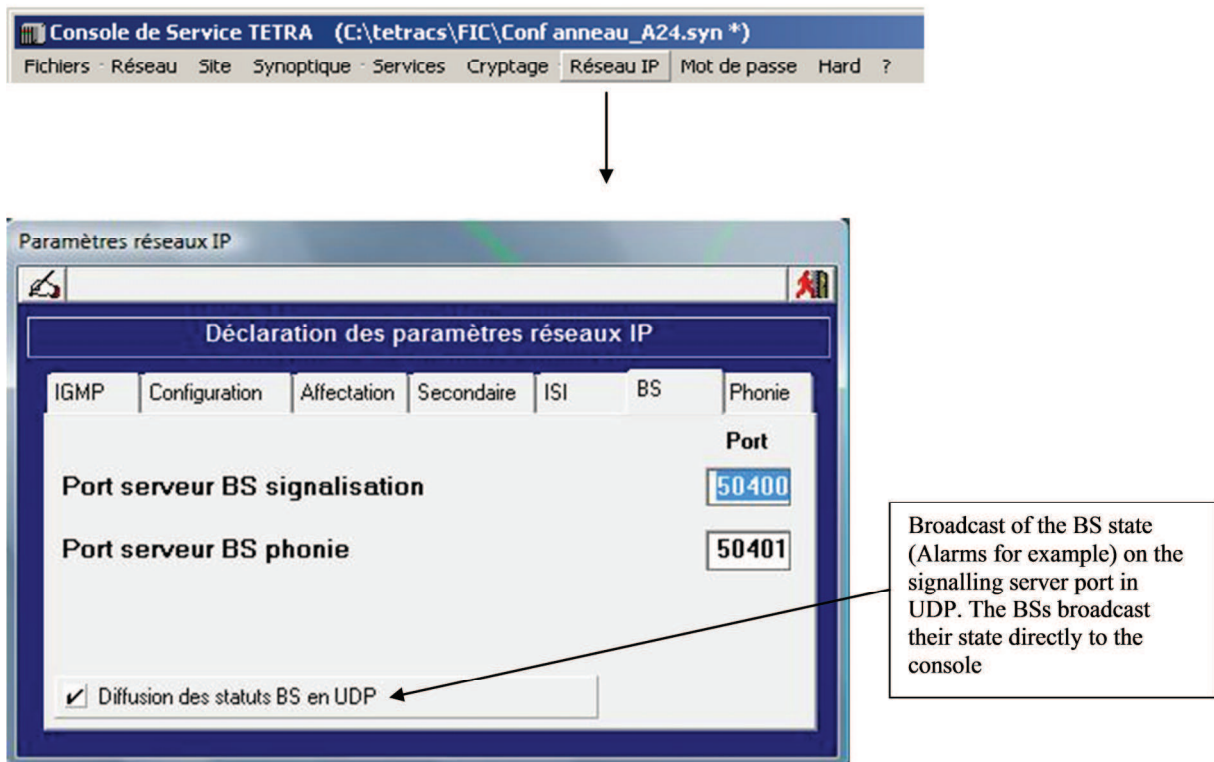
The role of the Phone server is to exchange the following information in TCP:

- Phone in the communications

The two ports are made known to the server (NeTIS-N) using a download of the equipment database from the network management terminal.

Port configuration on the network management terminal side:

In **Configuration / Paramètres**



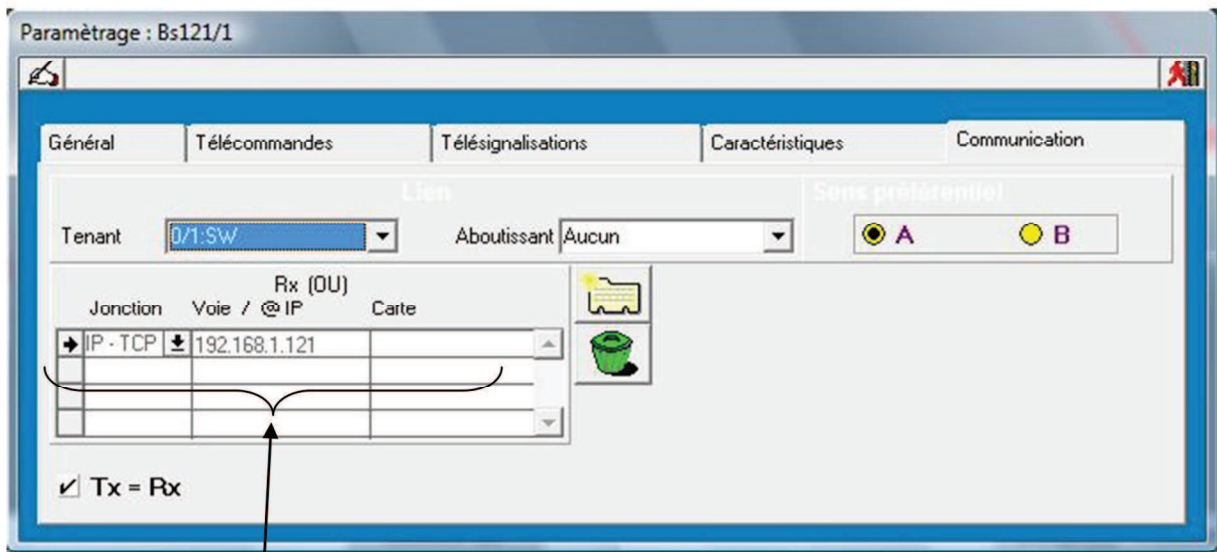
8.3.5 DECLARATION OF THE NETIS-B ADDRESSES ON THE TETRA CS SIDE

The SWITCH has a view of all the BSs that are part of the network via their IP address configured as shown below.

When a configuration request for a BS is received, the SWITCH can load its configuration using the BS IP address.

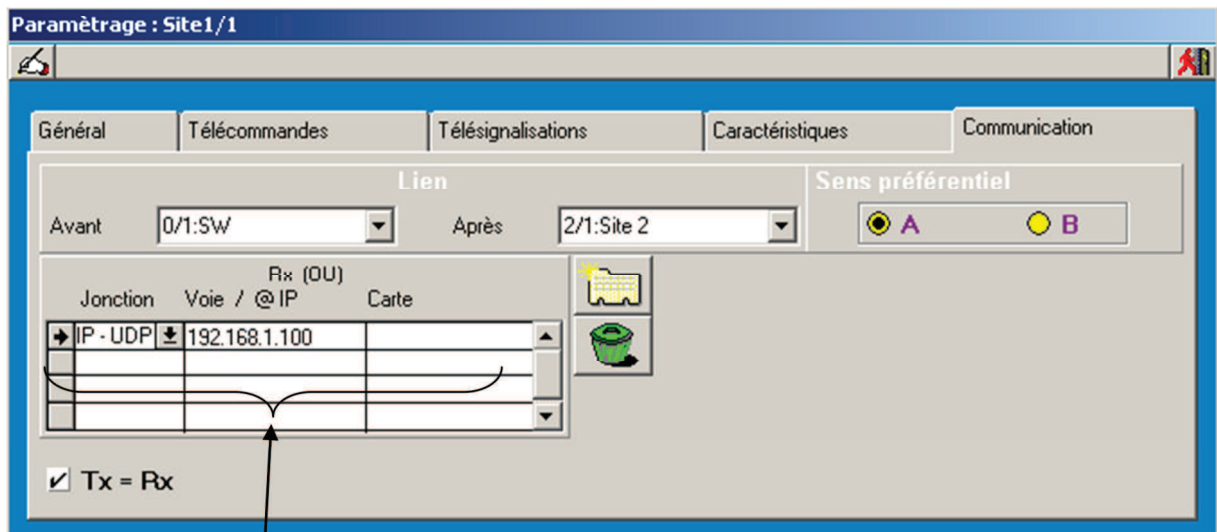
This address is also used to route phone and network communications.

In **Configuration / Paramètres**



Link type IP-TCP
IP address of a NeTIS-B 192.168.1.121

IP-TCP: All Signalling and Phone exchanges use TCP/IP



Link type IP-UDP
IP address of a NETIS B 192.168.1.100

IP-UDP: All Signalling exchanges use TCP/IP
All the Phone exchanges use UDP/IP

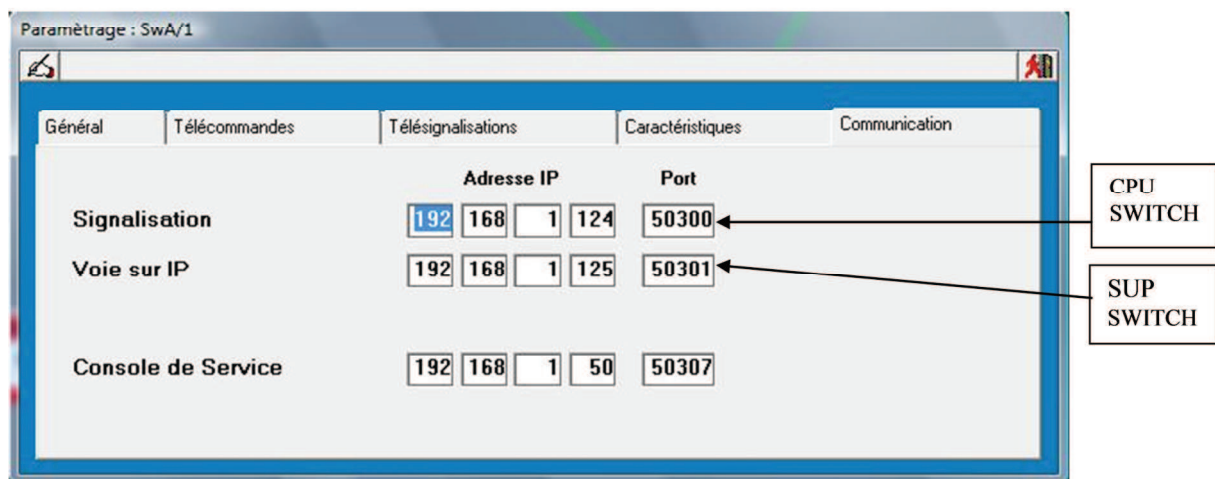
8.3.6 SWITCH SIGNALLING AND PHONE PORT

These SWITCH CPU ports and addresses will be used by the DISPATCHING.

The Operator Stations must know the CPU IP (Signalling) address and the associated Signalling Port.

As well as the phone port used by the SUPIP board. The SUPIP IP address is not used by the operator stations because phone is broadcast directly onto the IP network (UDP protocol) whereas for signalling both the TCP and UDP protocols are used.

The SWITCH is configured by a download from the equipment database from the network management terminal.



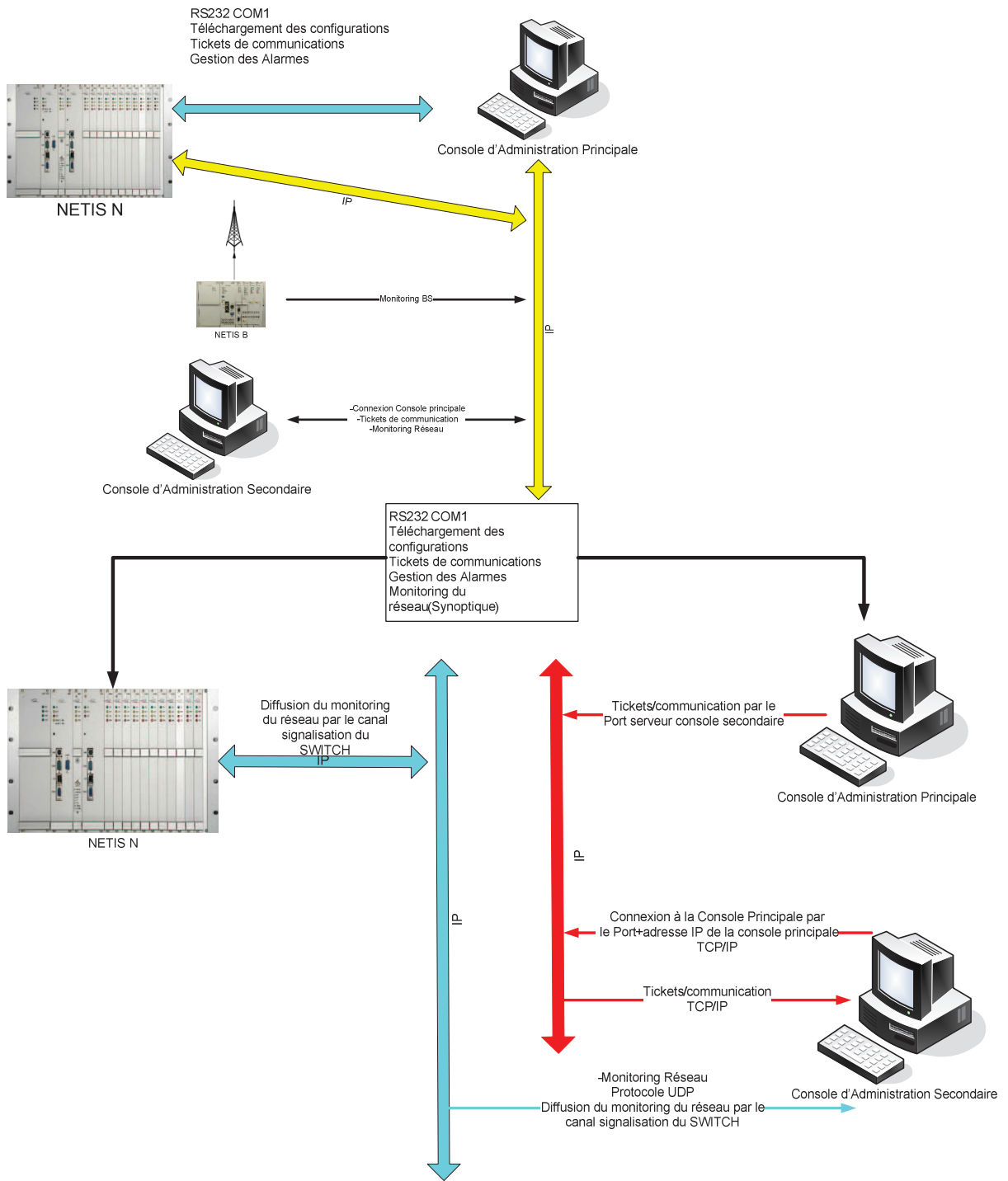
8.3.7 SECONDARY NETWORK MANAGEMENT TERMINAL

8.3.7.1 General

A network always has a primary network management terminal connected using an RS232 link to the NeTIS-N.

You can add secondary network management terminal connected using IP to the main network management terminal .

The rights of the secondary network management terminal are limited to network monitoring and to the ticket history (Logging) and you cannot load configurations to the NeTIS-N from it.

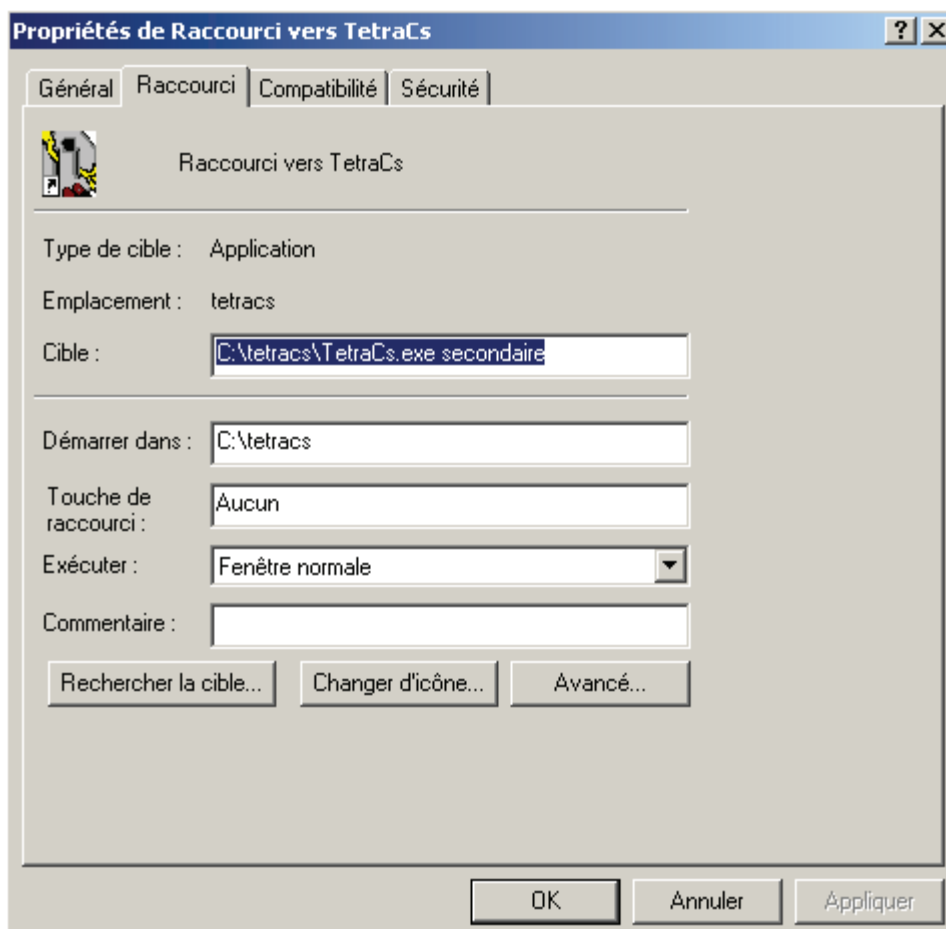


8.3.7.2 Secondary network management terminal installation

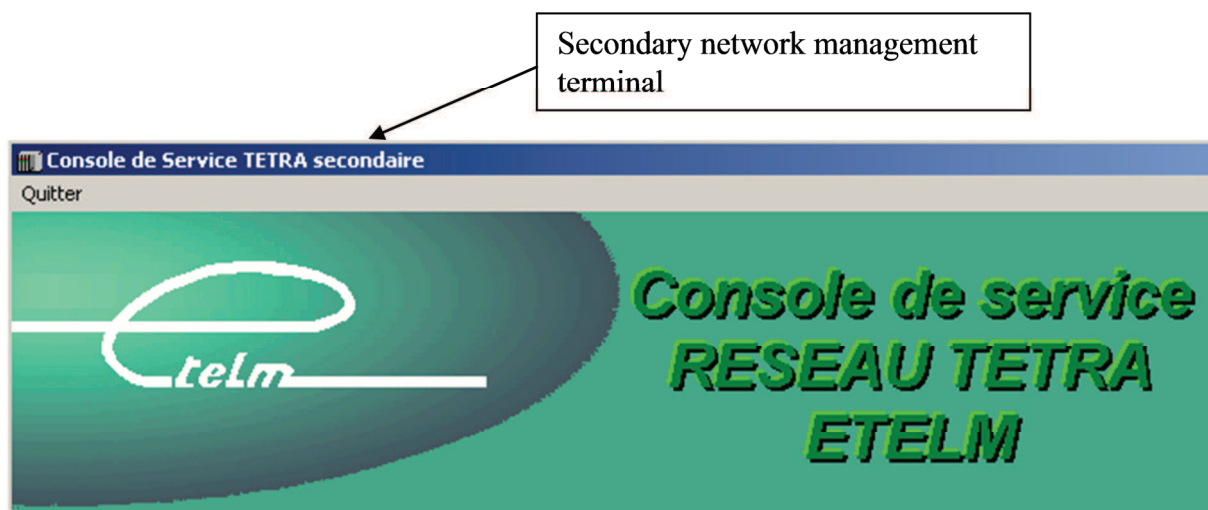
Retrieve the TetraCs directory from the primary network management terminal and paste it under the C: root of the new PC.



Create an application short cut `Tetracs.exe` and in the "Target" field of the tetraCs properties add the word "secondary" as shown below:



Launch the application



8.3.7.3 Configuring the main network management terminal

The main console is considered to be a server to which the secondary network management terminal will connect.

To do this, just declare a port for exchanges between consoles.

The server listens on the port defined below.