Teldat Router

XOT Protocol

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INDEX

Chapter 1 Introduction 1

1. XOT Protocol Introduction 2

Chapter 2 Configuration 3

1. Configuration Commands 4
   1.1. ? (HELP) 4
   1.2. ADD 5
      a) ADD ADDRESS 5
      b) ADD FACILITY 5
      c) ADD ROUTING 6
   1.3. CHANGE 6
      a) CHANGE ADDRESS 6
   1.4. DELETE 7
      a) DELETE ADDRESS 7
      b) DELETE FACILITY 7
      c) DELETE NA-CALLING 7
      d) DELETE ROUTING 8
   1.5. DISABLE 8
      a) DISABLE EXT-PACKET-MODE 8
   1.6. ENABLE 8
      a) ENABLE EXT-PACKET-MODE 8
   1.7. LIST 9
      a) LIST ADDRESS 9
      b) LIST ALL 9
      c) LIST FACILITY 10
      d) LIST PORT 10
      e) LIST ROUTING 10
   1.8. RESTORE 11
      a) RESTORE ALL 11
      b) RESTORE PORT 11
   1.9. SET 11
      a) SET CHANNEL-DIRECTION 12
         • SET CHANNEL-DIRECTION DECREASING 12
         • SET CHANNEL-DIRECTION INCREASING 12
      b) SET NA-CALLING 12
      c) SET PACKET-SIZE 13
      d) SET PACKET-WINDOW 13
      e) SET PROCESS-NA-CALLING 13
      f) SET SVC 13
         • SET SVC LOW 14
         • SET SVC HIGH 14
   1.10. EXIT 14

Chapter 3 Monitoring 15

1. Monitoring Commands 16
   1.1. ? (HELP) 16
   1.2. LIST 17
      a) LIST STATE 17
   1.3. EXIT 17

Chapter 4 XOT Interfaces 18

1. Creation of XOT interfaces 19
2. XOT Interfaces Configuration 20
3. X.25 parameters configuration 21
3.1. Address assignation 24
3.2. Liberation causes and diagnostics 25

Chapter 1
Introduction

1. XOT Protocol Introduction

X.25 over TCP/IP (XOT)

The XOT Interface allows X.25 packets to be transported over TCP/IP networks. This demands a reliable link level to transfer the packets. This link is generally LAPB (or LAPD) protocol in packet switch networks. However, when it is a different type of network, e.g. Frame Relay switch networks the LAPB link must be substituted for a distinct reliable link. If the TCP/IP is chosen as a link layer, this permits the interconnection of terminals (which operate in X.25 over Frame Relay networks and local Ethernet, Token Ring networks etc.), as the packet sequences are converted into datagram sequences. These are forwarded and routed over all IP networks until they reach their destination where the X.25 packets are recovered.

This method of encapsulating X.25 over TCP is defined in the RFC (Request For Comments) 1613 standard with which the XOT is compatible.

Chapter 2
Configuration

1. Configuration Commands

The XOT Protocol configuration is accessed through the main menu in the following way:

1. At the (*) prompt, enter PROCESS 4 (or P 4).
2. At the configuration (Config>) prompt, enter NODE XOT.
3. At the XOT protocol configuration (XOT Config>) prompt, use the configuration commands described in this chapter to configure the XOT Protocol parameters.

In this chapter the XOT Protocol configuration commands are explained in detail. The letters written in **bold** indicate the minimum number of characters which must be entered in order to make the command operative.

Command	Function
? (HELP)	Lists all the available commands or options.
ADD	Add a new element to a table.
CHANGE	Change the value of a parameter.
DELETE	Delete a facility or parameter.
DISABLE	Disable a facility.
ENABLE	Enable a facility.
LIST	List the parameters.
RESTORE	Restore the default values.
SET	Set the value of a parameter.
EXIT	Return to Config> prompt.

XOT configuration commands

1.1. ? (HELP)

Displays a list of the available commands or their options.

Syntax:

```
XOT Config> ?
```

Example:

```
XOT Config> ?
ADD
CHANGE
DELETE
DISABLE
ENABLE
LIST
RESTORE
SET
EXIT
XOT Config>
```

1.2. ADD

Add a new element to a table such as a new NA assignment, an IP address, a new routing or a new facility.

Syntax:

```
XOT Config> ADD ?
ADDRESS
FACILITY
ROUTING
XOT Config>
```

a) ADD ADDRESS

Allows you to assign a determined NA to an IP address. The Nas can be generic. You can also set an alternative IP address which you can use to connect when the configured timeout lapses in this command.

Example:

```
XOT Config> ADD ADDRESS
Value of NA? XXXXXXXXXXXXXXX
IP Address [0.0.0.0]?1.1.1.1
Alternate IP Address [0.0.0.0]? 1.1.1.2
Timeout to alternate connection (sec.)[30]? 20
XOT Config>
```

b) ADD FACILITY

Permits you to modify the call packets, changing the NAs or adding facilities.

Example:

```
XOT Config> ADD FACILITY
NA (digit or X)? XXXXXXXXXXXXXXX
NA new (digit , X or S)? XXXXXXXXXXXXXXX
Routing Port number   Ports(3-9) Router(2): 9
Priority[0-9](0): 2
Choose Window(Yes/No)(N)?
Choose packet length(Yes/No)(N)?
Reverse charge(Yes/No)(N)? y
Closed User Group(Yes/No)(N)? n
Network User Identifier:
User data: cc000000
XOT Config>
```

c) ADD ROUTING

Permits you to add a new routing i.e. assign NA to X.25 ports (or XOT).

Example:

```
Config> ADD ROUTING

Con    Ifc Type of interface                  CSR     CSR2  int
---      1 Router->Node                         0             0
---      2 Node->Router                         0             0
---      9 XOT                                  0             0
ISDN 1   5 ISDN D channel                A000000             1B
ISDN 1   7 ISDN B channel                F001640  F000E00    9C
ISDN 2   6 ISDN D channel                A200000             1B
ISDN 2   8 ISDN B channel                F001660  F000F00    9B
LAN      0 Ethernet                      9000000             1C
WAN1     3 X25                           F001600  F000C00    9E
WAN2     4 X25                           F001620  F000D00    9D

Number of routing port   Ports(3-9) Router(2):
Write priority(0-9)[0]
Write routing(S,N,E)[N]
Value of NA? XXXXXXXXXXXXXXX
Protocol identifier (hex): [0]?
XOT Config>
```

1.3. CHANGE

Syntax:

```
XOT Config> CHANGE ?
ADDRESS
XOT Config>
```

a) CHANGE ADDRESS

Permits you to change an assignment in the address table.

Example:

```
XOT Config> CHANGE ADDRESS
IP Address [0.0.0.0]?1.1.1.1
Value of NA?123456
XOT Config>
```

1.4. DELETE

Permits you to delete a parameter or an element from a table.

Syntax:

```
XOT Config> DELETE ?
ADDRESS
FACILITY
NA-CALLING
ROUTING
XOT Config>
```

a) *DELETE ADDRESS*

Permits you to delete an element from the address table.

Example:

```
XOT Config> DELETE ADDRESS
Value of NA? 1321231
XOT Config>
```

b) *DELETE FACILITY*

Permits you to delete an element from a facility table.

Example:

```
XOT Config> DELETE FACILITY
Entry number:1
num P Prt NA              NNA             Wcd Wcr Lcd  Lcr  RC  CUG   NUI/UD


1   2  9  XXXXXXXXXXXXXXX XXXXXXXXXXXXXXX  -   -   -    -   YES---- /CC000000
Delete this entry?(Yes/No)(N)? y
Facility deleted
XOT Config>
```

c) *DELETE NA-CALLING*

Deletes the NA calling assigned to the XOT port.

Example:

```
XOT Config> DELETE NA-CALLING
Deleted NA-CALLING port 9
XOT Config>
```

d) DELETE ROUTING

Deletes a routing from the table.

Example:

```
XOT Config> DELETE ROUTING
Entry number:1
Entry        Port      priority     routing              NA        UD
 1           2           2            N                1321321
Delete this entry?(Yes/No)(N)? y
Routing deleted
XOT Config>
```

1.5. DISABLE

Syntax:

```
XOT Config> DISABLE ?
EXT-PACKET-MODE
XOT Config>
```

a) DISABLE EXT-PACKET-MODE

Configures the port to work in 8 module.

Example:

```
XOT Config> DISABLE EXT-PACKET-MODE
XOT Config>
```

1.6. ENABLE

Syntax:

```
XOT Config> ENABLE ?
EXT-PACKET-MODE
XOT Config>
```

a) ENABLE EXT-PACKET-MODE

Configures the port to work in 128 module.

Example:

```
XOT Config> ENABLE EXT-PACKET-MODE
XOT Config>
```

1.7. LIST

List the different parameters.

Syntax:

```
XOT Config> LIST ?
ADDRESS
ALL
FACILITY
PORT
ROUTING
XOT Config>
```

a) LIST ADDRESS

Lists the address table.

Example:

```
XOT Config> LIST ADDRESS
X25 Address              IP Address         Altern. IP Addr.  Call Timeout.
        123456               1.1.1.1           1.1.1.2            30
XOT Config>
```

b) LIST ALL

Lists all the XOT configuration.

Example:

```
XOT Config> LIST ALL
Port information: 9(XOT)
Layer 3 Window: 2
Ext pkt mode:  Disabled
Packet size: 128
Caller Number:
NA calling process: Outgoing calls
PVC low: 0
PVC high: 0
SVC low: 100
SVC high: 100
Channel Direction: DEC

X25 Address        IP Address         Altern. IP Addr.   Call Timeout.
  123456             1.1.1.1           1.1.1.2            30
```

```
Con    Ifc Type of interface                    CSR     CSR2  int
---      1 Router->Node                           0             0
---      2 Node->Router                           0             0
---      9 XOT                                    0             0
ISDN 1   5 ISDN D channel                  A000000             1B
ISDN 1   7 ISDN B channel                  F001640  F000E00    9C
ISDN 2   6 ISDN D channel                  A200000             1B
ISDN 2   8 ISDN B channel                  F001660  F000F00    9B
LAN      0 Ethernet                        9000000             1C
WAN1     3 X25                             F001600  F000C00    9E
WAN2     4 X25                             F001620  F000D00    9D

Entry        Port      priority     routing             NA        UD
 1           3(X25)       0             N       XXXXXXXXXXXXXXX

X.25 global data:
Max. datagram length: 1500
Backup recover attempt time: 0
Max dynamically added addresses: 10
Check input call:  Enabled


Packet facilities:
num P Prt NA              NNA             Wcd Wcr Lcd  Lcr  RC  CUG   NUI/UD

1   7  3  XXXXXXXXXXXXXXX XXXXXXXXXXXXXXX  -   -   -    -   NO ----
XOT Config>
```

c) LIST FACILITY

Lists the facilities table.

Example:

```
XOT Config> LIST FACILITY
Packet facilities:
num P Prt NA              NNA             Wcd Wcr Lcd  Lcr  RC  CUG   NUI/UD

1   7  3  XXXXXXXXXXXXXXX XXXXXXXXXXXXXXX  -   -   -    -   NO ----
XOT Config>
```

d) LIST PORT

Lists the XOT port parameters.

Example:

```
XOT Config> LIST PORT
Port information: 9(XOT)
Layer 3 Window: 2
Ext pkt mode:  Disabled
Packet size: 128
Caller Number:
NA calling process: Outgoing calls
PVC low: 0
PVC high: 0
SVC low: 100
SVC high: 100
Channel Direction: DEC
XOT Config>
```

e) LIST ROUTING

Lists the routing table.

Example:

```
XOT Config> LIST ROUTING

Con    Ifc Type of interface                  CSR     CSR2  int
---      1 Router->Node                         0             0
---      2 Node->Router                         0             0
---      9 XOT                                  0             0
ISDN 1   5 ISDN D channel                 A000000             1B
ISDN 1   7 ISDN B channel                 F001640  F000E00    9C
ISDN 2   6 ISDN D channel                 A200000             1B
ISDN 2   8 ISDN B channel                 F001660  F000F00    9B
LAN      0 Ethernet                       9000000             1C
WAN1     3 X25                            F001600  F000C00    9E
WAN2     4 X25                            F001620  F000D00    9D

Entry        Port      priority     routing             NA        UD
 1           3(X25)       0            N       XXXXXXXXXXXXXXX
XOT Config>
```

1.8. RESTORE

Restores the default values.

Syntax:

```
XOT Config> RESTORE ?
ALL
PORT
XOT Config>
```

a) *RESTORE ALL*

Restore default values for all ports.

Example:

```
XOT Config> RESTORE ALL
Restored default values for all ports
XOT Config>
```

b) *RESTORE PORT*

Restore default values for the XOT port.

Example:

```
XOT Config> RESTORE PORT
Restored default values port number: 9
XOT Config>
```

1.9. SET

Assigns values to parameters.

Syntax:

```
XOT Config> SET ?
CHANNEL-DIRECTION
NA-CALLING
PACKET-SIZE
PACKET-WINDOW
PROCESS-NA-CALLING
SVC
XOT Config>
```

a) SET CHANNEL-DIRECTION

Permits you to define if the outgoing calls SVCs are to be assigned in descending or ascending order.

Syntax:

```
Config> SET CHANNEL-DIRECTION ?
DECREASING
INCREASING
XOT Config>
```

- *SET CHANNEL-DIRECTION DECREASING*

Assigns the channels in descending order beginning with the highest.

Example:

```
XOT Config> SET CHANNEL-DIRECTION DECREASING
XOT Config>
```

- *SET CHANNEL-DIRECTION INCREASING*

Assigns the channels in ascending order beginning with the lowest.

Example:

```
XOT Config> SET CHANNEL-DIRECTION INCREASING
XOT Config>
```

b) SET NA-CALLING

Permits you to configure the NA calling which is sent in the call request packets.

Example:

```
XOT Config> SET NA-CALLING
NA calling?123456
XOT Config>
```

c) SET PACKET-SIZE

Permits you to configure the packet size.

Example:

```
XOT Config> SET PACKET-SIZE
Packet size[1-4096][128]?
XOT Config>
```

d) SET PACKET-WINDOW

Permits you to configure the window size.

Example:

```
XOT Config> SET PACKET-WINDOW
Packet window(1-128)[2]
XOT Config>
```

e) SET PROCESS-NA-CALLING

This option allows you to add or suppress the NA of the calling packets processed by the **Teldat Router**. The values that can be given are:

A: Automatic. Automatic according to the interface. If it is DCE the NA is added to the calls coming in through the port. If the interface is DTE, the NA is added to the outgoing calls.

S: Suppress. Suppresses the NA in all the calls passing through the port.

O: Outgoing calls. Adds the NA to the outgoing calls.

I: Incoming calls. Adds the NA to the incoming calls.

T: Two-ways calls. Adds the NA to all calls.

Example:

```
XOT Config> SET PROCESS-NA-CALLING
Calling NA process [T,S,I,O,A]I:
XOT Config>
```

f) SET SVC

Configures the logical channels.

Syntax:

```
XOT Config> SET SVC ?
LOW
HIGH
XOT Config>
```

- *SET SVC LOW*

Configures the lowest logical channel.

Example:

```
XOT Config> SET SVC LOW
SVC low[0-4096][100]?1
XOT Config>
```

- *SET SVC HIGH*

Configures the highest logical channel.

Example:

```
XOT Config> SET SVC HIGH
SVC high[0-4096][100]?10
XOT Config>
```

1.10. EXIT

Use the **EXIT** command to return to the previous prompt.

Syntax:

```
XOT Config> EXIT
```

Example:

```
XOT Config> EXIT
Config>
```

Chapter 3
Monitoring

1. Monitoring Commands

The XOT Protocol monitoring is accessed through the main menu in the following way:

1. At the (*) prompt, enter PROCESS 3 (or P 3).
2. At the monitoring (+) prompt, enter NODE XOT.
3. At the XOT protocol monitoring (XOT>) prompt, use the monitoring commands described in this chapter to monitor the XOT Protocol parameters.

In this chapter the XOT Protocol monitoring commands are explained in detail. The letters written in **bold** indicate the minimum number of characters which must be entered in order to make the command operative.

Command	Function
? (HELP)	Lists the available commands or their options.
LIST	Lists the TCP servers state.
EXIT	Return to previous prompt.

XOT monitoring commands

1.1. ? (HELP)

Displays a list of available commands or options.

Syntax:

```
XOT> ?
```

Example:

```
XOT> ?
LIST
EXIT
XOT>
```

1.2. LIST

Syntax:

```
XOT> LIST ?
STATE
XOT>
```

a) LIST STATE

Lists the TCP servers state.

Example:

```
XOT> LIST STATE

Total Servers:     0
Servers listening: 0
Servers opened:    0
Servers clients:   0
XOT>
```

1.3. EXIT

Use the **EXIT** command to return to the previous prompt.

Syntax:

```
XOT> EXIT
```

Example:

```
XOT> EXIT
+
```

Chapter 4
XOT Interfaces

1. Creation of XOT interfaces

Firstly it is necessary to create the XOT interface.

This is achieved through the configuration menu via the **ADD DEVICE XOT** command. This creates the interface and assigns an interface number.

```
*P 4
User configuration
Config> ADD DEVICE XOT
Added XOT interface with num: 9
Config>
```

A list of the interfaces configured in the **Teldat Router** can be seen by entering the **LIST DEVICES** command after the user configuration prompt *Config>*.

```
*P 4
User configuration
Config> LIST DEVICES
Con      Ifc  Type of interface         CSR    CSR2      int
---       1   Router->Node                0                0
---       2   Node->Router                0                0
---       9   XOT                         0                0
LAN       0   Ethernet              9000000                1C
Line1     3   X25                   F001600 F000C00        9E
Line2     4   X25                   F001620 F000D00        9D
ISDN 1    5   X.25 D channel        A000000                1B
ISDN 1    7   X.25 B channel        F001640 F000E00        9C
ISDN 2    6   X.25 D channel        A200000                1B
ISDN 2    8   X.25 B channel        F001660 F000F00        9B
Config>
```

When you create an XOT interface, the routing is carried out towards it by using the node routing commands. It is only necessary to create one XOT interface as the X.25 calls are routed with an IP address.

2. XOT Interfaces Configuration

Before configuring the XOT protocol, it is advisable to have the corresponding part for the IP protocol configured so the addresses are assigned to the interfaces.

In order to achieve the XOT protocol configuration, the following operation must be carried out:

From the system console, type P 4 to access the configuration process.

```
*
*P 4
Config>
```

- XOT prompt access

From the configuration prompt, type **NODE XOT** to access the XOT port configuration.

Syntax:

```
Config> NODE XOT
```

Example:

```
Config> NODE XOT
XOT Config>
```

- To display the present values of the port you wish to use on screen.

Type **LIST PORT** at the XOT prompt *XOT Config>*.

Syntax:

```
XOT Config > LIST PORT
```

Example:

```
XOT Config> LIST PORT
Port information: [port_number] (XOT)
Packet window: 2
Ext pkt mode:  Disabled
Packet size: 128
Caller Number: 101010
NA caller process: Automatic
PVC low: 0
PVC high: 0
SVC low: 100
SVC high: 100
Channel Direction:  DEC
XOT Config>
```

3. X.25 parameters configuration

The meaning of the commands and the parameters which modify them are the following:

Packet window

Specifies the maximum number of X.25 packets awaiting acknowledgment. This window can have values between 1 and 128. Default value is 2.

Syntax:

```
XOT Config> SET PACKET-WINDOW
```

Example:

```
XOT Config> SET PACKET-WINDOW
Packet window(1-128)[ current value]?window_size
XOT Config>
```

Extended Packet Mode

Specifies the PS field module for the X.25 network level. This is the module used to consecutively number the sent X.25 packets and can have a value between 8 and 128 corresponding to the Disable and Enable values in this parameter. The default value is 8 (Disabled).

Syntax:

```
XOT Config> ENABLE EXTENDED-PACKET-MODE
```

Example:

```
XOT Config> ENABLE EXTENDED-PACKET-MODE
XOT Config>
```

Or:

```
XOT Config> DISABLE EXTENDED-PACKET-MODE
XOT Config>
```

Packet size

Specifies the maximum length of an X.25 packet. The length is limited to 4.096 octets. The default value is set to 128 octets.

Syntax:

```
XOT Config> SET PACKET-SIZE
```

Example:

```
XOT Config> SET PACKET-SIZE
Packet size[1-4096][current value]?packet_size
XOT Config>
```

NA Calling

The NA (Network Address) is the X.25 caller address for the request call packets exiting through the port. This is independent from the NA which they were received with in the **Teldat Router**. This is not programmed by default.

Syntax:

```
XOT Config> SET NA-CALLING
```

Example:

```
XOT Config> SET NA-CALLING
NA calling?na_calling
XOT Config>
```

This number can consist of up to 15 ASCII characters.

In order to delete use the **DELETE NA-CALLING** command**.**

Process NA calling

This option allows you to add or suppress the NA of the call packets processed by the **Teldat Router**. The values that can be given are:

A: Automatic. Automatic according to the interface. If it is DCE the NA is added to the calls coming in through the port. If the interface is DTE, the NA is added to the outgoing calls.

S: Suppress. Suppresses the NA in all the calls passing through the port.

O: Outgoing calls. Adds the NA to the outgoing calls.

I: Incoming calls. Adds the NA to the incoming calls.

T: Two-ways calls. Adds the NA to all calls.

Syntax:

```
XOT Config> SET PROCESS-NA-CALLING
```

Example:

```
XOT Config> SET PROCESS-NA-CALLING
Calling NA process [T,S,I,O,A]I:S
XOT Config>
```

SVC low

Indicates the lowest SVC number that can be used in X.25 communications. The range of permitted values is from 0 to 4.096. The default value is 100.

Syntax:

```
XOT Config> SET SVC LOW
```

Example:

```
XOT Config> SET SVC LOW
SVC low [0-4096] [current value]?SVC_low
XOT Config>
```

SVC high

Indicates the highest SVC number that can be used in X.25 communications. The range of permitted values is from 0 to 4.096. The default value is 100.

Syntax:

```
XOT Config> SET SVC HIGH
```

Example:

```
XOT Config> SET SVC HIGH
SVC high [0-4096] [current value]?SVC_high
XOT Config>
```

The number of logical channels are only significant on an internal level and do not necessarily have anything to do with the X.25 ports. The important point is the total number of the logical channels which are configured as this determines the maximum number of connections.

Channel direction

Specifies if the logical channel numbers are used in ascending or descending order. The possible values are ***INCREASING*** and ***DECREASING.*** The default value is decreasing**.**

Syntax:

```
XOT Config> SET CHANNEL-DIRECTION INCREASING
```

Example:

```
XOT Config> SET CHANNEL-DIRECTION INCREASING
XOT Config>
```

Or:

```
XOT Config> SET CHANNEL-DIRECTION DECREASING
XOT Config>
```

3.1. Address assignation

The following commands are used to associate X.25 addresses to IP destination addresses.

Add address

Syntax:

```
XOT Config> ADD ADDRESS
```

Example:

```
XOT Config> ADD ADDRESS
Value of NA?9876541
IP Address [0.0.0.0]?192.168.6.22
Alternate IP Address [0.0.0.0]?192.168.6.23
Timeout to alternate connection (sec.)[30]?60
XOT Config>
```

List address

Syntax:

```
XOT Config> LIST ADDRESS
```

Example:

```
XOT Config> LIST ADDRESS
X.25 Address    IP Address      Alt. IP Address    Timeout cnx.
111111          192.168.5.21
9876541         192.168.6.22    192.168.6.23       60
XOT Config>
```

Delete address

Syntax:

```
XOT Config> DELETE ADDRESS
```

Example:

```
XOT Config> DELETE ADDRESS
Value of NA?9876541
XOT Config>LIST ADDRESS
X.25 Address    IP Address      Alt. IP Address              Timeout cnx.
111111          192.168.5.21
XOT Config>
```

In the examples given, the calls with NA 111111 were sent to the router with the following IP address 192.168.5.21.

It is unnecessary to add the addresses to the incoming calls.

If the alternative IP address is left as 0.0.0.0, the alternative IP connection feature is not used.

3.2. Liberation causes and diagnostics

Under the following circumstances, a call directed to an XOT interface is released.

Cause (hex)	**Diagnostic** (dec)	**Motive**
0D	120	A specific NA/addr has not been configured.
09	120	A specific IP address cannot be reached.
11	119	Timer period has finalized in the TCP connection. The remote stops answering TCP packets.
09	119	The remote has closed the TCP connection.