http://www.bintec.de

RELEASE NOTE BIANCA/BRICK-XMP

July 24, 1998

New System Software:
Release 4.8 Revision 6

This document describes the new features, enhancements, bugfixes, and changes to the BIANCA/BRICK-XMP System Software since Release 4.8 Revision 3.

Upgrading System Software 2
What's New in Release 4.8.6................................3
Known Problems..3
Features...3
- Microsoft Callback Extension to Mode 3.............. 3
- Microsoft Callback via RADIUS 4
- IPX RADIUS Extensions 4
- Frame Relay 5
- X.25 5
- Performance Enhancement 10
- V.90 for BIANCA/BRICK XL and XMP 10
- IP Filter for TCP State and ICMP Type 11
- New Trace Command Feature............................ 12
- Status Display for Modems 13
- Wildcards for Dialing Numbers 13
- Link Quality Monitoring 14

Bugfixes 14
- Access Lists.. 14
- TP0 Bridge 15
- CAPI 15
- Dynamic Shorthold 15
- STAC Compression on Multilink PPP Interfaces.... 15
- Spaces in biboPPPLoginString.............................. 16
- Setting Administration Status to Down................. 16
- Setup Tool.. 17

Detailed Feature Descriptions............................18
- IPX RADIUS Extensions 18
- Frame Relay.. 21
- Link Quality Monitoring 45

NEW

Upgrading System Software

1. Retrieve the current system software image from BinTec's WWW server at http://www.bintec.de.
2. With this image you can upgrade the BIANCA/BRICK-XMP with the **update** command from the SNMP shell via a remote host (i.e. using telnet, minipad, or isdnlogin) or by using the **BOOTmonitor** if you are logged in directly on the console.
   Information on using the BOOTmonitor can be found in the *BRICK-XMP User's Guide* under *Firmware Upgrades*.
3. Once you've installed Release 4.8 Revision 6 you may want to retrieve the latest documentation (in Adobe's PDF format), which is also available from BinTec's FTP server at the address noted above.

   Note: When upgrading system software, it is also recommended that you use the most current versions of *BRICKware for Windows* and *UNIXTools*. Both can be retrieved from BinTec's FTP server.

Info: Performing a software update on a running system (via the **update** command) currently requires that a contiguous block of free memory, ≥ the size of the new software image, is available.

To verify enough memory space is available use the **show mem** command and note the output of the "largest block" field.

To maximize free memory two options are available.

- Perform the update immediately after rebooting the system. This ensures that memory has been defragmented.
- Temporarily reduce the size of your configuration file by deactivating memory intensive software options such as OSPF or IPX.

Note that you can always perform an update using the BOOTmonitor. The internal procedure of performing software upgrades on the BRICK is currently being optimized and a change is planned for a future release.

What's New in Release 4.8.6

Release 4.8 Revision 6:

Released: 24.07.98

Features: Bugfixes: Detailed Description:

Known Problems

In Release 4.8 Revision 6, three problems currently exist.

1. **Network Address Translation**
   After receiving several broadcast packets via an interface where NAT is being performed the BRICK may either "lock-up" or inadvertently reboot. If the system locks up the BRICK will no longer be accessible (via remote or console) and must be power cycled on and off.
2. **Dial-up connections for RADIUS-Users**
   Interfaces configured to use `ip_lapb` encapsulation, using the following entry in /etc/raddb/users,
   `BinTec-biboPPPTable = "Encapsulation=ip_lapb"`
   are sometimes rejected by the BRICK.
3. **V.90 Modem Connections**
   Depending on local line quality, V.90 modem connections on the BRICK may inadvertently disconnect, or may not be possible.

Features

Microsoft Callback Extension to Mode 3

The Microsoft Callback Control Protocol (CBCP) knows different modes to decide which number is used for callback. This protocol is activated, when there is a call from a Windows95/ NT client.

Up to now Mode 2 was implemented. In Mode 2 (callback to a user-defined number) the user is asked, when calling from a Windows95/ NT client, to enter the callback number. This number is then used for callback.

From this release on the MS-CBCP was extended to Mode 3. Mode 3 uses a predefined number for callback.

Which mode is used (Mode 2 or Mode 3) depends on whether there is a predefined number assigned. When there is a predefined number, either a entry in the *biboPPPDialTable* for this partner (*Direction*: *both* or *outgoing*; *Type*: *isdn* or *isdn_spv*) or when authentication is made via RADIUS and the RADIUS attribute Callback-Number is assigned, then Mode 3 is used. When calling from a Windows95/ NT client the caller is asked in a dialog box to confirm the mode (Mode 3) respectively the callback number. With no number assigned callback is made using Mode 2.

Such it is ensured that a callback is either made using the user-specified or the predefined number.

The variable *CallBack* in the *biboPPPTable* can be set to *ppp_offered* or *enabled*. But you must notice that with the value set to *enabled* no authentication is made during callback.

Also see Microsoft Callback via RADIUS below.

Microsoft Callback via RADIUS

With this new release it is possible to use Microsoft Callback via RADIUS for calls from a Windows95/ NT client.

The RADIUS server must be configured as follows:

```
Service-Type = Callback-Framed
```

Specifying only the Service-Type means using Mode 2 of the CBCP (user-specifiable number). This configuration assigns the value *enabled* to the variable *biboPPPCallBack* in the *biboPPPTable*.

To use Mode 3 (predefined number), that means using a fixed callback number, you must additionally assign a callback number as in the following example:

```
Service-Type = Callback-Framed

Callback-Number = “392”
```

The feature Microsoft Callback via RADIUS is only available for an inband identification of the caller (no calling line identification). The same it’s not possible to set the value *ppp_offered* for the variable *biboPPPCallBack*. For the time of the PPP connection there exists a temporary entry in the *biboPPPTable* with variable *CallBack* assigned the value *enabled*. This means that there is no additional authentication during callback. In Mode 3 a temporary entry in the *biboPPPDialTable* using the defined calling number is generated, too.

IPX RADIUS Extensions

The BRICK now supports dial-up IPX client connections via RADIUS. For a detailed description of this new feature see IPX RADIUS Extensions on page 18.

Frame Relay

Beginning with Release 4.8 Revision 6 Frame Relay is officially supported on the BRICK-XMP. The BRICK-XMP can be used as a Frame Relay Switch or a Frame Relay Router and supports the following official and defacto standards:

RFC 1490 *Multiprotocol Interconnect over Frame Relay*
RFC 1293 *Inverse Address Resolution Protocol*
ITU-T Q933a, Appendix II, X6 *Line Management Extensions*
FRF 1.1 *Congestion Management*

Frame Relay requires a separate license to be installed on the BRICK and may be purchased directly from BinTec Communications or your local distributor.

A detailed description of Frame Relay on the BRICK (Setup Tool menus and SNMP shell MIB objects/tables) as well as background information for users not familiar with Frame Relay is contained in the section Frame Relay beginning on page 21.

X.25

X.25 Window/ Packet Size Negotiation

Now you can decide for each X.25 link, whether a window/ packet size negotiation is made.

x25LkPrNegotiation is the new parameter in the *x25LinkPresetTable*, which handles this feature. This parameter can be assigned three possible values:

never	No negotiation. When a call arrives that does not correspond to the default size, the call is cleared.
always	Negotiations are always made.
when_necessary	There are only negotiations, when the requested values differ from the default values.

Window/ packet size negotiation settings can also be configured via Setup Tool, see “Configuring X.25 Parameters in Setup Tool” on page 6.

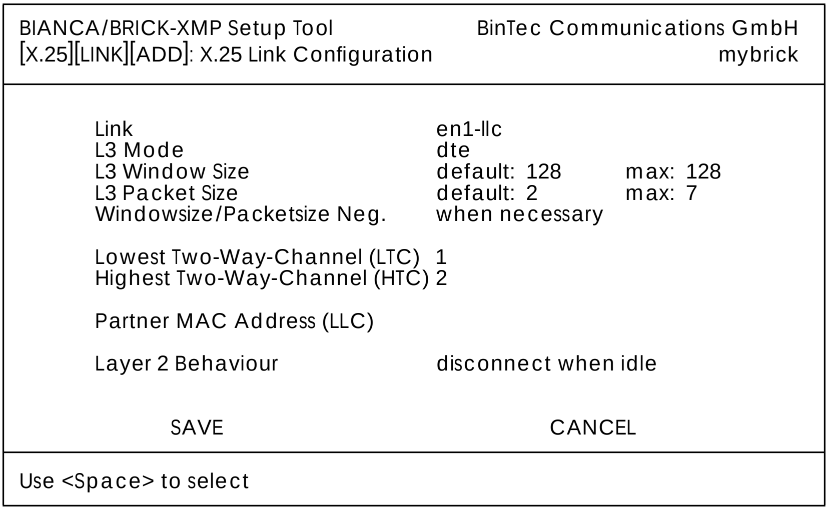
Configuring X.25 Parameters in Setup Tool

Now it is possible to configure additional X.25 parameters using Setup Tool.

•X.25 Link Configuration

X.25 → LINK CONFIGURATION → EDIT

Here window/ packet size negotiation can be adjusted for an X.25 link. **Windowsize/ Packetsize Neg.** corresponds to the parameter *x25LkPrNegotiation* in the *x25LinkPresetTable*.



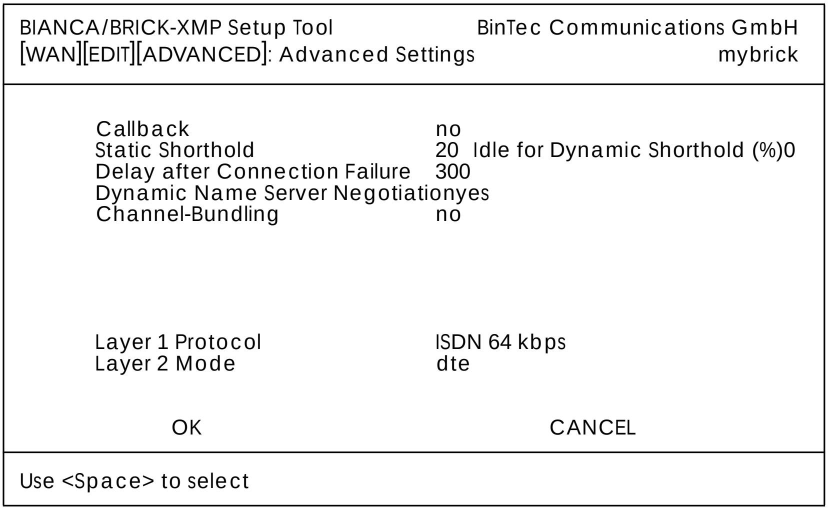
```
BIANCA/BRICK-XMP Setup Tool                 BinTec Communications GmbH
[X.25][LINK][ADD]: X.25 Link Configuration                     mybrick

      Link                              en1-llc
      L3 Mode                           dte
      L3 Window Size                    default:  128       max:  128
      L3 Packet Size                    default:  2         max:  7
      Windowsize/Packetsize Neg.        when necessary

      Lowest Two-Way-Channel (LTC)  1
      Highest Two-Way-Channel (HTC) 2

      Partner MAC Address (LLC)

      Layer 2 Behaviour                 disconnect when idle

           SAVE                                 CANCEL

Use <Space> to select
```

Windowsize/ Packetsize Neg. = Decides whether window/ packetsize negotiation is made for this X.25 link. The possible values are **never**, **always** and **when necessary**, where **when necessary** is the default value. The value *never* means no negotiation. When a call arrives that does not correspond to the default size, the call is cleared. *Always* means negotiations are always made and when *when necessary* is selected, there are only negotiations, when the requested values differ from the default values.

•WAN Partner

WAN PARTNER → **ADD** → **ADVANCED SETTINGS**

For WAN partners using the protocols X.25, X25ppp, X.31 B-Channel or X.25 no signalling the Layer 2 Mode can be configured in the advanced settings. The item Layer 2 Mode corresponds to the parameter *biboPPPLayer2Mode* in the *biboPPPTable.*



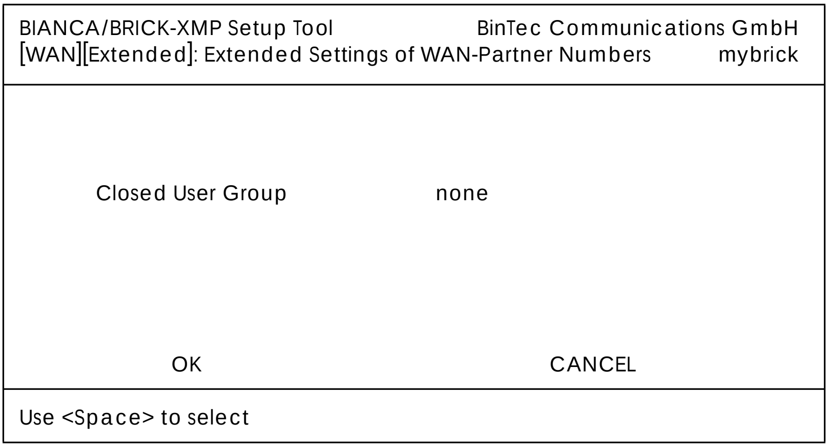
```
BIANCA/BRICK-XMP Setup Tool                       BinTec Communications GmbH
[WAN][EDIT][ADVANCED]: Advanced Settings                             mybrick


       Callback                         no
       Static Shorthold                 20  Idle for Dynamic Shorthold (%)0
       Delay after Connection Failure   300
       Dynamic Name Server Negotiationyes
       Channel-Bundling                 no





       Layer 1 Protocol                 ISDN 64 kbps
       Layer 2 Mode                     dte


             OK                                   CANCEL

Use <Space> to select
```

Layer 2 Mode = Layer 2 Mode can receive the values **auto**, **dte** or **dce**, where **auto** is the default value

•WAN Partner Numbers Extended

WAN PARTNER → **ADD** → **WAN NUMBERS** →
→ **ADD** → **ADVANCED SETTINGS** →

Here the item Closed User Group can be configured. The item corresponds to the parameter *biboDialClosedUserGroup* in the *biboDialTable.*



```
BIANCA/BRICK-XMP Setup Tool                 BinTec Communications GmbH
[WAN][Extended]: Extended Settings of WAN-Partner Numbers        mybrick


      Closed User Group                  none




            OK                                    CANCEL

Use <Space> to select
```

Closed User Group = The item Closed User Group can be assigned the values **none** or an integer from **1 to 9999**. **None** is the default value.

Active Layer 2 Set Up for Incoming X.25 Calls

Prior to release 4.8.6 the BRICK remained passive during setup of incoming X.25 dialup connections and waited for a SABM (Set Asynchronous Balance Mode) from the caller. Some X.25 implementations however were also waiting for a SABM from the BRICK.

Now the BRICK only waits one second for an incoming SABM. If no SABM is received within this time, the BRICK will send a SABM.

Because of the wait time the probability of a layer 2 setup collision is very small. Standard end-devices handle such collision correctly.

TP0 Bridge Extensions

To make possible connections between TCP clients and an X.25 network the TP0 Bridge feature (RFC 1086 / RFC 1006) is implemented on the BRICK.

With this release two extensions concerning the transmission of X.25 data (RFC 1006) for incoming X.25 connections to the TP0 Bridge have been made.

Firstly with release 4.8.6 NSAP addresses, which are subaddresses of X.25 addresses, can be proofed for incoming X.25 calls. If a listener transfers a NSAP address in the facility field of the listening address, only X.25 calls with the same NSAP address are signaled to the listener.

The second extension concerns the X.25 call indication packet, which is sent as the first packet, when an incoming X.25 connection is established. Now with release 4.8.6 there is a possibility that the listening application gets some information about the contents of the X.25 call indication packet.

To get this data the value of the function byte, (the first byte, the listener sends to the TP0 brigde, see RFC 1086) has to be 66 instead of 2. Then the first data packet, the listener receives on its new established TCP stream has the following format: It consists of 4 Byte TP0 header and the data in the extended X.25 Address Format:

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| vrsn = 255    |  reserved = 3 |          packet length        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|        address  type  = 4     | X.25 addr len | X.25 address  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|      ...      |      ...      |      ...      |      ...      |
|      ...      |      ...      |      ...      |      ...      |
|      ...      |      ...      |      ...      |      ...      |
|      ...      |      ...      |      ...      |Protocol ID len|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Protocol ID  |      ...      |      ...      |      ...      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| CUDF length   | Call User Data field ...      |      ...      |
|      ...      |      ...      |      ...      |      ...      |
|      ...      |      ...      |      ...      |      ...      |
|      ...      |      ...      |      ...      |      ...      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|Facility Length|  X.25 Facilities     ...      |      ...      |
|      ...      |      ...      |      ...      |      ...      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Performance Enhancement

Releae 4.8 Revision 6 contains additional internal performance enhancements that greatly reduce system load on systems supporting V.110 and Modem connections over PPP. With these enhancements the system load on the BRICK has been reduced by 50% (compared to previous releases with the same throughput).

V.90 for BIANCA/BRICK XL and XMP

V.90 is the new ITU-T standard for 56 kbit modem connections. V.90 combines the two competing modem standards K56flex and X2. Manufacturers from both camps, as well as BinTec, now offer software updates for their modems to allow connections using the new V.90 standard. So V.90 reestablishes the interoperability of client and centralsite modems of different manufacturers.

The new ITU-T standard V.90 has now been implemented in the K56flex modem features of the FM-8MOD Function Module for BRICK-XL and BRICK-XMP. These BRICKs now support the new V.90 code and K56flex. X2 is not supported.

For the BRICK-XL additionally to the new 4.8.6 software image the modem system software must be updated as described in the BRICK-XL User's Guide in Chapter 7 Command Reference. The file csm_486.csm to update the modem software can be downloaded from the BinTec FTP server at http://www.bintec.de.

After the software update the configuration of the BRICK-XL and BRICK-XMP must be adjusted. To allow V.90 connections the modem profiles must be adjusted in Setup Tool. In the menu [MODEM][PROFILE][EDIT] the item **Modulation** must be set to V.90 instead of K56flex.

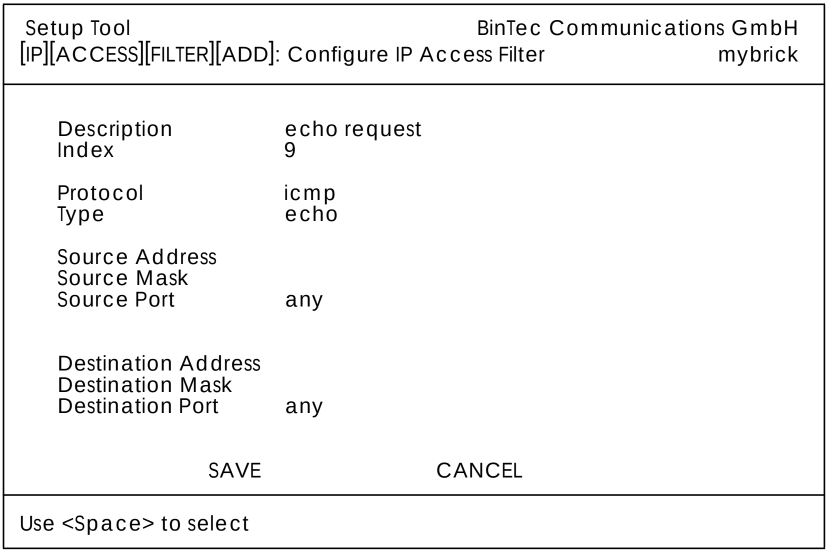
IP Filter for TCP State and ICMP Type

The filters for IP access have been enhanced.

ICMP Type

The filters can now be used to filter IP packets in dependence of the ICMP type.
In the *ipFiltertable* there is the new variable *icmptype*, which can be assigned the following values :
echoRep, *destUnreach*, *srcQuench*, *redirect*, *echo*, *timeExcds*, *parmProb*, *timestamp*, *timestampRep*, *addrMask*, *addrMaskRep*, *dont_verify* .
Setup Tool's Filters menu has also been changed. You can now define filters according to appropriate ICMP types using the Type field after setting the protocol field to "ICMP".

IP → **ACCESS LISTS** → **FILTERS** → **ADD**



```
Setup Tool                                         BinTec Communications GmbH
[IP][ACCESS][FILTER][ADD]: Configure IP Access Filter                 mybrick

    Description                echo request
    Index                      9

    Protocol                   icmp
    Type                       echo

    Source Address
    Source Mask
    Source Port                any


    Destination Address
    Destination Mask
    Destination Port           any

                  SAVE                      CANCEL

Use <Space> to select
```

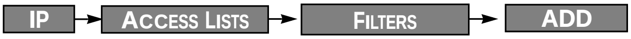
TCP Connection State

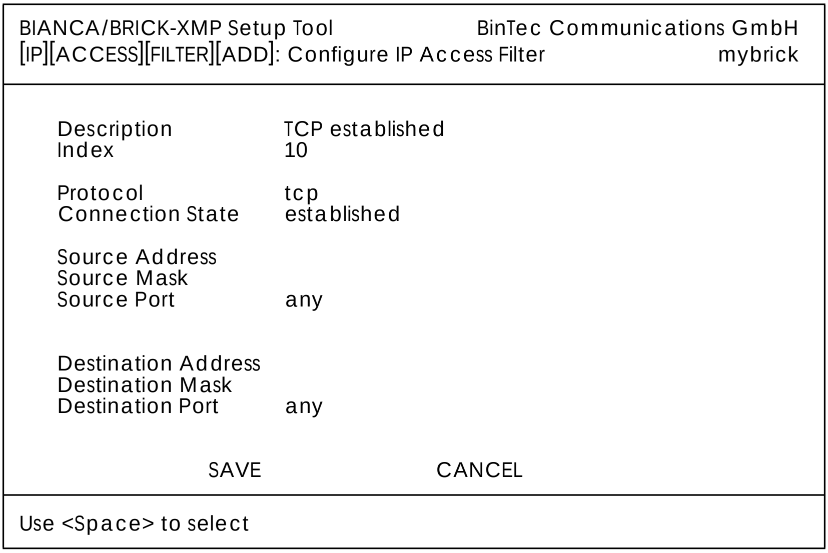
Filters can now be defined based on the state of an TCP Connection.

In the *ipFilterTable* there is the new variable *TcpConnState*, which can be assigned the following values:
dont_verify, established.
When this variable is set to *established*, this filter matches for TCP packets,which do not initiate a connection.
A typical application for this filter is to let packets pass through, which belong to connections that were initiated from inside, but discard all other TCP packets. This can be configured by the following rules:

1. rule:	ALLOW (TCP / established)
2. rule:	DENY (TCP / dont_verify)

The configuration in Setup Tool:





```
BIANCA/BRICK-XMP Setup Tool                    BinTec Communications GmbH
[IP][ACCESS][FILTER][ADD]: Configure IP Access Filter               mybrick

    Description           TCP established
    Index                 10

    Protocol              tcp
    Connection State      established

    Source Address
    Source Mask
    Source Port           any


    Destination Address
    Destination Mask
    Destination Port      any

               SAVE                    CANCEL

Use <Space> to select
```

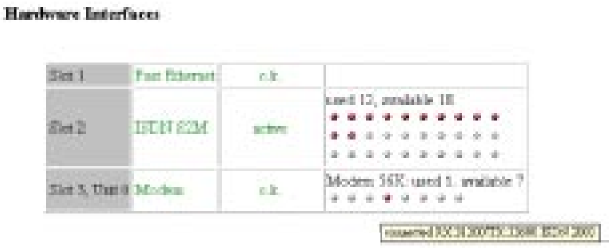
New Trace Command Feature

The trace command has been enhanced. It is now possible to decode HOLD and RETRIEVE messages in the D-Channel.

Status Display for Modems

The web based status page for your BRICK now additionally displays information on installed modems.

Under Hardware Interfaces you will find the modems with the respective slot they are installed in. The modem type and modem status are displayed. Each modem used at the moment is marked red and when you move the mouse pointer over the red channel symbol, the rate for receiving and transmitting data in bps is displayed. Additionally you are informed about the ISDN channel used. The four digits xyzz stand for the slot (x), the unit (y) and the ISDN channel used (zz). For the example below this would consequently mean: slot 2, unit 0 and channel 3.


Hardware Interfaces

Slot 1	Fast Ethernet	o.k.	
Slot 2	ISDN S2M	active	used 12, available 18
Slot 3, Unit 0	Modem	o.k.	Modem 56K: used 1, available 7

[illegible]

Wildcards for Dialing Numbers

Similar to wildcards for the calling party's address in the *biboDialTable* for incoming calls, the variable *Number* now can also contain wildcards for outgoing calls. The wildcards for outoing and incoming calls are defined as follows:

Wildcard	Example	Outgoing Calls	Incoming Calls
*	1234*	is ignored, e.g 1234	matches zero or any string, e.g 1234 or 123467
?	1234?	is replaced by 0, e.g. 12340	matches any single digit, e.g. 12349, 12347
[a-b]	123[5-9]	first digit in the range, e.g. 1235	denotes the range of possible digits to match, e.g. 1235, 1236

Wildcard	Example	Outgoing Calls	Incoming Calls
[^a-b]	123[^0-5]	range of digits not allowed, first possible digit inserted, e.g. 1236	denotes the range of excluded digits to match, e.g. 1236, 1237
{ab}	{00}1234	inserted for outgoing calls, e.g. 001234	optional string to match, e.g. 001234, 1234

The advantage is, that now you can use one entry for the variable *Number* for incoming and outgoing calls. For Example {0}91196790 will generate 091196790 for outgoing calls and will accept 091196790 and 91196790 for incoming calls as valid CLID.

Link Quality Monitoring

By the help of Link Quality Monitoring (LQM defined in RFC 1989) it is possible to exchange information within a PPP connection to draw conclusions about the underlying connection quality.

This information is typically transmitted periodically to the partner as so-called Link Quality Reports (LQR). The interval (Reporting Period) is agreed upon during the LCP negotiation.

Link Quality Monitoring can be useful to examine e.g. modem connections. (With unreliable modem connections it can happen that because of CRC errors no more data can be transmitted.)

For detailed information on the new feature Link Quality Monitoring see the section Detailed Feature Descriptions on page 45.

Bugfixes

Access Lists

- There was a bug in the access lists implementation concerning the following conditions:

  1.Filtering for source or destination ports.

  2.The action is deny

3.The IP datagrams are fragmented.

Under these conditions fragments are discarded, though the ports of the complete datagram do not correspond to the ports defined in the filters.

This bug has been fixed.

TP0 Bridge

- Sometimes it happened that it was not possible to establish an initial TP0 Bridge connection (RFC 1086) between the TCP client and the BRICK.

  This bug has been fixed. In this context the TP0 Bridge syslog messages have been changed, too.

CAPI

- If a CAPI application used an X.25 protocol, it wasn't any longer informed about incoming X.25 calls after it has sent a CONNECT_B3_REQ message to establish an outgoing X.25 connection. In this case the CONNECT_B3_Ind message, the application has to receive got lost.

  This bug has been fixed.

Dynamic Shorthold

- When combining dynamic B-Channel Bundling with optimally making use of the charging intervals (by dynamic shorthold), there was the problem that, when reducing the bandwith, the current charging intervals were not taken into consideration. This problem has been fixed.
  To optimize charges now the bandwith is reduced by disconnecting a B-Channel only short before a new charging interval.

STAC Compression on Multilink PPP Interfaces

- According to RFC 1974 (*PPP STAC LZS Compression Protocol*) there are several check modes to keep the compressor and decompressor histories in synchronisation even in the absence of a reliable link to guarantee the sequential transmission of data.

In Release 4.8.3 it still happened that in rare cases, when *biboPPPCompression* = stac (RFC 1974, check mode 3) was used on MultiLink PPP interfaces the history re-synchronisation process sometimes came to a state where decompression histories were out-of-sync and user data could no longer be transmitted over the line.

This problem has been fixed in the current release.

Spaces in biboPPPLoginString

- There appeared problems in the login procedure configuration (especially for Compuserve users), when strings like passwords or login names were containing spaces. That was because spaces are used as internal flags to handle the login procedure.

  To handle this problem blank spaces in strings, which are part of the variable *LoginString* in the *biboPPPTable*, must be preceded by a backslash as shown in the following example for the string “pass word”:

inx LoginString(rw)

00 "-d1 \n e: CIS\n D: name/go:pppconnect\n wor -d1 **pass\ word**\n PPP"

This must be considered, when the variable *LoginString* is configured via SNMP. In the Setup Tool no additional backslashes have to be entered, when configuring the items Host, User ID and Password in the menu [WAN][EDIT][ADVANCED][PROVIDER].

Setting Administration Status to Down

- When by “ifconfig down” or via the Setup Tool the variable *ifAdminStatus* was set to down for an active interface, the variables in the PPP accounting syslog message containing PPP connection information only had the value 0.

  This problem has been solved. Now the syslog message contains the correct values.

Setup Tool

- When a PPP interface was resetted in the interface monitor in [MONITOR][INTERFACES][EXTENDED], there could occur a reboot of the BRICK with large configurations.

  This problem has been solved.

- When a default route was configured for a WAN partner interface in the [IP][ROUTING] menu or the SNMP shell and afterwards the [WAN][EDIT][IP] menu was opened again for this WAN Partner and left with SAVE, this default route was deleted.

  This bug was fixed.

Detailed Feature Descriptions

IPX RADIUS Extensions

The BRICK now supports dial-up IPX client connections via RADIUS. Support for IPX links via RADIUS has been tested using Merit's AAA RADIUS server 3.5.6. The examples shown below can be used with the Merit server, for use with other servers consult your local documentation.

Assuming a RADIUS server has been configured in Setup Tool's IP → RADIUS SERVER menu (or the *radiusServerTable* from the SNMP shell), and the RADIUS server can successfully authenticate the caller, dial-up links can be setup to support IPX networking using standard IPX or BinTec-specific RADIUS attributes mentioned below.

Standard Attributes

Framed-IPX-Network

This attribute defines a transfer network for the IPX link. Setting this attribute to "Framed-IPX-Network = 8" effectively sets the IPX network number for the transfer network to "0:0:0:8".

Normally, when this attribute is set to "fffffffe" the calling host is assigned a network number from an existing address pool, currently this feature is not supported on the BRICK. To disable a transfer network for the IPX WAN link you can set this attribute to "0" (no transfer network, unnumbered RIP).

RIP / SAP updates: If the "Framed-IPX-Network" attribute is used entries in the BRICK's *ripCircTable* and *sapCircTable* are configured using default settings for RIP / SAP updates (triggered+piggybacked).

BinTec-specific Attributes

BinTec-specific RADIUS attributes added in release 4.8.3 are defined below. For additional information, see also the section *Using BinTec-specific Attributes* on page 20.

BinTec-ipxCircTable	Creates or modifies ***ipxCircTable*** entries.

BinTec-ripCircTable	Creates or modifies ***ripCircTable*** entries
BinTec-sapCircTable	Creates ore modifies ***sapCircTable*** entries.

Example IPX over RADIUS /etc/raddb/client Entries

The definitions below could be used for a dial-up IPX link between two BRICKs. RIP / SAP updates will be performed via the default triggered+piggybacked mode.

```
kornburgxl
    Password = “access2roth”, Framed-IPX-Network = 0
    Framed-Protocol = PPP, Idle-Timeout = 300,
rothxl
    Password = “access2kornburg”, Framed-IPX-Network = 0
    Framed-Protocol = PPP. Idle-Timeout = 300,
```

If the router rothxl supports IPX WAN links but requires a transfer network (0:0:0:9) this definition could be used instead.

```
rothxl
    Password = “access2kornburg”, Framed-IPX-Network = 9
    Framed-Protocol = PPP. Idle-Timeout = 300,
```

If the required IPX services are statically configured, RIP and SAP can be disabled for the WAN link using the BinTec-specific options shown below.

```
kornburgxl
    Password = “access2roth”, Framed-IPX-Network = 0
    Framed-Protocol = PPP, Idle-Timeout = 300,
    BinTec-ripCircTable = “ripcircstate=off”,
    BinTec-sapCircTable = “sapcircstate=off”
```

The definition below could be used for a dial-in Windows Client that does not support IPX WAN links. In this example, setting “Update = 0” disables periodic updates for active links.

```
winlaptop
    Password = “486pentium?”
    Framed-Protocol = PPP, Idle-Timeout = 300,
    Bintec-ipxCircTable = “netnumber=0:0:0:a ipxcirctype=ipxcpWS”
    BinTec-ripCircTable = “Update=0 AgeMultiplier=10000”,
    BinTec-sapCircTable = “Update=0 AgeMultiplier=10000”
```

RIP/SAP Updates for RADIUS interfaces

Since RADIUS interfaces are only available as long as the respective client is connected please note the following effects this may have on links configured for active RIP and SAP updates.

- Access to services on the dial-in client's LAN (from hosts on the RADIUS client's LAN) may not be reliable.
- IPX clients cannot be informed of changes (routing or service advertisements) unless they are actually connected when the change occurs.

This may lead to a state where a server appears as being present on the remote network but is no longer available. The preferred solution, albeit time-consuming, to this problem is to statically configure the required routes and services on the clients and to disable RIP/SAP updates.

Using BinTec-specific Attributes

Each of the BinTec-specific RADIUS attributes corresponds to a MIB table. Supported BinTec-specific attributes can be used in your server's /etc/raddb/users file. The attribute definitions must also be added to your dictionary file (normally found in /etc/raddb). To modify a MIB table entry you must use the following syntax:

<BinTec-Option> = "*variable*1=*value*1 … *variable*n=*value*n"

An example authentication line from a RADIUS /etc/raddb/users file might look like this:

```
Service-Type = Framed,
BinTec-biboPPPTable = "DynShorthold=50 IpAddress=static",
BinTec-ipNatPresetTable = "Protocol=tcp extport=1050 intport=100"
```

Also, when using these attributes please note:

- The table entry's *ifIndex* is set automatically and can't be influenced.
- The entries are not case-sensitive.
- You must not use blank spaces before or after »=« signs inside the double quotes.
- Attributes support either **static** or **dynamic** mode.

Static mode modifies existing table entries while dynamic mode creates a new table entry. All variables you want to create (dynamic) must be defined in one line.

Frame Relay

Frame relay is a connection oriented technology that provides a fast packet-switching service for access to Wide Area Networks. It makes optimum use of available bandwidth using a complex statistical multiplexing algorithm. Due to the ommitance of some layer three network functions, Frame Relay is often thought of as a “streamlined version for X.25”.

Frame Relay is a flexible and cost-effective alternative to existing WAN technologies best suited for network installations exemplifying any of the following characteristics:

- Applications generate significant amounts of bursty-traffic
- Network traffic is delay-sensitive
- High network availability is a major priority
- Dispersed enterprise (locations separated by long distances)
- Integration with existing public and/or private packet switched networks is required.

The description of Frame Relay on the BRICK is broken down into the following sections.

1. An Overview of Frame Relay Technology (p. 21)
2. System tables for the Frame Relay subsystem (p. 28).
3. Setup Tool menus for configuring Frame Relay (p. 30).
4. Example Frame Relay configuration using Setup Tool (p. 41)

An Overview of Frame Relay Technology

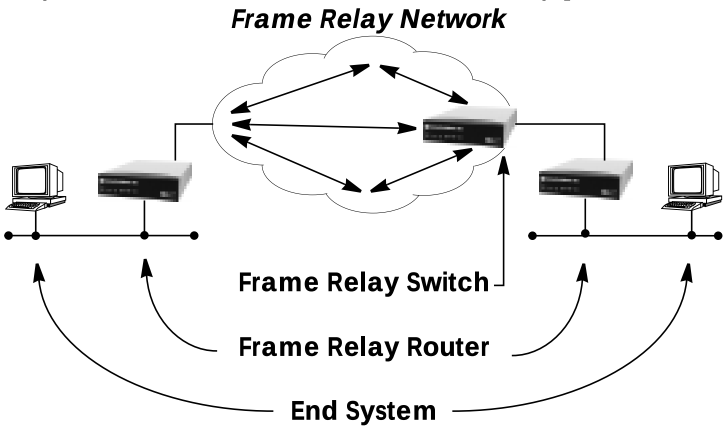
As the name suggests, it works by breaking data streams into variable length frames and forwards (relays) these frames into the network via predetermined logical connections called **Permanent Virtual Circuits**, or PVCs.

Some of the key concepts of Frame Relay are listed below.

- Small, variable length frames are used to transport user data; this makes frame relay well suited for data applications (particularly those generating bursty-traffic) —video and voice transmissions are generally not appropriate.

- Improved overall performance (compared to X.25)—a result of limited error correction and acknowledgement routines.
- Users are guaranteed a minimum amount of bandwidth which is always available (the Committed Information Rate, or CIR).
- High network availability is achieved through statistically multiplexing virtual connections (data streams) onto logical connections, or Permanent Virtual Circuits (PVCs).
- Integrated bandwidth allocation (true bandwidth on demand) allows users to take up additional bandwidth, when available, at no extra charge —based on the user's Committed Burst Rate (CBR) and Excess Burst Rate (EBR).
- Congestion notification allows frame relay device to notify neighbouring devices (in either direction) of bandwidth bottlenecks to help maintain quality of services.

There are different types of equipment found in a typical Frame Relay Networks based on the various tasks they perform.



End Systems

End systems are typically end-user devices that take advantage (make use of) the underlying Frame Relay network. Depending on the application running on the end stations bandwidth requirements of end systems on the LAN can be different. Some applications generate large amounts of intermittent bursty traffic (typical of data applications, telnet, ftp, www) while others (like voice or video) require a constant bitrate.

Frame Relay Routers

Frame Relay Routers are used to connect point-to-multipoint networks (LANs) to a public (or private) Frame Relay network. Its the router’s job to encapsulate data into Frame Relay frames for transport over the network link. A Frame Relay Router encapsulates LAN frames in frame relay frames and feeds those frames to a Frame Relay Switch for transmission across the network. A Frame Relay Router also receives frame relay frames from the network, strips the frame relay frame off each frame to product the original LAN frame, and passes the LAN frame on to the end device. A Frame Relay Router communicates directly with one or more Frame Relay Switches to negotiate the opening/closing of virtual circuits and to control network congestion.

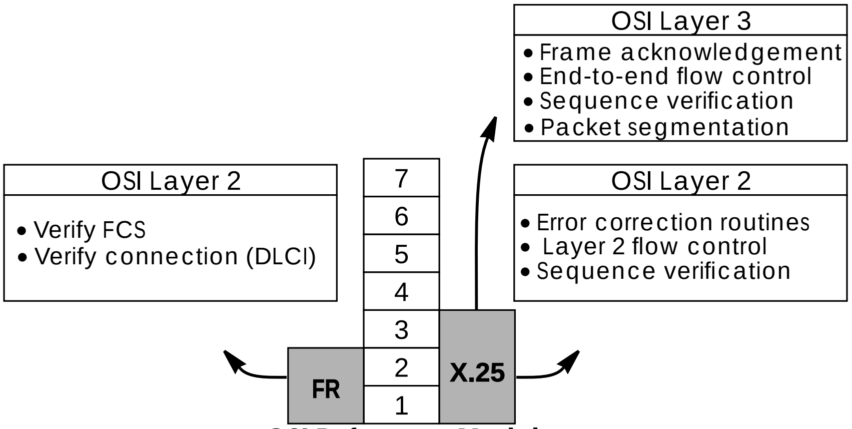
Frame Relay Switches

Switches are typically owned by public network providers but may be owned by private sites implementing private Frame Relay Networks. Aside from the FECN, BECN, and DE frame fields (used for congestion management) the content and final destination of individual frame is of no interest to the switch. Using a simple mapping scheme frames are passed from one interface (DLCI) to another.

Protocol Structure

Frame Relay Protocol Stack

Although similar in concept to X.25, frame relay operates at layer 2 of the OSI reference model. This is where the main differences between the two lie. Frame relay simply leaves out the extensive error detection / correction and end-to-end flow control found in X.25.



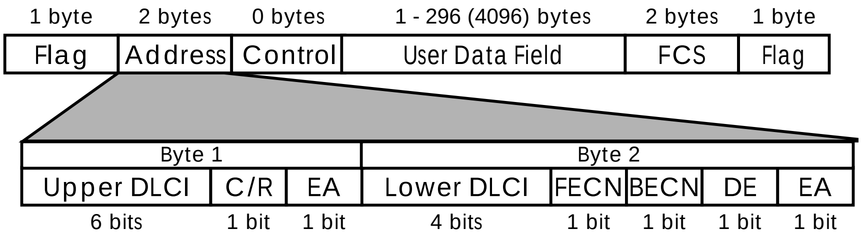
OSI Reference Model

This greatly simplifies the tasks a frame relay switch must perform.

Frame Relay Frame Format

As shown below frame relay is a streamlined protocol that uses HDLC framing. Virtual frame relay connections are routed based on the DLCI field of incoming frames.

Frame Relay Frame



Flag	HDLC Flag (bit sequence: 01111110)
FCS	Frame Checksum Sequence
DLCI	Data Link Connection Identifier
C/R	Command / Response Indicator
EA	Extended Address bit
FECN	Forward Explicit Congestion Notification
BECN	Backward Explicit Congestion Notification
DE	Discard Eligibility Indicator

Frame Relay Addressing

The basic (**unextended**) Frame Relay specification only supports locally significant addressing. These addresses are up to 2 bytes long. Using the EA fields **extended** addresses can be used which may be up to 4 bytes long.

When a frame is read the first EA bit that is set (i.e., it's value = 1) determines the address.

Congestion Notification

The FECN and BECN bits (see above) are used to notify neighbouring frame relay devices of possible congestion.

Virtual Circuits

In Frame Relay multiple connections are mapped to a single physical network connection.

Data Link Connection Identifier

The DLCI field is used to route virtual frame relay connections. A standard DLCI (2 byte address field) consists of 10 bits and is based on the frame's Upper and Lower DLCI fields. These 10 bits establish an upper limit of 1024, 2^{10}, possible simultaneous virtual channels that can be multiplexed on to a PVC.

A DLCI may specify a value between 0 and 1023; however not all values are valid. As shown below some values are reserved for network management or other features such as LAPD in the D-channel.

DLCI	Use (Q.922)	Use (LMI)
0	Signalling	Reserved
1- 15	Reserved	Reserved
16 - 511	Available (except when the D-channel is used)	Available
512 - 991	Available	Available
992 - 1007	Layer 2 management	Available

DLCI	Use (Q.922)	Use (LMI)
1008 - 1018	Reserved	Reserved
1019 - 1022	Reserved	Multicasting
1023	Consolidated Link Layer Management	Signalling

NOTE: A DLCI is only significant to the local station. Though it is used locally to identify both directions of a virtual circuit it has no meaning to the next station (or the destination) in the frame relay network.

Frame Relay Services

Frame relay access can be purchased in a variety of configurations depending of your site's needs. Characteristics of the service you will receive include:

1. The type of physical connection you have to the frame relay network, ISDN or X.21.
2. The amount (from 56Kbps up to 2Mbps) and type of bandwidth available via this connection; this will include your guaranteed and excess rates. See CIR, CBR, and EBR below.
3. The number of PVCs you are receiving.

Committed Information Rate

When purchasing frame relay services from your provider, you will be assigned a Committed Information Rate. This defines the minimum amount of bandwidth that your provider guarantees to be available to your site at all times.

Committed Burst Rate

You will also receive a Committed Burst Rate with your service package. This is an additional amount of bandwidth (in excess of your CIR) you may use when network resources are available. The CBR is free of charge, but be aware that all frames that are in excess of your CIR will be DE (Discard Eligible) flagged and may be discarded by intermediate switches if the network becomes congested.

Excess Burst Rate

As Excess Burst Rate is also available; it defines the maximum data rate the service provider's network will attempt to sustain. Also note that all EBR traffic is flagged Discard Eligible.

The Frame Relay Subsystem

Frame Relay on the BRICK consists of 5 SNMP system tables contained in the BRICK's `fr` group. An overview of these tables is shown below. The full description of each SNMP object is contained on the following pages.

frGlobals	frDlcmiTable	frCircuitTable
frErrTable	frMprTable	

Overview: Frame Relay System Tables

- *frGlobals*
  Global settings for Frame Relay on the BRICK. Currently only contains the frTrapState object which is used to enabled / disable *frDLCIStatusChange* traps on the BRICK. (This trap indicates that the state of a particular Virtual Circuit has changed.)
- *frDlcmiTable*
  Contains parameters for each DLCM (Data Link Connection Management) interface for each instance of frame relay service on the BRICK.
- *frCircuitTable*
  Contains information for each Data Link Connection Identifiers and corresponding virtual circuits.
- *frErrTable*
  Used to store important status messages reported for interfaces configured with Local Management Interface.
- *frMprTable*
  Contains Multiprotocol Routing over Frame Relay interfaces (MPFR) on the BRICK. These interfaces are Virtual interfaces since they do not necessarily map to a single hardware interface. MPFR interfaces may be used by higher level protocols.

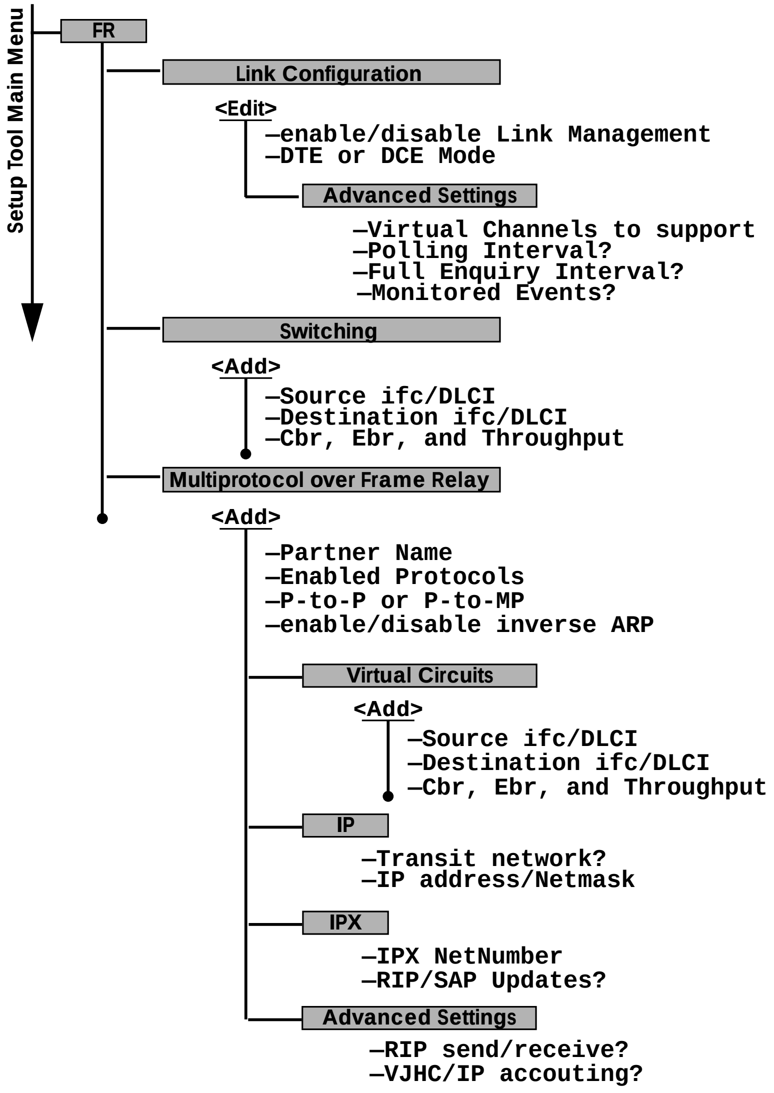
For detailed information regarding the new system tables/ variable for Frame Relay please refer to the *BIANCA/BRICK MIB Reference* which is available via BinTec's web site.

Frame Relay System Messages

biboAdmSyslogMessage	***~Level***
Attach link <*ifindex*> failed	debug
Attach link <*ifindex*>	debug
Bind link <*ifindex*> failed	debug
Link <*ifindex*> bound; starting LMI	debug
Be exceeded - packet discarded	debug
Want open ifc <*ifindex*>.	debug
Unknown ARP protocol <*proto*>	debug
No license	info
DLCI out of range: <*dlci*>	notice
No more than 256 interfaces allowed	error
Create: illegal index <*ifindex*>	error
Create: index <*ifindex*> already exists	error

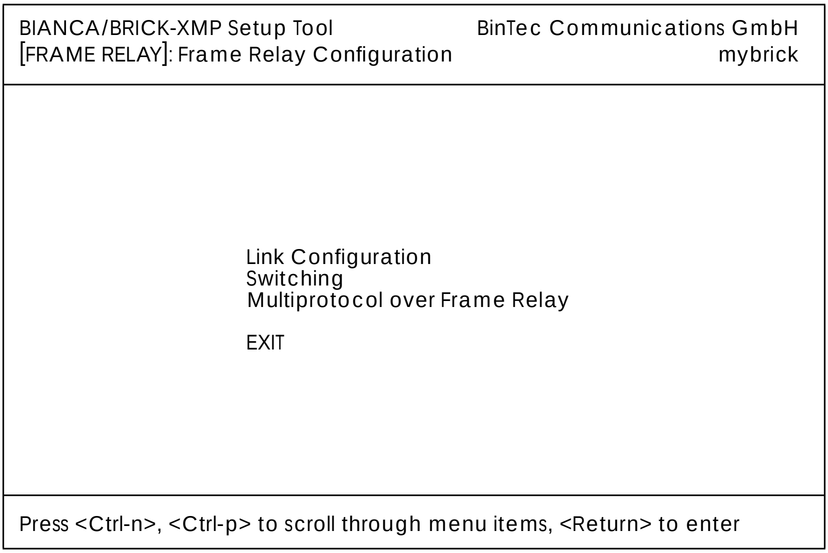
Frame Relay Setup Tool Menus

Several menus have been added to Setup Tool to allow for easy configuration of Frame Relay on the BRICK. An overview of the menu structure is shown below. Individual submenus are described in detail on the following pages.



Setup Tool Menus

Frame Relay on the BRICK can be configured from Setup Tool using the three menus available here.



```
BIANCA/BRICK-XMP Setup Tool                    BinTec Communications GmbH
[FRAME RELAY]: Frame Relay Configuration                          mybrick



                 Link Configuration
                 Switching
                 Multiprotocol over Frame Relay

                 EXIT



Press <Ctrl-n>, <Ctrl-p> to scroll through menu items, <Return> to enter
```

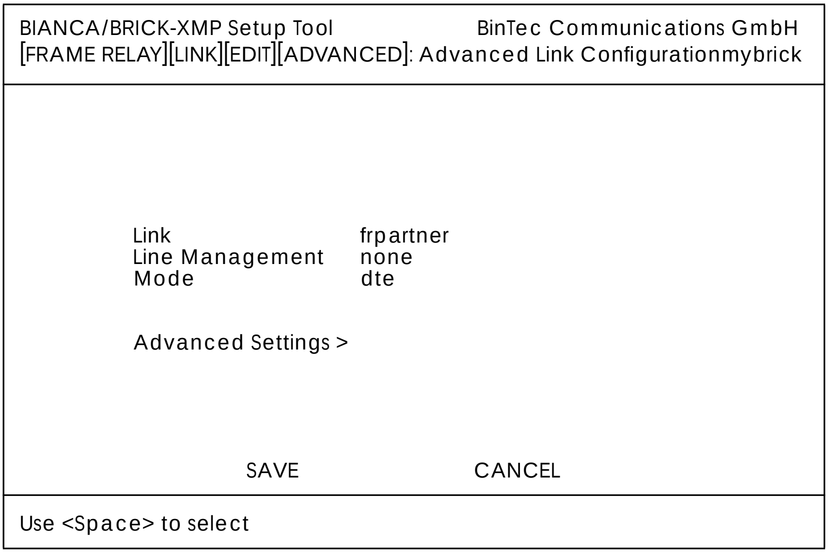
LINK CONFIGURATION contains the settings relative to the layer 2 of Frame Relay interface.

SWITCHING lists settings for each Frame Relay Virtual Circuit.

MULTIPROTOCOL OVER FRAME RELAY lists all existing MPFR interfaces configured on the BRICK.

FR → **LINK CONFIGURATION** →

This menu lists the available links that may be configured as the transport layer of a Frame Relay interface. Use the menu shown below (First select the link and hit enter) to edit link's settings.



```
BIANCA/BRICK-XMP Setup Tool                    BinTec Communications GmbH
[FRAME RELAY][LINK][EDIT][ADVANCED]: Advanced Link Configurationmybrick



        Link                    frpartner
        Line Management         none
        Mode                    dte

        Advanced Settings >



                    SAVE                    CANCEL

Use <Space> to select
```

Link = Shows the link that is currently being edited.

Line Management = Determines whether or not link management is being performed on this link. Currently, the method described in Q.933 is supported.

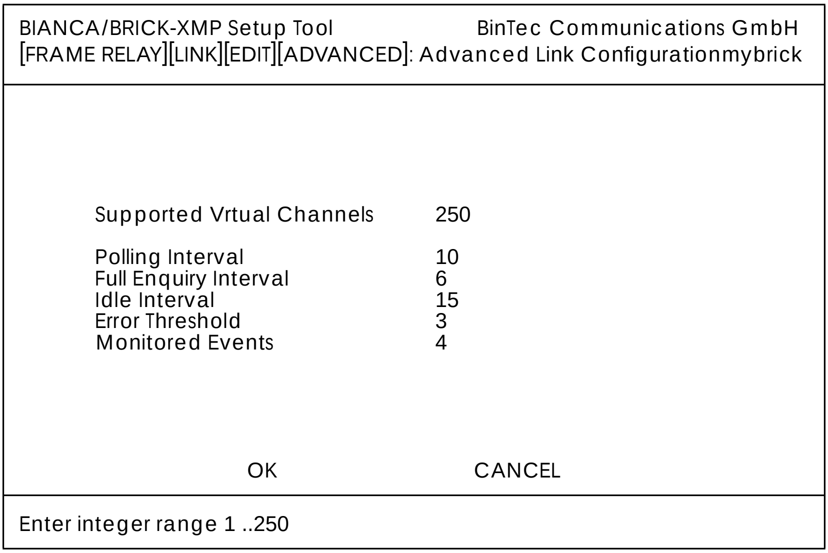
Mode = Defines the mode (DTE or DCE) the BRICK operates at for this connection. Note that one side of the link must operate as DTE and one as DCE.

Select **SAVE** to accept the settings and return to the previous menu.

Select **CANCEL** to discard all changes made since the last SAVE and return to the previous menu.

FR → LINK CONFIGURATION → ADVANCED SETTINGS →

This menu can be used to configure special settings relating to line management for Frame Relay interfaces on the BRICK . Some options only apply to BRICK operating in DTE or DCE mode.


```
BIANCA/BRICK-XMP Setup Tool                    BinTec Communications GmbH
[FRAME RELAY][LINK][EDIT][ADVANCED]: Advanced Link Configurationmybrick



          Supported Vrtual Channels          250

          Polling Interval                   10
          Full Enquiry Interval              6
          Idle Interval                      15
          Error Threshold                    3
          Monitored Events                   4



                        OK                          CANCEL

Enter integer range 1 ..250
```

Supported Virtual Channels = This field can be used to control how many Virtual Channels this Link supports; a maximum of 250 (default) VCs are possible.

Polling Interval = When set for DTE mode (client) and q933a line management is enabled this field determines the number of seconds between successive status enquiry messages sent out by the BRICK. (default 10 seconds)

Full Enquiry Interval = When set for DTE mode (client) and q933a line management is enabled this field determines the number of status enquiry intervals that pass before issuing a full status enquiry message (default 6 intervals).

Idle Interval = When set for DCE mode (server) and line management is enabled this field defines the number of seconds within a status enquiry messages should be received (default 15 seconds).

Error Threshold = When line management is enabled this field defines the maximum number of unanswered Status Enquiries the BRICK accepts before declaring the interface down (default 3 messages).

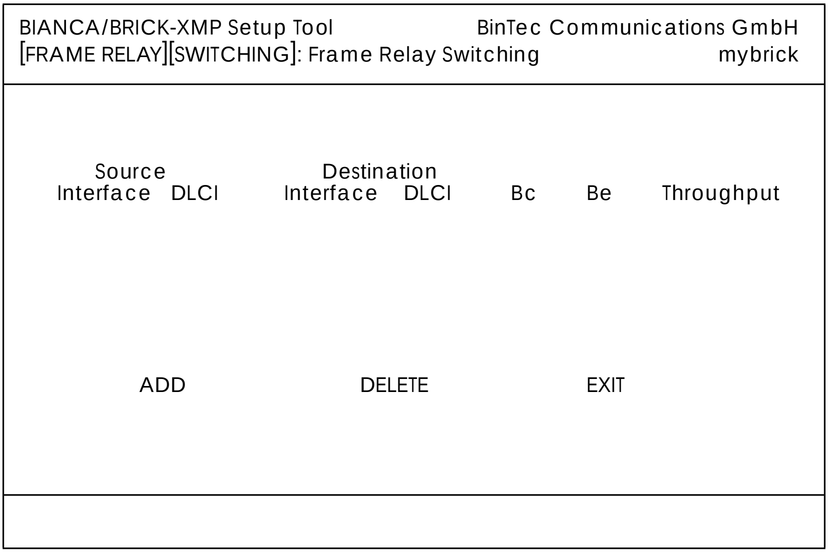
Monitored Events = When line management is enabled this field defines the number of status polling intervals over which the error threshold (previous field) is counted. For example, if within 'MonitoredEvents' number of events the station receives 'ErrorThreshold' number of errors, the interface is marked as down (default 4 intervals).

Select **OK** to accept the settings and return to the previous menu.

Select **CANCEL** to discard all changes made since the last SAVE and return to the previous menu.

FR → SWITCHING →

This menu is used to configure frame relay switching functionality on the BRICK. When used as a Frame Relay switch this menu can be used to configure routes, or mappings (i.e., from incoming interface / DLCI to outgoing interface DLCI).
Frame Relay routes can be added, removed, or changed here.



```
BIANCA/BRICK-XMP Setup Tool                  BinTec Communications GmbH
[FRAME RELAY][SWITCHING]: Frame Relay Switching                 mybrick


        Source                  Destination
   Interface   DLCI        Interface   DLCI      Bc      Be     Throughput



          ADD                  DELETE                EXIT
```

Select ADD to create a new Frame Relay route.

Select DELETE to remove a Frame Relay route entry that has been tagged (using the spacebar) for deletion.

Select EXIT to accept the list of Frame Relay routes and return to the previous menu.

To edit a Frame Relay route, highlight the entry and then enter <Return>. When adding or changing an entry the following information must be provided.

Source Interface = Use the spacebar and scroll through the list of Frame Relay interfaces to select the source interface for this route.

Source DLCI = Defines the DLCI of the source interface for this route.

Destination Interface = Use the spacebar to scroll through the list of Frame Relay interfaces and select the destination interface.

Destination DLCI = Defines the DLCI on the destination interface to use.

Committed Burst Rate = (Abbreviated Bc) This field defines the maximum amount of data (in bits) to transfer under normal conditions.

Excess Burst Rate = (Abbreviated Be) This field defines the maximum amount of uncommitted data (in bits) to attempt deliver.

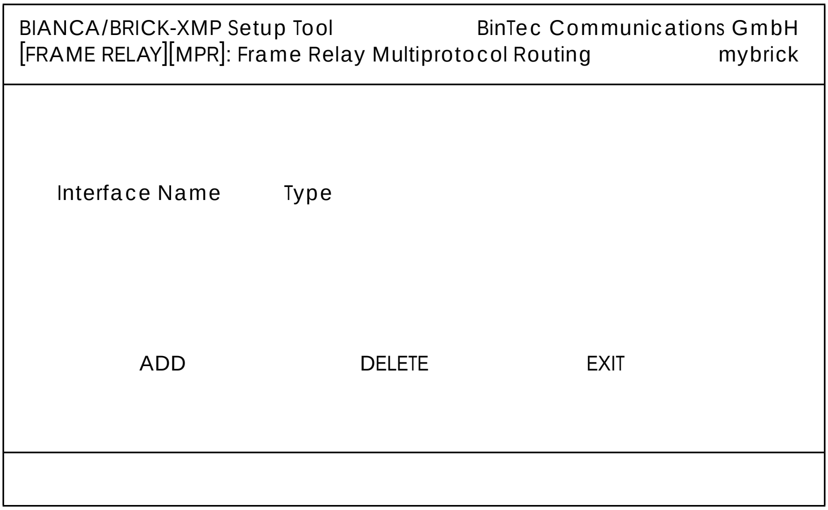
Throughput = This field defines the physical throughput for this interface (and defaults to ifSpeed).

Select **OK** to accept the settings and return to the previous menu.

Select **CANCEL** to discard all changes made since the last SAVE and return to the previous menu.

FR → MULTIPROTOCOL OVER FRAME RELAY

This menu lists Multiporotocol Routing over Frame Relay interfaces on the BRICK. MPFR interfaces can be added, removed, or changed here. .



```
BIANCA/BRICK-XMP Setup Tool                    BinTec Communications GmbH
[FRAME RELAY][MPR]: Frame Relay Multiprotocol Routing              mybrick



     Interface Name       Type




          ADD                  DELETE                  EXIT
```

Interface Name = Identifies the interface name (taken from the *ifDescr* object from the *ifTable*).

Type = Specifies whether the interface is a point-to-point, or point-to-multipoint interface.

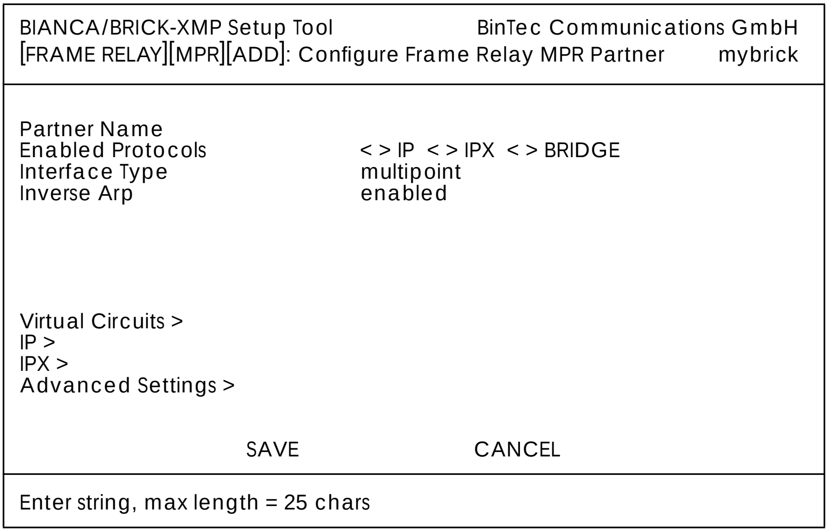
Select **ADD** to create a new MPFR interface. (See the EDIT / ADD menu on the following page.)

Select **DELETE** to remove a MPFR interface that has been tagged (using the spacebar) for deletion.

Select **EXIT** to accept the interface list and return to the previous menu.

FR → **MULTIPROTOCOL OVER FRAME RELAY** → **ADD**

This menu is used to create (or change) MPFR (Multi-Protocol routing over Frame Relay) interfaces on the BRICK.



```
BIANCA/BRICK-XMP Setup Tool                       BinTec Communications GmbH
[FRAME RELAY][MPR][ADD]: Configure Frame Relay MPR Partner          mybrick


Partner Name
Enabled Protocols                    < > IP  < > IPX  < > BRIDGE
Interface Type                       multipoint
Inverse Arp                          enabled




Virtual Circuits >
IP >
IPX >
Advanced Settings >

                      SAVE                      CANCEL

Enter string, max length = 25 chars
```

Partner Name = Define a unique name to identify this MPFR partner.

Enabled Protocols = Identifies the protocols that will be supported by this Frame Relay link. Currently, only IP traffic is supported.

Interface Type = Determines the interface type as being either “multipoint” or “point to point”.

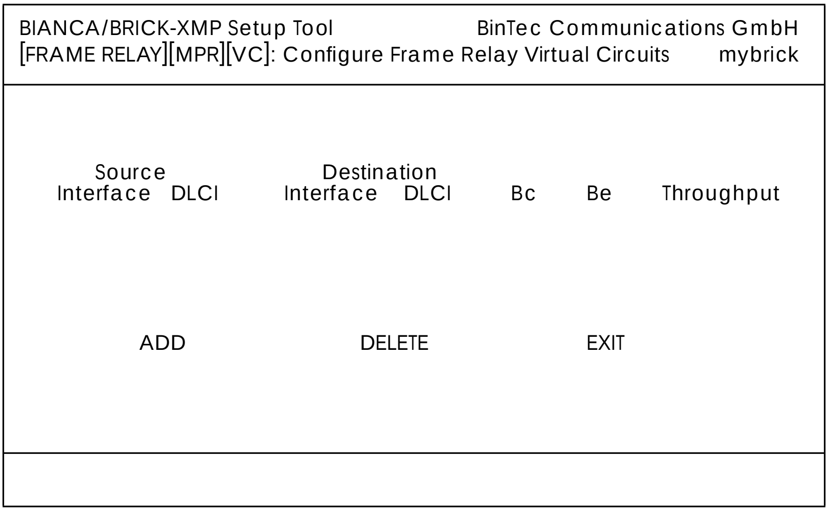
Inverse Arp = Enables / disables inverse ARP over this interface.

Select **SAVE** to accept the settings and return to the previous menu.

Select **CANCEL** to discard all changes made since the last SAVE and return to the previous menu.

FR → **MULTIPROTOCOL OVER FRAME RELAY** → **VIRTUAL CIRCUITS** →

This menu should only be used by sites receiving multiple DL-CIs from their Frame Relay service provider. Depending on the number of DLCIs and type of service being received use this menu to define the appropriate data rates.



```
BIANCA/BRICK-XMP Setup Tool                  BinTec Communications GmbH
[FRAME RELAY][MPR][VC]: Configure Frame Relay Virtual Circuits    mybrick


       Source                  Destination
   Interface   DLCI        Interface    DLCI       Bc       Be      Throughput



            ADD                    DELETE                  EXIT
```

Source Interface = Using the spacebar scroll through the list of Frame Relay interfaces.

Source DLCI = Defines the DLCI used on this interface.

Committed Burst Rate = The maximum amount of data that is gaurenteed to be transferred by the service provider.

Excess Burst Rate = The amount of additional data that is uncommitted by the service provider.

Throughput = The physical throuput of this interface.

Select **ADD** to create a new Virtual Circuit for this FR interface.

Select **DELETE** to remove an existing Virtual Circuit that has been tagged (using the spacebar) for deletion.

Select **EXIT** to accept the list and return to the previous menu.

FR → MULTIPROTOCOL OVER FR → ADD → IP →

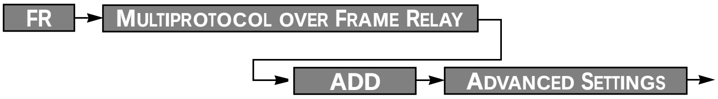
This is where you configure the IP settings for this remote MPFR partner and is only available if the IP protocol has been enabled.

Note: The settings used in this menu are the same as those used in the **WAN PARTNER → ADD → IP →** menu described in the *User's Guide* but only apply to this MPFR partner.

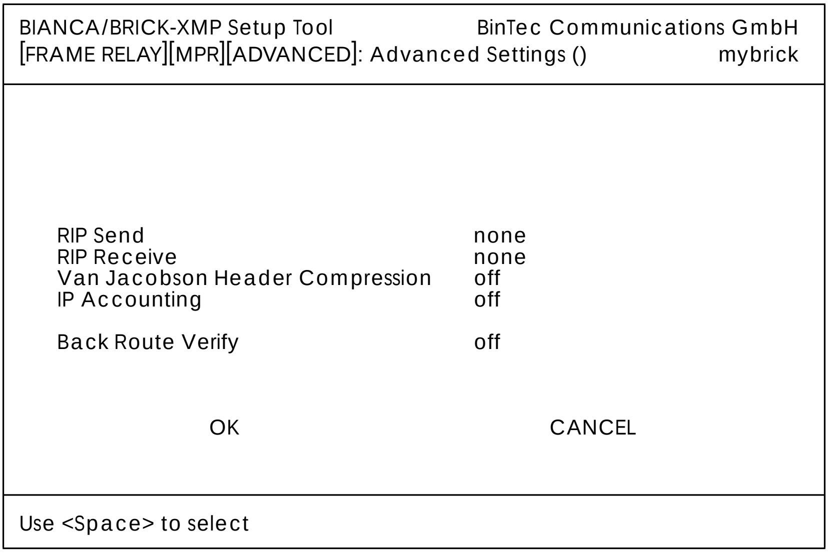
FR → MULTIPROTOCOL OVER FR → ADD → IPX →

This is where you configure the IPX settings for the remote MPFR partner. This menu is only available if IPX has been enabled.

Note: The settings used in this menu are the same as those used in the **WAN PARTNER → ADD → IPX →** menu described in the *User's Guide* but only apply to this MPFR partner.



This menu is to used to configure several advanced features (a subset of the same features found in the WAN Partners Advanced Settings menu). .



```
BIANCA/BRICK-XMP Setup Tool                     BinTec Communications GmbH
[FRAME RELAY][MPR][ADVANCED]: Advanced Settings ()                 mybrick




    RIP Send                               none
    RIP Receive                            none
    Van Jacobson Header Compression        off
    IP Accounting                          off

    Back Route Verify                      off



               OK                                  CANCEL



Use <Space> to select
```

RIP Send = This option allows you to control the types (if any) of RIP packets to transmit the frame relay interface.

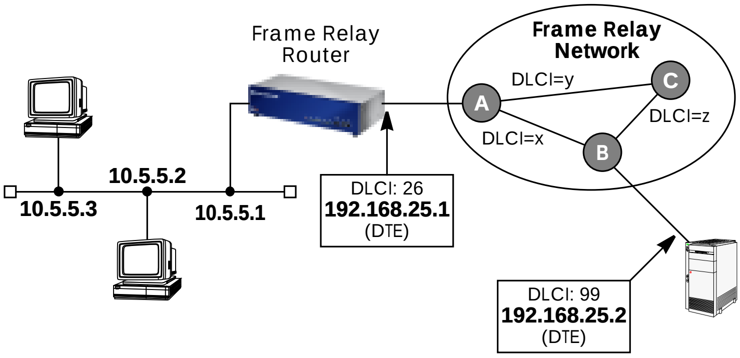
RIP Receive = This option allows you to control the types (if any) of RIP packets to accept via the frame relay interface.

Van Jacobson Header Compression = Disable or enable IP header compression for packets send via this interface.

Back Route Verify = Optionally verify the sender's IP address.

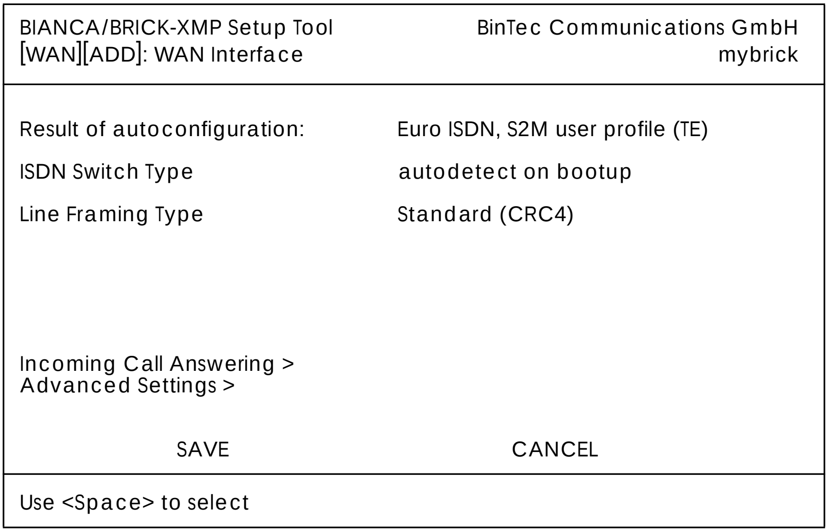
Example Configuration using Setup Tool

Frame Relay over ISDN Lines



Requirements: Frame Relay requires a separate license to be installed on the BRICK. After installing your license verify the Frame Relay is listed as "valid" in Setup Tool's License menu (or the *Status* field for the **`frame_relay`** entry in the *biboAdmLicInfoTable* shows **`valid_license`**).

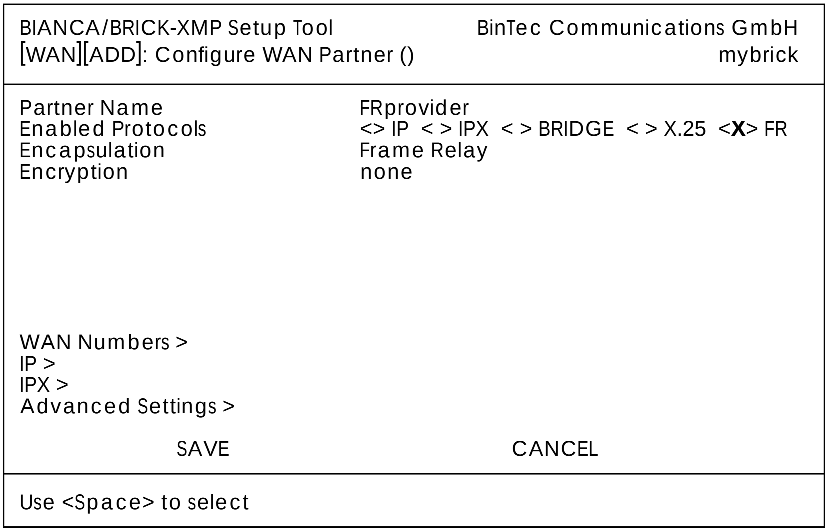
1. **Define the physical interface**
   In Setup Tool's main menu select the ISDN interface where the Frame Relay service is being received.



```
BIANCA/BRICK-XMP Setup Tool                    BinTec Communications GmbH
[WAN][ADD]: WAN Interface                                          mybrick

Result of autoconfiguration:           Euro ISDN, S2M user profile (TE)

ISDN Switch Type                       autodetect on bootup

Line Framing Type                      Standard (CRC4)




Incoming Call Answering >
Advanced Settings >

                SAVE                             CANCEL

Use <Space> to select
```

You should verify the “Result of autoconfiguration” field is correct. If this interface is a leased line or it was not properly detected set the Switch Type and D/B channel fields appropriately here and [SAVE] the settings.

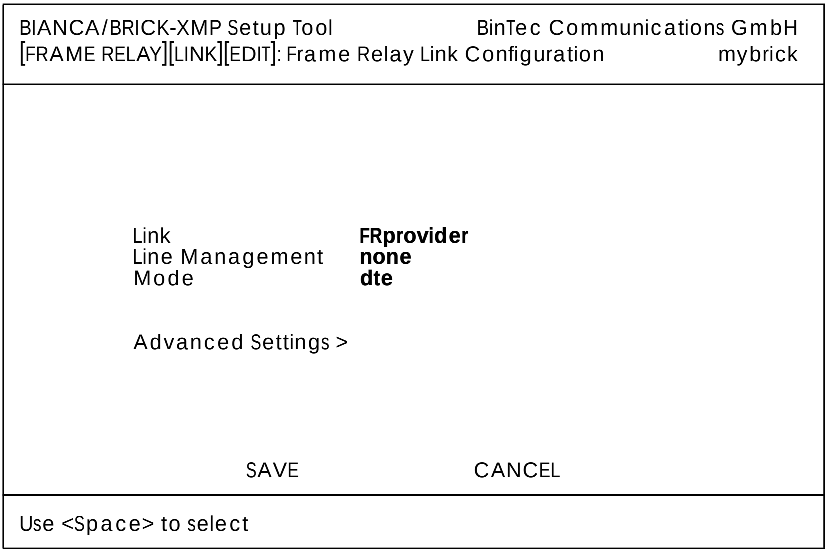
2. **Configure a new WAN Partner**
This step defines the (physical) link to the next switch in the Frame Relay network (host A shown above). Create a new interface in the WAN PARTNER → ADD → menu.



```
BIANCA/BRICK-XMP Setup Tool              BinTec Communications GmbH
[WAN][ADD]: Configure WAN Partner ()                        mybrick

Partner Name                 FRprovider
Enabled Protocols            <> IP  < > IPX  < > BRIDGE  < > X.25  <X> FR
Encapsulation                Frame Relay
Encryption                   none





WAN Numbers >
IP >
IPX >
Advanced Settings >

           SAVE                          CANCEL

Use <Space> to select
```

After defining a partner name enable the FR protocol. Ensure that only FR is enabled here. Select the ISDN port (from step 1) to use and [SAVE] the settings.

3. **Configure the Frame Relay Link Settings**
Go to the FR → LINK CONFIGURATION → menu and select the physical link (partner name) you configured in the previous step and hit enter to set the desired parameters. It is very important that you set the Mode field to **dte** here if the BRICK is operating as a Frame Relay router.

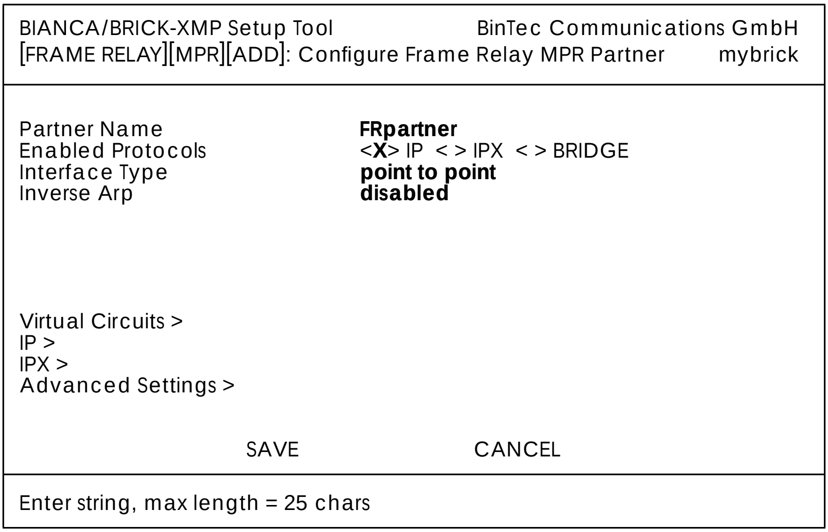


```
BIANCA/BRICK-XMP Setup Tool                    BinTec Communications GmbH
[FRAME RELAY][LINK][EDIT]: Frame Relay Link Configuration          mybrick




          Link                   FRprovider
          Line Management        none
          Mode                   dte

          Advanced Settings >



                    SAVE                  CANCEL

Use <Space> to select
```

Optionally, you can define whether Link Management should be performed for this link. If Link management is to be performed on this link, several options are available via the Advanced Settings sub-menu that control how often various LMI packets to send to the server (DCE) and the intervals at which these enquiries are sent.

4. **Configure the Multi-Protocol Routing Interface**
   Go to the FR → MULTIPROTOCOL OVER FRAME RELAY → menu and select ADD to create a new MPFR (Multi-Protocol routing over Frame Relay) partner interface. This step will define the virtual interface to the end-system (host at IP address 192.168.25.2 in the diagram above) IP packets will be routed to / from.

Note: When enabling protocols to route over Frame Relay please note that at current, only IP over Frame Relay has been tested on the BRICK.



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BIANCA/BRICK-XMP Setup Tool                     BinTec Communications GmbH
[FRAME RELAY][MPR][ADD]: Configure Frame Relay MPR Partner          mybrick

Partner Name                      FRpartner
Enabled Protocols                 <X> IP  < > IPX  < > BRIDGE
Interface Type                    point to point
Inverse Arp                       disabled

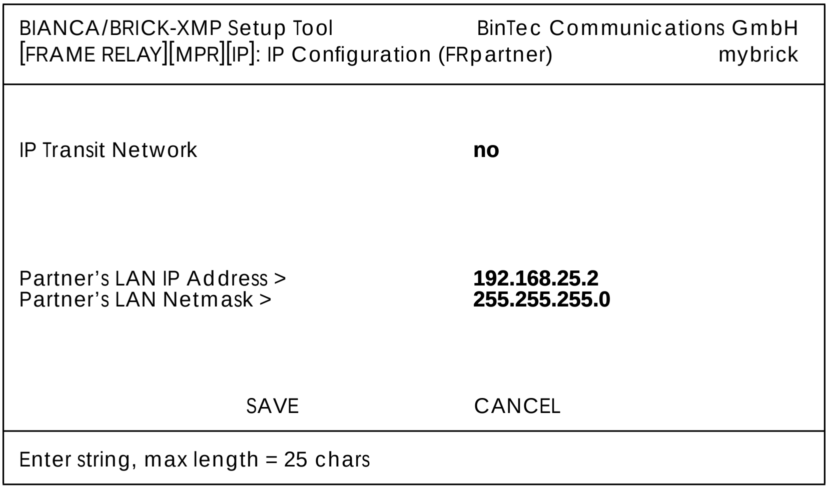


Virtual Circuits >
IP >
IPX >
Advanced Settings >

                    SAVE                    CANCEL

Enter string, max length = 25 chars
```

5. **Configure IP settings for MPFR Interface**
In the IP submenu configure the IP settings for the remote Frame Relay end station (192.168.25.2 in our example diagram). A transit network is optional. Select [SAVE] to ensure your Frame Relay setup is saved to a configuration file.



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BIANCA/BRICK-XMP Setup Tool                     BinTec Communications GmbH
[FRAME RELAY][MPR][IP]: IP Configuration (FRpartner)                mybrick


IP Transit Network                           no



Partner's LAN IP Address >                   192.168.25.2
Partner's LAN Netmask >                      255.255.255.0



                    SAVE                    CANCEL

Enter string, max length = 25 chars
```

Link Quality Monitoring

Because Link Quality Monitoring as described under Features is specified within LCP negotiation, i.e. before the authentication of the partner, for the configuration of incoming calls a distinction must be made between inband and outband identification.

In case of outband identification (CLID / outband RADIUS) and for outgoing calls the LQM is activated by setting the variable *biboPPPLQMonitoring* in the *biboPPPTable* to on. When a RADIUS server is used the variable is set by the help of the BinTec dictionary.

For incoming calls identified inband (identification by the internal *biboPPPTable* or via RADIUS server) the variable *biboPPPProfileLQMonitoring* in the *biboPPPProfileTable* must be set to on.

After a successful LCP negotiation for every link of a temporary connection additionally to the entry in the *biboPPPLinkTable* a correlating entry in the *biboPPPLQMTable* is generated. Both entries can be uniquely assigned to each other by the *IFIndex* respectively the *CallReference* value.

The *biboPPPLQMTable* is a new table and is described in detail in the following.
biboPPPLQMTable:

inx	IfIndex(*ro	CallReference(ro)	ReportingPeriod(ro)
	OutLQRs(ro)	OutPackets(ro)	OutOctets(ro)
	InLQRs(ro)	InPackets(ro)	InOctets(ro)
	InDiscards(ro)	InErrors(ro	PeerOutLQRs(ro)
	PeerOutPackets(ro)	PeerOutOctets(ro)	PeerInLQRs(ro)
	PeerInPackets(ro)	PeerInOctets(ro	PeerInDiscards(ro)
	PeerInErrors(ro	LossedOutLQRs(ro)	LossedOutPackets(ro)
	LossedOutOctets(ro)	LossedPeerOutLQRs(ro)	LossedPeerOutPkts(ro)
	LossedPeerOutOcts(ro)		

The *biboPPPLQMTable* contains statistical information for each current PPP link on the system. Only the system can add or delete entries to this table.

Entries are created by the system each time a new PPP link was established and LQM was negotiated successfully.

Entries are removed by the system, when the corresponding PPP link is disconnected.
For detailed information on the meaning of the single variables see the *BIANCA/BRICK MIB Reference* on the BinTec Website.