Teldat Router

WAN Reroute (WRR) Backup

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Chapter 1
Introduction

1. Introduction

This chapter describes the WAN Reroute (WRR) Backup function.

WRR backup is yet another available instrument to provide fault tolerance. When a link or interface etc., does not function correctly or simply does not function, this mechanism achieves an alternative path to route the data to its destination. Generally, this is carried out by enabling new links in order to find an alternative path (here this indicates the rerouting), where possible to divert the traffic from the primary link that is currently inactive.

In the following section, the WRR Backup operation mode is described.

2. Backup by Rerouting

Backup through rerouting (*Backup WAN Reroute*, WRR) is known as such because the traffic goes through a backup process during the period of time when the primary link is down and is rerouted through an alternative link. This deals with non-transparent backup from the point of view of the layer 3 protocols.

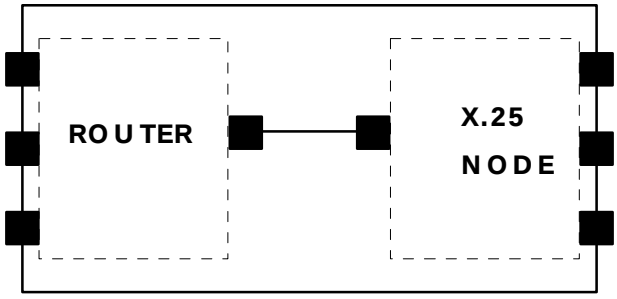
The backup by rerouting philosophy implies the following steps:

1. Detection of the main link failure.
2. Rerouting of traffic through an alternative link.
3. Detection of main link recovery.
4. Rerouting of traffic through the primary link.

2.1. Primary Link

From the router's operational point of view, two virtual devices are integrated:

1. A router carrying out internetworking functions.
2. A packet switch for packets coming from both the router and the X.25 and ISDN ports when these are transporting X.25.



As can be seen in the figure, each virtual device manages its own set of interfaces.

The primary link can be any of the router's interfaces which communicate their active state (if they are up or down), i.e. they can be established at any given moment if they are down or not. E.G. a Frame Relay interface, a synchronous or asynchronous PPP interface (not DIAL however as these are always active), LAN interface (Ethernet or Token Ring) etc. Generally you configure a permanent primary link.

In cases where an interface admits various subinterfaces e.g. Frame Relay, you can establish one of the subinterfaces as the primary link (a specific DLCI in Frame Relay, an NRI in X.25).

You cannot establish the whole of the X.25 interface as the primary link although you can specify an NRI as a subinterface.

The primary link is the one that the traffic should go through under *normal* operating conditions and only in cases where abnormalities are detected or when it is inactive, is the traffic rerouted through an alternative link prepared for such incidences. In situations where both links (the primary one and the alternative) are active, the primary link has greater priority therefore the traffic is routed through this.

2.2. Secondary Link

The secondary or alternative link is the one the traffic is rerouted through when a failure has been detected in the primary link.

Under normal conditions, this link should not be active but idle waiting for an alternation in the normal function of the primary link being monitored. Should a failure be detected, the secondary link activates and serves as an alternative path for the traffic which cannot go through the primary link.

In these cases, those interfaces controlled by the router which are NOT subinterfaces (e.g. a determined DLCI in a Frame Relay link cannot be a secondary link) can be configured as a secondary link.

Usually a 'switch' interface is used as a secondary link, such as a Dial PPP, a PPP link over AT commands, a Frame Relay over ISDN etc., although you can also establish a permanent interface as mentioned in the previous section (except in cases of subinterfaces).

2.3. Function

The mode in which the WRR Backup is carried out is the following:

An association is established between the primary link and the secondary link (sub) interfaces to specify which interface is going to carry out backup when the primary one is down.

Backup can be established for various primary interfaces or subinterfaces through the same secondary interface. When one of the primary ones falls, the secondary activates and until *ALL* the primary interfaces have recovered, the secondary will not deactivate.

Similarly, you can configure backup for a primary interface or subinterface through various secondary interfaces. In these cases, when the primary interface is down, all the secondary interfaces programmed activate.

a) Link Status

Any link (be it the primary one or secondary) can be in any of the following states at any given moment:

- *Not present*, interface is not present.
- *Not supported*, interface is not supported.
- *Active*, interface is active.
- *Inactive*, interface is inactive.
- *Carrying out test*, interface is carrying out a test.
- *Disabled*, interface is disabled through configuration.

The **secondary** interface can also be in the following state:

- *Available*, the secondary interface is monitoring the state of the primary interface.

Under normal conditions the primary interface is in an *active* state and the traffic is routed through this (where it corresponds to). The secondary interface remains in an *available* state monitoring the primary interface state.

b) Events

Various events can occur provoking changes in the state of the system:

- *Primary Up (**PriUp**)*, one of the primary interfaces associated to a secondary interface has announced the recovery of the link.

- *Primary Down (**PriDwn**)*, one of the primary interfaces associated to this secondary interface has announced link failure.
- *First Stabilization Time expired*, the timer for the first establishment period of time has lapsed. **The First Stabilization Time** is length of time the primary interface must be down before activating the secondary (to carry out backup).
- *Stabilization Time expired*, the timer for the establishment period of time has lapsed. **The Stabilization Time** is the minimum length of time the primary interface must be active for before the secondary deactivates (returns from backup to initial situation).
- *Unknown (**Unk**)*, no event has been produced yet, or the event is unknown.

c) WRR Backup state in the Secondary

The WRR backup procedure can be found in distinct states:

- **Disabled (---),** when there is no enabled association or where the WRR is globally disabled.
- **Initial (*Ini*),** state of the device when starting up. The secondary interface is *available*. If the *Primary Up* event occurs, then it passes to a **Direct** state, if the *Primary Down* event occurs it then passes from **Direct→Alternative.**
- **Direct (*Dir*),** the secondary is *available* as all the controlled primary links are *active*.
- **Direct→Alternative (*Dir→Alt*),** when the secondary link is *available* but it has received a *Primary Down* event from one of the associated primaries.
- **Alternative (Alt),** when the *First Stabilization Time expired out* event arrives. With this the secondary interface auto test begins so it will activate.
- **Alternative→Direct (*Alt→Dir*),** the *Primary Up* event from one of the primaries associated has occurred.

d) WRR Backup process

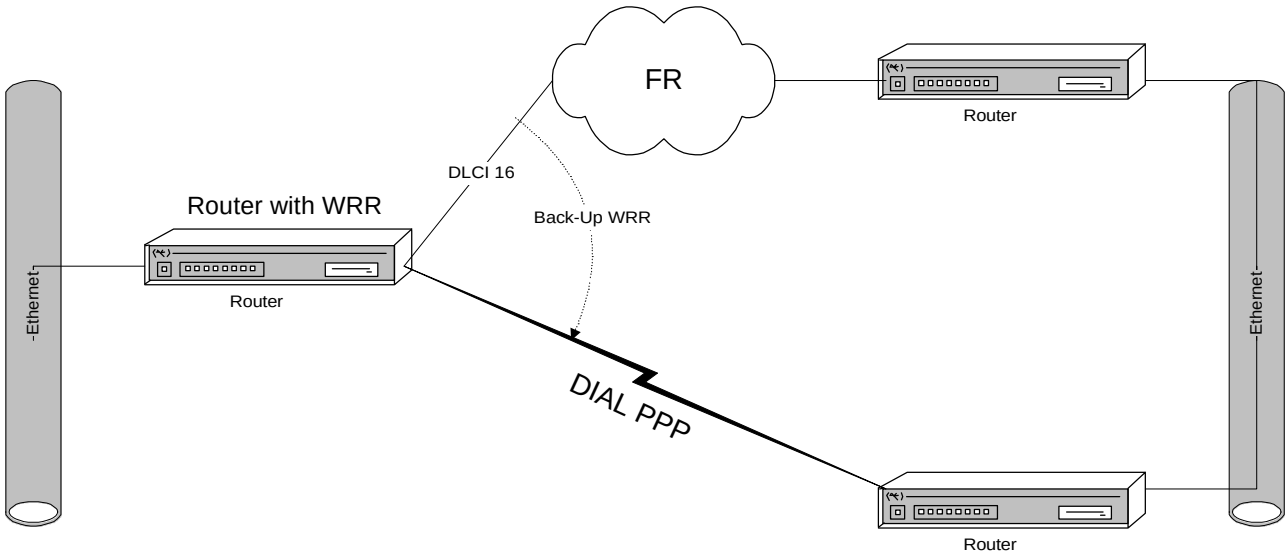
The backup process initiates when a *Primary Down* event occurs and the secondary is in an *available* state. This then passes to a **Direct→Alternative** state. Once the minimum time required for the primary to be down has expired (First Stabilization Time) and secondary effectively begins to operate, the WRR Backup process passes to an **Alternative** state.

When the secondary link is *active* (routing traffic normally sent through the primary link) with backup in an **Alternative** state and the primary (being monitored) recovers (producing a *Primary Up* event), if this primary is the last down link configured in this link as secondary, it passes to **Alternative→Direct**. Once the minimum wait time for the primary link to be active (*Stabilization Time*) has expired, the primary link reactivates and the secondary is deactivated (in cases of Dial, secondary links requiring a call to be carried out, the call is released). The backup passes to a **Direct** state.

2.4. Example of backup through rerouting (WRR)

The functional environment consists of:

- A device where you configure the WRR feature with an association and where the primary link is a dlci (16) and the secondary a Dial-PPP channel.
- A device at the remote end for the FR link.
- A device functioning as a PPP server.



While the primary link is active, the secondary interface is on 'standby' i.e. as if it were down. If the RIP is enabled in the secondary link, calls are not provoked as the link is down. The traffic is routed through the primary link.

When the primary link goes down, the secondary interface activates. If RIP is enabled, it begins to learn the routes through the secondary link. If there are static routes configured through the secondary, these activate. The dynamic routes learned through the primary and the static routes it has as the second hop, fall and the traffic is rerouted through the secondary interface. A larger cost is assigned to all the routes learned by the secondary interface. Through this, if various dlcis backups are configured for the same secondary interface, the IP traffic for dlcis that are still active is not rerouted through the secondary interface.

When the primary link recovers, the static routes activate again. If there is active RIP in the primary this begins to learn the routes through the primary. The dynamic routes learned by the secondary and the configured static routes are deleted. The IP traffic is then routed through the primary.

Chapter 2
Configuration

1. Accessing the WRR Backup Configuration prompt

The WRR configuration commands are available in the associated configuration prompt. To access the WRR configuration prompt, carry out the following steps:

1. Access the general configuration menu, *Config>*.
2. Enter the command related to the WRR, **F**EATURE **WRR**-BACKUP-WAN feature (the letters written in **bold** are the minimum number of characters needed for the command to be acknowledged by the router).

Example:

```
Teldat              (c)1996,97,98,99

Router model NUCLEOX-PLUS  CPU M68360      S/N: XXXX/XXXXX
1 LAN, 6 WAN Lines, 2 ISDN Lines


*P 4
User Configuration
Config> FEATURE WRR-BACKUP-WAN

WAN Reroute Backup User Configuration
Backup WRR>
```

Once you have accessed the WRR configuration prompt (*Backup WRR>*), you can configure the feature through the commands described in the following section.

2. WRR Backup Configuration Commands

The following table describes the WRR Backup configuration commands.

Command	Function
? (HELP)	Displays the WRR Backup configuration commands or lists the available options for a specific command.
ADD **P**AIR	Creates a WRR Backup association.
DELETE **P**AIR	Deletes a WRR Backup association.
DISABLE	Permits you to disable the whole WRR Backup function or determined associations to it.
ENABLE	Enables the WRR Backup function as well as associations.
LIST	Displays the configuration parameters.
SET	Configures the stabilization times.
EXIT	Exits the WRR Backup prompt and returns to the general configuration prompt, *Config>*.

The letters written in **bold** are the minimum number of characters needed for the command to be acknowledged by the router.

If you do not enter all the necessary parameters in the command line in order to complete a command, the device will request this.

2.1. ? (HELP)

The **?** (HELP) command lists all the valid commands for the level. You can also use this after a specific command to list its options.

Syntax:

```
Backup WRR> ?
```

Example:

```
Backup WRR> ?
ADD
DELETE
DISABLE
ENABLE
LIST
SET
EXIT
Backup WRR>
```

2.2. ADD PAIR

Creates a new association for the WRR Backup. In order to achieve this, you need to indicate the primary interface you wish to monitor, the subinterface (if necessary), the secondary interface and the stabilization times.

If you wish to configure WRR Backup for a primary interface or subinterface over various secondary or various primary interfaces and/or subinterfaces over the same secondary, add as many associations to the same common interface as necessary.

Syntax:

```
Backup WRR> ADD PAIR
```

Example:

```
Backup WRR> ADD PAIR
Primary Interface: [0]? 1
Primary Subinterface: ? 16
Secondary Interface: [0]? 0
First stabilization time: [-1]?
Stabilization time: [-1]?
Backup WRR>
```

NOTE: A "-1" value in the stabilization times indicates that defined values are configured by default.

2.3. DELETE PAIR

This eliminates one of the WRR Backup associations that have been configured in the router. In this case you only need to indicate the primary link interface and subinterface (if required) and the secondary link interface.

Syntax:

```
Backup WRR> DELETE PAIR
```

Example:

```
Backup WRR> DELETE PAIR
Primary Interface: [0]? 1
Primary Subinterface: ?
Secondary Interface: [0]?
Backup WRR>
```

2.4. DISABLE

The **DISABLE** command is used to disable both a determined association and the whole WRR Backup function.

a) PAIR

Disables a specific association. The WRR Backup continues to function normally in the rest of the enabled associations.

Syntax:

```
Backup WRR> DISABLE PAIR
```

Example:

```
Backup WRR> DISABLE PAIR
Primary Interface: [0]? 1
Primary Subinterface: ? 16
Secondary Interface: [0]?
Backup WRR>
```

b) WRR

Completely disables the WRR Backup function. None of the associations configured will function. However, the associations' configuration is maintained so you can subsequently enable WRR Backup and conserve all the configured parameters.

Syntax:

```
Backup WRR> DISABLE WRR
```

Example:

```
Backup WRR> DISABLE WRR
Backup WRR>
```

2.5. ENABLE

Through the **ENABLE** command you can enable associations that have been expressly disabled (when an association is created, it is configured as enabled by default) or enable the WRR Backup function.

a) PAIR

Enable an association that has been previously disabled. In this way it can now operate.

Syntax:

```
Backup WRR> ENABLE PAIR
```

Example:

```
Backup WRR> ENABLE PAIR
Primary Interface: [0]? 1
Primary Subinterface: ? 16
Secondary Interface: [0]?
Backup WRR>
```

b) WRR

Enable the WRR Backup functionality. If you do not enable the function in general through this command, nothing related to it will be executed.

Syntax:

```
Backup WRR> ENABLE WRR
```

Example:

```
Backup WRR> ENABLE WRR
Backup WRR>
```

2.6. LIST

Through the **LIST** command you can view all the WRR Backup configuration information. This includes both the general parameters and the different associations present.

Syntax:

```
Backup WRR> LIST
```

Example:

```
Backup WRR> LIST
Backup-WRR is disabled.
Default First Stabilization Time: 1 (seconds)
Default Stabilization Time:       1 (seconds)

Primary                 Secondary   Re-route   T.1st  T
Net Subnet      Descrip Net Descrip Enabled    Stab   Stab
----------------------- ----------- ---------- -----  -----
1   16          FR/0    6   PPP/0   Yes        Def    Def
1   17          FR/0    0   ETH/0   No         Def    Def
Backup WRR>
```

2.7. SET

The **SET** command is used to configure the different stabilization times. You can configure both the stabilization times used by default and those used by a determined association.

a) DEF-FIRST-TMP-STAB

Configures the *Default First Stabilization Time* value.

Syntax:

```
Backup WRR> SET DEF-FIRST-TMP-STAB <time in secs.>
```

Example:

```
Backup WRR> SET DEF-FIRST-TMP-STAB
Default First Stabilization Time: [1]? 2
Backup WRR>
```

b) DEF-TMP-STAB

Configures the *Default Stabilization Time* value.

Syntax:

```
Backup WRR> SET DEF-TMP-STAB <time in secs.>
```

Example:

```
Backup WRR> SET DEF-TMP-STAB
Default Stabilization Time: [1]? 2
Backup WRR>
```

c) FIRST-TMP-STAB

Configures the *First Stabilization Time* value for a specific association.

As well as the First Stabilization Time value, the association referred to is also indicated.

A value of "-1" establishes the associated default time (it take the Default First Stabilization Time).

Syntax:

```
Backup WRR> SET FIRST-TMP-STAB
```

Example:

```
Backup WRR> SET FIRST-TMP-STAB
Primary Interface: [0]? 1
Primary Subinterface: ? 16
Secondary Interface: [0]?
First stabilization time: [-1]? 1
Backup WRR>
```

d) TMP-STAB

Configures the *Stabilization Time* value for a specific association.

As well as the Stabilization Time value, the association referred to is also indicated.

A value of "-1" establishes the associated default time (it take the Default Stabilization Time).

Syntax:

```
Backup WRR> SET TMP-STAB
```

Example:

```
Backup WRR> SET TMP-STAB
Primary Interface: [0]? 1
Primary Subinterface: ? 16
Secondary Interface: [0]?
Stabilization time: [-1]? 2
Backup WRR>
```

2.8. EXIT

Exits the WRR Backup configuration prompt and returns to the general configuration prompt, *Config>*.

Syntax:

```
Backup WRR> EXIT
```

Example:

```
Backup WRR> EXIT
Config>
```

3. Interaction with other Protocols

3.1. WRS Backup

You must not configure as either a primary or secondary link an interface having this type of backup enabled (Backup WAN Restoral).

Configuration is independent between backups. It is not possible to enable both types of backup in the same interface.

3.2. Static Routing

Static routing reacts correctly before the rerouting backup process. Its normal functionality is not affected as the configured static routes are active or not according to the state of the links and not the state of the WRR Backup.

3.3. Dynamic Routing

Dynamic routing maintains its normal functionality before rerouting backup process. On enabling a secondary link, a route learning process is produced through it when this enters into a backup situation. When the primary link recovers, if you wish all traffic originally routed through it to return, you need to assign a cost for the interface greater than the routes learned through the secondary link (this way the routes dynamically learned through the primary or primary link are always prioritized).

Chapter 3
Monitoring

1. Accessing the WRR Monitoring prompt

The WRR Backup monitoring commands are available in the associated monitoring prompt. To access the WRR monitoring prompt, carry out the following steps:

1. Access the general monitoring menu, (+).
2. Enter the command related to the WRR, **F**EATURE **WRR**-BACKUP-WAN feature (the letters written in **bold** are the minimum number of characters needed for the command to be acknowledged by the router).

Example:

```
*P 3
Console Operator
+FEATURE WRR-BACKUP-WAN

-- Backup WAN Reroute user console --
WRR>
```

2. WRR Backup Monitoring Commands

The following table describes the WRR Backup monitoring commands.

Command	Function
?(HELP)	Displays the WRR Backup monitoring commands or lists the available options for a specific command.
LIST	Displays the statistics relative to WRR Backup.
EXIT	Exits the WRR Backup monitoring prompt and returns to the general monitoring prompt (+).

2.1. ? (HELP)

The **?** (HELP) command lists all the valid commands for the level. You can also use this after a specific command to list its options.

Syntax:

```
WRR> ?
```

Example:

```
WRR> ?
LIST
EXIT
WRR>
```

2.2. LIST

Through the **LIST** command you can view all the information relative to the WRR Backup, statistics etc.

a) ALL

Displays all the available information in monitoring.
The meaning of the various parts is detailed in the description of the specifically associated commands.

Syntax:

```
WRR> LIST ALL
```

Example:

```
WRR> LIST ALL

Global information:
-------------------
Backup-WRR is enabled.
Default First Stabilization Time: 1 (seconds)
Default Stabilization Time:       1 (seconds)

Per pair information:
---------------------
Primary                  Secondary   Re-route   T.1st T     Last      Num   Num
Net Subnet      Descrip  Net Descrip Enabled    State Stab  Event     Act   Inact
---------------------- ---------- ---------- ----- ----- --------- ----- -----
1   16          FR/0     6   PPP/0   Yes        1     1     PriDwn    2     2

Per secondary current status:
-----------------------------
Secondary   Re-route   C.1st C     NºCir Current
Net Descrip State      Stab  Stab  InBUp Duration
----------- ---------- ----- ----- ----- ---------------
6   PPP/0   Alt        0     0     1            13:46:20

Statistics summarized:
----------------------
Total number of times alt state is reached:      2
Total number of times alt->dir state is reached: 1
Total number of times dir state is reached:      2
Total number of times dir->alt state is reached: 2
Longest completed WRR backup process:           0:12:34
Accumulated amount of time doing WRR back-up:     0:12:34

Per secondary ifc statistics:
-----------------------------
Secondary   Num   Num   Num   Num   Current         Accumulated     Longest
Net Descrip Dir   D->A  Alt   A->D  Duration        Duration        Duration
----------- ----- ----- ----- ----- --------------- --------------- ---------------
6   PPP/0   2     2     2     1           13:46:20         0:12:34         0:12:34
WRR>
```

b) COUNTERS

Displays the different statistics. The association secondary links or a summary of all the WRR Backup in general.

• LIST COUNTERS SECONDARY-IFCS

Displays the statistics of each interface configured as a secondary link.

Syntax:

```
WRR> LIST COUNTERS SECONDARY-IFCS
```

Example:

```
WRR> LIST COUNTERS SECONDARY-IFCS

Per secondary ifc statistics:
-----------------------------
Secondary   Num   Num   Num   Num   Current         Accumulated     Longest
Net Descrip Dir   D->A  Alt   A->D  Duration        Duration        Duration
----------- ----- ----- ----- ----- --------------- --------------- ---------------
6   PPP/0   2     2     2     1           14:06:49         0:12:34         0:12:34
WRR>
```

The meaning of each field is as follows:

Secondary Net / Descript	Interface number (ifc) and description of the type of the secondary link interface.
Num Dir	Number of times that the backup has passed to a "Direct" state.
Num D->A	Number of times that the backup has passed to a "Direct→Alternative" state.
Num Alt	Number of times that the backup has passed to an "Alternative" state.
Num A->D	Number of times that the backup has passed to a "Alternative→Direct" state.
Current Duration	Current rerouting process time.
Accumulated Duration	Accumulated rerouting process time.
Longest Duration	Maximum rerouting process time.

- *SUMMARY*

Displays the counters relevant to the state changes in the associations and the duration of the WRR rerouting Backup.

Syntax:

```
WRR> LIST COUNTERS SUMMARY
```

Example:

```
WRR> LIST COUNTERS SUMMARY

Statistics summarized:
----------------------
Total number of times alt state is reached:      2
Total number of times alt->dir state is reached: 1
Total number of times dir state is reached:      2
Total number of times dir->alt state is reached: 2
Longest completed WRR backup process:           0:12:34
Accumulated amount of time doing WRR back-up:     0:12:34
WRR>
```

c) STATES-SECONDARY-IFCs

Displays the various secondary link states.

Syntax:

```
WRR> LIST STATES-SECONDARY-IFCs
```

Example:

```
WRR> LIST STATES-SECONDARY-IFCs

Per secondary current status:
-----------------------------
Secondary   Re-route   C.1st C     NºCir Current
Net Descrip State      Stab  Stab  InBUp Duration
----------- ---------- ----- ----- ----- ---------------
0   Eth/0   Ini        0     0     0             0:00:00
6   PPP/0   Alt        0     0     1            14:17:10
WRR>
```

The meaning of each field is as follows:

Secondary Net / Descript	Interface number (ifc) and description of the type of the secondary link interface.
Re-route State	State of secondary link (In Chapter **1**, section **2.3.c** the states which they can appear in can be found).
C.1st Stab	Remaining time for switch to backup.
C Stab	Remaining time for backup recovery.
Nº Cir InBUp	Number of primary links associated in backup.
Current Duration	Current time in backup.

d) PAIRS

Displays the global information and data relative to the associations.

Syntax:

```
WRR> LIST PAIRS
```

Example:

```
WRR> LIST PAIRS

Global information:
-------------------
Backup-WRR is enabled.
Default First Stabilization Time: 1 (seconds)
Default Stabilization Time:       1 (seconds)

Per pair information:
---------------------
Primary                 Secondary   Re-route   T.1st T     Last      Num   Num
Net Subnet      Descrip Net Descrip Enabled    Stab  Stab  Event     Act   Inact
----------------------- ----------- ---------- ----- ----- --------- ----- -----
1   16          FR/0    6   PPP/0   Yes        1     1     PriDwn    2     2
1   17          FR/0    0   Eth/0   Yes        2     2     Unk       0     0
WRR>
```

The meaning of the fields is as follows:

Default Stabilization Time	Default Stabilization Time.
Default First Stabilization Time	Default First Stabilization Time.
Primary Net / Subnet / Descrip	Interface number (ifc), subinterface and description of the type of the primary link interface.
Secondary Net / Descrip	Interface number (ifc) and description of the type of the secondary link interface.
Re-route Enabled	Indicates if the association is enabled (YES) or disabled (NO) in order to carry out backup.
T.1st Stab	First Stabilization Time.
T Stab	Stabilization Time.
Last Event	The last event provoked by the primary interface. (In Chapter **1**, section **2.3.b**, all the distinct events that can be produced appear).
Num Act	Number of times that a primary link has activated.
Num Inact	Number of times that a primary link has gone down, has deactivated.

2.3. EXIT

Exits the WRR Backup monitoring prompt.

Syntax:

```
WRR> EXIT
```

Example:

```
WRR> EXIT
+
```

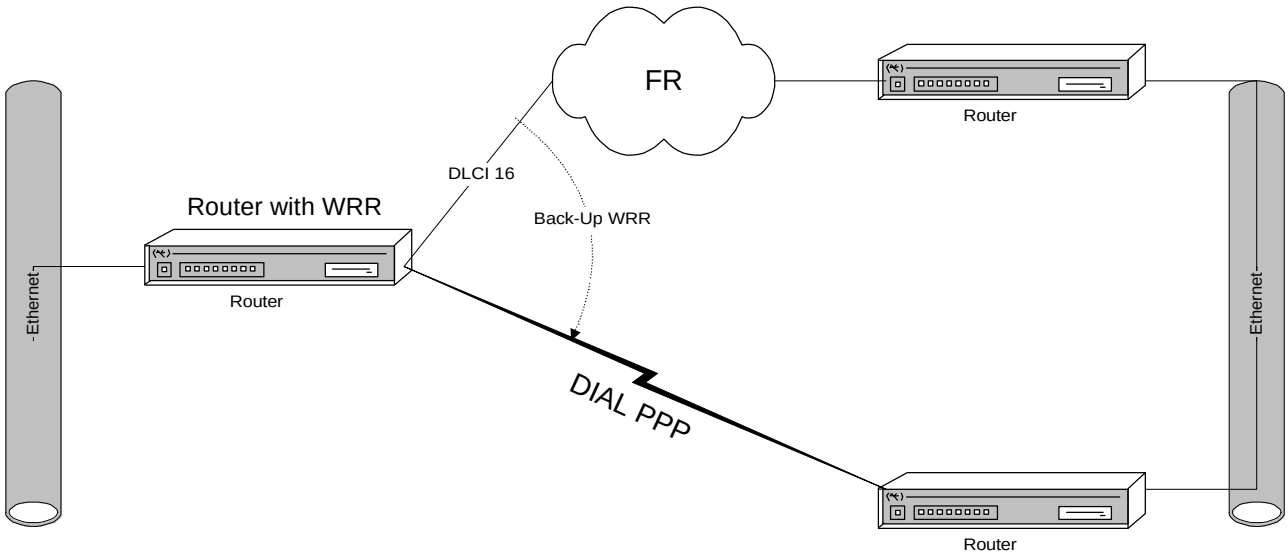
Chapter 4
Practical example of WRR Backup Configuration

1. WRR Backup Configuration Example

The steps to follow in order to configure the case given in chapter **1** are shown below.

The functional environment consists of:

- A device where you configure the WRR feature with an association and where the primary link is a dlci (16) and the secondary a Dial-PPP channel.
- A device at the remote end for the FR link.
- A device functioning as a PPP server.



Supposing you wish to establish backup through WRR as indicated in the figure; when the Frame Relay DLCI 16 interface goes down, the Dial-PPP link activates establishing the call etc., until the DLCI recovers. The backup call is then released deactivating the Dial PPP link.

In order to achieve this, you must configure the Frame Relay interface with a PVC in the router and the necessary parameters in the DLCI 16 and the Dial PPP interface. For further information on configuring these interfaces, please consult manuals *Dm510-I "PPP Interface"*, *Dm503-I "Frame Relay"* and/or *Dm523-I "Fr Interfaces over ISDN"*.

Supposing you have both interfaces configured in the router. You can check if these are present in the interface list:

```
*PROCESS 4

Config> LIST DEVICES

Con    Ifc Type of interface                  CSR     CSR2  int
---      7 Router->Node                         0             0
---      8 Node->Router                         0             0
ISDN 1   3 ISDN                            F001640  F000E00   9C
ISDN 1   5 B channel: FR                       0             0
ISDN 1   9 ISDN D channel: X25             A000000           1B
ISDN 2   4 ISDN                            F001660  F000F00   9B
ISDN 2   6 B channel: PPP                      0             0
ISDN 2  10 ISDN D channel: X25             A200000           1B
LAN      0 Ethernet                        9000000           1C
WAN1     1 Frame Relay                     F001600  F000C00   9E
WAN2     2 Frame Relay                     F001620  F000D00   9D
Config>
```

Supposing you wish to establish WRR backup of the Frame Relay interface DLCI 16 configured in the WAN line 1 (interface 1) over the Dial PPP interface that has already been configured over an ISDN line B channel (interface 6).

Enter the following to access the WRR Backup configuration menu:

```
Config> FEATURE WRR-BACKUP-WAN

WAN Reroute Backup User Configuration
Backup WRR>
```

Enable the WRR Backup:

```
Backup WRR> ENABLE WRR
Backup WRR>
```

You need to create the association between the required interfaces, establishing the default parameters for the timers:

```
Backup WRR> ADD PAIR
Primary Interface: [0]? 1
Primary Subinterface: ? 16
Secondary Interface: [0]? 6
First stabilization time: [-1]?
Stabilization time: [-1]?
Backup WRR>
```

You can now check that the association has been correctly created by viewing the associations' list:

```
Backup WRR> LIST
Backup-WRR is enabled.
Default First Stabilization Time: 1 (seconds)
Default Stabilization Time:       1 (seconds)

Primary                 Secondary   Re-route   T.1st  T
Net Subnet      Descrip Net Descrip Enabled    Stab   Stab
----------------------- ----------- ---------- -----  -----
1   16          FR/0    6   PPP/0   Yes        Def    Def
Backup WRR>
```

Now you can save the configuration and restart the router so the changes take affect and the WRR Backup is operating as configured.

You need to return to the general configuration prompt and save the configuration.

```
Backup WRR> EXIT
Config> SAVE
Save configuration [n]? y

Saving configuration...OK
Config>
```

Press Control-P in order to access the Console Management (*), and once there restart the router:

```
Config>                                                    (Enter Control-P)
*RESTART
Are you sure to restart the system?(Yes/No)? y
Disk configuration read
Initializing



Teldat               (c)1996,97,98,99

Router model NUCLEOX-PLUS  CPU M68360      S/N: xxxx/xxxxx
1 LAN, 6 WAN Lines, 2 ISDN Lines


*
```