D-Link®

Маршрутизаторы.
Интерфейс командной строки.

RECYCLABLE

Оглавление

1. Начальные сведения

1.1 Описание

В этом разделе описываются необходимые сведения для начального конфигурирования маршрутизатора, такие как принципы нумерации портов и начальные сведения об интерфейсе командной строки.

1.2 Нумерация портов

❈ Номер порта маршрутизатора формируется из типа интерфейса, номера слота и номера порта на слоте по форме <тип><слот>/<порт>. Следующая таблица иллюстрирует соответствие типов интерфейсов и их названий:

Тип интерфейса	Полное название	Краткое название
Serial Port	Serial	s
Synchronous Port	Serial	s
Asynchronous Port/Aux	Async	a
10M Ethernet	Ethernet	e
100M Fast Ethernet	Fast Ethernet	f
ISDN BRI	BRI	b
E1(ISDN PRI)	Serial	s

❈ Номер слота расширения формируется по принципу справа-налево снизу-вверх начиная с 1. Номер слота для фиксированных портов -- 0. Слоты нумеруются вне зависимости от типа устанавливаемого модуля расширения.

❈ Порты нумеруются справа налево, начиная с 0 для каждого слота. Если на модуле расширения присутствует всего один порт, то он имеет номер 0.

Модель	Порт	Номер порта
DI-1750	Фиксированный порт10/100M Ethernet	FastEthernet0/0
	Фиксированный порт Aux	Async0/0
	Слоты расширения	Справа налево слот 1-2
DI-2630	Слоты расширения	Нижний ряд: справа налево слот 1-2 Верхний ряд: справа налево слот 3-4
	Фиксированный порт10/100M Ethernet	FastEthernet0/0
	Фиксированный порт Aux	Async0/0
DI-3660	Фиксированный порт Aux	Async0/0
	Слоты расширения	Нижний ряд: справа налево слоты 1-2 Средний ряд: справа налево слоты 3-4 Верхний ряд: справа налево слоты 5-6

1.3 Конфигурация консольного порта

Первоначальная конфигурация маршрутизатора возможна только с порта консоли. Маршрутизаторы D-Link DI-1750, DI-2630 & DI-3660 поставляются с консольным портом со скоростью передачи от 1200 бод до 115200 бод и стандартным разъемом RJ45. Поставляемый в

комплекте с маршрутизатором кабель DRC-0001 может быть использован для подключения к терминалу типа VT-100 или COM-порту компьютера. Используйте программу эмуляции терминала (такую, как Windows Hyper terminal) для подключения к устройству.

Перед тем как включить Ваш маршрутизатор, подключите кабель между консольным портом маршрутизатора D-Link и терминалом или COM-портом компьютера.

Запустите программу эмуляции терминала (Windows HyperTerminal)

Выберите COM-порт, к которому подключен консольный кабель DCR-0001:

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Установите параметры соединения следующим образом: скорость передачи 9600 бод, 8 бит, 1 стоп-бит, без контроля четности, без контроля потока:

Включите маршрутизатор. Вы увидите сообщение об инициализации:

После того, как маршрутизатор загрузит D-Link IOS, на консоли появится приветствие и приглашение:

1.4 Справка

Для получения оперативной справки по командам введите ?

- · Введите ? для вывода спска доступных команд

  `Router>?`
- · Нажмите пробел для продолжения списка, любую клавишу для выхода из справки.

1.5 Режимы

Пользовательский интерфейс маршрутизатора включает несколько режимов, позволяющих выполнять определенные действия и имеющие соответствующий набор команд. Нижеследующая таблица иллюстрирует   основные режимы:

Режим	Метод входа	Приглашение	Метод выхода
Системный монитор	Включите маршрутизатор и нажмите Ctrl+Break на консоли	monitor#	командой *quit*
Режим пользователя	Регистрация	Router>	команда *exit* или *quit*
Привилегированный режим	Команда "enter" в режиме пользователя	Router#	команда *exit* или *quit*
Режим конфигурирования	Команда "config" в привилегированном режиме	Router_config#	команда *exit* или *quit* или Ctrl-Z

Каждый режим имеет специфическое подмножество команд. Если у Вас не получается ввести команду проверьте приглашение или введите ? для получения списка доступных команд.

Пример (обратите внимание на приглашение):

```
Router> enter
Password: <enter password>
Router# config
Router_config# config_interface f0/0
Router_config_f0/0#  config-ip address 192.168.1.1 255.255.255.0
Router_config_f0/0# exit
Router_config# exit
Router# exit
Router>
```

1.6 Отмена команды

Для отмены произведимого командой действия добавьте no перед командой. Например:

```
Router_config# no config-ip route
```

1.7 Сохранение конфигурации

Сделанные конфигурационные изменения хранятся в оперативной памяти устройства. Чтобы сохранить их в постоянной памяти введите команду write в привилегированном или конфигурационном режиме.

```
Router#write
Saving current configuration...
OK!
Router#
```

Примечание: несохраненные изменения теряются при выключении питания или перезагрузке маршрутизатора.
Во избежание повреждения устройства не выключайте маршрутизатор во время записи конфигурации!

1.8 Обновление IOS(Firmware):

Обновление IOS может быть загружено с сервера TFTP.

Для обновления подключите консольный кабель к маршрутизатору и включите маршрутизатор.
Вы увидите следующее сообщение:

```
System Bootstrap, Version 0.2.3
Serial num:D302131000003, ID num:000755
Copyright (c) 2002 D-Link Corporation. DI-2630 Processor MPC860T @ 50Mhz The
current time: 2003-5-21 11:46:48
Please wait system check ram... Check ram OK
```

Нажмите Ctrl+Break чтобы войти в режим монитора.

```
Welcome to DI Multi-Protocol 2630 Series Router


monitor#
monitor#config
monitor_config#config-interface f0/0
monitor_config_f0/0#config-ip address 192.168.200.197 255.255.255.0
monitor_config_f0/0#exit
monitor_config#exit
monitor#copy tftp flash:
Source file name[]?DI-2630-1.3.1CF.bin
Remote-server ip address[]?192.168.200.194
Destination file name[DI-2630-1.3.1CF.bin]?
################################################################################
##################
################################################################################
##################
################################################################################
##################
################################################################################
##################
################################################################################
##################
################################################################################
##################
################
TFTP:successfully receive 9505 blocks ,4866266 bytes
monitor#
monitor#reboot
Do you want to reboot the router(y/n)?y
Please wait..

System Bootstrap, Version 0.2.3
Serial num:D302131000003, ID num:000755
Copyright (c) 2002 D-Link Corporation.

DI-2630 Processor MPC860T @ 50Mhz
The current time: 2003-5-21 11:41:42
Loading DI-2630-1.3.1CF.bin......
Start Decompress DI-2630-1.3.1CF.bin
```

В этих сообщениях выводится имя файла с обновленным программным обеспечением

```
################################################################################
```

```
##################
####################################################################
##################
####################################################################
##################
####################################################################
##################
####################################################################
##################
####################################################################
##################
####################################################################
##################
##################################################
 Decompress 4864154 byte,Please wait system up..


D-Link Internetwork Operating System Software
DI-2630 Series Software , Version 1.3.1L, RELEASE SOFTWARE System start up OK


Router console 0 is now available


Press RETURN to get started


2003-5-21 11:45:51 Router System started --
2003-5-21 11:45:51 Line on Interface Serial1/0, changed state to down
2003-5-21 11:45:51 Line on Interface Async0/0, changed state to down
2003-5-21 11:45:51 Line on Interface Serial1/0, changed state to down
2003-5-21 11:45:51 Line protocol on Interface FastEthernet0/0, changed state to up


Welcome to DI Multi-Protocol 2630 Series Router
Router>enter
Password:
Router#
```

1.9 Назначение пароля привелигированного режима

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>enter
Router#config
Router_config#enable password dlink
Router_config#wr
Saving current configuration...
OK!
Router_config#exit
Router#
```

2. Примеры конфигураций

2.1 SLIP на асинхронном интерфейсе, маршрутизация по RIP :

Примечание: использование протокола SLIP возможно только в асинхронном режиме работы порта!
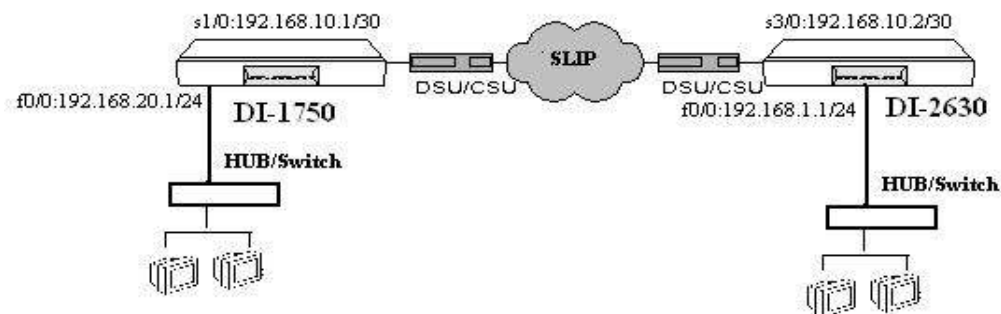
Конфигурация DI-1750:	**Конфигурация DI-2630:**

```
 Welcome to DI Multi-Protocol 1750 Series Router

DI1750>enter

DI1750#disp run

Building configuration...

Current configuration:

!version 1.3.1D

service timestamps log date

service timestamps debug date

no service password-encryption

!

hostname DI1750

!

config-interface FastEthernet0/0

 config-ip address 192.168.20.1 255.255.255.0

 no config-ip directed-broadcast

!

config-interface Serial1/0

 set-phy-layer mode async

 config-ip address 192.168.10.1 255.255.255.252

 no config-ip directed-broadcast

 config-encap slip

 set-phy-layer speed 38400

!

config-interface Async0/0

 no config-ip address

 no config-ip directed-broadcast

!

config-router rip

 config-network 192.168.10.0 255.255.255.252

 config-network 192.168.20.0 255.255.255.0

config-neighbor  192.168.10.2

! DI1750#
```

```
  Welcome to DI Multi-Protocol 2630 Series Router

DI2630>enter

DI2630#disp run

Building configuration...

Current configuration:

!version 1.3.1D

service timestamps log date

service timestamps debug date no

service password-encryption

!

hostname DI2630

!

config-interface FastEthernet0/0

 config-ip address 192.168.1.1 255.255.255.0

 no config-ip directed-broadcast

!

config-interface Serial3/0

 set-phy-layer mode async

 config-ip address 192.168.10.2 255.255.255.252

 no config-ip directed-broadcast

 config-encap slip

 set-phy-layer speed 38400

!

config-interface Async0/0

 no config-ip address

 no config-ip directed-broadcast

!

config-router rip

config-network 192.168.1.0 255.255.255.0

config-network 192.168.10.0 255.255.255.252

config-neighbor  192.168.10.2

! DI2630#
```

2.2 SLIP на асинхронном интерфейсе, маршрутизация статическая:

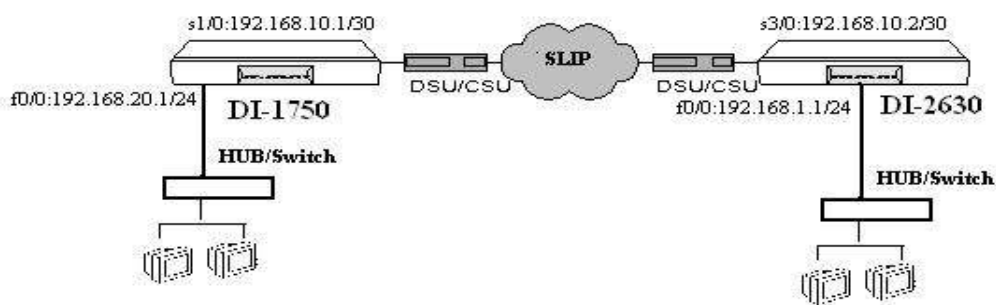Примечание: использование протокола SLIP возможно только в асинхронном режиме работы порта!

Конфигурация DI-1750:

```
 Welcome to DI Multi-Protocol 1750 Series Router
DI1750>enter DI1750#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
hostname DI1750
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 set-phy-layer mode async
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap slip
 set-phy-layer speed 38400
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.1.0 255.255.255.0 192.168.10.2
! DI1750#
```

Конфигурация DI-2630:

```
   Welcome to DI Multi-Protocol 2630 Series Router
DI2630>enter DI2630#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date no
service password-encryption
!
hostname DI2630
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 set-phy-layer mode async
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
 config-encap slip
 set-phy-layer speed 38400
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.20.0 255.255.255.0
192.168.10.1
!
DI2630#
```

2.3 PPP на асинхронном интерфейсе, маршрутизация по RIP :

Конфигурация DI-1750:

```
 Welcome to DI Multi-Protocol 1750 Series Router
DI1750>enter
DI1750#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
hostname DI1750
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 set-phy-layer mode async
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap ppp
 set-phy-layer speed 38400
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router rip
 config-network 192.168.10.0 255.255.255.252
 config-network 192.168.20.0 255.255.255.0
config-neighbor  192.168.10.2
!
DI1750#
```
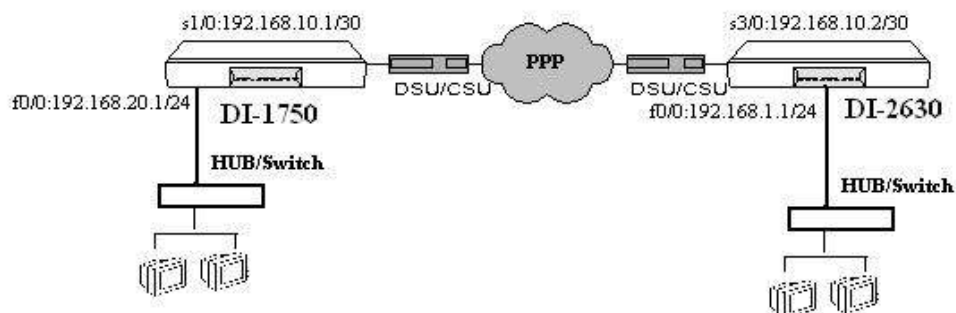
Конфигурация DI-2630:

```
   Welcome to DI Multi-Protocol 2630 Series Router
DI2630>enter
DI2630#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
hostname DI2630
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 set-phy-layer mode async
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
 config-encap ppp
 set-phy-layer speed 38400
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router rip
 config-network 192.168.1.0 255.255.255.0
 config-network 192.168.10.0 255.255.255.252
config-neighbor  192.168.10.1
! DI2630#
```

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2.4 PPP на синхронном интерфейсе, маршрутизация по RIP :

Конфигурация DI-1750:

```
Welcome to DI Multi-Protocol 1750 Series Router
DI1750>enter
DI1750#display  run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
hostname DI1750
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router rip
 config-network 192.168.20.0 255.255.255.0
 config-network 192.168.10.0 255.255.255.252
config-neighbor 192.168.10.2
!
DI1750#
```
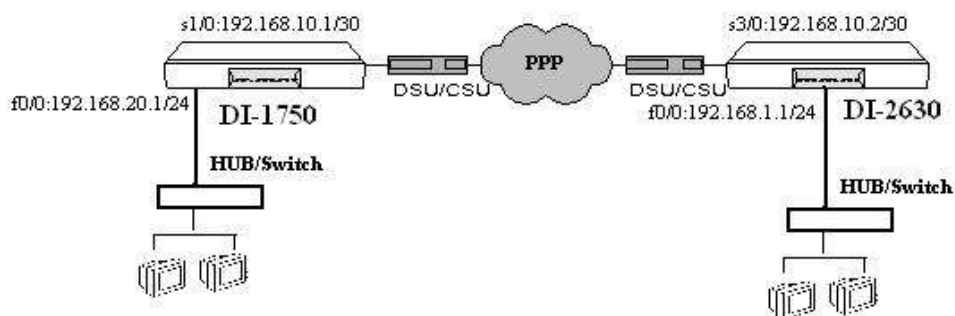
Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
DI2630>enter
DI2630#display run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
hostname DI2630
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast

config-router rip
 config-network 192.168.1.0 255.255.255.0
 config-network 192.168.10.0 255.255.255.252
config-neighbor 192.168.10.1
!
DI2630#
```

2.5 PPP на синхронном интерфейсе, маршрутизация статическая:

Конфигурация DI-1750:

```
Welcome to DI Multi-Protocol 1750 Series Router
DI1750>enter
DI1750#display  run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
hostname DI1750
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.1.0 255.255.255.0 192.168.10.2
!
DI1750#
```
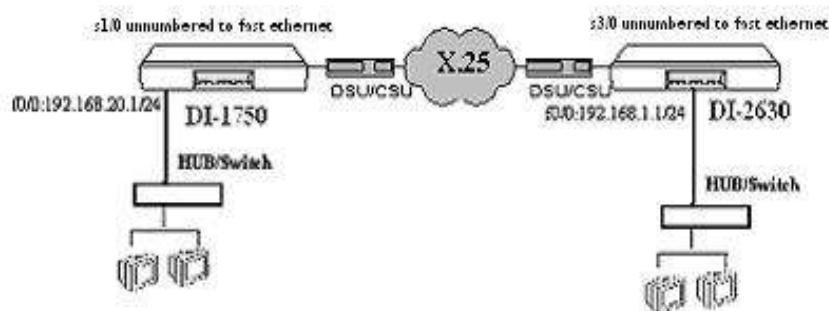
Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
DI2630>enter
DI2630#display run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
hostname DI2630
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.20.0 255.255.255.0
192.168.10.2
!
DI2630#
```

Интерфейс командной строки.

2.6 PPP на синхронном интерфейсе без назначения IP, маршрутизация по RIP:

Конфигурация DI-1750:

```
Welcome to DI Multi-Protocol 1750 Series Router
Router>ent
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-isdn switch-type basic-5ess
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip unnumbered FastEthernet0/0
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router rip
config-network 192.168.20.0  255.255.255.0
!
Router#
```
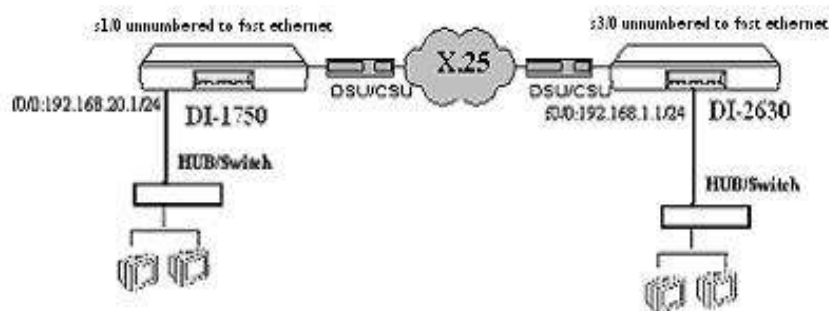
Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>enter
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1C
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-isdn switch-type basic-5ess
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 config-ip unnumbered FastEthernet0/0
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router rip
 config-network 192.168.1.0
!
Router#
```

2.7 PPP на синхронном интерфейсе без назначения IP, маршрутизация статическая:

Конфигурация DI-1750:	**Конфигурация DI-2630:**

```
Welcome to DI Multi-Protocol 1750 Series Router
Router>ent
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-isdn switch-type basic-5ess
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip unnumbered FastEthernet0/0
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.1.0 255.255.255.0  s1/0
!
Router#
```

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>enter
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1C
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-isdn switch-type basic-5ess
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 config-ip unnumbered FastEthernet0/0
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.20.0 255.255.255.0  s3/0
! Router#
```

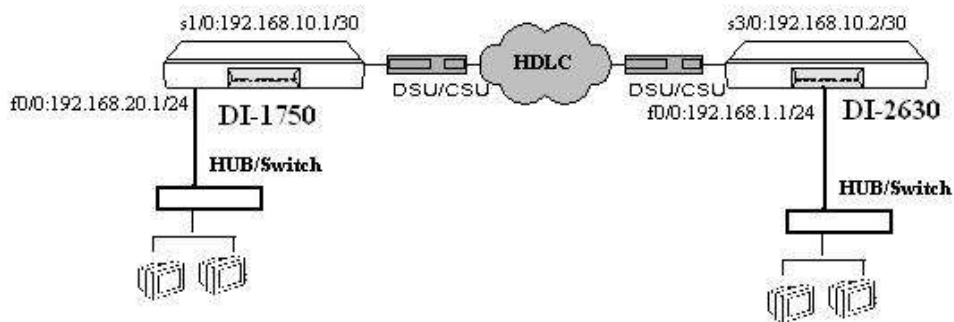## 2.8 HDLC на синхронном интерфейсе, маршрутизация по RIP:

Конфигурация DI-1750:

```
Welcome to DI Multi-Protocol 1750 Series Router
DI1750>enter
DI1750#display  run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
hostname DI1750
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap HDLC
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router rip
 config-network 192.168.20.0 255.255.255.0
 config-network 192.168.10.0 255.255.255.252
config-neighbor 192.168.10.2
!
DI1750#
```

Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
DI2630>enter
DI2630#display run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
hostname DI2630
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
 config-encap HDLC
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast

config-router rip
 config-network 192.168.1.0 255.255.255.0
 config-network 192.168.10.0 255.255.255.252
config-neighbor 192.168.10.1
!
DI2630#
```

2.9 HDLC на синхронном интерфейсе, маршрутизация статическая:

Конфигурация DI-1750:

```
Welcome to DI Multi-Protocol 1750 Series Router
DI1750>enter
DI1750#display  run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
hostname DI1750
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap HDLC
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.1.0 255.255.255.0 192.168.10.2
!
DI1750#
```
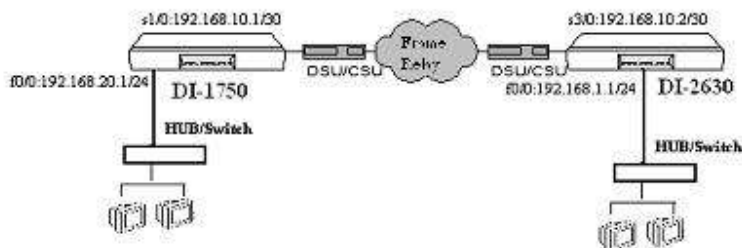
Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
DI2630>enter
DI2630#display run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
hostname DI2630
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
 config-encap HDLC
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.20.0 255.255.255.0
192.168.10.1
!
DI2630#
```

2.10 Frame Relay на синхронном интерфейсе, маршрутизация по RIP:

Конфигурация DI-1750:

```
Welcome to DI Multi-Protocol  1750 Series Router
Router>enter
Router#display run
Building configuration...
Current configuration:
!
version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap frame-relay
 config-fr local-dlci 16
 config-fr map 192.168.10.2 pvc 16
 config-fr lmi-type ansi
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router rip
 config-network 192.168.20.0 255.255.255.0
 config-network 192.168.10.0 255.255.255.0
 config-neighbor 192.168.10.2
!
Router#
```

Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>ent
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
 config-encap frame-relay
 config-fr local-dlci 16
 config-fr map 192.1681.0.1 pvc 16
 config-fr intf-type dce
 config-fr lmi-type ansi
 set-phy-layer speed 64000
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router rip
 config-network 192.168.1.0
 config-network 192.168.10.0
 config-neighbor 192.168.10.1
!
Router#
```

DI-1750 Interface Information

```
Router#display int s1/0
Serial1/0 is up, line protocol is up
 Mode=Sync DTE
  DTR=UP,DSR=UP,RTS=UP,CTS=UP,DCD=UP
  Interface address is 192.168.10.1/30
  MTU 1500 bytes, BW 64 kbit, DLY 2000 usec
  Encapsulation Frame-relay, loopback not set
  Keepalive set(10 sec)
  FrameRelay DTE, LMI type is ANSI, LMI DLCI 0
  LMI DTE Link Errors 2, Protocol Errors 0, Inactives
0
    T391 10, N391 6, N392 3, N393 4
  Recvd Octets 6237, Recvd Frames 103, Recvd Discards
0
  Sent Octets 5080, Sent Frames 88, Sent Discards 1
  Recvd Errors 0, Sent Errors 0, Recvd Unknowns 0
  60 second input rate 674 bits/sec, 1 packets/sec!
  60 second output rate 528 bits/sec, 1 packets/sec!
    103 packets input, 6443 bytes, 7 unused_rx, 0 no
buffer
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0
ignored, 0 abort
    88 packets output, 5414 bytes, 8 unused_tx, 0
underruns
  error:
    0 clock, 0 grace
  PowerQUICC SCC specific errors:
    0 recv allocb mblk fail     0 recv no buffer
    0 transmitter queue full    0 transmitter
hwqueue_full
Router#display fra
              Frame Relay/IP state
  Serial1/0        UP
================================================
  Port           DLCI    State       remote IP
local IP             Type
================================================
  Serial1/0       16    ACTIVE    192.168.10.2
192.168.10.1      M
```
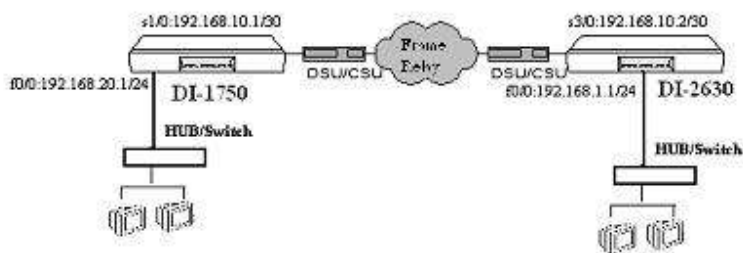
DI-2630 Interface Information

```
Router#disp int s3/0
Serial3/0 is up, line protocol is up
 Mode=Sync DCE Speed=64000
  DTR=UP,DSR=UP,RTS=UP,CTS=UP,DCD=UP
  Interface address is 192.168.10.2/30
  MTU 1500 bytes, BW 64 kbit, DLY 2000 usec
  Encapsulation Frame-relay, loopback not set
  Keepalive set(10 sec)
  FrameRelay DCE, LMI type is ANSI, LMI DLCI 0
  LMI DCE Link Errors 0, Protocol Errors 0, Inactives
0
    T392 15, N392 3, N393 4
  Recvd Octets 227451, Recvd Frames 3707, Recvd
Discards 0
  Sent Octets 220801, Sent Frames 3691, Sent Discards
0
  Recvd Errors 0, Sent Errors 0, Recvd Unknowns 0
  60 second input rate 1126 bits/sec, 2 packets/sec!
  60 second output rate 1127 bits/sec, 2 packets/sec!
    3708 packets input, 234881 bytes, 8 unused_rx, 0
no buffer
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0
ignored, 0 abort
    3691 packets output, 235211 bytes, 8 unused_tx, 0
underruns
  error:
    0 clock, 0 grace
  PowerQUICC SCC specific errors:
    0 recv allocb mblk fail     0 recv no buffer
    0 transmitter queue full    0 transmitter
hwqueue_full
Router#disp frame
              Frame Relay/IP state
  Serial3/0        UP
================================================
  Port           DLCI    State       remote IP
local IP         Type
================================================
  Serial3/0       16    ACTIVE    192.168.10.1
192.168.10.2      M
```

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2.11 Frame Relay на синхронном интерфейсе, маршрутизация статическая:

Конфигурация DI-1750:

```
Welcome to DI-Mutil-Protocol 1750 Series Router
Router>enter
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap frame-relay
 config-fr local-dlci 16
 config-fr map 192.168.10.2 pvc 16
 config-fr lmi-type ansi
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.1.0 255.255.255.0 192.168.10.2
!
Router#
```

Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>ent
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date no
service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
 config-encap frame-relay
 config-fr local-dlci 16
 config-fr map 192.168.10.1 pvc 16
 config-fr intf-type dce
 config-fr lmi-type ansi
 set-phy-layer speed 64000
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.20.0 255.255.255.0
192.168.10.1
!
Router#
```

DI-1750 Interface Information

```
Router#display int s1/0
Serial1/0 is up, line protocol is up
 Mode=Sync DTE
  DTR=UP,DSR=UP,RTS=UP,CTS=UP,DCD=UP
  Interface address is 192.168.10.1/30
  MTU 1500 bytes, BW 64 kbit, DLY 2000 usec
  Encapsulation Frame-relay, loopback not set
  Keepalive set(10 sec)
  FrameRelay DTE, LMI type is ANSI, LMI DLCI 0
  LMI DTE Link Errors 2, Protocol Errors 0, Inactives
0
    T391 10, N391 6, N392 3, N393 4
  Recvd Octets 6237, Recvd Frames 103, Recvd Discards
0
  Sent Octets 5080, Sent Frames 88, Sent Discards 1
  Recvd Errors 0, Sent Errors 0, Recvd Unknowns 0
  60 second input rate 674 bits/sec, 1 packets/sec!
  60 second output rate 528 bits/sec, 1 packets/sec!
    103 packets input, 6443 bytes, 7 unused_rx, 0 no
buffer
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0
ignored, 0 abort
    88 packets output, 5414 bytes, 8 unused_tx, 0
underruns
  error:
    0 clock, 0 grace
  PowerQUICC SCC specific errors:
    0 recv allocb mblk fail     0 recv no buffer
    0 transmitter queue full     0 transmitter
hwqueue_full
Router#display fra
              Frame Relay/IP state
  Serial1/0        UP
================================================
  Port           DLCI    State          remote IP
local IP        Type
================================================
  Serial1/0    16    ACTIVE    192.168.10.2
192.168.0.1      M
```
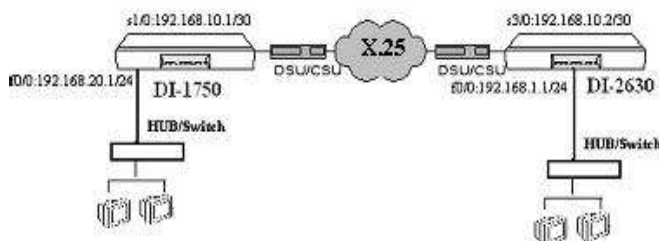
DI-2630 Interface Information

```
Router#disp int s3/0
Serial3/0 is up, line protocol is up
 Mode=Sync DCE Speed=64000
  DTR=UP,DSR=UP,RTS=UP,CTS=UP,DCD=UP
  Interface address is 192.168.10.2/30
  MTU 1500 bytes, BW 64 kbit, DLY 2000 usec
  Encapsulation Frame-relay, loopback not set
  Keepalive set(10 sec)
  FrameRelay DCE, LMI type is ANSI, LMI DLCI 0
  LMI DCE Link Errors 0, Protocol Errors 0, Inactives
0
    T392 15, N392 3, N393 4
  Recvd Octets 227451, Recvd Frames 3707, Recvd
Discards 0
  Sent Octets 220801, Sent Frames 3691, Sent Discards
0
  Recvd Errors 0, Sent Errors 0, Recvd Unknowns 0
  60 second input rate 1126 bits/sec, 2 packets/sec!
  60 second output rate 1127 bits/sec, 2 packets/sec!
    3708 packets input, 234881 bytes, 8 unused_rx, 0
no buffer
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0
ignored, 0 abort
    3691 packets output, 235211 bytes, 8 unused_tx, 0
underruns
  error:
    0 clock, 0 grace
  PowerQUICC SCC specific errors:
    0 recv allocb mblk fail     0 recv no buffer
    0 transmitter queue full     0 transmitter
hwqueue_full
Router#disp frame
              Frame Relay/IP state
  Serial3/0        UP
================================================
  Port           DLCI    State          remote IP
local IP        Type
================================================
  Serial3/0    16    ACTIVE    192.168.10.1
192.168.10.2      M
```

2.12 X.25 на синхронном интерфейсе, маршрутизация по RIP:

Конфигурация DI-1750:

```
Welcome to DI-Mutil-Protocol 1750 Series Router
Router>enter
Router#display run
Building configuration...
Current configuration:
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap x25
 config-x25 address 1111
 config-x25 map 192.168.10.2 svc 2222 broadcast
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router rip
 config-network 192.168.20.0 255.255.255.0
 config-network 192.168.10.0 255.255.255.252
 config-neighbor 192.168.10.2
!
x25switch destination default Serial1/0
!
Router#
```

Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>enter
Router#display run
Building configuration...
Current configuration:
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
 config-encap x25
 config-x25 address 2222
 config-x25 interface dce
 config-x25 map 192.168.10.1 svc 1111 broadcast
 set-phy-layer speed 64000
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router rip
 config-network 192.168.20.0 255.255.255.0
 config-network 192.168.10.0 255.255.255.252
 config-neighbor 192.168.10.1
!
x25switch destination default Serial3/0
!
Router#
```

DI-1750 Interface Information

```
Router#display int s1/0
Serial1/0 is up, line protocol is up
 Mode=Sync DTE
  DTR=UP,DSR=UP,RTS=UP,CTS=UP,DCD=UP
  Interface address is 192.168.10.1/30
  MTU 1500 bytes, BW 64 kbit, DLY 2000 usec
  Encapsulation X25, loopback not set
  LAPB DTE, module 8, k 7, N1 1500, N2 16, T1 3
    state EST, VS 7, VR 4, Remote VR 7
    IFRAMEs 9276/9287, RRs 9133/9210, RNRs 0/0, REJs
0/0
    FRMRs 0/0, SABMs 1/1, SABMEs 0/0
   UAs 0/1, DMs 0/0, DISCs 0/0
  X25  DTE, address 1111, modulo 8, I/O window size 2
2, packet size
128 128
    Virtual Circuits: One-way 0, Two-way 16, PVC 0,
SVC 16
  Timers: T20 180s, T21 200s, T22 180s, T23 180s, idle
  VC timeout
100s
    RESTARTs 1/1, RESTART CONFIRMs 0/0, DIAGs 0/0
    CALLs 0/1, CALL CONFIRMs 1/0, CLEARs 0/0,
CLEAR CONFIRMs 0/0
    DATAs 6123/6135, RRs 3151/3150, RNRs 0/0
    RESETs 0/0, RESET CONFIRMs 0/0, INTERRUPTs
0/0, INTERRUPT CONFIRMs 0/0
  60 second input rate 1704 bits/sec, 8 packets/sec!
  60 second output rate 1667 bits/sec, 8 packets/sec!
   18410 packets input, 472462 bytes, 6 unused_rx, 0
no buffer
   0 input errors, 0 CRC, 0 frame, 0 overrun, 0
ignored, 0 abort
   18499 packets output, 471408 bytes, 8 unused_tx, 0
underruns
   error:
   0 clock, 0 grace
  PowerQUICC SCC specific errors:
   0 recv allocb mblk fail    0 recv no buffer
   0 transmitter queue full   0 transmitter
hwqueue_full
!
Router#display x25 vc
                        X.25/IP state
   Serial1/0      UP
=================================================
 No. Port      VC  I/O    State    X.121 Address
IP Address     Flag
=================================================
1   Serial1/0  16  out    work     2222
192.168.10.2
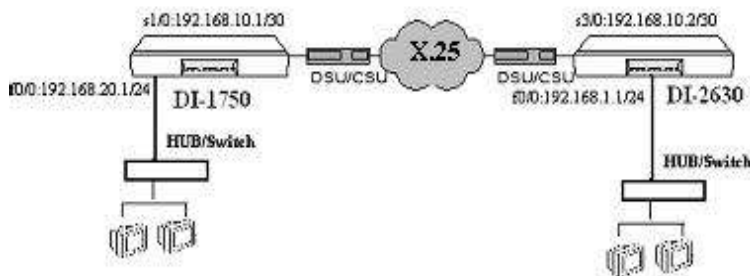```

## DI-2630 Interface Information

```
Router#display int s3/0
Serial3/0 is up, line protocol is up
 Mode=Sync DCE Speed=64000
  DTR=UP,DSR=UP,RTS=UP,CTS=UP,DCD=UP
  Interface address is 192.168.10.2/2
  MTU 1500 bytes, BW 64 kbit, DLY 2000 usec
  Encapsulation X25, loopback not set
  LAPB DCE, module 8, k 7, N1 1500, N2 16, T1 3
    state EST, VS 4, VR 6, Remote VR 4
    IFRAMEs 10214/10196, RRs 10129/10054, RNRs 0/0,
REJs 0/0
    FRMRs 0/0, SABMs 0/1, SABMEs 0/0
   UAs 1/0, DMs 0/0, DISCs 0/0
  X25  DCE, address 2222, modulo 8, I/O window size 2
2, packet size
128 128
    Virtual Circuits: One-way 0, Two-way 16, PVC 0,
SVC 16
  Timers: T10 60s, T11 180s, T12 60s, T13 60s, idle VC
  timeout
100s
    RESTARTs 1/1, RESTART CONFIRMs 0/0, DIAGs 0/0
    CALLs 1/0, CALL CONFIRMs 0/1, CLEARs 0/0,
CLEAR CONFIRMs 0/0
    DATAs 6740/6710, RRs 3472/3485, RNRs 0/0
    RESETs 0/0, RESET CONFIRMs 0/0, INTERRUPTs
0/0, INTERRUPT CONFIRMs 0/0
  60 second input rate 1800 bits/sec, 9 packets/sec!
  60 second output rate 1848 bits/sec, 9 packets/sec!
   20345 packets input, 516875 bytes, 3 unused_rx, 0
no buffer
   0 input errors, 0 CRC, 0 frame, 0 overrun, 0
ignored, 0 abort
   20251 packets output, 517982 bytes, 8 unused_tx, 0
underruns
   error:
   0 clock, 0 grace
  PowerQUICC SCC specific errors:
   0 recv allocb mblk fail    0 recv no buffer
   0 transmitter queue full   0 transmitter
hwqueue_full
!
Router#display x25 vc
                        X.25/IP state
   Serial3/0      UP
=================================================
 No. Port      VC  I/O    State    X.121 Address
IP Address     Flag
=================================================
 1   Serial3/0  16  in     work     1111
192.168.10.1
```

2.13 X.25 на синхронном интерфейсе, маршрутизация статическая:

Конфигурация DI-1750:

```
Welcome to DI-Mutil-Protocol 1750 Series Router
Router>enter
Router#display run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap x25
 config-x25 address 1111
 config-x25 map 192.168.10.2 svc 2222 broadcast
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.1.0 255.255.255.0 192.168.10.2
!
x25switch destination default Serial1/0
!
Router#
```

Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>enter
Router#display run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
 config-encap x25
 config-x25 address 2222
 config-x25 interface dce
 config-x25 map 192.168.10.1 svc 1111 broadcast
 set-phy-layer speed 64000
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
 config-ip route 192.168.2.0 255.255.255.0
192.168.10.1
!
x25switch destination default Serial3/0
!
Router#
```

DI-1750 Interface Information

```
Router#display int s1/0
Serial1/0 is up, line protocol is up
 Mode=Sync DTE
  DTR=UP,DSR=UP,RTS=UP,CTS=UP,DCD=UP
  Interface address is 192.168.10.1/30
  MTU 1500 bytes, BW 64 kbit, DLY 2000 usec
  Encapsulation X25, loopback not set
  LAPB DTE, module 8, k 7, N1 1500, N2 16, T1 3
    state EST, VS 7, VR 4, Remote VR 7
    IFRAMEs 9276/9287, RRs 9133/9210, RNRs 0/0, REJs
0/0
    FRMRs 0/0, SABMs 1/1, SABMEs 0/0
    UAs 0/1, DMs 0/0, DISCs 0/0
  X25  DTE, address 1111, modulo 8, I/O window size 2
2, packet size
128 128
    Virtual Circuits: One-way 0, Two-way 16, PVC 0,
SVC 16
  Timers: T20 180s, T21 200s, T22 180s, T23 180s, idle
  VC timeout
100s
    RESTARTs 1/1, RESTART CONFIRMs 0/0, DIAGs 0/0
    CALLs 0/1, CALL CONFIRMs 1/0, CLEARs 0/0,
CLEAR CONFIRMs 0/0
    DATAs 6123/6135, RRs 3151/3150, RNRs 0/0
    RESETs 0/0, RESET CONFIRMs 0/0, INTERRUPTs
0/0, INTERRUPT CONFIRMs 0/0
  60 second input rate 1704 bits/sec, 8 packets/sec!
  60 second output rate 1667 bits/sec, 8 packets/sec!
   18410 packets input, 472462 bytes, 6 unused_rx, 0
no buffer
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0
ignored, 0 abort
   18499 packets output, 471408 bytes, 8 unused_tx, 0
 underruns
  error:
    0 clock, 0 grace
  PowerQUICC SCC specific errors:
    0 recv allocb mblk fail      0 recv no buffer
    0 transmitter queue full     0 transmitter
hwqueue_full
!
Router#display x25 vc
                         X.25/IP state
   Serial1/0     UP
================================================
 No. Port         VC   I/O    State    X.121 Address
IP Address    Flag
================================================
1   Serial1/0    16   out    work     2222
192.168.10.2
```
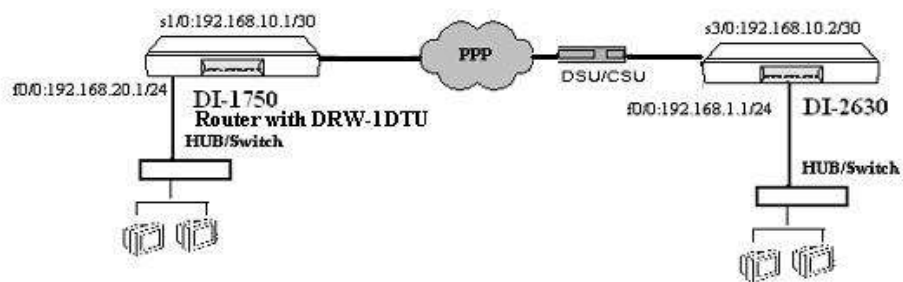
DI-2630 Interface Information

```
Router#display int s3/0
Serial3/0 is up, line protocol is up
 Mode=Sync DCE Speed=64000
  DTR=UP,DSR=UP,RTS=UP,CTS=UP,DCD=UP
  Interface address is 192.168.10.2/2
  MTU 1500 bytes, BW 64 kbit, DLY 2000 usec
  Encapsulation X25, loopback not set
  LAPB DCE, module 8, k 7, N1 1500, N2 16, T1 3
    state EST, VS 4, VR 6, Remote VR 4
    IFRAMEs 10214/10196, RRs 10129/10054, RNRs 0/0,
REJs 0/0
    FRMRs 0/0, SABMs 0/1, SABMEs 0/0
    UAs 1/0, DMs 0/0, DISCs 0/0
  X25  DCE, address 2222, modulo 8, I/O window size 2
2, packet size
128 128
    Virtual Circuits: One-way 0, Two-way 16, PVC 0,
SVC 16
  Timers: T10 60s, T11 180s, T12 60s, T13 60s, idle VC
  timeout
100s
    RESTARTs 1/1, RESTART CONFIRMs 0/0, DIAGs 0/0
    CALLs 1/0, CALL CONFIRMs 0/1, CLEARs 0/0,
CLEAR CONFIRMs 0/0
    DATAs 6740/6710, RRs 3472/3485, RNRs 0/0
    RESETs 0/0, RESET CONFIRMs 0/0, INTERRUPTs
0/0, INTERRUPT CONFIRMs 0/0
  60 second input rate 1800 bits/sec, 9 packets/sec!
  60 second output rate 1848 bits/sec, 9 packets/sec!
   20345 packets input, 516875 bytes, 3 unused_rx, 0
no buffer
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0
ignored, 0 abort
   20251 packets output, 517982 bytes, 8 unused_tx, 0
underruns
  error:
    0 clock, 0 grace
  PowerQUICC SCC specific errors:
    0 recv allocb mblk fail      0 recv no buffer
    0 transmitter queue full     0 transmitter
hwqueue_full
!
Router#display x25 vc
                         X.25/IP state
   Serial3/0     UP
================================================
 No. Port         VC   I/O    State    X.121 Address
IP Address    Flag
================================================
 1   Serial3/0    16   in     work     1111
192.168.10.1
```

2.14 HDLC на синхронном интерфейсе, маршрутизация по RIP с модулем 1DTU:
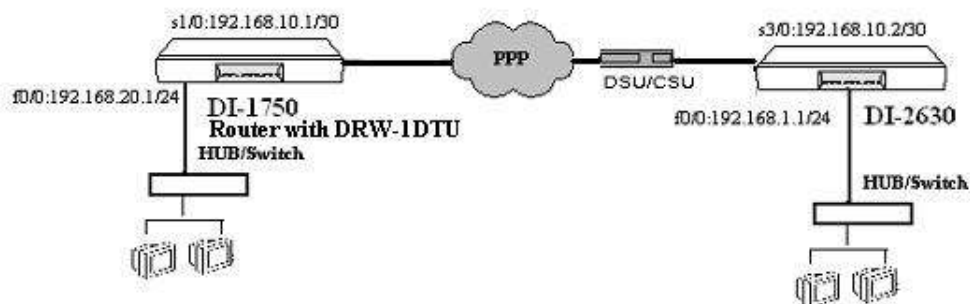

Конфигурация DI-1750:

```
Welcome to DI-Mutil-Protocol 1750 Series Router
Router>ent
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 no config-ip address
 no config-ip directed-broadcast
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-interface BM2/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 set-phy-layer speed 128000
 linemode lt
!
config-router rip
 config-network 192.168.10.0 255.255.255.252
 config-network 192.168.20.0 255.255.255.0
 config-neighbor 192.168.10.1
Router#
```
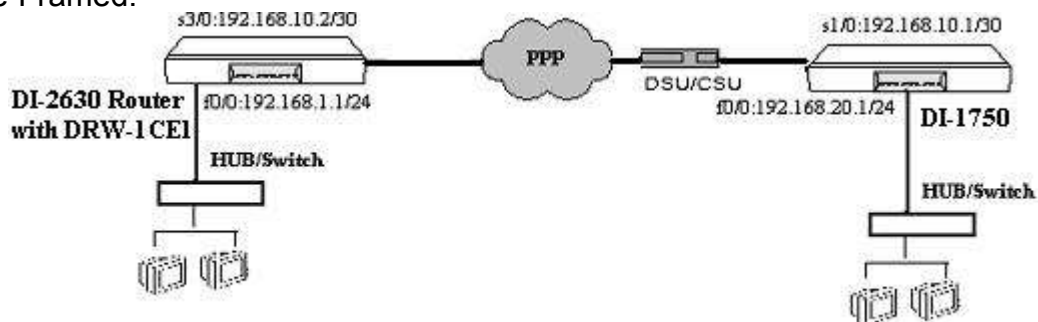
Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>ent
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Ethernet3/1
 no config-ip address
 no config-ip directed-broadcast
 duplex half
!
config-interface Serial3/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router rip
 config-network 192.168.10.0 255.255.255.252
 config-network 192.168.1.0 255.255.255.0
 config-neighbor 192.168.10.2
!
Router#
```

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2.15 PPP на синхронном интерфейсе, маршрутизация статическая, с модулем 1DTU:

Конфигурация DI-1750:

```
Welcome to DI-Multi-Protocol 1750 Series Router
Router>ent
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 no config-ip address
 no config-ip directed-broadcast
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-interface BM2/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 set-phy-layer speed 128000
 linemode lt
!
config-ip route 192.168.1.0 255.255.255.0 192.168.10.2
!
Router#
```
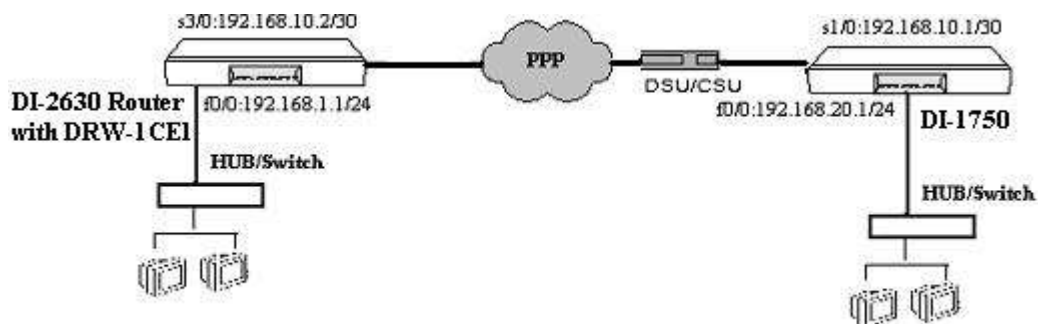
Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>ent
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Ethernet3/1
 no config-ip address
 no config-ip directed-broadcast
 duplex half
!
config-interface Serial3/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168..0 255.255.255.0 192.168.10.1
!
Router#
```

2.16 HDLC на синхронном интерфейсе, маршрутизация статическая, с модулем Channelized E1 в режиме Framed:

Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>ent
Router#disp run
Building configuration...
Current configuration:
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-controller E1 2/0
  config-framing NO-CRC4
  set-linecode hdb3
  channel 0
  timeslots 1-15
!
config-isdn switch-type basic-net3
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.252
 no config-ip directed-broadcast
!
config-interface Serial2/0:0
 config-ip address 192.168.10.2 255.255.255.0
 no config-ip directed-broadcast
 config-bw 960
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.2.0 255.255.255.0 192.168.10.1
!
Router#
```

Конфигурация DI-1750:

```
Welcome to DI-Mutil-Protocol 1750 Series Router
Router>enter
Router#display run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-bw 960
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.1.0 255.255.255.0 192.168.10.2
!
Router#
```
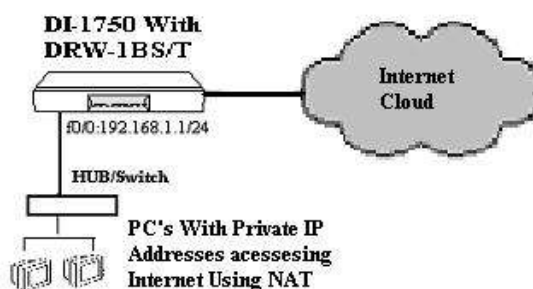
2.17 HDLC на синхронном интерфейсе, маршрутизация статическая, с модулем Channelized E1 в режиме UnFramed:

Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router

Router>ent

Router#disp run

Building configuration...

Current configuration:

!

!version 1.3.1D

service timestamps log date

service timestamps debug date

no service password-encryption

!

config-controller E1 2/0

 unframed

 set-linecode hdb3

!

config-isdn switch-type basic-net3

!

config-interface FastEthernet0/0

 config-ip address 192.168.1.1 255.255.255.0

 no config-ip directed-broadcast

!

config-interface Serial2/0:0

 config-ip address 192.168.10.2 255.255.255.252

 no config-ip directed-broadcast

 config-bw 2048

!

config-interface Async0/0

 no config-ip address

 no config-ip directed-broadcast

!

config-ip route 192.168.20.0 255.255.255.0
192.168.10.1

Router#
```

Конфигурация DI-1750:

```
Welcome to DI-Mutil-Protocol 1750 Series Router

Router>enter

Router#disp run

Building configuration...

Current configuration:

!

!version 1.3.1D

service timestamps log date

service timestamps debug date

no service password-encryption

!

config-interface FastEthernet0/0

 config-ip address 192.168.20.1 255.255.255.0

 no config-ip directed-broadcast

!

config-interface Serial1/0

 config-ip address 192.168.10.1 255.255.255.252

 no config-ip directed-broadcast

 config-bw 2048

!

config-interface Async0/0

 no config-ip address

 no config-ip directed-broadcast

!

config-ip route 192.168.1.0 255.255.255.0 192.168.10.2

!

Router#
```

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2.18 Доступ к интернет по ISDN, скорость 64 Кбит через модуль DRW-1BST, NAT:

Конфигурация DI-1750:

```
 Welcome to DI Multi-Protocol 1750 Series Router
Router>ent
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-isdn switch-type basic-net3
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
 config-ip nat inside
!
config-interface Serial1/0
 no config-ip address
 no config-ip directed-broadcast
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-interface BRI2/0
 config-ip address negotiated
 no config-ip directed-broadcast
 config-ppp pap sent-username dlinkind xxxxx--à ( ISP
password)
 config-bw 128
 set-dialer string 24339696
 set-dialer load-threshold 5 4
 config-ip nat outside
!
config-ip route default BRI2/0
!
config-ip access-list standard 1
 config-permit any
!
config-ip nat inside source list 1 interface BRI2/0
!
Router#
```
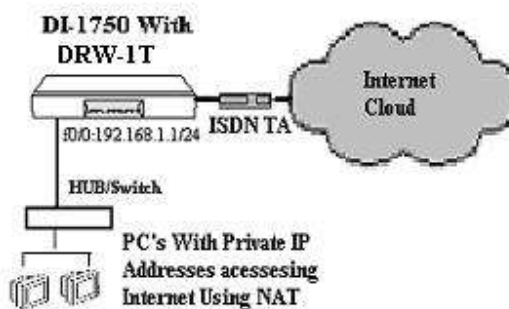
```
Router#disp isdn stat
Global ISDN Switchtype = basic-net3
ISDN b2/0 interface :
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
    TEI = 78, State =
MULTIPLE_FRAME_ESTABLISHED
    Layer 3 Status:
        1 Active Layer 3 Call(s)
    Activated dsl 0 CCBs = 1
        CCB:callid=3, sapi=0, ces=1, B-chan=1
  Total Allocated ISDN CCBs = 1
Router#disp dialer int b2/0
BRI2/0 statistics
Idle timer (120 secs), Fast idle timer (20
secs) Wait for carrier (30 secs), Re-enable
(5 secs) Number of active calls = 1
Dial String   Successes   Failures   Last called
Last status
24339696       3           0          never
Load threshold for dialing additional calls is 5
Load threshold for disconnecting redundant calls is 4
BRI2/0:1 - dialer type = ISDN Current
call connected 00:00:01:53
Connected to 24339696
Time until disconnect 119 second
Dialer state is Connected BRI2/0:2 -
dialer type = ISDN
```

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2.19 Доступ к интернет по ISDN, скорость 128 Кбит через модуль DRW-1BST, NAT:

Конфигурация DI-1750:

```
Router>enter
Router#disp run
Building configuration...
Current configuration:
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-ncryption
!
config-isdn switch-type basic-net3
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
 config-ip nat inside
!
config-interface Serial1/0
 no config-ip address
 no config-ip directed-broadcast
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-interface BRI2/0
 config-ip address negotiated
 no config-ip directed-broadcast
 config-ppp multilink
 config-ppp pap sent-username dlinkind xxxxx---à( ISP Password)
 config-bw 128
 set-dialer string 24339696
 set-dialer load-threshold 5 4
 config-ip nat outside
!
config-ip route default BRI2/0
config-ip access-list standard 1
 config-permit any
config-ip nat inside source list 1 interface BRI2/0
Router#
```

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```
Router#disp dialer int b2/0
BRI2/0 statistics
Idle timer (120 secs), Fast idle timer (20 secs) Wait for carrier (30 secs), Re-enable (5 secs)
Number of active calls = 2
Dial String      Successes    Failures     Last called    Last status
24339696         2            83           never
Load threshold for dialing additional calls is 5
Load threshold for disconnecting redundant calls is 4
BRI2/0:1 - dialer type = ISDN Current call connected 00:00:04:03
Connected to 24339696
Dialer state is Connected
BRI2/0:2 - dialer type = ISDN Current call connected 00:00:03:33
Connected to 24339696
Dialer state is Connected
Router#disp isdn stat
Global ISDN Switchtype = basic-net3
ISDN b2/0 interface :
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
    TEI = 74, State = MULTIPLE_FRAME_ESTABLISHED
    TEI = 75, State = MULTIPLE_FRAME_ESTABLISHED
    Layer 3 Status:
        No Active Layer 3 Call(s)
    Activated dsl 0 CCBs = 0
  Total Allocated ISDN CCBs = 0
```

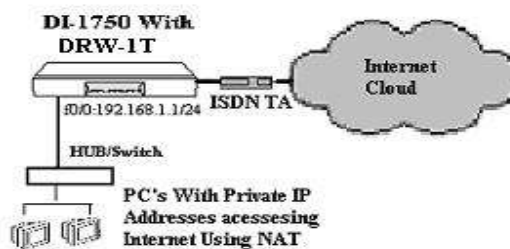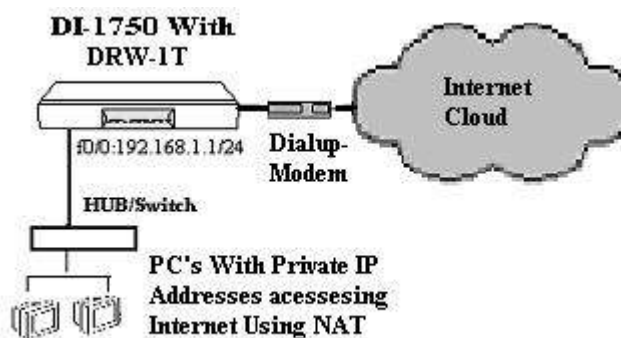## 2.20 Доступ к интернет по ISDN через внешний TA на интерфейсе Serial, NAT:


```
Router>enter
Router#display run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0 no config-ip directed-broadcast
 config-ip nat inside
!
config-interface s1/0
 config-ip address negotiated
 no config-ip directed-broadcast
 config-ppp pap sent-username dlinkind xxxxx---à(ISP Password)
 set-phy-layer speed 115200
 set-line dial
 set-dialer string 24339696
 config-async mode dedicated
 config-ip nat outside
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
config-ip route default Serial1/0
!
config-ip access-list standard 1
 config-permit any
!
config-ip nat inside source list 1 interface Serial1/0
Router#
```

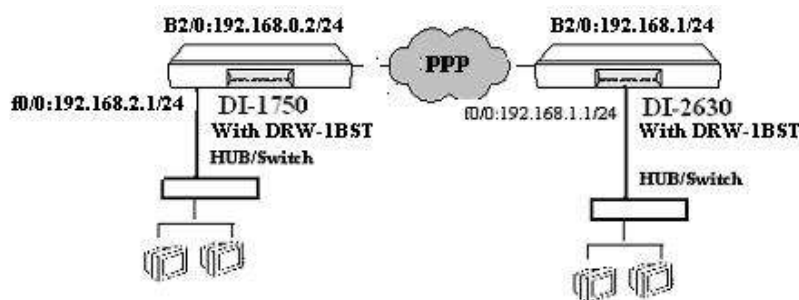## 2.21 Доступ к интернет по ISDN через внешний ТА на интерфейсе Aux, NAT:


```
Router>enter
Router#display run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
 config-ip nat inside
!
config-interface Serial1/0
 no config-ip address
 no config-ip directed-broadcast
!
config-interface Async0/0
 config-ip address negotiated
 no config-ip directed-broadcast
 config-ppp pap sent-username dlinkind  xxxxxx --à (ISP Password)
 set-phy-layer speed 115200
 set-line dial
 set-dialer string 24339696
 config-async mode dedicated
 config-ip nat outside
!
config-ip route default Async0/0
!
config-ip access-list standard 1
 config-permit any
!
config-ip nat inside source list 1 interface Serial1/0
Router#
```

2.22 Доступ к интернет через внешний Dialup модем на интерфейсе Serial, NAT:


```
Router>enter
Router#display run
Building configuration...
Current configuration:
!version 1.3.1C
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
 config-ip nat inside
!
config-interface Serial1/0
 set-phy-layer mode async
 config-ip address negotiated
 no config-ip directed-broadcast
 config-ppp pap sent-username dlink inteld850
 set-line dial
 set-dialer string 24404444
 config-ip nat outside
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route default Serial1/0
!
config-ip access-list standard 1
 config-permit any
!
config-ip nat inside source list 1 interface Serial1/0
Router#
```

2.23 PPP по ISDN, маршрутизация статическая, модуль DRW-1BST:

Конфигурация DI-2630:
```
Welcome to DI Multi-Protocol 2630 Series Router
Router>ent
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-isdn switch-type basic-net3
username dlink password 0 dlink
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-interface BRI1/0
 config-ip address 192.168.0.1 255.255.255.0
 no config-ip directed-broadcast
 config-ppp authentication pap
 config-ppp pap sent-username dlink dlink
 set-dialer string 26529060
!
config-ip route 192.168.2.0 255.255.255.0 192.168.0.2
dialer-list 1 protocol ip permit
Router#
```
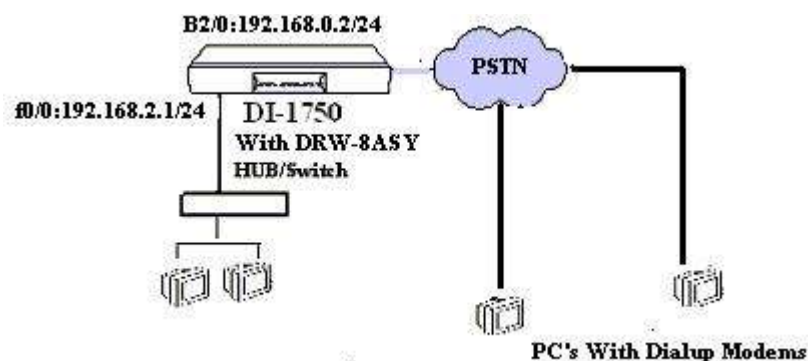
Конфигурация DI-1750:
```
Welcome to DI-Mutil-Protocol 1750 Series Router
Router>ent
Router#disp run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-isdn switch-type basic-net3
username dlink password 0 dlink
!
config-interface FastEthernet0/0
 config-ip address 192.168.2.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-interface BRI2/0
 config-ip address 192.168.0.2 255.255.255.0
 no config-ip directed-broadcast
 config-ppp authentication pap
 config-ppp pap sent-username dlink dlink
 set-dialer string 26529930
!
config-ip route 192.168.1.0 255.255.255.0 192.168.0.1
dialer-list 1 protocol ip permit
Router#
```

For 128Kbps Connection --↙Go to ISDN Interface configuration :- config-interface BRI2/0 and config-ppp multilink.

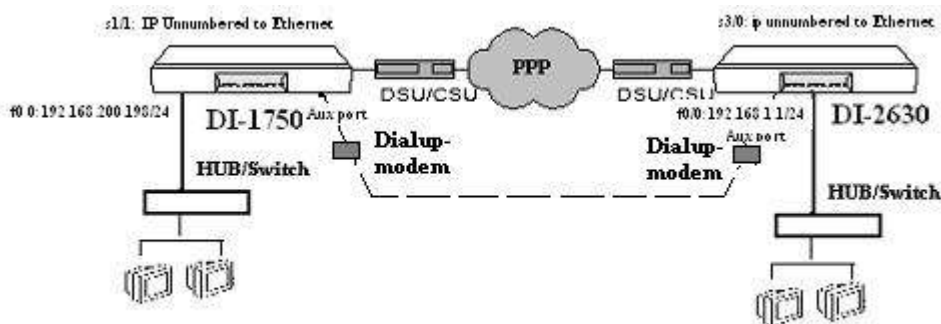## 2.24 Удаленный доступ к сети по DIALUP, модуль DRW-8A/S


```
Router>enter
Router#display run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-ip local pool dlink 192.168.2.193 2
!
username dlink password 0 dlink
!
config-interface FastEthernet0/0
 config-ip address 192.168.2.196 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial4/0
 set-phy-layer mode async
 config-ip unnumbered FastEthernet0/0
 no config-ip directed-broadcast
 config-ppp authentication chap
 config-peer default ip address pool dlink
 set-phy-layer speed 115200
 set-line dial
!
config-interface Serial4/1
 set-phy-layer mode async
 config-ip unnumbered FastEthernet0/0
 no config-ip directed-broadcast
 config-ppp authentication chap
 config-peer default ip address pool dlink
 set-phy-layer speed 115200
 set-line dial
!
config-interface Serial4/2
 no config-ip address
 no config-ip directed-broadcast
```

```
!
config-interface Serial4/3
 no config-ip address
 no config-ip directed-broadcast
!
config-interface Serial4/4
 no config-ip address
 no config-ip directed-broadcast
!
config-interface Serial4/5
 no config-ip address
 no config-ip directed-broadcast
!
config-interface Serial4/6
 no config-ip address
 no config-ip directed-broadcast
!
config-interface Serial4/7
 no config-ip address
 no config-ip directed-broadcast
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
Router#
```

2.25 Backup выделенной линии с использованием Dialup модема:

Конфигурация DI-1750:

```
Welcome to DI Multi-Protocol 1750 Series Router
Router>enter
Router#sh run
Building configuration...
Current configuration:
!version 1.3.0O
service timestamps log date
service timestamps debug date
no service password-encryption
!
username dlink password 0 dlink
config-interface FastEthernet0/0
 config-ip address 192.168.200.198 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip unnumbered FastEthernet0/0
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 config-ip unnumbered FastEthernet0/0
 no config-ip directed-broadcast
 config-ppp authentication pap
 set-phy-layer speed 115200
 set-line dial
!
config-ip route 192.168.1.0 255.255.255.0 Serial1/1
config-ip route 192.168.1.0 255.255.255.0 Async0/0 10
Router#
```
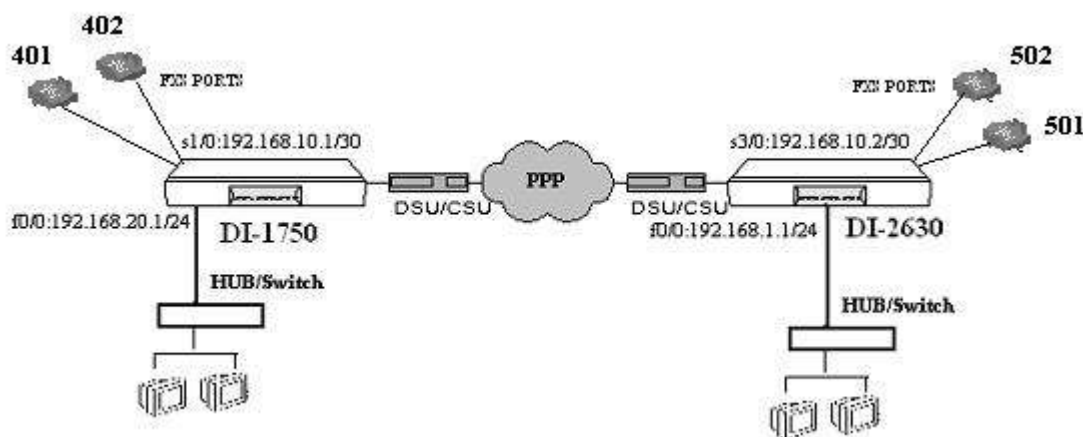
Конфигурация DI-2630:

```
Router#display run
Building configuration...
Current configuration:
!version 1.3.1C
service timestamps log date
service timestamps debug date
no service password-encryption
!
username dlink password 0 dlink
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial3/0
 set-backup interface Async0/0
 set-backup delay 10 10
 config-ip unnumbered FastEthernet0/0
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 config-ip unnumbered FastEthernet0/0
 no config-ip directed-broadcast
 config-ppp pap sent-username dlink dlink
 set-line dial
 set-dialer string 26526161
!
config-ip route 192.168.200.0 255.255.255.0 Serial3/0
config-ip route 192.168.200.0 255.255.255.0 Async0/0
10
!
dialer-list 1 protocol ip permit
Router#
```

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2.26 VOIP : конфигурация FXS-FXS:
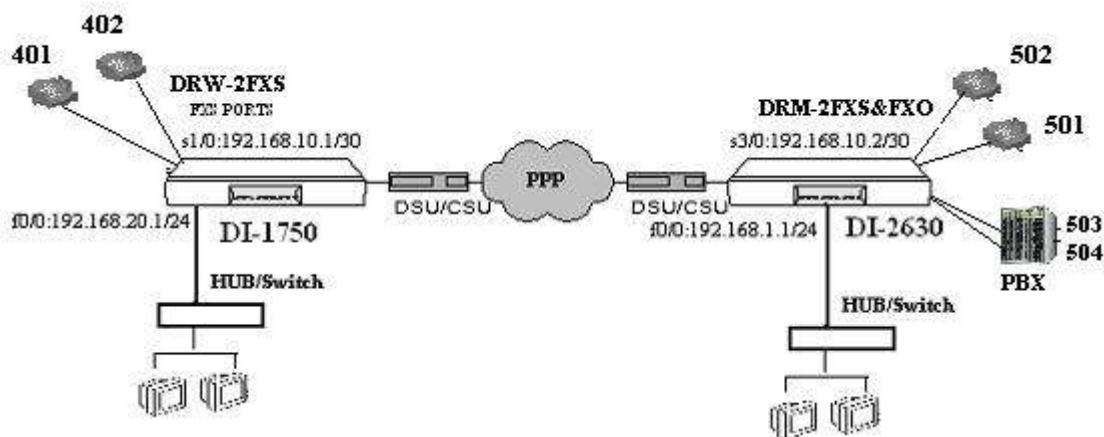

Конфигурация DI-1750:

```
Welcome to DI Multi-Protocol 1750 Series Router
Router>enter
Router#display run
Building configuration... Current configuration:
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.1.0 255.255.255.0 192.168.10.2
!
match-dialpeer destination
!
set-dial-peer 1 pots
  config-destination-pattern 401
  config-port 2/0
!
set-dial-peer 2 pots
  config-destination-pattern 402
  config-port 2/1
!
set-dial-peer 3 voip
  config-destination-pattern 501
   set-session 192.168.1.1
   config-codec g729r8
!
set-dial-peer 4 voip
config-destination-pattern 502
   set-session 192.168.1.1
   config-codec g729r8
!
config-voice-port 2/0
!
config-voice-port 2/1
!
Router#
```

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Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>enter
Router#display run
Building configuration...
Current configuration:
!
!version 1.3.1C
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Ethernet1/1
 no config-ip address
 no config-ip directed-broadcast
 duplex half
!
config-interface Serial1/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.20.0 255.255.255.0 192.168.10.1
!
!
match-dialpeer destination
!
set-dial-peer 1 pots
  config-destination-pattern 501
  config-port 3/0
!
set-dial-peer 2 pots
  config-destination-pattern 502
  config-port 3/1
!
set-dial-peer 3 voip
  config-destination-pattern 401
  set-session 192.168.20.1
  config-codec g729r8
!
set-dial-peer 4 voip
  config-destination-pattern 402
 set-session 192.168.20.1
  config-codec g729r8
!
config-voice-port 3/0
!
config-voice-port 3/1
!
Router#
```

2.27 VOIP: конфигурация FXS-FXO:
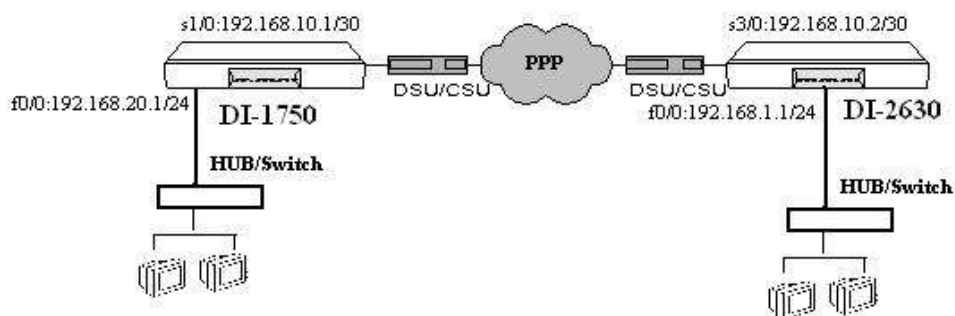

Конфигурация DI-1750:

```
Welcome to DI Multi-Protocol 1750 Series Router
Router>enter Router#display run Building configuration... Current configuration:
!version 1.3.1D
service timestamps log date service timestamps debug date no service password-
encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-ip route 192.168.1.0 255.255.255.0 192.168.10.2
!
match-dialpeer destination
!
set-dial-peer 1 pots
  config-destination-pattern 401
  config-port 2/0
!
set-dial-peer 2 pots
  config-destination-pattern 402
  config-port 2/1
!
set-dial-peer 3 voip
  config-destination-pattern 501
  set-session 192.168.1.1
  config-codec g729r8
!
set-dial-peer 4 voip
  config-destination-pattern 502
  set-session 192.168.1.1
  config-codec g729r8
!
set-dial-peer 5 voip
  config-destination-pattern 503
  set-session 192.168.1.1
  config-codec g729r8
!
set-dial-peer 6 voip
  config-destination-pattern 504
  set-session 192.168.1.1
  config-codec g729r8
!
config-voice-port 2/0
config-voice-port 2/1
Router#
```

Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>enter
Router#display run
Building configuration...
Current configuration:
!
!version 1.3.1C
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Ethernet1/1
 no config-ip address
 no config-ip directed-broadcast
 duplex half
!
config-interface Serial1/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
```

2.28 PPP на синхронном интерфейсе, маршрутизация по OSPF :

Конфигурация DI-1750:

```
Welcome to DI Multi-Protocol 1750 Series Router
Router>enter
Router#display run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.20.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.1 255.255.255.252
 no config-ip directed-broadcast
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router ospf 1
 config-network 192.168.10.0 255.255.255.252 area 1
 config-network 192.168.20.0 255.255.255.0 area 1
!
Router#
```

Конфигурация DI-2630:

```
Welcome to DI Multi-Protocol 2630 Series Router
Router>enter
Router#display run
Building configuration...
Current configuration:
!
!version 1.3.1D
service timestamps log date
service timestamps debug date
no service password-encryption
!
config-interface FastEthernet0/0
 config-ip address 192.168.1.1 255.255.255.0
 no config-ip directed-broadcast
!
config-interface Serial1/0
 config-ip address 192.168.10.2 255.255.255.252
 no config-ip directed-broadcast
 config-ip mask-reply
 config-encap ppp
!
config-interface Async0/0
 no config-ip address
 no config-ip directed-broadcast
!
config-router ospf 1
 config-network 192.168.10.0 255.255.255.252 area 1
 config-network 192.168.1.0 255.255.255.0 area 1
!
Router#
```