

WANPIPE™

Multi-protocol WANPIPE Driver

CONFIGURATION M A N U A L

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Introduction

WANPIPE from Sangoma Technologies Inc. (<http://www.sangoma.com>) is a family of intelligent multi-protocol WAN adapters with data transfer rates up to 4Mbps. They are also known as Synchronous Data Link Adapters (SDLA) and are designated as S514-PCI or S508-ISA. These cards support

Frame Relay, PPP, Cisco HDLC protocols.

Sangoma S514 PCI and S508 ISA are intelligent adaptors that support most WAN protocols in firmware. The fact that protocols are supported in firmware makes device driver design much simpler.

Driver's major responsibility is to pass data between the adaptor and FreeBSD/OpenBSD operating system. Furthermore, by using the intelligent adaptors, system CPU load is kept at the minimum, an important factor in Server-Router performance and stability: a relatively slow machine, like a 486, can be used with the Sangoma adapter and FreeBSD/OpenBSD OS to create a powerful T1 router/firewall.

Another benefit of isolating protocols, on the board, is the possibility to test and certify protocol implementations on one operating system and be sure that they will work identically on any other operating system. If necessary, a protocol update can be installed on the fly, without recompiling the driver or the kernel.

Sangoma Adapters can have two different physical interfaces, T1 (CSU/DSU on board) or serial V.35/X.21/EIA530/RS232. The card with the T1 interface allows the server to connect directly to the T1 line without an external CSU/DSU.

WANPIPE Configuration

The WANPIPE configuration process starts with creating a detailed configuration file that outlines the hardware, protocol and IP options as well as location of the adapter firmware. It is created for each WANPIPE device.

A WANPIPE device does not describe a physical card, but a logical implementation of a physical card. For example, a S5141 card contains a single CPU with two physical ports: a High-Speed (up to 4Mbps) port and a Low-Speed (up to 512Kbps) port. Furthermore, each port can support an independent physical connection. Therefore, to reiterate, *number of Wanpipe devices refers to the number of physical lines connected to a Sangoma adapter.*

To simplify the WANPIPE configuration process, a GUI configuration utility called **wancfg** was developed. It is located in `/usr/sbin` directory.

Ex: `/usr/sbin/wancfg`

NOTE: wancfg has extensive help files for each WANPIPE option.

If wancfg cannot be used due to lack of bash2 support, please use the sample Wanpipe configuration files to aid you in configuring WANPIPE. The sample configuration files are located in `/etc/wanpipe/samples` directory.

1.Start `/usr/sbin/wancfg`

2.Select 'Create' option

3.Select a wanpipe device.

If this is a first device select wanpipe1 and hit <SELECT> button.

4.Choose a protocol

In this case choose Frame Relay and hit <BACK> button.

5.Select Hardware Setup

6.Probing Hardware:

The top option is "Probe Hardware" Select this option and press <ENTER>

Select a device. When selecting devices note the PORT option. Usually PORT=PRI would be used.

IMPORTANT:

After the hardware probe section you will notice that the next four fields have been filled out. Thus, adapter type and PCI info should be skipped.

All other options should normally be left as DEFAULT unless you have special information.

7.Exit Hardware Setup

8.CSU/DSU Setup

The new S514-4 and S514-7 T1/E1 cards that contain an onboard T1/E1 CSU/DSU's are configured in /usr/sbin/wancfg.

Check with the line provider at what speed the fractional T1/E1 line is set to. (ex. 64K, 128k ... 1.5M). The fractional T1 consists of 24 channels and E1 consists of 32 channels each 64K. Using the CSU/DSU one configures the line speed by enabling or disabling channels 1 to 24/32.

For example:

64K line	: enable channel 1,disable 2 to 24
128K line	: enable channel 1 and 2, disable 3 to 24
Full T1 (1.5M)	: enable 1 to 24
Full E1 (2.048M)	: enable 1 to 32

9.Network Interface Setup

The network interface set-up depends on the type of connection.

Frame Relay supports many interfaces, each bound to a DLCI. Thus, there are questions related to the number of DLCIs and configuration information for each DLCI.

In the case of Point-to-Point protocols like PPP and CHDLC, there is only one interface per physical port.

10.Once all network interfaces are setup keep hitting the <BACK> button until Main Menu is reached.

Then select <EXIT> and save the config file.

The new config file will be located in /etc/wanpipe directory.

11.Start the device:

```
wanrouter start wanpipe1
```

Note: The card doesn't have to be connected to start the wanrouter.

Please refer to the Appendix A on how to configure each protocol.

Configuring the onboard FT1 CSU/DSU

Sangoma S508FT1 and S514-3 FT1 cards come with an on board CSU/DSU, that needs to be configured separately using the `/usr/sbin/wanpipe_cfgft1` utility.

Note:

This section only relates to the S514-3 and S508FT1 cards. The new S514-4 and S514-7 T1/E1 cards use `/usr/sbin/wancfg` to configure the onboard CSU/DSU.

Before proceeding with the CSU/DSU configuration:

1. The CSU/DSU configuration information must be obtained from the T1 provider

Check with the T1 provider at what speed the fractional T1 line is set to. (ex 64K, 128k ... 1.5M). The fractional T1 consists of 24 channels each 64K. Using the CSU/DSU one configures the line speed by enabling or disabling channels 1 to 24.

For example:

64K line	: enable channel 1,disable 2 to 24
128K line	: enable channel 1 and 2, disable 3 to 24
Full T1 (1.5M)	: enable 1 to 24

Start and stop the WANPIPE device using the `wanrouter` command. This will test the `wanpipe#.conf` file and make sure that the card is present.

```
wanrouter start  
wanrouter stop
```

2. CFGFT1 Requirements

`/usr/sbin/wanpipe_cfgft1` is a GUI application written in, bash version 2, shell script. You must have bash version 2.0 or greater to run this script.

The `wanpipe_cfgft1` utility uses the `/bin/bash2` executable.

3. Running WANPIPE_CFGFT1

The CFGFT1 utility contains all help files necessary to configure the CSU/DSU.

```
/usr/sbin/wanpipe_cfgft1 wanpipe1
```

4. The WANPIPE_CFGFT1 configurator has three modes of operations.

Standard Configuration

This is the simplest configuration method. This method should be used by default and will be sufficient for 99% of the configuration cases.

Advanced Configuration

This is a text based configuration mode, where commands are sent to the CSU/DSU directly. It should be used if standard configuration does not meet the requirements.

Auto Detect Configuration

This option works only for B8ZS encoding and ESF framing modes. It will try to detect the speed of the line and automatically configure the CSU/DSU.

For further information regarding the advanced CSU/DSU configuration option, please refer to the Appendix B

APPENDIX A

Frame Relay

Frame Relay is a simplified form of Packet Switching similar in principle to X.25 in which synchronous frames of data are routed to different destinations depending on header information.

The biggest difference between Frame Relay and X.25 is that X.25 guarantees data integrity and network managed flow control at the cost of some network delays. Frame Relay switches packets end to end much faster, but **there is no guarantee of data integrity at all**.

Frame Relay is cost effective, partly due to the fact that the network buffering requirements are carefully optimized. Compared to X.25, with its store and forward mechanism and full error correction, **network buffering is minimal**. Frame Relay is also **much faster than X.25**: the frames are switched to their destination with only a few byte times delay, as opposed to several hundred milliseconds delay on X.25.

Wanpipe Frame Relay Options

Wanpipe Frame Relay has the following modes of operations:
WANPIPE and API.

WANPIPE MODE:

The FreeBSD/OpenBSD Kernel uses Frame Relay logical channels to route packets to remote networks, using the TCP/IP protocol.

Each logical channel is represented by a network interface, where each interface contains unique IP information. Kernel uses the IP information to route incoming packets to remote networks.

API MODE:

Frame Relay API mode is used to send non-IP traffic over a frame relay link. The API interface allows the user to build a custom application on top of the frame relay link in order to transmit custom data packets (i.e Non IP). An example of a custom application would be Voice-over IP, Data capture and packet analysis.

Information needed from your network provider, telco and ISP

1. List of DLCI (channels) used:

DLCI is a logical Frame Relay link/channel (16 - 4096).

Please note that if you have **only one DLCI** (which is usually the case for an 'edge of the network' configuration), you can use the AUTO setting, in which WANPIPE will discover the one DLCI from the network and automatically configure for it.

In wancfg, if you specify a DLCI instead of using AUTO, you will not be able to change back without reconfiguring the whole Frame relay configuration from scratch.

2.IP address for each DLCI channel (WANPIPE MODE)

Ex: Local: 201.1.1.1 Remote: 201.1.1.2

3.Clocking Mode:

Except in local back-to-back connections, clocking is always external, supplied by the network.

4.Frame Relay Signaling:

Frame relay has number of signaling options:
LMI, ANSI, Q933

5.Frame Relay Station:

Frame relay has two modes of operation:
CPE or NODE.

CPE:

customer premises equipment. As an end user, a Frame Relay connection should always be set to this mode.

NODE: switch emulation:

This option should only be used in back-to-back test situation. Sangoma can act as a switch, but on a real network, the network end is always the Access Node.

6.CSU/DSU Configuration:

If you are using a Sangoma card that includes a T1,E1 or 56k DSU/CSU, the physical line settings will need to match the information provided by your telco.

Cisco HDLC

Cisco HDLC is a point-to-point protocol implemented on top of HDLC layer 2. As the name implies CHDLC is a protocol mostly used to connect to the Cisco[™] external routers.

Wanpipe CHDLC Options

Wanpipe CHDLC has the following modes of operations: WANPIPE and API.

WANPIPE MODE:

The FreeBSD/OpenBSD Kernel uses the CHDLC point-to-point link to route packets to a remote network, using the TCP/IP protocol.

A CHDLC point-to-point connection is represented by a single network interface that contains IP information obtained from the ISP. The Kernel uses the IP information to route incoming packets to remote a network.

API MODE:

CHDLC mode used to send non-IP traffic over a CHDLC point-to-point link. The API interface allows the user to build a custom application on top of the CHDLC link in order to transmit custom data packets (i.e Non IP). An example of a custom application would be a Satellite Receive Only data collector or Data capture and packet analysis tool.

Information needed from your telco and ISP

- 1.IP address for the CHDLC point-to-point connection
(WANPIPE MODE)

Ex: Local: 201.1.1.1 Remote: 201.1.1.2

- 2.Clocking Mode:

Except in local back-to-back connections, clocking is always external, supplied by the network.

- 3.CSU/DSU Configuration:

If you are using a Sangoma card that includes a T1,E1 or 56k DSU/CSU, the physical line settings will need to match the information provided by your telco.

PPP

Point-To-Point Protocol (PPP) is a protocol implemented on top of HDLC layer 2. PPP is a standard protocol used when connecting over a point-to-point link.

Wanpipe PPP Options

Wanpipe PPP has the following modes of operations: WANPIPE.

WANPIPE MODE:

The FreeBSD/OpenBSD Kernel uses the PPP point-to-point link to route packets to a remote network, using the TCP/IP protocol.

A PPP point-to-point connection is represented by a single network interface that contains IP information obtained from the ISP. The Kernel uses the IP information to route incoming packets to remote a network.

API MODE: Not supported.

Information needed from your telco and ISP

1. IP address for the PPP point-to-point connection
(WANPIPE MODE)

Ex: Local: 201.1.1.1 Remote: 201.1.1.2

2. Clocking Mode:

Except in local back-to-back connections, clocking is always external, supplied by the network.

3. CSU/DSU Configuration:

Sangoma S514/S508FT1 cards are supplied with an onboard CSU/DSU that needs to be configured, based on the type line it's being connected to.

Important:

This version of PPP protocol is supported by WANPIPE in firmware, as with all other protocols. The limitation of the current WANPIPE PPP protocol is that it cannot run on a Secondary port of the Sangoma adapter (ex. S514-1).