

User Manual on Configuration of DAHDI/Asterisk

Version 1.3

22.03.2016

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CONTENTS

- 1. Introduction.....5
 - 1.1. Purpose of the current document5
 - 1.2. Driver package DAHDI.....5
- 2. Installation of DADHI and configuration of DAHDI_TDMOX6
 - 2.1. Installation of DAHDI6
 - 2.1.1. Installation of DRIVERS DAHDI6
 - 2.1.2. Installation of the DAHDI utilities6
 - 2.1.3. Compilation peculiarities of the drivers7
 - 2.2. Configuration of DAHDI_TDMOX.....8
 - 2.2.1. Software structure.....8
 - 2.2.2. Creation of low level configuration DAHDI_TDMOX.9
 - 2.2.3. Start DAHDI10
 - 2.2.4. User actions required10
 - 2.2.5. EXAMPLE - configuration for ASTEROID2-1L3S11
 - 2.2.6. EXAMPLE - configuration FOR ASTEROID2-MT16.....12
 - 2.2.7. EXAMPLE - configuration for ELF2-AE13
 - 2.3. Synchronization14
- 3. Installation of DAHDI AND configuration DAHDI_DYNAMIC.....16
 - 3.1. Installation of DAHDI16
 - 3.1.1. Installation of the drivers16
 - 3.1.2. Installation of the DAHDI utilities16
 - 3.1.3. loading the drivers not copying them into the system.....16
 - 3.1.4. Compilation peculiarities of the drivers17
 - 3.2. Configuration of DAHDI_DYNAMIC.....18
 - 3.2.1. Structure of software18
 - 3.2.2. Description of equipment in the SYSTEM.CONF file.....19
 - 3.2.3. Start DAHDI20

| | | |
|--------|--|----|
| 3.2.4. | User actions required | 20 |
| 3.2.5. | EXAMPLE - configuration for ASTEROID-1L3S | 21 |
| 3.2.6. | EXAMPLE - configuration for ASTEROID2-MT16..... | 22 |
| 3.2.7. | EXAMPLE - configuration for ELF2-AE in the CCS mode | 23 |
| 3.2.8. | EXAMPLE - configuration for ELF2-AE in the CAS mode | 24 |
| 3.3. | Synchronization | 25 |
| 4. | Diagnostics | 27 |
| 4.1. | General check of DAHDI functionality | 27 |
| 4.2. | Diagnostics of DAHDI_TDMoX | 28 |
| 5. | Configuration of FreePBX | 30 |
| 5.1. | Adjustment of the GSM channels in FREEPBX | 31 |
| 6. | Appendices | 33 |
| 6.1. | Appendix 1. Quick installation of FREEPBX 2.11 through the example of ASTEROID-1L3S..... | 33 |
| 6.2. | Appendix 2. Glossary..... | 34 |

1. INTRODUCTION

1.1. PURPOSE OF THE CURRENT DOCUMENT

Current User Manual will help you to configure Asterisk and required components for working with the devices manufactured by the "Parabel" company connectable via the Ethernet port via the TDMoE protocol. Asteroid2, Asteroid2-MT16 and ELF2-AE belong to such types of the devices.

The User Manual contains just some brief information on connection of TDMoE devices to Asterisk in OS Linux with further manual configuration or by means of the web-interface (FreePBX, AsteriskNOW,...).

1.2. DRIVER PACKAGE DAHDI

Drivers are required for working with the peripheral equipment - a program component working in the kernel mode. The DAHDI driver (a driver package, to be prices) represent such a program component for the peripheral equipment in Asterisk. DAHDI is delivered archived with the source code, so compile and install it on the target system before using it.

A standard driver package DAHDI allows implementation of the TDMoE/TDMoX protocol in the **dahdi_dynamic** driver. This package was developed by the Digium company. For a number of historical reasons, the driver contains a significant quantity of architectural constraints. E.g., TDMoE of the device cannot be automatically configured by the **dahdi_genconf** utility.

An alternative DAHDI driver **dahdi_tdmox** with lots of corrections, built-in diagnosis tools, which better works with the multiprocessor systems and high load systems is developed for users of the "Parabel" equipment. Besides, the driver **dahdi_tdmox** is accompanied by the configuration scripts making it easy to use it as part of a package with the web-interface – FreePBX, Elastix.

Hence, there are two realizations of the drivers supporting the TDMoE equipment - a standard **dahdi_dynamic** and an alternative **dahdi_tdmox**. Both drivers work as part of the DAHDI package, though they are differently configured. Configuration of both drivers is described in this manual in separate chapters. To connect the equipment, select the desired configuration method and follow the described procedure.

2. INSTALLATION OF DADHI AND CONFIGURATION OF DAHDI_TDMOX

Pass through this chapter if you will use a standard DADHI package (the driver `dahdi_dynamic`).

2.1. INSTALLATION OF DAHDI

2.1.1. INSTALLATION OF DRIVERS DAHDI

1. Download the "DAHDI bundle with bugfixes and supplements" from our web site.
The most recent version can be found there <http://parabel.ru/en/driversupdates/>
2. Extract the archive
`tar xf dahdi_2.9.2+2.9.2-parabel_2.9.2.1.tar.bz2`
3. Make sure the packages required for compilation of the drivers are available.
The packages of the following types: `patch`, `make`, `gcc`, `linux-headers-`uname -r``, `linux-kbuild-`uname -r``
4. Allow/prohibit required compilation options.
`editor build.sh`
5. Compile the driver
`./build.sh`
6. Delete old drivers to prevent a possible version conflict.
`cd dahdi-linux-complete/linux; make uninstall`
`modinfo dahdi` must produce "ERROR: Module dahdi not found."
7. Install the drivers
`./install.sh`

2.1.2. INSTALLATION OF THE DAHDI UTILITIES

Install the DAHDI utilities, choose from:

- Using your package manager(`apt`, `yum`,...)
Maybe the utilities have already been installed by the package manager, as dependencies for the package `asterisk`, `asterisk-dahdi`, ...
- From our build.
`./build.tools.sh`
`./install.tools.sh`

ATTENTION: It is not recommended to install the utilities from our DAHDI build over the utilities set by the package manager. It can result in the file version conflict.

Apply corrections `dahdi_tdmox\patches\` for scripts and utilities DAHDI, FreePBX, Elastix.

- For the supported distributives start the script `./patch.sh` from the corresponding directory.
Example: `freepbx-2.11`
- For the rest of the distributives apply corrections from the directory, corresponding to the utilities version of DAHDI. Example: `dahdi-2.9.0`.
See `dahdi_cfg -h`.
See `man patch`.

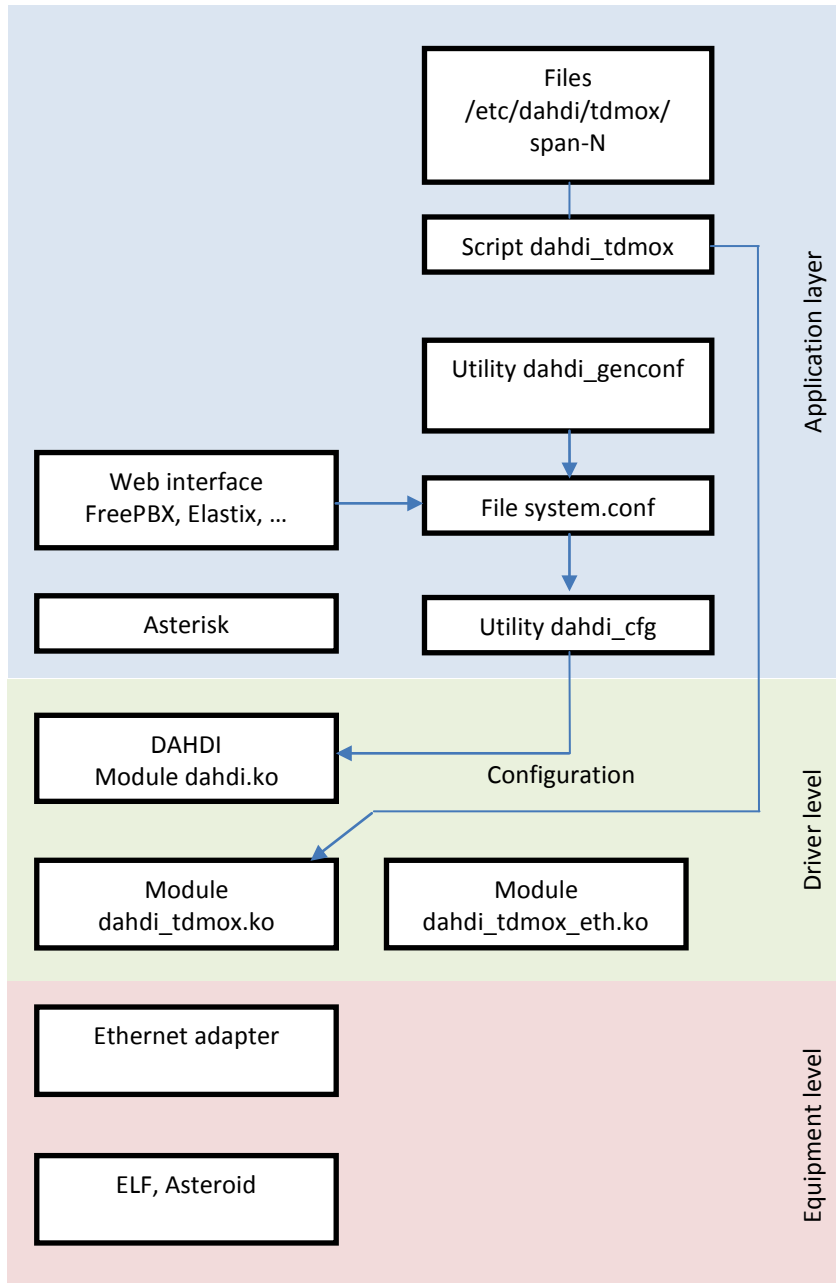
2.1.3. COMPILATION PECULIARITIES OF THE DRIVERS

One should remember the following.

- Kernel header files, if they are being installed separately of the distributive, must be strictly of the working version of the kernel in the system.
- Any Linux driver must be compiled with the same gcc version as the Linux kernel.
- The DAHDI driver depends on the kernel. DAHDI must be rebuilt after changing and kernel compilation.

2.2. CONFIGURATION OF DAHDI_TDMOX

2.2.1. SOFTWARE STRUCTURE



The following components are related to the configuration process:

- Low level configuration files `/etc/dahdi/tdmox/span-N` (where N – span number). These files contain equipment configuration, they are created once when connecting the device or changing their settings.
- Script `dahdi_tdmox` reads the low level configuration from the files and records it into the module `dahdi_tdmox.ko`. Doing so the main module of dahdi is aware of presence of the TDMoX devices. Script `dahdi_tdmox` starts automatically when the dahdi service is started in the system.
- File `system.conf` contains configuration for the main dahdi module. Essentially, it is the same description of configuration of the equipment, though at the second configuration stage – at start of the main dahdi module. The

system.conf file can be created automatically by some versions of FreePBX or utility `dahdi_genconf`, included into the standard DAHDI package. At automatic creation of **system.conf** information in it is generated based on the low-level configuration, performed at the first stage.

- The utility **dahdi_cfg** records information from the file `system.conf` into the main module `dahdi`. It is completion of the second stage of configuration, after that `dahdi` is fully functional. The utility `dahdi_cfg` starts automatically when the `dahdi` service is started in the system.

2.2.2. CREATION OF LOW LEVEL CONFIGURATION DAHDI_TDMOX.

Low level configuration is created by the user once when connecting the equipment or changing its settings. First of all, in the directory `/etc/dahdi/tdmox/` create a file with the `.conf` extension of the required format and corresponding to the equipment settings. Examples of the `.conf` files can be seen in the `/etc/dahdi/tdmox/samples` directory.

`.conf` file contains the following parameters:

addr – Ethernet address of Asteroid (ELF), specified in the device console.

Address can be viewed and edited in the USB console of the device. It should be borne in mind that within a single Ethernet network all devices must have a unique address. Factory settings of the TDMoE devices use the same MAC address. If several TDMoE devices are connected to the server, then provide each device with a unique address. The `addr` field shall be set in the following format: `eth0/00:55:55:55:55:20/0`, where `eth0` - network interface name, `00:55:55:55:55:20` - mac address of the device, `0` - sub-address of the device, `0` always.

device – Type of the device. “asteroid”, “asteroid-mt16”, “asteroid-1u”, “elf2-ae”.

moduleN – type of the module. FXS, FXO, GSM.

timing – Whether SPAN will be used for DAHDI synchronization. `.0` – don't use for DAHDI synchronization.

`>0` – can be used for DAHDI synchronization.

ATTENTION:

Read the “Synchronization” chapter.

Having created the `.conf` file (or after changing it), execute it, with the result that the utility (interpreter program) `tdmox_genconf` will be started. It will generate the low level configuration in the directory of the `/etc/dahdi/tdmox/span-N` type. This configuration is a working environment for drivers `dahdi_tdmox` and it will be further used at start of `dahdi`.

2.2.3. START DAHDI

Prior to the first start of DAHDI create the empty file `/etc/dahdi/system.conf` for compatibility with the standard utilities of configuration. Further this file will be automatically generated by the web shell or the `dahdi_genconf` utility.

Unload Asterisk & DAHDI

```
service asterisk stop
```

```
service dahdi unload
```

Load DAHDI

```
service dahdi start
```

Result of starting can be viewed in the «Diagnostics» chapter.

2.2.4. USER ACTIONS REQUIRED

Summarizing the steps of configuring and starting of DAHDI.

1. Create the low level configuration `dahdi_tdmox`, corresponding to the settings of the equipment.
2. Create an empty file `/etc/dahdi/system.conf`
3. Start the dahdi service.

2.2.5. EXAMPLE - CONFIGURATION FOR ASTEROID2-1L3S

Connect the Asteroid-1L3S to interface eth0, having specified the address 00:55:55:55:55:20 and having set it as a synchronization source for DAHDI. To do it install and save in the Asteroid-1L3S console:

Configuration/Common/MAC = 00:55:55:55:55:20

Configuration/Common/VCO = 0

Configuration/E1/Clock source = Internal

Create or copy a file from the examples /etc/dahdi/tdmox/asteroid-1l3s.conf:

```
#!/usr/bin/env /usr/bin/tdmox_genconf
spanno=1
addr=eth0/00:55:55:55:55:20/0
device=asteroid2
module1=FXS
module2=FXO
module3=FXS
module4=FXS
timing=1
```

2.2.6. EXAMPLE - CONFIGURATION FOR ASTEROID2-MT16

Connect Asteroid2-MT16 to interface eth0, having specified the address 00:55:55:55:55:30 and having set it as a synchronization source for DAHDI. To do it install and save in the Asteroid2-MT16 console:

Configuration/MAC = 00:55:55:55:55:30

Configuration/Clocksource =Master

Create or copy a file from the examples /etc/dahdi/tdmox/asteroid2-mt16.conf

```
#!/usr/bin/env /usr/bin/tdmox_genconf
spanno=1
addr=eth0/00:55:55:55:55:30/0
device=asteroid2-mt16
module1=FXS
module3=FXS
module4=FXS
module5=FXS
timing=1
```

2.2.7. EXAMPLE - CONFIGURATION FOR ELF2-AE

Connect the ELF2-AE to interface eth0, having specified the address 00:55:55:55:55:40 and having set it as a synchronization source for DAHDI. To do it install and save in the ELF2-AE console:

```
Configuration/Common/MAC = 00:55:55:55:55:40
```

```
Configuration/Common/VCO = 0
```

```
Configuration/E1/Clock source = Line
```

Create or copy from the examples `/etc/dahdi/tdmox/elf2-ae.conf`

```
#!/usr/bin/env /usr/bin/tdmox_genconf  
spanno=1  
addr=eth0/00:55:55:55:55:40/0  
device=elf2-ae  
timing=1
```

2.3. SYNCHRONIZATION

The DAHDI driver operates in a synchronous mode, i.e. all DAHDI devices (E1 maps, Asteroid, ELF) must work synchronously. By synchrony we mean a hierarchal distribution of clocks from a single source via configuration of all system elements in the master-slave mode. If there is the E1 stream from the provider, as a rule it is selected as a master for the whole system. If there is no connection to the provider – select one of the DAHDI devices as a master. The parameter `timing = 1` of the master device in the `.conf` file.

Synchronization setting errors can affect operation of the PRI protocol, it can result in appearance of the clicks in the vocal tract, ruptures of fax messages.

DAHDI receives recommendations from the `system.conf` file on the SPANs which can be used as a synchronization source. DAHDI searches for the first SPAN without the ALARM state, and uses it as a synchronization source.

For the TDMoX devices the properties can be specified on the device which can be used as a synchronization source. The lower the timing parameter is – the higher the priority. `timing = 0` means don't use as a synchronization source.

The command `"cat /proc/dahdi/[1..100] | grep CLOCKSOURCE"` will display a synchronization source TDMoX.

Hereby we consider the typical synchronization schemes.

| Make-up of a system | Settings of the devices | .conf file | Comments |
|-----------------------|--|--|--|
| 1 Asteroid device | Clock source=internal VCO=0 | timing = 1 | Asteroid will be a synchronization source for DAHDI |
| 2 Asteroid devices | Asteroid1: Clock source=internal VCO=0 Asteroid2: Clock source=internal VCO=2 | Asteroid1: timing=1 Asteroid2: timing=0 | Asteroid1 will be a synchronization source for DAHDI and Asteroid2. |
| ELF2-AE and Asteroid. | ELF2-AE: Clock source=line VCO=0 Asteroid: Clock source=internal VCO=2 | ELF2-AE: timing=1 Asteroid: timing=0 | ELF2-AE receives synchronization from E1. DAHDI receives synchronization from ELF2-AE. Asteroid receives synchronization from DAHDI (i.e. from E1) |

| | | | |
|---|--|--|---|
| <p>2 ELF2-AE devices, ELF2-AE1 – to the provider (PSTN). ELF2-AE2 – to local PBX.</p> | <p>ELF2-AE1: Clock source=line VCO=0 ELF2-AE2: Clock source=internal VCO=2</p> | <p>ELF2-AE1: timing=1 ELF2-AE2: timing=0</p> | <p>ELF2-AE1 receives synchronization from E1. DAHDI receives synchronization from ELF2-AE1. ELF2-AE2 receives synchronization from DAHDI (i.e. fromE1).</p> |
|---|--|--|---|

3. INSTALLATION OF DAHDI AND CONFIGURATION DAHDI_DYNAMIC

If an alternative realization of DAHDI is used (the driver dahdi_tdmox), this chapter can be passed through.

3.1. INSTALLATION OF DAHDI

3.1.1. INSTALLATION OF THE DRIVERS

1. Download the "DAHDI bundle with bugfixes and supplements" from our web site. The most recent version can be found there <http://parabel.ru/en/driversupdates/>.
2. Extract the archive `tar xf dahdi_2.9.2+2.9.2-parabel_2.9.2.1.tar.bz2`
3. Make sure the packages required for compilation of the drivers are available. The packages of the following types: `patch`, `make`, `gcc`, `linux-headers-`uname -r``, `linux-kbuild-`uname -r``
4. Allow/prohibit required compilation options. editor `build.sh`
5. Compile the driver `./build.sh`
6. Delete the old drivers to prevent a possible version conflict. `cd dahdi-linux-complete/linux; make uninstall`
`modinfo dahdi` must produce "ERROR: Module dahdi not found."
7. Install drivers `./install.sh`

3.1.2. INSTALLATION OF THE DAHDI UTILITIES

Install the DAHDI utilities, choose from:

- Using your package manager (`apt`, `yum`,...) Maybe the utilities have been already installed by the package manager, as dependencies for the package `asterisk`, `asterisk-dahdi`, ...
- From our build. `./build.tools.sh ./install.tools.sh`

ATTENTION: It is not recommended to install the utilities from our build DAHDI over the utilities installed by the package manager. It can result in the file version conflict.

3.1.3. LOADING THE DRIVERS NOT COPYING THEM INTO THE SYSTEM

To check the drivers not copying them into the system, you can use the scripts in the directory `demo/obsolete`.

system.conf - DAHDI configuration file.

`./run` will load DAHDI, and will use configuration from the local `system.conf`.

`./stop` will unload DAHDI.

These scripts are sufficient for checking of ELF2-AE, Asteroid.

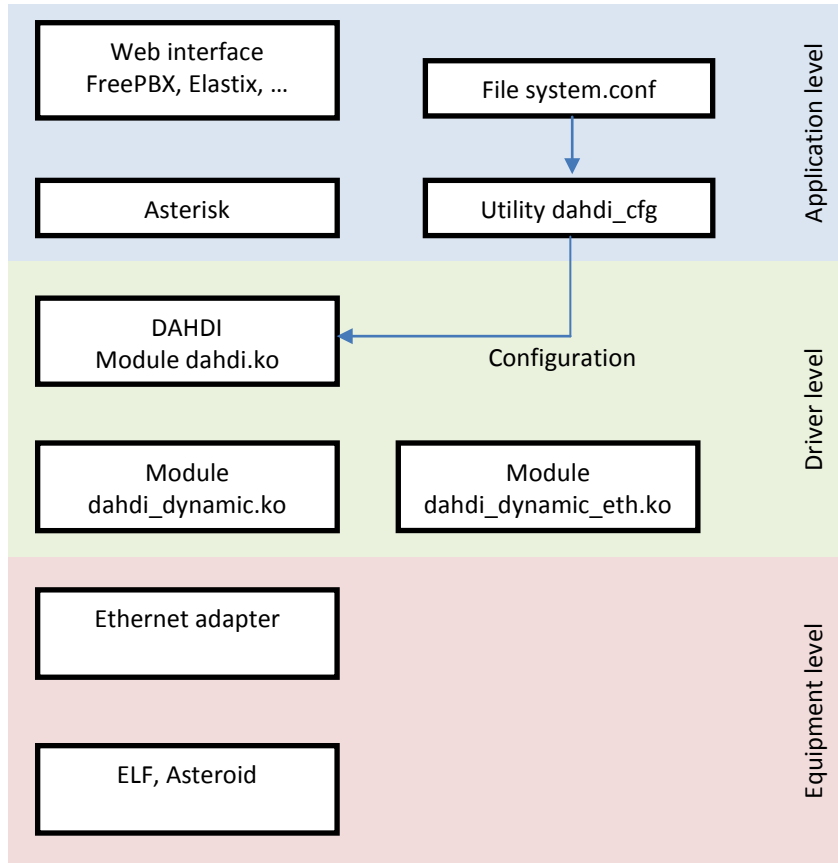
3.1.4. COMPILATION PECULIARITIES OF THE DRIVERS

One should remember the following.

- Kernel header files, if they are being installed separately of the distributive, must be strictly of the working version of the kernel in the system.
- Any Linux driver must be compiled with the same gcc version as the Linux kernel.
- The DAHDI driver depends on the kernel. DAHDI must be reassembled after the kernel is changed or assembled.

3.2. CONFIGURATION OF DAHDI_DYNAMIC

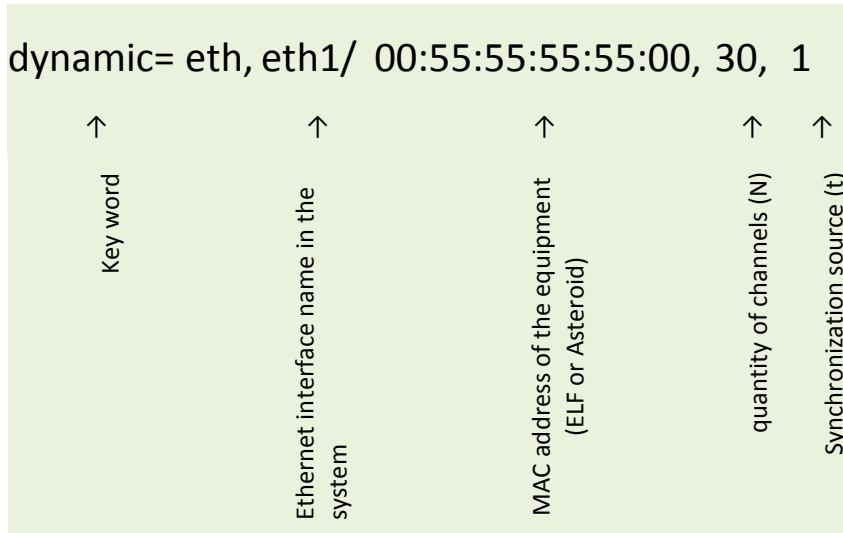
3.2.1. STRUCTURE OF SOFTWARE



- **dahdi_dynamic, dahdi_dynamic_eth** – the modules realizing the protocol TDMoE supported in the ELF equipment, Asteroid.
- File **system.conf** – text file containing description of the DAHDI configuration
- The utility **dahdi_cfg** serves for recording of configuration into the DAHDI drivers. The utility dahdi_cfg starts automatically when the dahdi service is started in the system.

3.2.2. DESCRIPTION OF EQUIPMENT IN THE SYSTEM.CONF FILE.

Contents of system.conf starts with description of the span – a group of the channels belonging to this TDMoE device (ELF or Asteroid).



Description of the span starts with the key word **dynamic=**.

MAC address must be installed the same as in the settings of the equipment performed via the USB console. It should be borne in mind that within a single Ethernet network all devices must have a unique address. Factory settings of the TDMoE devices use the same MAC address. If several TDMoE devices are connected to the server, then provide each device with a unique address.

N – quantity of channels - shall be set according to the type of the equipment being connected.

| Device | N |
|--|-----|
| Asteroid | 30 |
| Asteroid-MT16 | 128 |
| ELF2 in the CCS signaling mode (PRI, SS7) | 31 |
| ELF2 in the CAS signaling mode (pulsewise, MF) | 30 |

t– whether the device (span) is a synchronization source. If t=0, then DAHDI doesn't use this device as a synchronization source. If t=1, then DAHDI will be synchronized from this device.

Note. Prior to editing the system.conf file, stop the DAHDI driver by the "dahdi_cfg -s" command.

3.2.3. START DAHDI

Unload Asterisk & DAHDI

```
service asterisk stop
```

```
service dahdi unload
```

Load DAHDI

```
service dahdi start
```

Result of starting can be found in the «Diagnostics» chapter.

3.2.4. USER ACTIONS REQUIRED

Summarizing the steps of configuring and starting DAHDI.

1. Edit the file `/etc/dahdi/system.conf` according to the settings of the equipment.
2. Start the dahdi service.

3.2.5. EXAMPLE - CONFIGURATION FOR ASTEROID-1L3S

Connect Asteroid-1L3S to interface eth1, having specified the address 00:55:55:55:55:20 and having set it as a synchronization source for DAHDI. To do it, install and save in the Asteroid-1L3S console:

Configuration/Common/MAC = 00:55:55:55:55:20

Configuration/Common/VCO = 0

Configuration/E1/Clock source = Internal

Edit the file /etc/dahdi/system.conf:

```
dynamic=eth,eth1/00:55:55:55:55:20,30,1
alaw=1-30
echocanceller=oslec,1-30
fxsls=8-15
fxols=23-30
loadzone=ru
defaultzone=ru
```

3.2.6. EXAMPLE - CONFIGURATION FOR ASTEROID2-MT16

Connect Asteroid2-MT16 to interface eth0, having specified the address 00:55:55:55:55:30 and having set it as a synchronization source for DAHDI. To do it install and save in the Asteroid2-MT16 console:

Configuration/MAC = 00:55:55:55:55:30

Configuration/Clocksource =Master

Edit the file /etc/dahdi/system.conf:

```
dynamic=eth,eth1/00:55:55:55:55:30,128,1
alaw=1-128
echocanceller=oslec,1-128
fxols=1-112
fxsls=113-128
loadzone=ru
defaultzone=ru
```

3.2.7. EXAMPLE - CONFIGURATION FOR ELF2-AE IN THE CCS MODE

The CCS mode is used when working with PRI (EuroISDN, QSIG), SS7. To select the mode, specify the number of the channels N=31 in the file system.conf.

Connect ELF2-AE to interface eth1, having specified the address 00:55:55:55:55:40 and having set it as a synchronization source for DAHDI. To do it install and save in the ELF2-AE console:

```
Configuration/Common/MAC = 00:55:55:55:55:40
```

```
Configuration/Common/VCO = 0
```

```
Configuration/E1/Clock source = Line
```

Edit the file /etc/dahdi/system.conf:

```
dynamic=eth,eth1/00:55:55:55:55:40,31,1
alaw=1-15,17-31
echocanceller=oslec,1-15,17-31
bchan=1-15,17-31
dchan=16
loadzone=ru
defaultzone=ru
```

3.2.8. EXAMPLE - CONFIGURATION FOR ELF2-AE IN THE CAS MODE

The CAS mode is used when working with pulse and MF signaling. To select the mode, specify the number of the channels N=30 in the file system.conf.

Connect ELF2-AE to interface eth1, having specified the address 00:55:55:55:55:40 and having set it as a synchronization source for DAHDI. To do it install and save in the ELF2-AE console:

```
Configuration/Common/MAC = 00:55:55:55:55:40
```

```
Configuration/Common/VCO = 0
```

```
Configuration/E1/Clock source= Line
```

Edit the file /etc/dahdi/system.conf:

```
dynamic=eth,eth1/00:55:55:55:55:00,30,1
alaw=1-30
echocanceller=oslec,1-30
fxsls=8-15
fxols=23-30

loadzone=ru
defaultzone=ru
```


3.3. SYNCHRONIZATION

The DAHDI driver operates in a synchronous mode, i.e. all DAHDI devices (E1 maps, Asteroid, ELF) must work synchronously. By synchrony we mean a hierarchal distribution of hours from a single source via configuration of all system elements in the master-slave mode). If there is the E1 stream from the provider, as a rule it is selected as a master for the whole system. If there is no connection to the provider – select one of the DAHDI devices as a master. The master device has a system.conf file parameter `t = 1`.

Synchronization setting errors can affect operation of the PRI protocol, can result in appearance of the clicks in the vocal tract, ruptures of fax messages.

DAHDI receives recommendations from the system.conf file, in the SPANs which can be used as a synchronization source. DAHDI searches for the first SPAN without the ALARM state, and uses it as a synchronization source.

For the TDMoX devices the properties can be specified on the device which can be used as a synchronization source. The lower the parameter `t` – the higher the priority. `t = 0` means don't use as a synchronization source.

Command `"cat /proc/dahdi/[1..100] | grep CLOCKSOURCE"` will display a synchronization source TDMoX.

Hereby we consider the typical synchronization schemes.

| Make-up of a system | Settings of the devices | system.conf | Comments |
|-----------------------|--|--|--|
| 1 Asteroid device | Clock source=internal VCO=0 | t = 1 | SPAN1 will be ClockSource and MASTER. |
| 2 Asteroid devices | Asteroid1: Clock source=internal VCO=0 Asteroid2: Clock source=internal VCO=2 | Asteroid1: t=1 Asteroid2: t=0 | Asteroid1 will be a synchronization source for DAHDI, and for Asteroid2. |
| ELF2-AE and Asteroid. | ELF2-AE: Clock source=line VCO=0 Asteroid: Clock source=internal VCO=2 | ELF2-AE: t=1 Asteroid: t=0 | ELF2-AE receives synchronization from E1. DAHDI receives synchronization from ELF2-AE. Asteroid receives synchronization from DAHDI (i.e. from E1) |

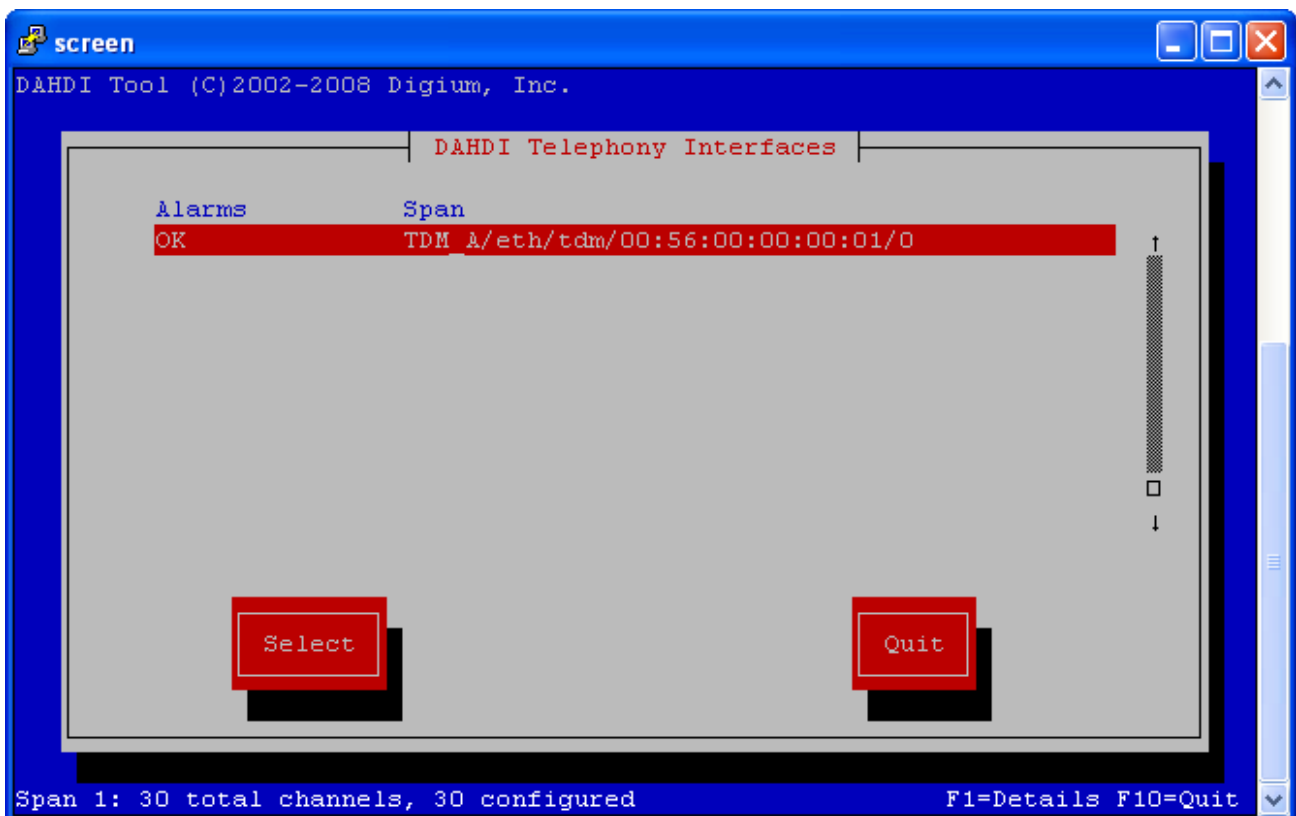
| | | | |
|---|--|--------------------------------------|---|
| 2 ELF2-AE devices ELF2-AE1 – to the provider (PSTN). ELF2-AE2 – to local PBX. | ELF2-AE1: Clock source=line VCO=0 ELF2-AE2: Clock source=internal VCO=2 | ELF2-AE1: t=1 ELF2-AE2: t=0 | ELF2-AE1 receives synchronization from E1. DAHDI receives synchronization from ELF2-AE1. ELF2-AE2 receives synchronization from DAHDI (i.e. from E1). |
|---|--|--------------------------------------|---|

4. DIAGNOSTICS

4.1. GENERAL CHECK OF DAHDI FUNCTIONALITY

Start *dahdi_tool*.

SPAN must have OK status.



If this is not the case:

- Check the cables and switches
- Make sure that the same mac address was specified in the device and in the configuration files.
- Make sure that the devices are connected to the network interface specified in the DAHDI configuration files.
- Make sure that the current network interface works.
ifconfig must display interface, there must be no errors on the interface.
- To view the traffic use the command
`tcpdump -i eth0 -s 14 "ether proto 0xd00d"`
The packages must interchange - the packages to the device, the packages from the device.

View the channels, busy state, synchronization source

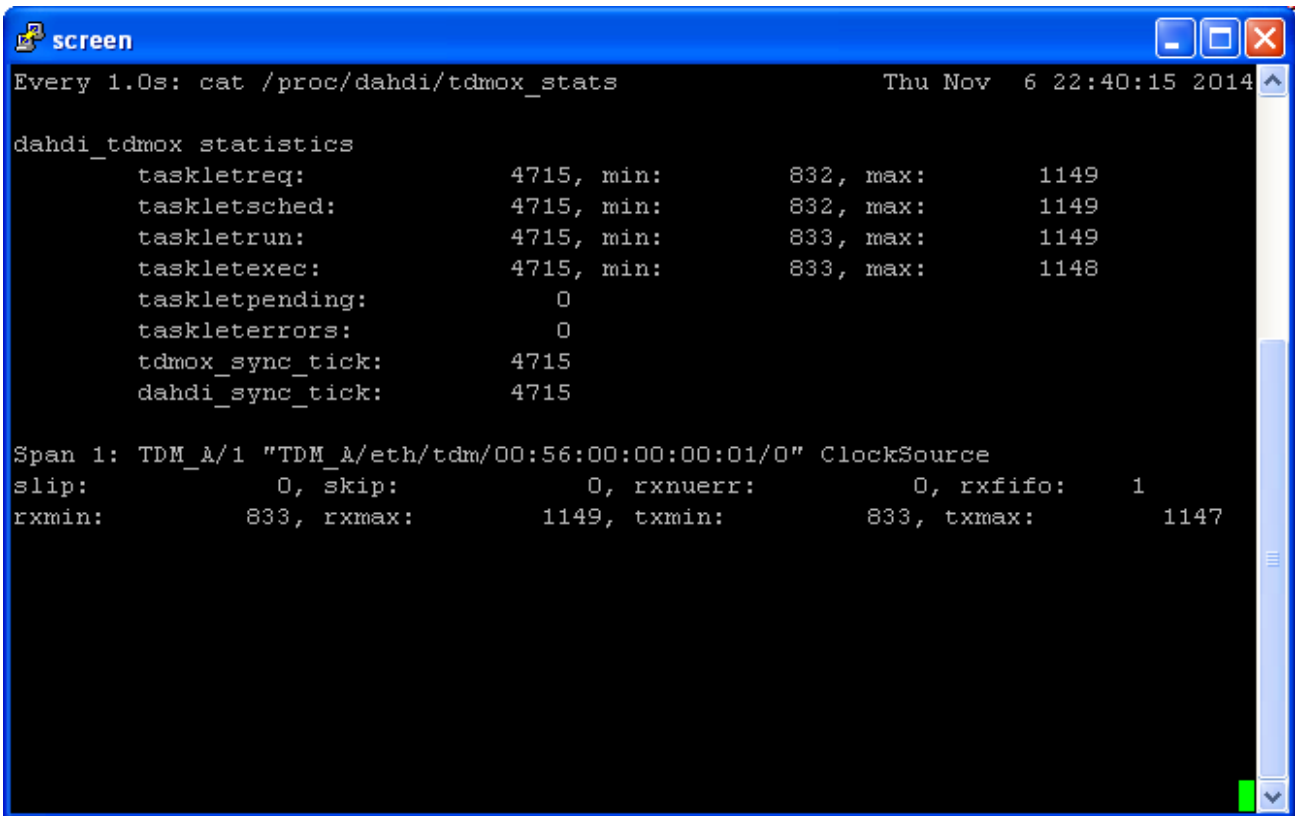
```
watch -n 1 "cat /proc/dahdi/1"
```

4.2. DIAGNOSTICS OF DAHDI_TDMOX

If the dahdi_tdmox driver is used, in the file `/proc/dahdi/tdmox_stats` you can view additional statistics on operation.

```
watch -n 1 "cat /proc/dahdi/tdmox_stats"
```

Counters tasklet errors, slip, skip, rxnuerr must not increase.



taskleterrors – failed to execute tasklet. May be a heavy load of the system.

tasklet* min&max – silent intervals between the calls tasklets at different stages.

slip – tdmox packages from the device go more rarely, as compared with the DAHDI master clock. See “Synchronization”.

skip – tdmox packages from the device go more frequently, as compared with the DAHDI master clock. See “Synchronization”.

rxnuerr – numeration of incoming TDMoX packages is disturbed.

rxmin/rxmax – minimum / maximum pause between the incoming TDMoX packages.

The ideal values – 1000.

txmin/txmax – minimum / maximum pause between the outgoing TDMoX packages.

The ideal values – 1000.

Allow calculation/display rx/tx/min/max

```
echo 1 > /sys/module/dahdi_tdmox/parameters/rctx_time
```

Allow display of run-time of the tasklets

```
echo 1 > /sys/module/dahdi_tdmox/parameters/tasklet_time
```

Reset statistics of TDMoX

```
echo> /proc/dahdi/tdmox_stats
```

5. CONFIGURATION OF FREEPBX

1. Execute "Installation of DAHDI" and "Configuration DAHDI" for your devices.
2. Restart Asterisk & DAHDI

```
amportal stop
```

```
amportal start
```
3. Continue adjustment by means of the FreePBX tools
 Connectivity/DAHDI Config

FreePBX Administration

192.168.161.128/admin/config.php?display=dahdi

Admin Applications Connectivity Reports Settings User Panel Logout: admin

Digital Hardware

| Span | Alarms | Framing/Coding | Channels Used/Total | D-Channel | Signaling | Action |
|------|--------|----------------|---------------------|-----------|-----------|--------|
|------|--------|----------------|---------------------|-----------|-----------|--------|

Analog Hardware

| Type | Ports | Action |
|-----------|--|--------|
| FXO Ports | 8,9,10,11,12,13,14,15 | Edit |
| FXS Ports | 1,2,3,4,5,6,7,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30 | Edit |

Reload Asterisk Dahdi Module Restart Dahdi & Asterisk

DAHDI Version: 2.9.2 Echo Cancellation:

Settings
 Global Settings
 System Settings
 Modprobe Settings
 Module Settings
 Sangoma Settings

Frog Inside FreePBX let freedom ring

ATTENTION: Modules FXS and FXO of the Asteroid2 and Asteroid2-MT16 devices use the LoopStart signaling (FreePBX by default uses KewlStart). Install the LoopStart signaling, save and apply the configuration.

5.1. ADJUSTMENT OF THE GSM CHANNELS IN FREEPBX

Unfortunately, FreePBX misses evident E&M signaling support being used in the GSM modules. The GSM channels shall be described manually.

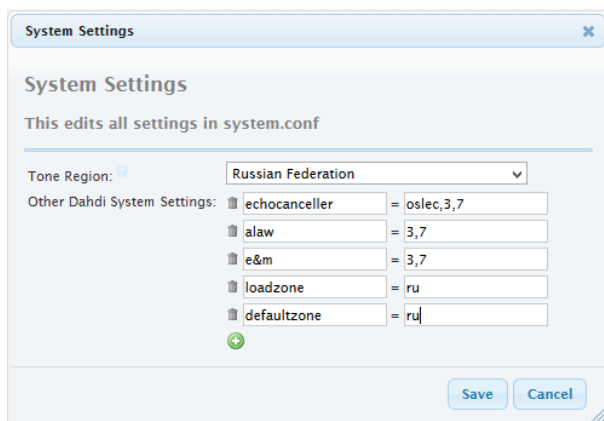
Find out the numbers of the GSM channels

```
cat /proc/dahdi/1 | grepTDM_AE
```

Specify the channels in “Connectivity/DAHDI Config /System Settings”.

Add the strings

```
echocanceller=oslec,3,7
alaw=3,7
e&m=3,7
loadzone=ru
defaultzone=ru
```



Specify the channels in “Connectivity/DAHDIConfig /GlobalSettings” or in the file `/etc/asterisk/chan_dahdi_custom.conf` (recommended).

```
signaling=e&m
group=0
context=from-analog
channels=3,7
```

Apply changes

Restart DAHDI&Asterisk

GSM channels will not appear in the list but they will:

1. Be visible in asterisk –
dahdi show channels
2. Receive incoming calls in Asterisk/FreePBX.
3. Be available for description of outgoing calls in FreePBX in the g0 group.

6. APPENDICES

6.1. APPENDIX 1. QUICK INSTALLATION OF FREEPBX 2.11 THROUGH THE EXAMPLE OF ASTEROID-1L3S.

Install the FreePBX 2.11 distributive.

Run the code below.

```
(
set -e

cd /usr/src/

wget -t0 -c http://parabel.ru/d/software/dahdi/dahdi_2.9.2%2B2.9.2-
parabel_2.9.2.3.tar.bz2

tar xf dahdi_2.9.2+2.9.2-parabel_2.9.2.3.tar.bz2

cd dahdi_2.9.2+2.9.2-parabel_2.9.2.3

yum -y install patch newt-devel mc

./build.sh

./install.sh

cd ./dahdi_tdmox/patches/freepbx-2.11/

./patch.sh

cd /etc/dahdi/tdmox/

cp samples/asteroid-1l3s.conf .

./asteroid-1l3s.conf

echo > /etc/dahdi/system.conf

amportal stop

amportal start

)
```

Specify in Asteroid-1L3S the MAC address specified in asteroid-1l3s.conf.

Asteroid device-1L3S is ready to be configured via FreePBX.

See the Connectivity/DAHDI Config" menu

6.2. APPENDIX 2. GLOSSARY

The following terms are used in this document:

DAHDI – driver package for low level support of the phone equipment. The package works as a part of the Asterisk complex, controlled by the Linux OS.

MAC – access level to the Ethernet environment. Generally, in this document the MAC address is meant – an address of the Ethernet device. A low-level communication protocol on Ethernet can stand for MAC as well.

Module – dynamically loadable driver. As a rule the module files have the .ko extension and are located in the directory /lib/modules/... Modules related to DAHDI are called dahdi.ko, dahdi_dynamic.ko, dahdi_dynamic_eth.ko, dahdi_tdmox.ko, dahdi_tdmox_eth.ko. The list of downloaded modules in linux can be viewed by the lsmod command.

Patch – a correction implemented into the driver or a software product. Usually it is delivered in the form of source code, and is used by the patch program.

PRI – designation of the signaling family developed within the ISDN project. As a rule, the PRI signaling uses the 16-th channel of the E1 frame and realizes exchange with the signaling packages of HDLC format via the serial channel.

Span (SPAN) – a term used in DAHDI to describe a group of the single type configurable channels. In case of the E1 adapters, e.g., the span coincides with the E1 port. Numeration of the spans and channels in Asterisk starts with “1”.

TDMoX /TDMoE – transmission protocol of voice information as the packages at the MAC Ethernet level. The protocol is realized in the drivers DAHDI package.

CLOCKSOURCE - span status informing that dahdi_dynamic or dahdi_tdmox consider this span to be a synchronization source of the module.

MASTER - span status informing that DAHDI considers this span to be a synchronization source.

If configuration is proper, one span must have the CLOCKSOURCE and MASTER status.

Revisions.

- 1.1 – description of dahdi_tdmox
- 1.2 – added a description of the standard dahdi_dynamic, Glossary
- 1.3 – a bug is fixed in the service command syntax