

# KAIROS Operational Manual

Version 1.3

Radio Activity srl

a JVCKENWOOD Company

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# KAIROS – Operational manual

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## 1 KAIROS: general description

### 1.1 Features and application

**KAIROS** is dual mode analog and DMR transceiver, intended for both fixed and mobile use. As a repeater it can work both as stand alone and as part of a network of repeaters; as a fixed or mobile station it can work as a radio subscriber, connected directly to a dispatching system, which can spread from a very simple console (4W+E/M), to a more complex RPT/SIP equipment.

**KAIROS** is a software-defined radio transceiver that implements all mo-demodulation and filtering processes via SW. This technique assures repeatability and perfect matching between the base stations. It also allows to manage multiple protocols at the same time to perform, for example, a **dual mode** transceiver able to switch between analog and DMR automatically and in real time, according to the incoming radio (or IP) signals. **KAIROS** has got an effective SW and HW platform that realizes a powerful embedded workstation. Its **LINUX core**, thanks to the continuous upgrading from thousands of developers around the world, interfaces naturally IP devices and networks.

Please refer to “ENB53 - KAIROS family 1v1.pdf” document for a general description about intended use of **KAIROS**, features and applications, compliance to normatives.

The documentation is valid for all the models of the KA-xxx series, if not otherwise specified; the head of family is the KA-160 model and the derived ones are the following: KA-080, KA-350, KA-450, KA-500, KA-900. Please refer to “ENB52 - KAIROS user manual 1v4.pdf” for engineering specifications of each model. All models are certified according to ETSI, FCC and IC rules; the following table shows their identification ID:

ETSI ( 1588 ! )	FCC	IC
KA-160	Y9M-KA160	10484A-KA160
KA-080	Y9M-KA080	10484A-KA080
KA-350	Y9M-KA350	10484A-KA350
KA-450	Y9M-KA450	10484A-KA450
KA-500	Y9M-KA500	10484A-KA500
KA-900	Y9M-KA900	10484A-KA900

### 1.2 Block diagram description

The logical structure of **KAIROS** is quite simple: the core is logical block, made by a microprocessor, a DSP and a FPGA, which embeds all the functionalities of the transceiver/repeater and which is connected to different interfaces:

1. IP: this is LAN Ethernet interface for exchanging audio, data and remote control with a remote device;
2. RF: this is made by a digital class C transmitter and 2 identical digital receivers;

3. AF: this is a simple 4W+E/M interface;
4. I/O: a set of input/output contact for monitoring local devices.

Every mathematical elaboration of signals is digitally made by the core and also the logical behaviour of the station is totally managed by the core. Every signal received from both RF and AF/IP interface, arrives at the core and the core itself generates every signal to both RF and AF/IP interface. This means that there is no direct connections between a command and its effect, but the core decide how to manage signals, according to its established function inside network. After this clarification, it is possible to describe each interface block.

### 1.2.1 Logical core block

This block is made by a microprocessor, a DSP and a FPGA, connected together by a set of logical buses. Microprocessor is responsible of the high level communication and high level management of the device; DSP performs every digital processing of the signals; FPGA is used as an interface with other blocks. This block is equipped also with flash and RAM memory, RTC and a complex digital PLL system based on a VCTCXO for implementing a very stable clock generator for synchronizing all the block of the KAIROS to the same frequency reference.

### 1.2.2 IP interface

This is the main communication port of the device, aimed not only to remote control, programming and monitoring, but also to implement a virtual audio and data line over IP. This line can be used for audio and data exchange with other devices; in case of IP connected networks, made by **KAIROS** repeaters, a proprietary protocol will be used with additional information, while in case of connection to standard RTP/SIP devices, a RTP/SIP protocol will be used. This interface is completely managed by the microprocessor of the logic core.

### 1.2.3 AF interface

This is the second audio interface of **KAIROS**, after the virtual line over IP, for local connection to speaker and microphone. Two balanced, not isolated 4 wire lines are available, equipped with SQ and PTT contact. The audio signals are digitally converted by a AtoD / DtoA processor and they are digitally managed by the DSP of the logic core.

### 1.2.4 RF interface

This is the most important block after the core, because it consists in the TX and in the double RX. The TX is made by a digital frequency synthesizer and a class C amplifier, which can provide up to 25W RF output. The transmitter is equipped with direct and the reflected power sensors, temperature sensor, current monitor. The RX is made by 2 parallel and identical receivers, sharing the same local VCO (digitally synthesized). They are equipped with a double channel filter at intermediate frequency (45MHz), which allows 25, 20 and 12.5KHz channel spacing. The signal at intermediate frequency is sampled by a digital IF processor, for getting

the baseband signal on a digital bus. Base band side of both TX and RX are connected to the DSP of the logic core for digital signal modulation/demodulation and processing.

### 1.2.5 I/O interface

**KAIROS** is equipped with some digital input and digital output contacts, referred to ground, directly managed by the microprocessor of the logic core, for interfacing with other devices with general purpose.

## 2 KAIROS Manager SW pack Overview (REMOTE CONTROL)

This section is an operational guide for configuring the **KAIROS** radio station for most common standard usage. It is not a complete manual of course, but a guide for setting the main functional parameters and for analyzing the working status of the equipment. Please contact Factory for custom applications or for any other usage.

**KAIROS** needs the following connections:

- ∞ Power supply: 13.2Vdc with negative to ground;
- ∞ TX output: transmitter output, to be connected to a duplexer or a TX antenna, or a 50 ohm dummy load;
- ∞ RX M input: main receiver input, to be connected to a duplexer, or to a RX antenna. If branched with TX, please maintain at least 75dB of isolation between RX and TX to avoid damages or malfunctioning;
- ∞ RX D input: diversity receiver input, to be connected to a second RX antenna, through a filter for decoupling it from TX output. If not used, connect it to a 50 ohm dummy load;
- ∞ GPS: if GPS receiver is included, connect the GPS input to a GPS antenna with at least 20 dB of amplification and possibly equipped with a band-pass filter for out-band noise reduction. A 5Vdc power supply is supplied over the same RF coaxial cable;
- ∞ LAN port: TCP/IP port for remote control, to be connected to a 10/100 BT Ethernet network;
- ∞ I/O port: this connectors contains 2 audio lines interfaces (4W+E/M) some digital I/O contacts, one 0-20V analog input and a 12V output (400mA max) for eventual auxiliary devices. This connector remain unused for repeater functions. Refer to user manual for pinout.

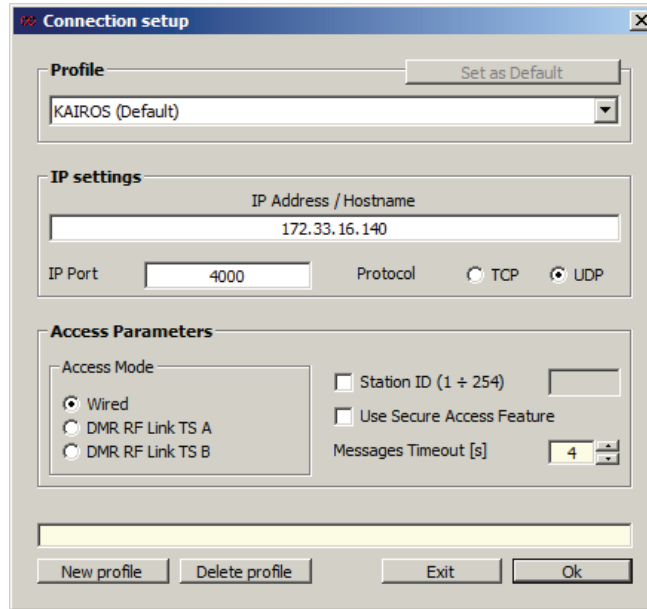
When **KAIROS** is powered on, it performs a self calibration test, taking about 30 seconds. Please wait for calibration end before proceeding.

The only physical command available is the power button: a short push will switch **KAIROS** on; a long push (about 5 seconds, until LEDs are flashing green) will switch **KAIROS** off; if the power cord is disconnected, **KAIROS** “remembers” the last power status (on or off) for successive power on. Every other setting is available through Kairos\_Manager application.

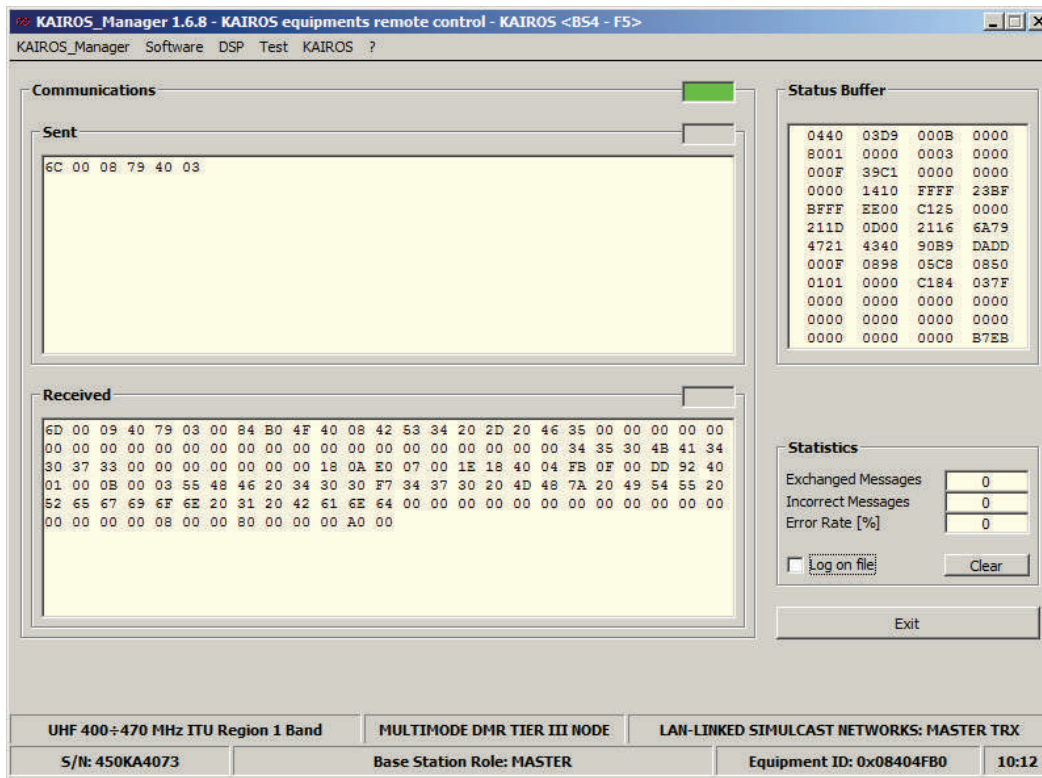
### 2.1 Installation

Installation of “KAIROS\_Manager” requires a PC with Windows O.S.; insert the CD with the installation package into the PC; run “Setup.bat” application with “Administrator rights”. After installing, the application is available from the folder “Radio Activity \ Kairos Manager”.

After double clicking on “KAIROS Manager.exe” the following window will appear:

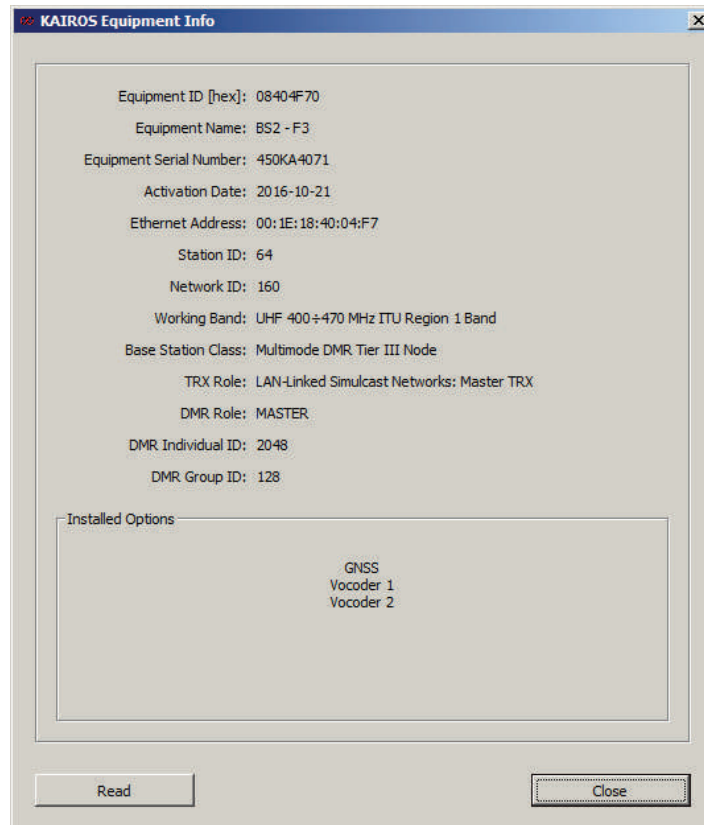


Connection parameters like IP address of the target equipment should be set to get access to the device. The main control window will appear, which will give access to each equipment setting. Here following the description of the function menus of the main mask:



**“KAIROS Manager” menu** allows to change the language and measurements units

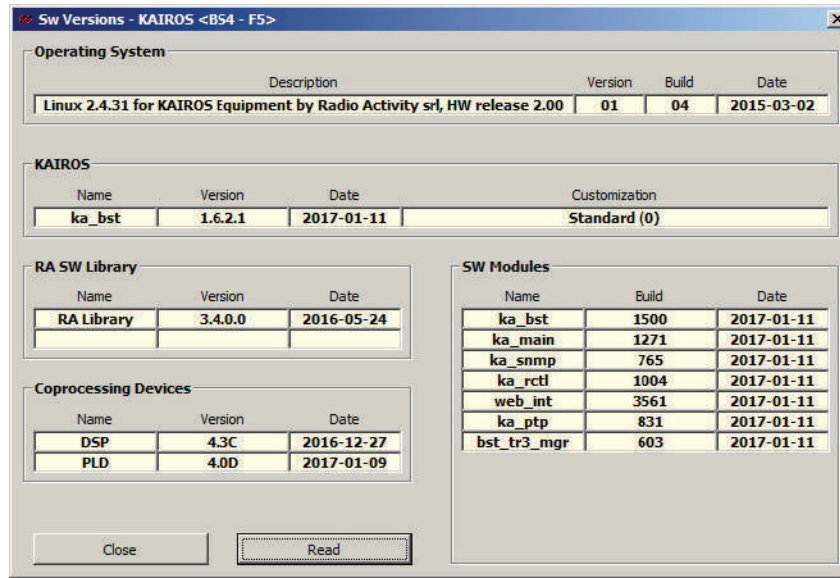
**“?”/KAIROS Equipment info” menu** shows the factory data, technical features and eventuality installed options (GPS, vocoders) of KAIROS.



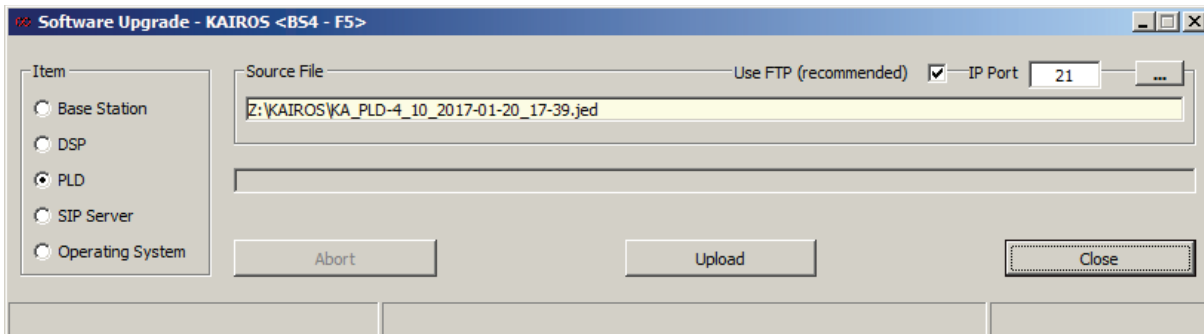
## 2.2 Software and configuration maintenance

“**Software**” menu allows to view versions of downloaded files and to download newer ones. It give access to:

- ∞ a mask with the versions of the different firmware installed into equipment:



- ∞ a mask for new software downloading:

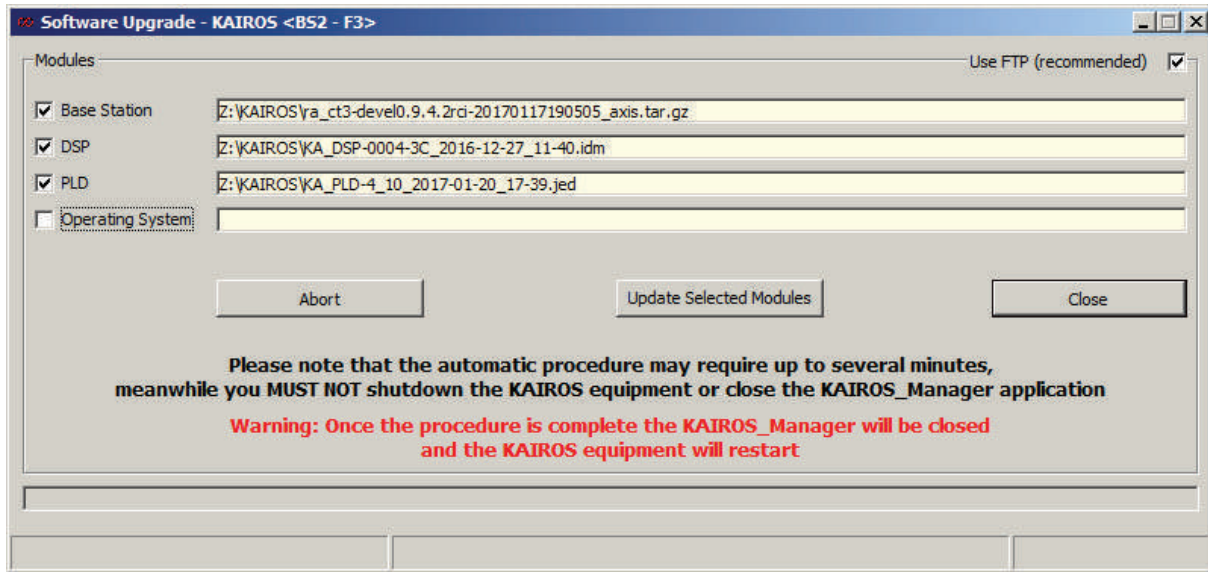


To upload new SW,

1. Select the type of firmware you need to download (microprocessor/DSP/FPGA/SIP/OS).
2. Select the file to be downloaded through “...” button (browse).
3. Push “Upload” button.
4. Wait for the end of the process.



- ∞ A mask for a simultaneous software downloading of the selected modules.

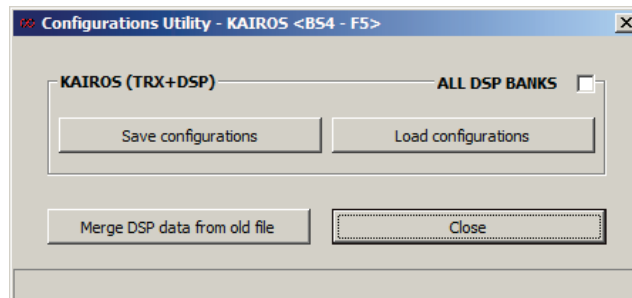


To upload new SW,

5. Select the module/s you need to download (microprocessor/DSP/FPGA/OS).
6. Select the file to be downloaded by clicking over the bar (browse).
7. Push "Update selected modules" button.
8. Wait for the end of the process.

A KAIROS is characterized not only by its FW, but also by its configuration, which can be uploaded and/or saved through the following menu:

**"Configuration utility" menu:** this function allows to clone an equipment by saving the entire configuration. Each configuration can be saved on a PC and load from it.

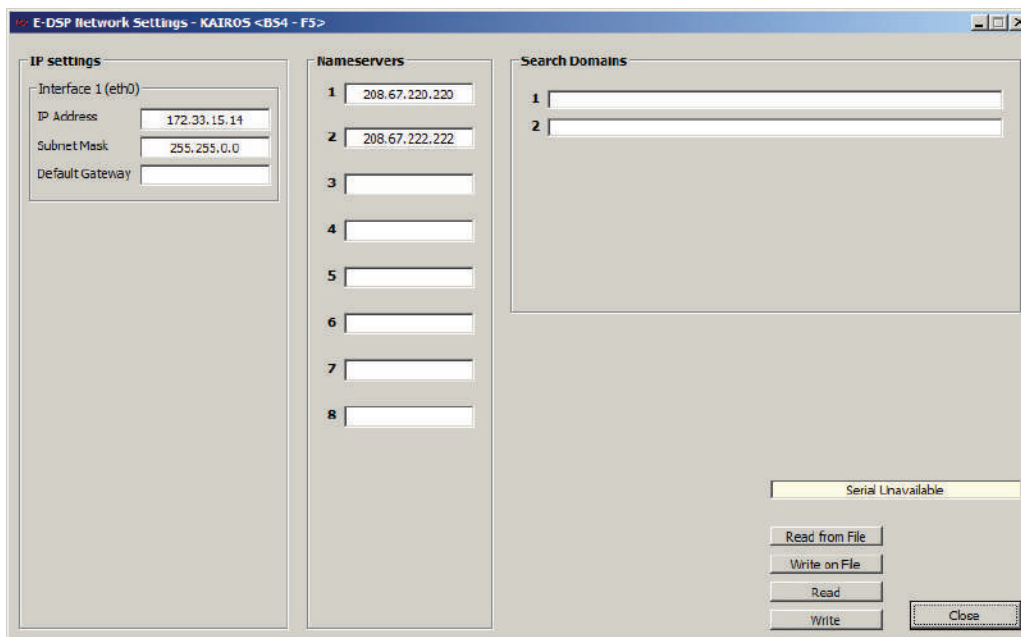


## 2.3 Main configuration

**“KAIROS” menu** is the most frequently used one and it contains masks for systems setup, configuration, control, restart of equipment. It is continuously changing according to the product developing and up-dating, but its main functions remain the same and they are explained here following.

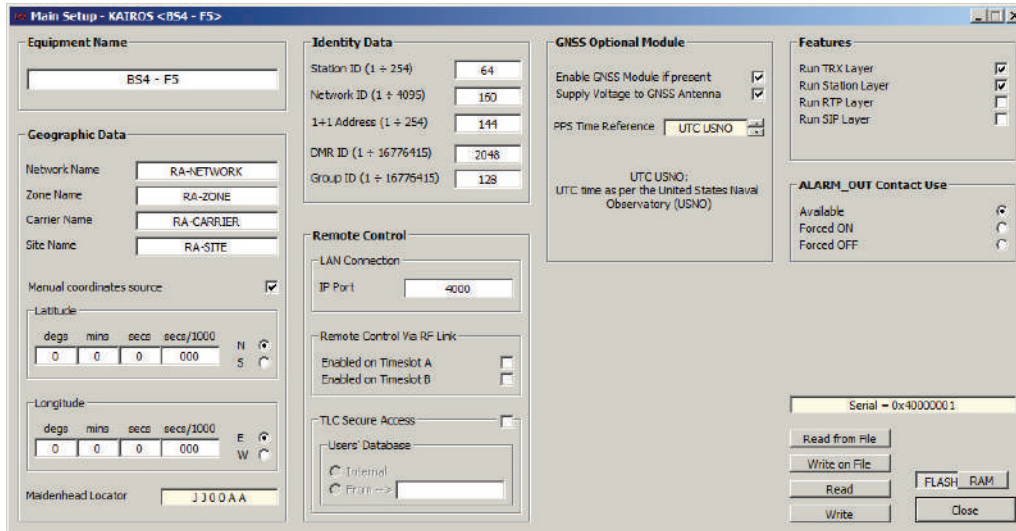
### “Configuration \ Network settings” menu

It allows to set-up the IP address of the radio for remote control over Ethernet. It is important to define the subnet mask and the gateway address (if present).

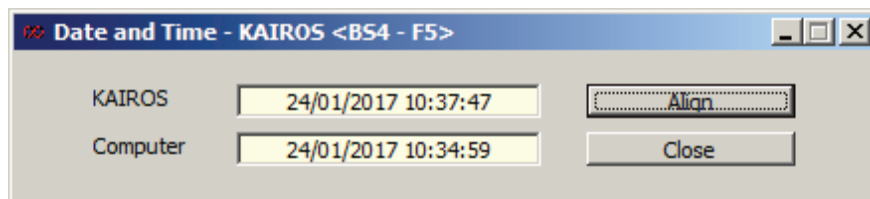


**“Configuration \ Main setup” menu**

It allows to set-up identifying parameters for the equipment and other parameters which are referred to hardware configuration (internal serial ports settings, remote control port settings and GPS module interface settings). Contact factory before changing them.



**“Controls \ Date/time” menu**



It allows to align the real time clock of the equipment to the time of the PC. This is not for signal synchronization, but only for attaching a time to eventual alarm notification.

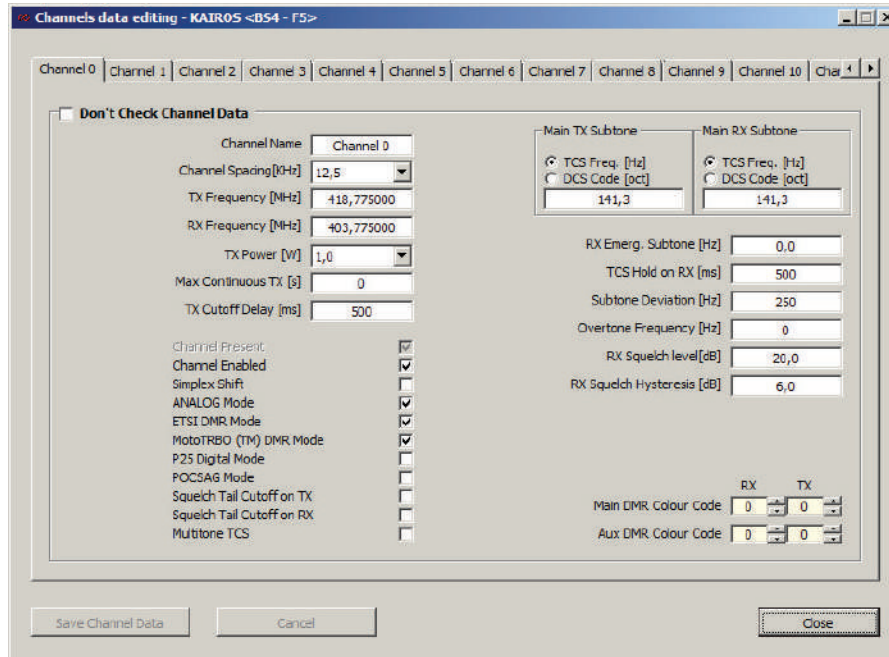
## 2.4 Channel configuration

### “Configuration \ Channel table” menu

This is the list of programmable channels of base station: 200 channels are available for communication. It is possible to save/read the table on/from file or microprocessor memory by pushing the corresponding buttons of the mask. Other buttons are available for setting default channel, current working channel and for applying modifications to current status.

	Channel 0	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	Channel 9
Channel Name	Channel 0	Empty Channel	Empty Channel	Empty Channel	Empty Channel	Empty Channel	Empty Channel	Empty Channel	Empty Channel	Empty Channel
Channel present	Yes	No	No	No	No	No	No	No	No	No
Channel enabled	Yes	No	No	No	No	No	No	No	No	No
ANALOG mode	Yes	No	No	No	No	No	No	No	No	No
DMR ETSI mode	Yes	No	No	No	No	No	No	No	No	No
DMR MotoTRBO mode	Yes	No	No	No	No	No	No	No	No	No
Digital P25 mode	No	No	No	No	No	No	No	No	No	No
POCSAG mode	No	No	No	No	No	No	No	No	No	No
Channel bandwidth [kHz]	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5	12,5
TX Frequency [MHz]	418,77500	0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	0,00000
RX Frequency [MHz]	403,77500	0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	0,00000	0,00000
Simplex Frequency Shift	No	No	No	No	No	No	No	No	No	No
TX Power [W]	1,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Maximum continuous tx time [s]	0	0	0	0	0	0	0	0	0	0
Transm. closure delay [ms]	500	500	500	500	500	500	500	500	500	500
TX DPL Code [oct]	--	--	--	--	--	--	--	--	--	--
RX DPL Code [oct]	--	--	--	--	--	--	--	--	--	--
TX TCS Frequency [Hz]	141,3	123,5	123,5	123,5	123,5	123,5	123,5	123,5	123,5	123,5
RX TCS Frequency [Hz]	141,3	123,5	123,5	123,5	123,5	123,5	123,5	123,5	123,5	123,5
Multitone TCS	No	No	No	No	No	No	No	No	No	No
Squelch Tail Cutoff on TX	No	No	No	No	No	No	No	No	No	No
Squelch Tail Cutoff on RX	No	No	No	No	No	No	No	No	No	No
RX Emergency TCS Frequency [Hz]	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
RX TCS hold time [ms]	500	500	500	500	500	500	500	500	500	500
Subtone deviation [Hz]	250	250	250	250	250	250	250	250	250	250
Supertone Frequency [Hz]	0	0	0	0	0	0	0	0	0	0
RX Squelch level [dB]	20,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0
RX Squelch Hysteresis [dB]	6,0	6,0	6,0	6,0	6,0	6,0	6,0	6,0	6,0	6,0
RX DMR Colour Code (main)	0	1	1	1	1	1	1	1	1	1
RX DMR Colour Code (main)	0	1	1	1	1	1	1	1	1	1
RX DMR Colour Code (aux)	0	1	1	1	1	1	1	1	1	1
TX DMR Colour Code (aux)	0	1	1	1	1	1	1	1	1	1

By double-clicking over a channel or by pushing “Modify channel” button, it is possible to change the settings of each channel. The following window will appear:

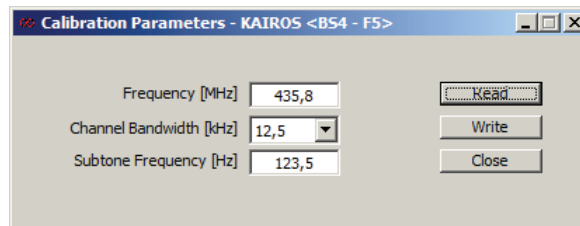


It is possible to set channel name and bandwidth, transmission power, carrier frequencies sub-audio (both TCS and DPL) tones, color codes, squelch level, hysteresis and hold time, maximum transmission time.

The boxes in the lower left side of the mask should be checked according to the desired working mode of the channel (analogical, DMR, both of them) and to enable the channel itself.

Each channel can be read, saved, deleted.

**“Configuration \ Calibration parameters” menu**



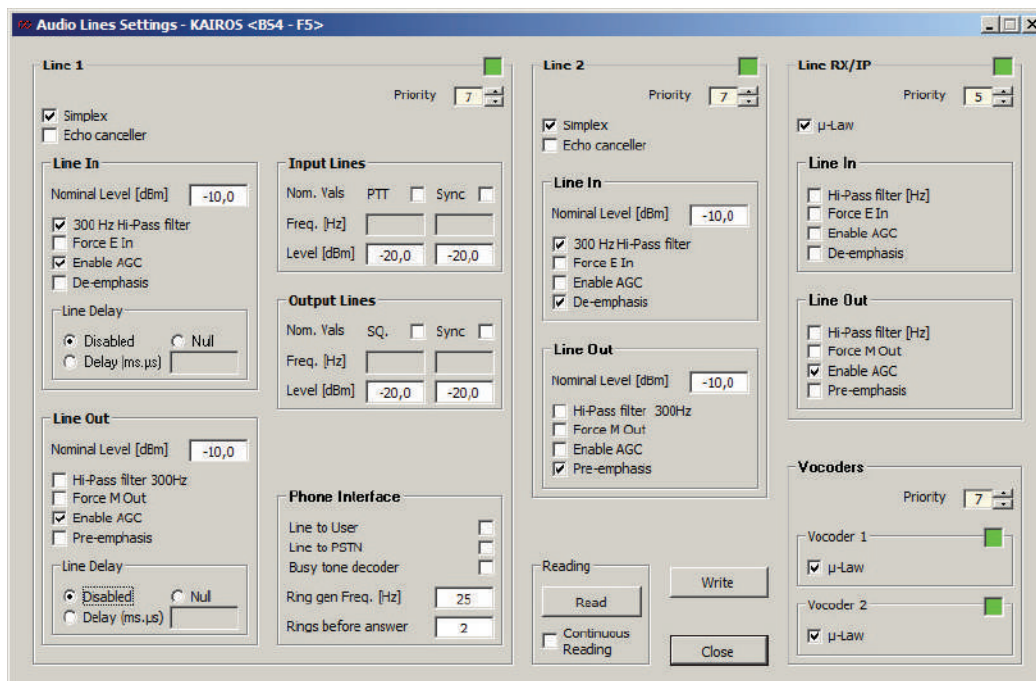
This menu allows to set the parameters of the calibration channel, that is the frequency where loop self test will be performed. It is suggested to set this frequency “near” the working ones.

**“Configuration \ Audio lines configuration” menu**

This mask allows to configure the physical analog line interface of the base station. Line 0 and 1 correspond to the physical 4W lines on the I/O connector; line 2 is a virtual line over TCP/IP connection; line 3 is a virtual internal line to DSP.

For each input and output line it is possible:

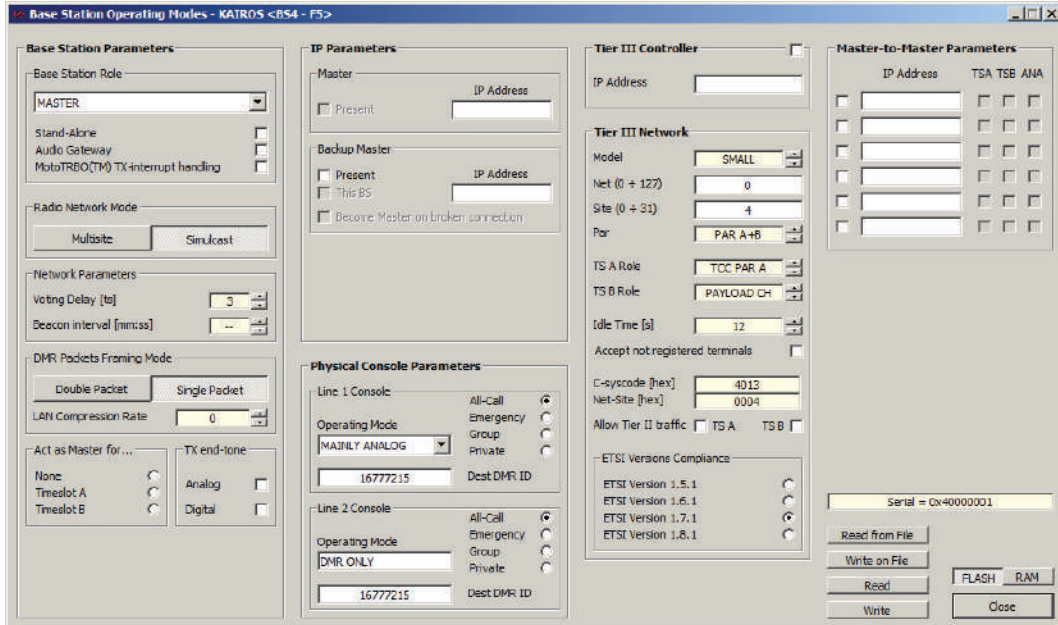
- ∞ to set nominal signal level
- ∞ to enable HP and/or LP filters with programmable cut-off frequency
- ∞ to insert a time delay
- ∞ to enable and define nominal level and frequency of eventual control tones

**2.5 Network role configuration****“Configuration \ Base Station operating modes” menu**

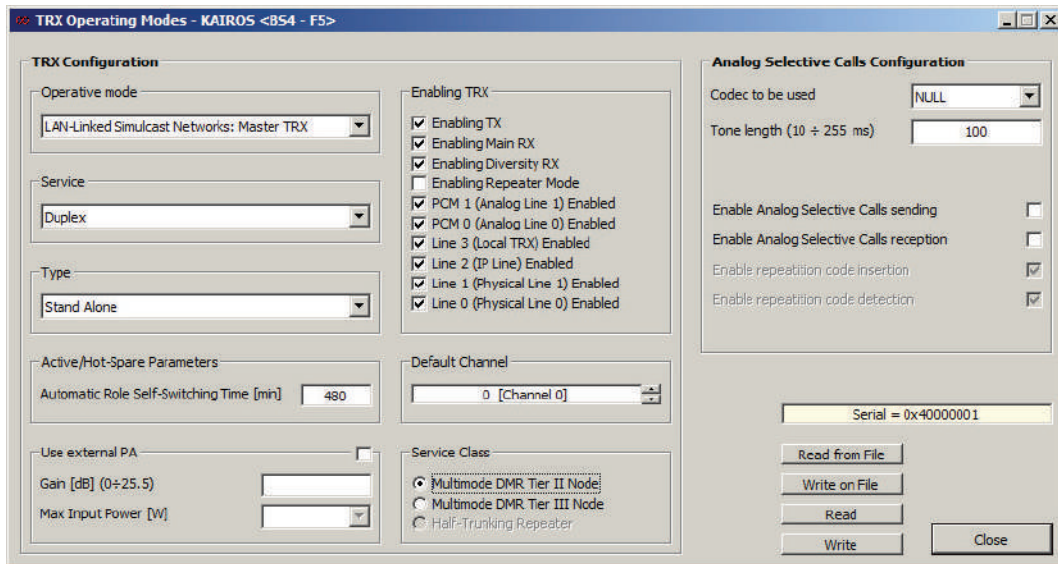
This mask allows configuring the role of the base station both in a network and in a standalone condition. It concerns the logical function of the base station, considered as a block of the radio system, and its parameters are managed by the microprocessor; this mask pairs with the “TRX operating modes” mask, which concerns how to process the signals, depending on the base station role, and which parameters are managed by the DSP.

It is possible to set the type of network (multisite or simulcast), to configure source of synchronization framing, to specify addresses and IP ports for logical connections inside network, and so on. Many of these parameters refer to Radio Activity network architecture. Contact Factory for further details.





**“Configuration \ TRX operating mode” menu**

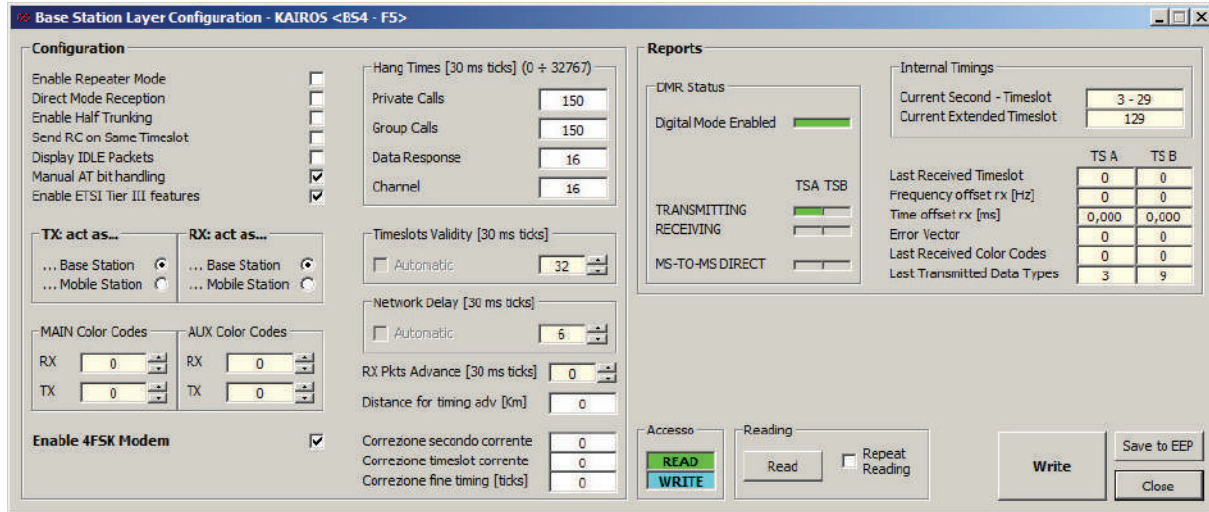


This mask allows setting the operative configuration of the base station:

- ∞ main functionality (master, slave, sub-master, ...)
- ∞ duplex, semi-duplex, simplex
- ∞ 1+0 or 1+1
- ∞ Repeater/fixed station/multi-receiver
- ∞ Single or space diversity reception
- ∞ Audio frequency lines interfaces enabling
- ∞ Tier II / Tier III Mode

**“Configuration \Base Station layer configuration” menu**

This is the main DMR control mask allowing to configure DMR mode parameters of base station. The mask contains both a configuration box and a monitor box.



The programmable parameters are the following:

- ∞ enable of reception as a terminal or as a base station,
- ∞ enable of transmission as a terminal or as a base station,
- ∞ enable of repeater mode,
- ∞ normal and emergency color code both for TX and RX (this parameters are read from channels table: for non-volatile settings, channels table must be edited!),
- ∞ network delay,
- ∞ Hang time for different kind of calls, private, group, data,
- ∞ TX hold time after last valid data timeslot or after hang time expiration,
- ∞ Delay compensation, to compensate for different path delays in simulcast network.

The monitor box gives information about:

- ∞ current timing, UTC minute and second, network offset seconds, timeslots and ticks,
- ∞ DMR mode enable,
- ∞ busy timeslots both in TX and RX,
- ∞ number of current second/timeslot analyzed
- ∞ number of last received timeslot (even and odd)
- ∞ frequency offset
- ∞ time offset
- ∞ error vector

“Save in EEP” button allows to save the configuration parameters of DSP into flash memory.



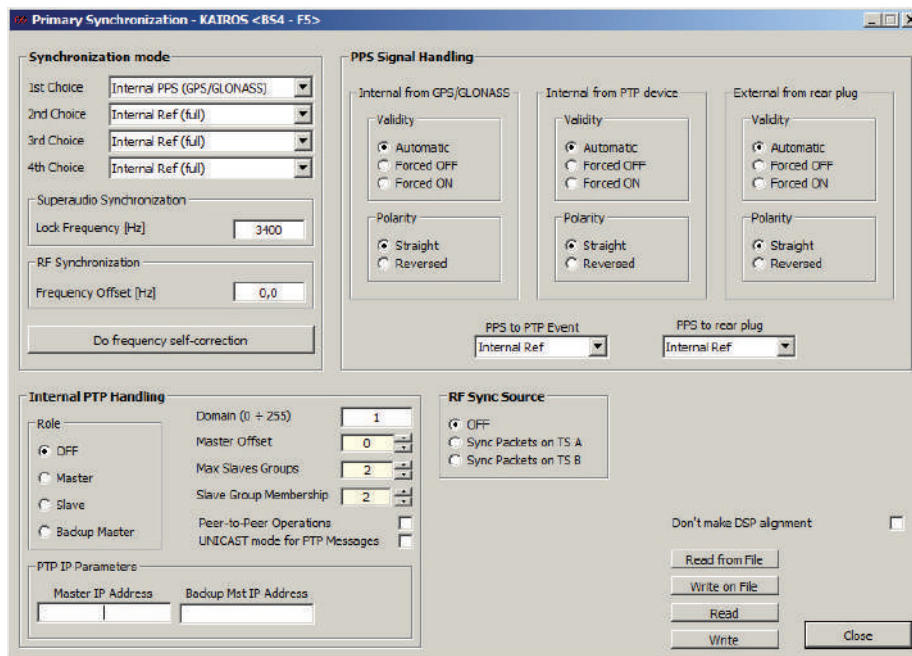
## 2.6 Synchronization and filtering settings

### “Configuration \ Primary Synchronization” menu

This menu allows specifying the sources of synchronization for the base station:

- ∞ internal VCTCXO (0.1ppm)
- ∞ GPS / 1PPS
- ∞ PTP – according to IEEE1588
- ∞ Super-audio tone on audio line interface
- ∞ Timeslot 4FSK / RF pattern
- ∞ External PPS (provided by an external synch source through the rear plug)

More sources can be selected with a different priority, so that in case of lack of the first source, the second can be automatically chosen and so on. If GPS signal is used for synchronization, a box for 1PPS setting is available.



To finely align the internal VCTCXO to the selected primary synchronization source, a “Frequency self-correction” function is available.

For simulcast application, synchronization is the inner core of the system. Particular attention must be paid in order to correctly synchronize the entire system. Contact Factory for further details.

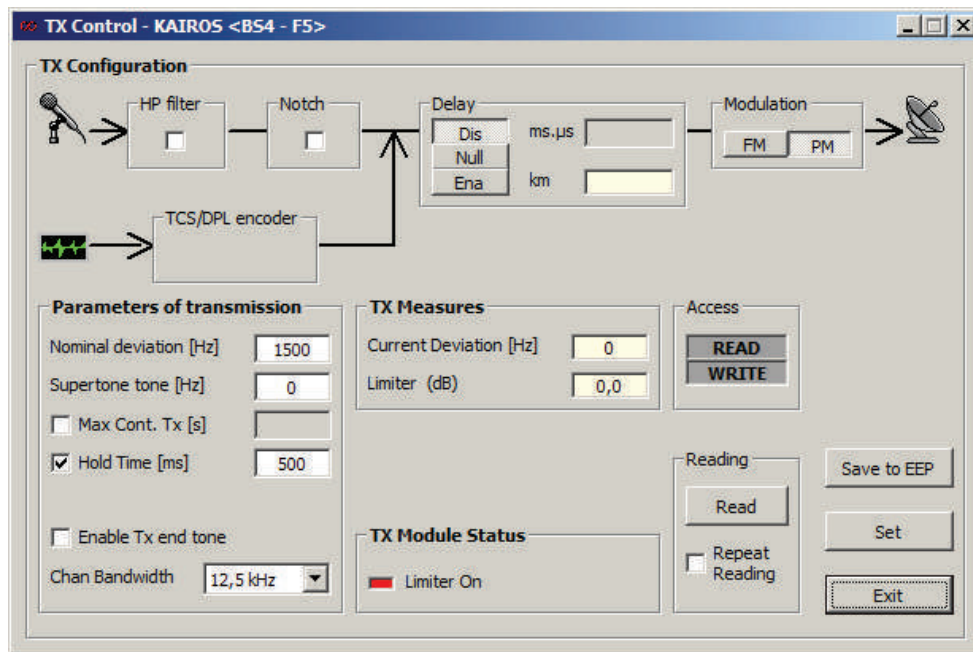
**“Configuration \ TX control” menu**

This mask allows configuring transmitter parameters. For other DMR typical parameters please refer to “Configuration \ Base Station layer configuration” menu.

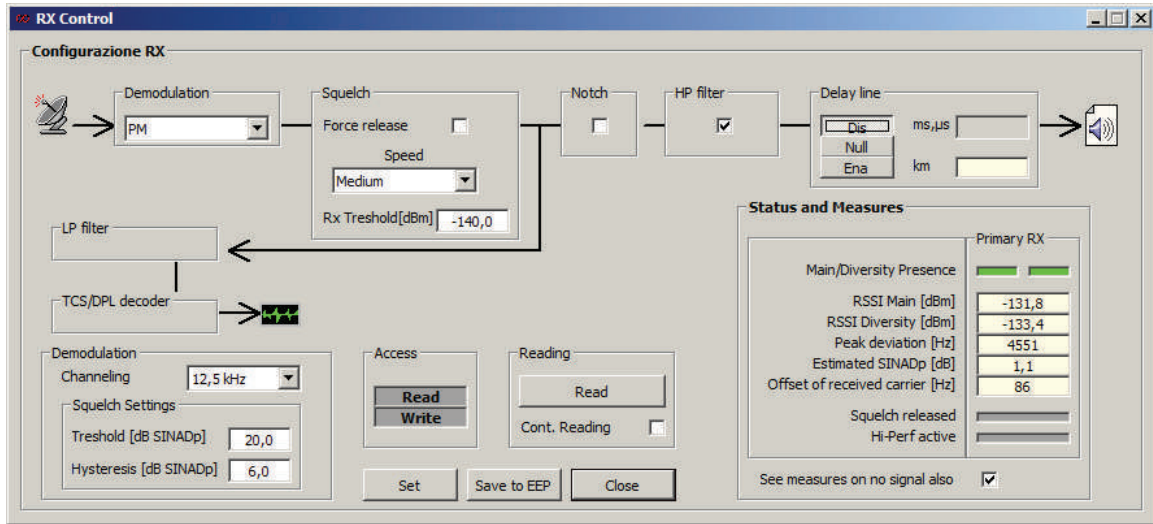
On the path of the modulating signal, it is possible:

- ∞ to enable HP and/or LP filters with programmable cut-off frequency,
- ∞ to enable a Notch filter self-centered on analog sub-audio frequency,
- ∞ to insert a delay (in microseconds) to compensate for different path delays in simulcast network (here is for analog mode only!)
- ∞ to enable a band equalizer filter with different “length” (useful only in analog mode),
- ∞ to define the type of analog modulation, FM or PM

Instantaneous deviation and eventual signal level compression are also monitored.



**“Configuration \ RX control” menu**



This mask allows configuring receiver parameters. For others DMR typical parameters please refer to “Configuration \ Base Station layer configuration” menu.

On the demodulation path of the received signal, it is possible:

- ∞ to define the type of analog demodulation, FM or PM,
- ∞ to set squelch opening mode
- ∞ to enable HP and/or LP filters with programmable cut-off frequency,
- ∞ to insert a delay (in microseconds) to compensate for different path delays in simulcast network(here is for analog mode only!),

The box “Demodulation parameters” contains settings as read from channel table. Eventual modification will be overwritten at next channel change or power on.

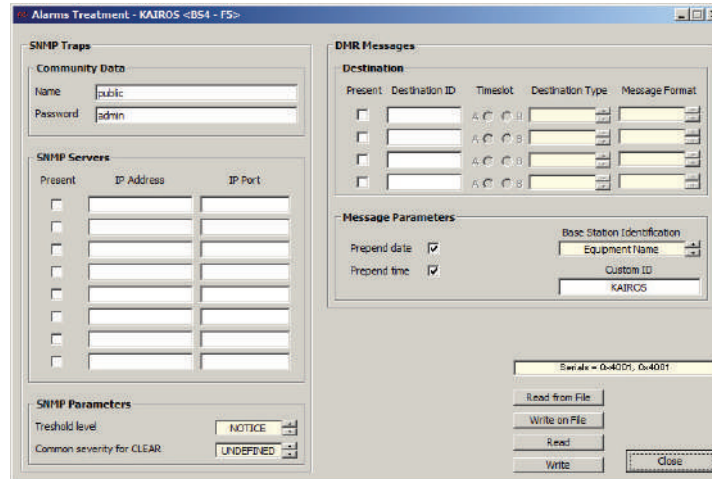
Peak deviation, psophometric SINAD and carrier offset frequency are also monitored.

**2.7 Alarm configuration**

**“Alarm Configuration \ Alarm treatment” menu**

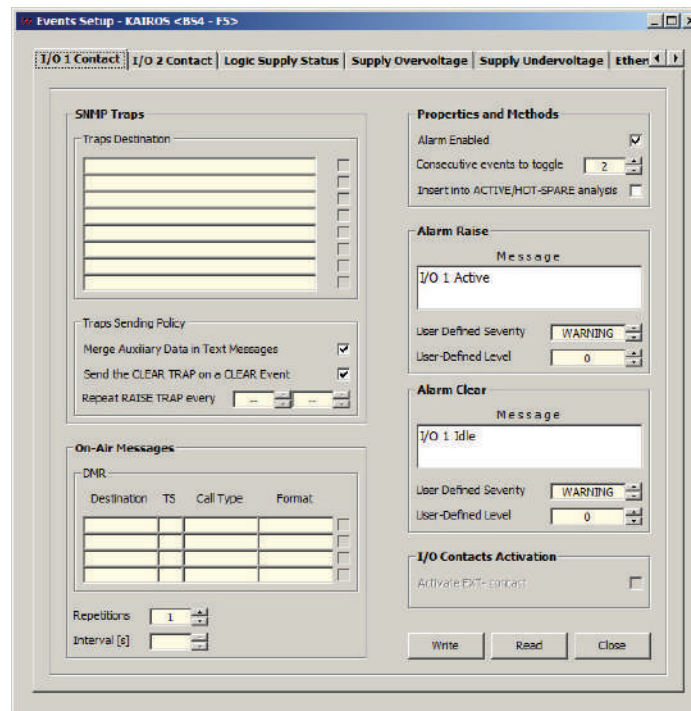
The base station can generate spontaneous alarms when user defined events happen. Alarm can be sent to a SNMP server, to a mobile/portable radio (as a short TXT message), or it can enable one or more I/O contacts.

The menu “Alarm treatment” allows configuring the addresses of eventual SNMP servers.



**“Alarm Configuration \ Alarm events” menu**

“Alarm events” menu allows configuring the events that can generate an alarm and the destination of the alarm itself.



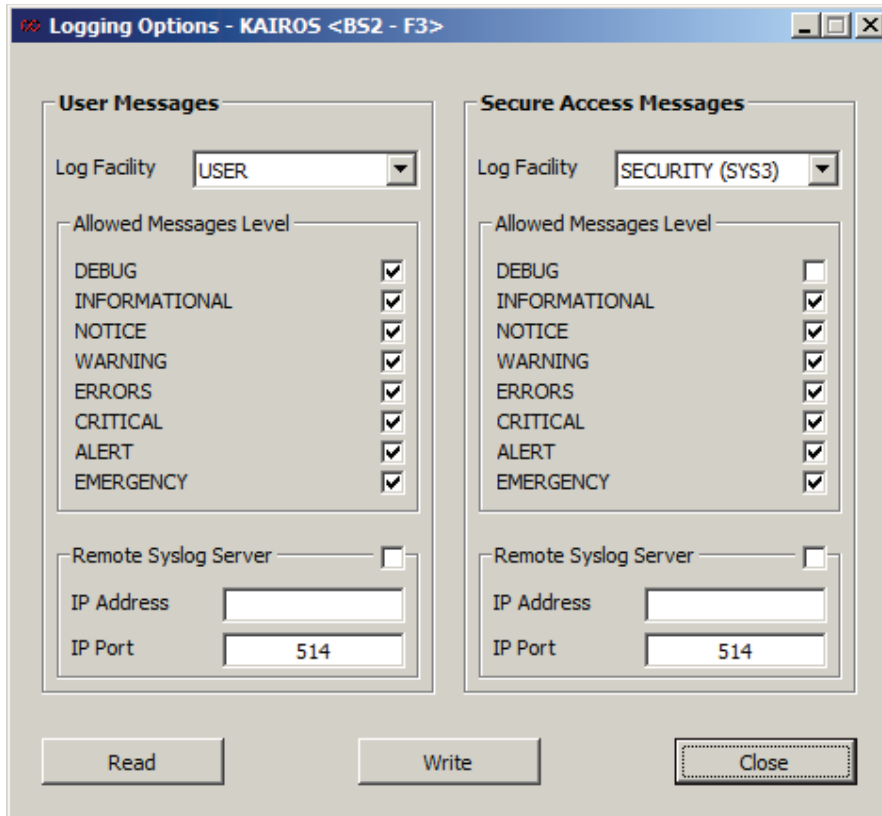
A list of about 30 events is available on the tabs at the top of the mask. For each of them, it is possible to set a different destination and a different text for the message to send, both when the alarm raises and when the alarm clears.

Available destinations for alarm messages are: one of the SNMP servers (which have been previously defined), or a mobile/portable radio (by specifying the ID, group or private, the timeslot, the number of repetition). In addition, an I/O contact can be activated by an alarm.

**“Configuration \ Logging Options” menu**

This mask allows setting the logging messages levels.

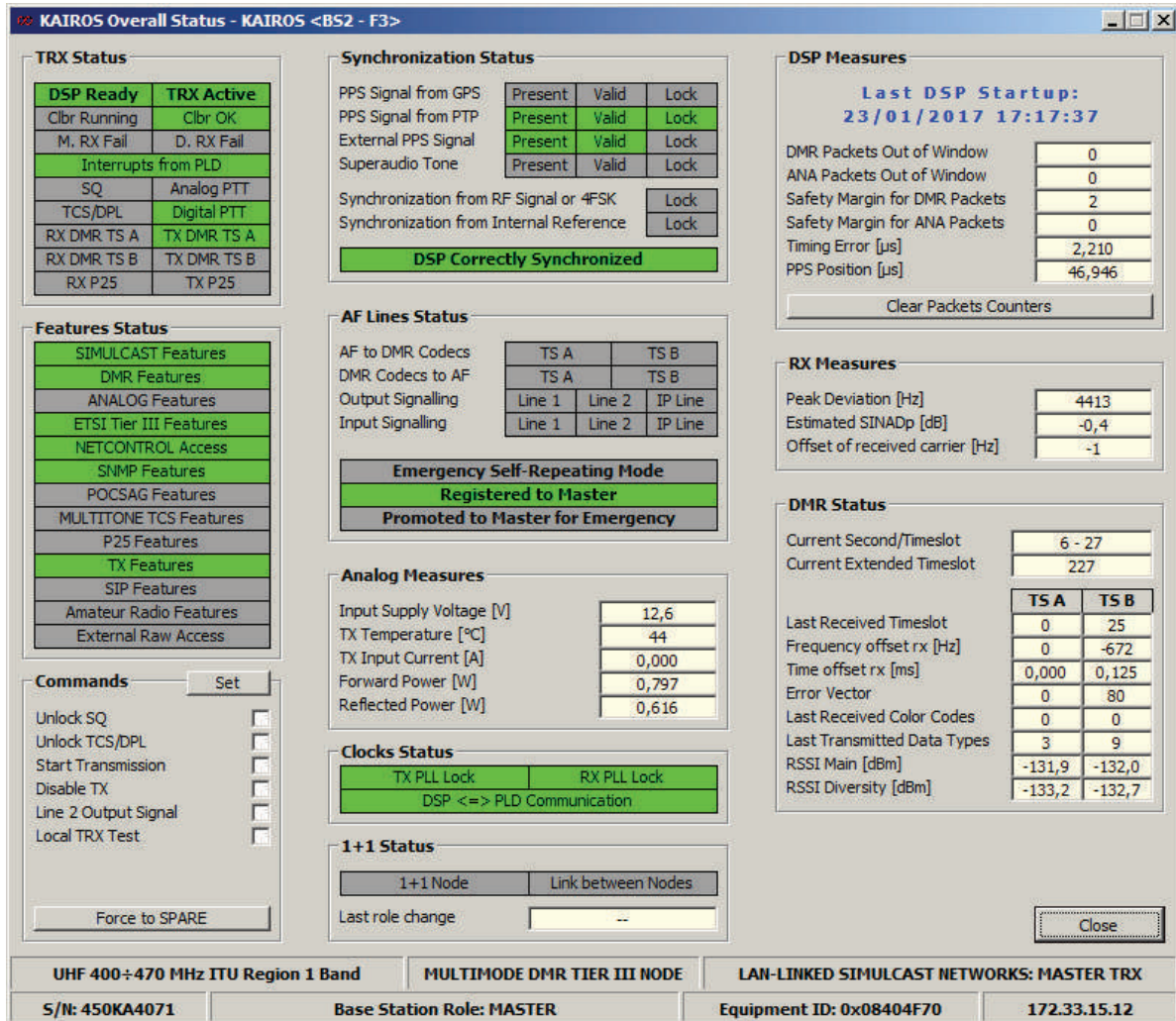
A remote Syslog server can be used by entering the IP Address and the IP port.



**2.8 Main controls**

**“Controls \ KAIROS Overall status” menu**

This mask allows monitoring the status of the main parameters of the base station. The values are self-explanatory; the color of flags (green/red) immediately gives the positive or negative status of the variable.



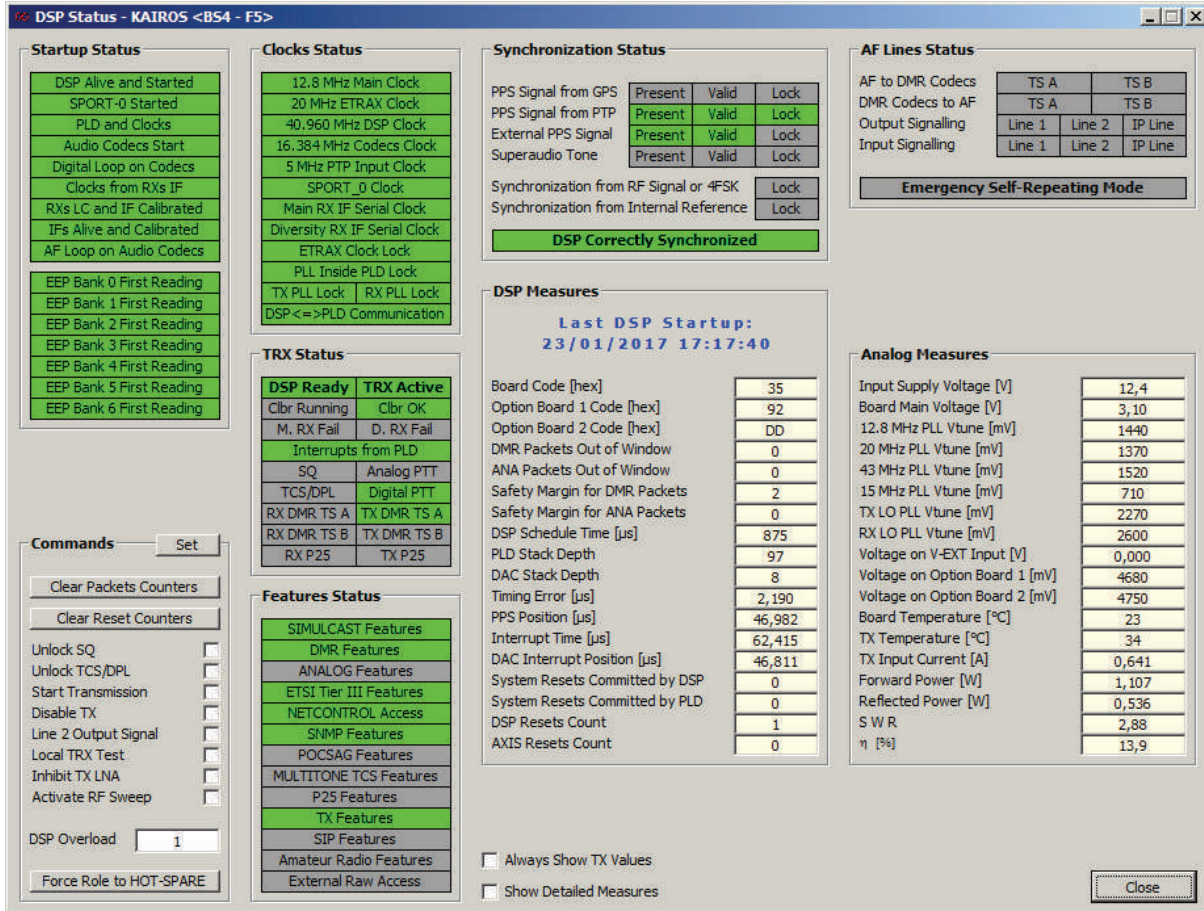
The monitor box gives information about:

- ∞ TRX parameters
- ∞ Enabled/disabled licenses
- ∞ Synchronization status of the base station
- ∞ AF Lines (incoming, outgoing signaling and codecs activity)
- ∞ DSP measures
- ∞ RX measures
- ∞ DMR status over TSA/TSB

The mask allows also giving some testing commands to the base station, like unlocking the squelch, starting transmission or disabling it, sending signal to IP.



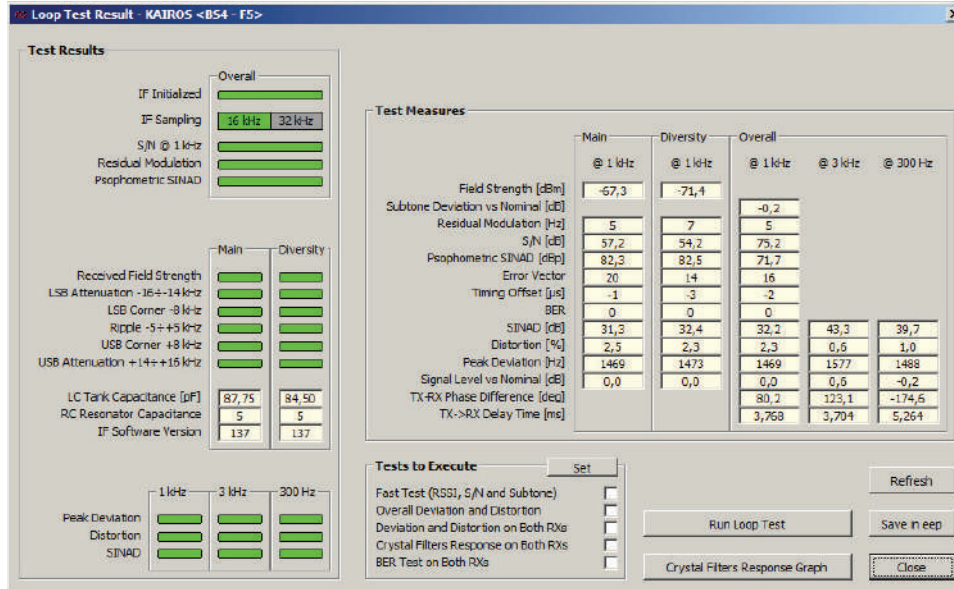
**“Controls \ DSP and PLD status” menu**



This mask shows the current status of the transceiver, giving the main measurements and indications about receiver, transmitter, logical blocks, power supply, synchronism, audio line interface, calibration results. Through these data, a complete and general look at the working conditions of the device is promptly available for the user. Measurements are divided into macro-blocks for simplify the reading.

Some further measurements about DMR protocol are available through the “base station layer configuration” menu.

**“Controls \ Loop test result” menu**



This mask shows the results of the start-up self-calibration process and allows starting new self-test procedures. A list of possible tests is available: user can select the ones to launch. If any value is out of range, the measure will be highlighted in red, but the radio however will optimally work with the last valid set of tuning parameters which have been saved into flash memory.

“Save in EEPROM” button will save the current calibration parameters, together with synchronism tuning values into flash memory.



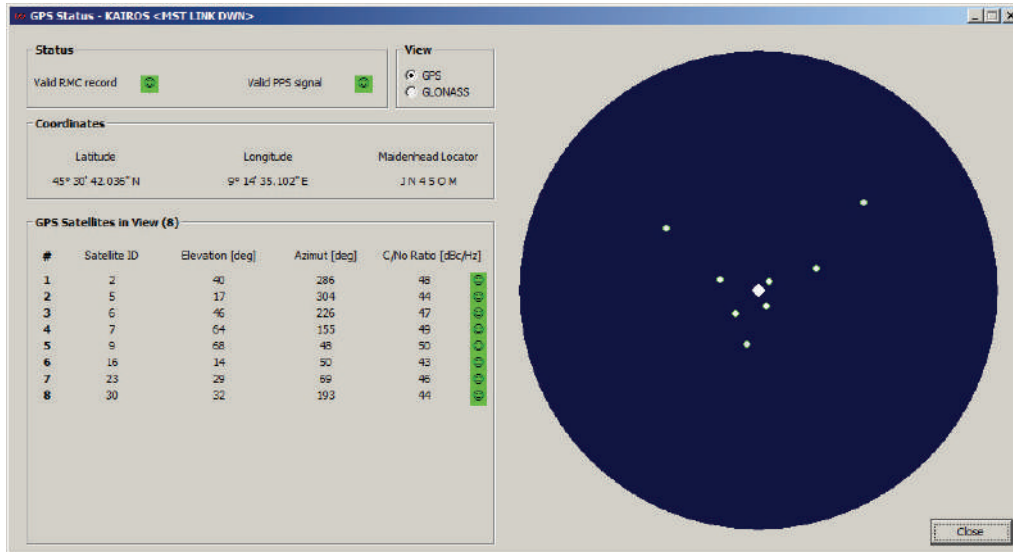
**“Controls \ Vtune test result” menu**

This mask shows the tuning voltages, which result from the self-tuning of the parameters of the RX input filters, the RX VCO and the TX VCO. These functional blocks are parametric with their working frequency and they can be tuned by applying a variable voltage on some control lines. The self-tuning procedure is performed by Factory and resulting parameters are saved to flash memory. This mask gives the possibility to launch a new self-tuning process and to save new resulting parameters to flash.

Frequency (MHz)	RX Head (U)	RX PLL (Coarse) (U)	RX PLL (Fine) (mU)	TX PLL (Coarse) (U)	TX PLL (Fine) (mU)	RSSI Main (dBm)	RSSI Diversity (dBm)	Residual Dev (Hz)
396.8	0.54	0.00	150.5	0.00	0.0	-68.8	-74.7	8
430.2	0.70	0.00	2296.0	0.00	1462.0	-66.6	-74.4	7
439.6	1.16	1.16	2150.0	0.93	2287.5	-66.3	-74.1	8
416.0	1.63	1.72	1513.5	1.49	2107.0	-65.3	-72.9	7
422.4	1.90	2.31	1999.5	2.06	2155.0	-65.3	-72.9	7
438.8	2.15	2.97	1975.0	2.72	2107.0	-64.6	-74.1	7
436.2	3.30	3.67	1999.5	3.00	2214.6	-66.4	-72.9	10
441.6	3.34	4.41	1999.5	4.13	2195.0	-64.7	-74.0	7
440.0	3.51	5.28	1986.5	4.91	2195.0	-64.5	-74.0	8
454.4	3.47	5.90	2064.0	5.02	2107.0	-66.5	-74.2	7
460.8	4.04	5.85	1978.0	6.68	2171.5	-66.7	-74.2	7
467.2	4.29	7.71	2021.0	7.48	2214.5	-68.9	-74.1	8
470.6	4.50	8.62	2042.5	8.22	2214.5	-71.4	-74.2	8

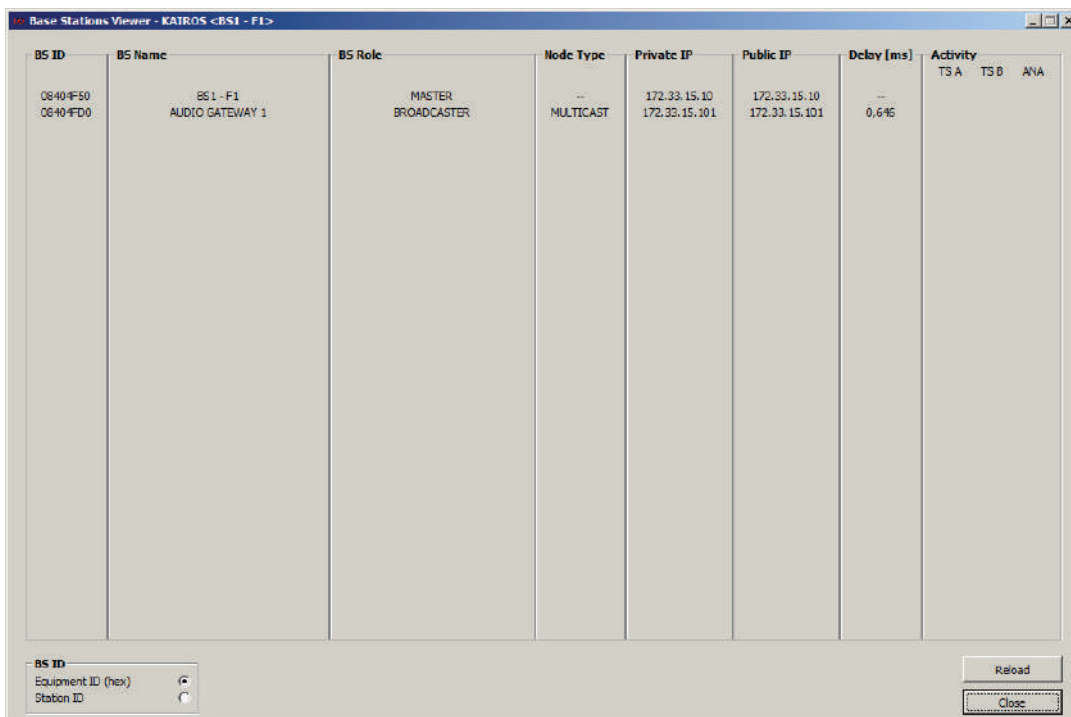
**“Controls \ GPS Status” menu**

When GPS receiver is connected to equipment and synchronization is expected by 1PPS signal, this mask gives useful information about the status of the received signal by GPS



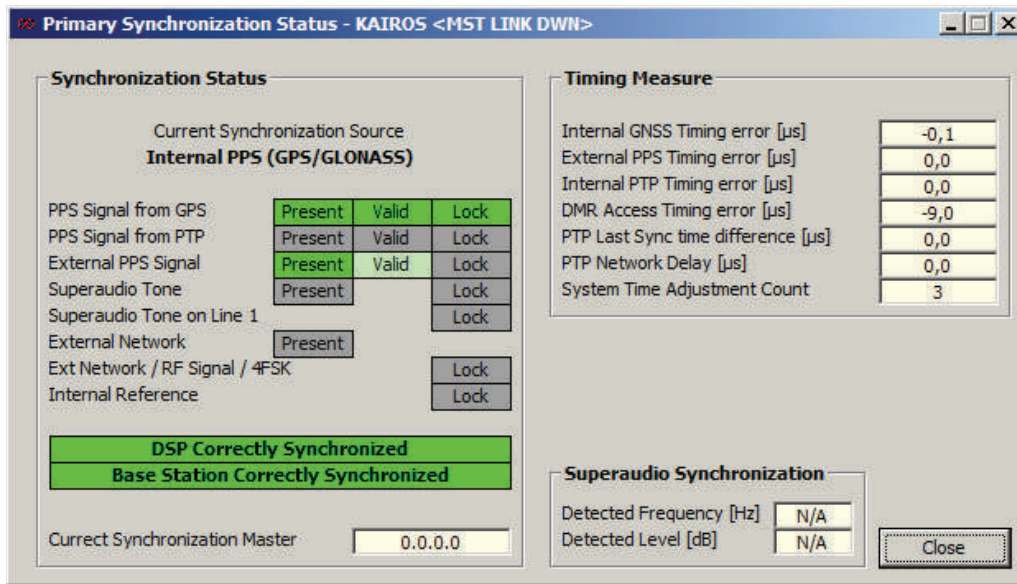
**“Controls \ Base Station Viewer” menu**

This mask shows the configuration of the network as the master can see it currently: all the affiliated equipment to the master are visible, together with their role into network, node type and type of activity (analog or DMR, timeslot 1 or 2). Every ongoing communication will be visible; every yellow flag will reveal an active RF reception; the green flag will reveal the best signal that the master chooses for retransmitting. The three column specify if the ongoing signal is analog or digital and in this case which timeslot is busy.



**“Controls \ Primary Synchronization Status” menu**

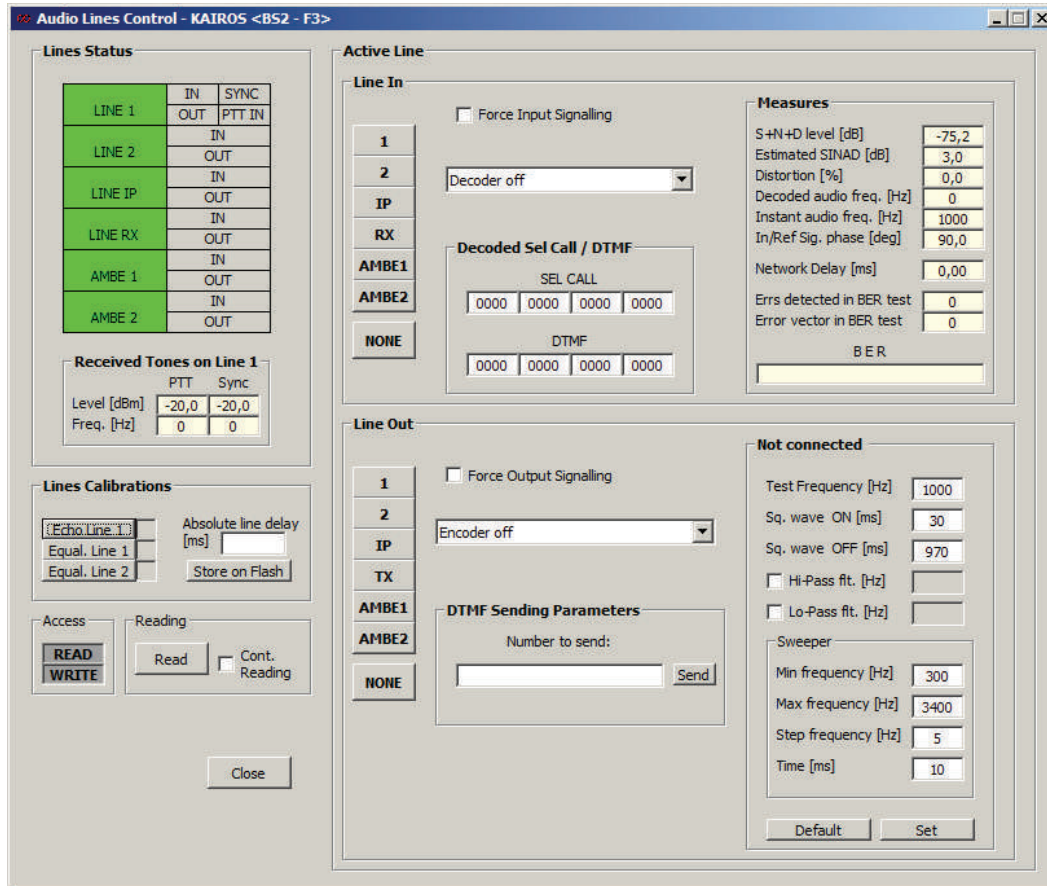
This mask allows monitoring the synchronization status of the base station, indicating the current source. There is also included a field showing some timing measurements.



**“Controls \ Audio Line Control” menu**

This mask allows an Audio line monitoring (Line 1-2, IP, RX and codecs audio flow).

It provides also a field containing audio testing commands which allow activate/deactivate In/Out audio Line signaling. As well as, audio measurements.



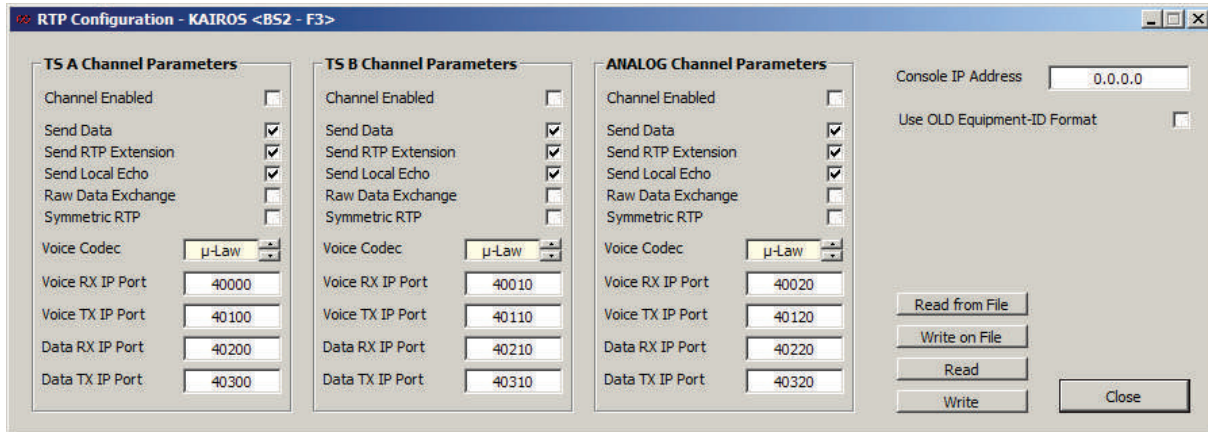
## 2.9 SIP/RPT configuration

KAIROS can run an optional “DMR Gateway” agent to interface Analog and DMR radio systems to several external networks (the AMBE codec option board is requested). It allows radio users to easily communicate and interoperate with:

- ∞ External telephone applications like conventional PSTN equipments (external interface needed) and VoIP systems (SIP PABX, SIP Hardphones, Softphones, Open Source SIP platforms).
- ∞ Dispatching systems and control room applications like analog 4-wire + E&M consoles, RTP based consoles, SIP based dispatching systems for control room applications, to connect a Base Station (or a radio network) to a local operator desk.
- ∞ Other users under different radio networks/repeater (Wide Area Mobility).

**“Configuration \ RTP Configuration” menu**

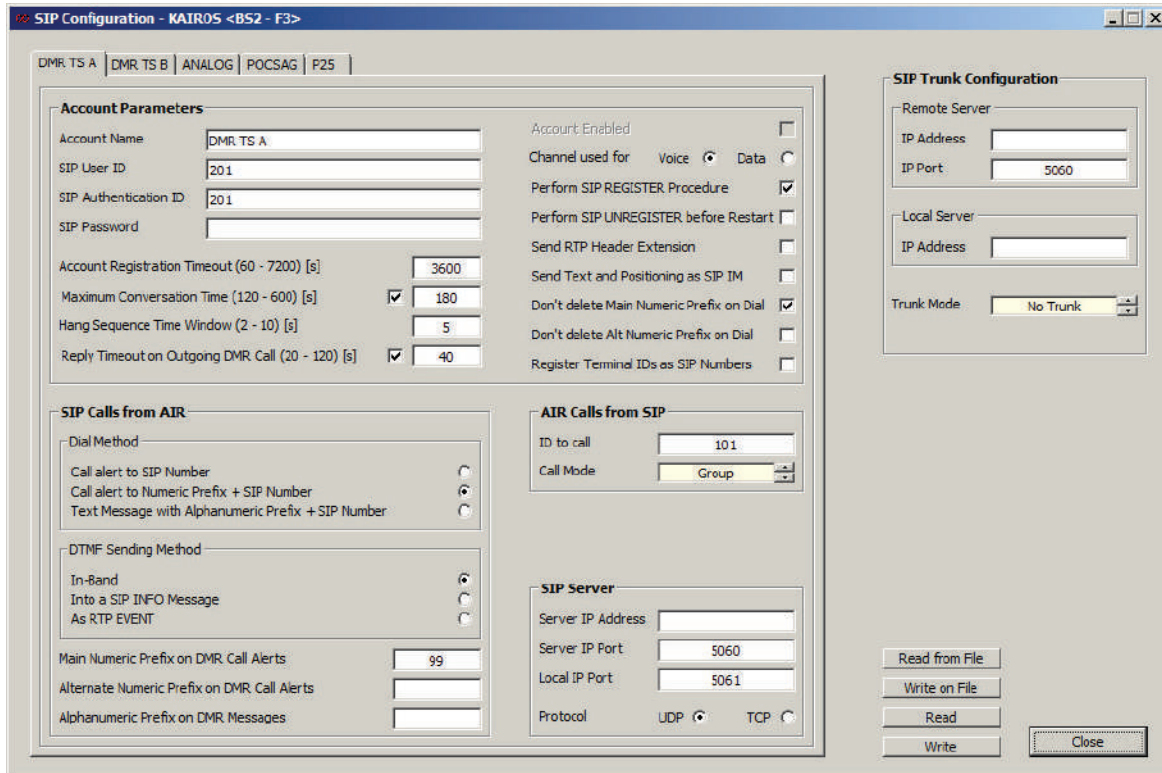
This mask shows the main parameters to be configured on the Kairos base station to enable the *KA\_RTP* interface. It is possible to set for each radio channel DMR TSA, DMR TSB or Analog channel a UDP/RTP port to receive/send voice from/to dispatcher and also to receive/send data from/to dispatcher.



For further information see the SIP/RTP Gateway documents.

**“Configuration \ SIP Configuration” menu**

This mask shows the main parameters to be configured on the Kairos base station to enable the *KA\_SIP* interface to connect to an external telephone applications like conventional PSTN equipments (externalinterface needed) and VoIP systems (SIP PABX, SIP Hardphones, Softphones, Open Source SIP platforms).



For further information see the SIP/RTP Gateway documents.

## 2.10 Restart options

**“Restart” menu:** this function give access to sub-menu for equipment multilevel reset/restart. It is possible to restart different SW embedded function of microprocessor/DSP unit, as follows:

- ∞ SIP layer – only the SIP manager layer is restarted
- ∞ BASE STATION layer – restart the role of BS in network
- ∞ TRX layer – TX and RX peripheral module is restarted
- ∞ DSP – only the DSP module is restarted
- ∞ PLD – only the system clock managing is restarted
- ∞ Main – main program is restarted
- ∞ KAIROS – LINUX application is restarted
- ∞ Reboot – deeper restart from boot program of microprocessor
- ∞ SHUTDOWN (HANDLE WITH CARE) – KAIROS complete switch off (NO restart).