KENWOOD

KAIROS Manager
Function Manual

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Revision History

Revision	Edition

Document Revision

This document shall from time to time be changed without notice. This document is created and published for the products having the following design specifications.

Firmware Version

Item	Version	How to Verify
KAIROS Firmware	1.6.5.0	Software > Versions of KAIROS Manager

Programming Software Version

Item	Version	How to Verify
KAIROS Manager	1.7.1	? > About… of KAIROS Manager

Application Software Version

Item	Version	How to Verify

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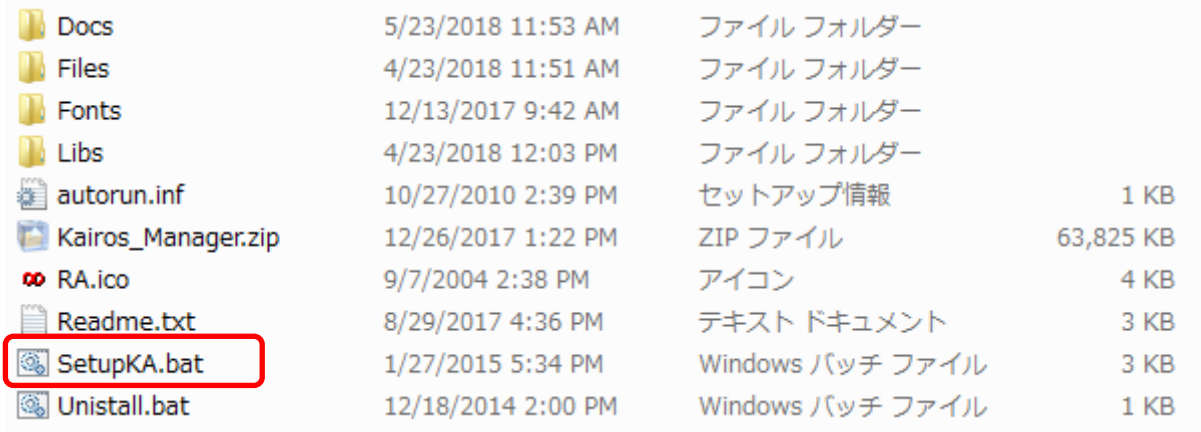
1. KAIROS Manager Installation

"KAIROS_Manager" is a PC Application to configure a KAIROS.

1.1. Installation

Installation of "KAIROS_Manager" requires a PC with Windows O.S.; insert the thumb drive with the installation package into the PC.

Important! Run "Setup.bat" application with "Administrator rights".

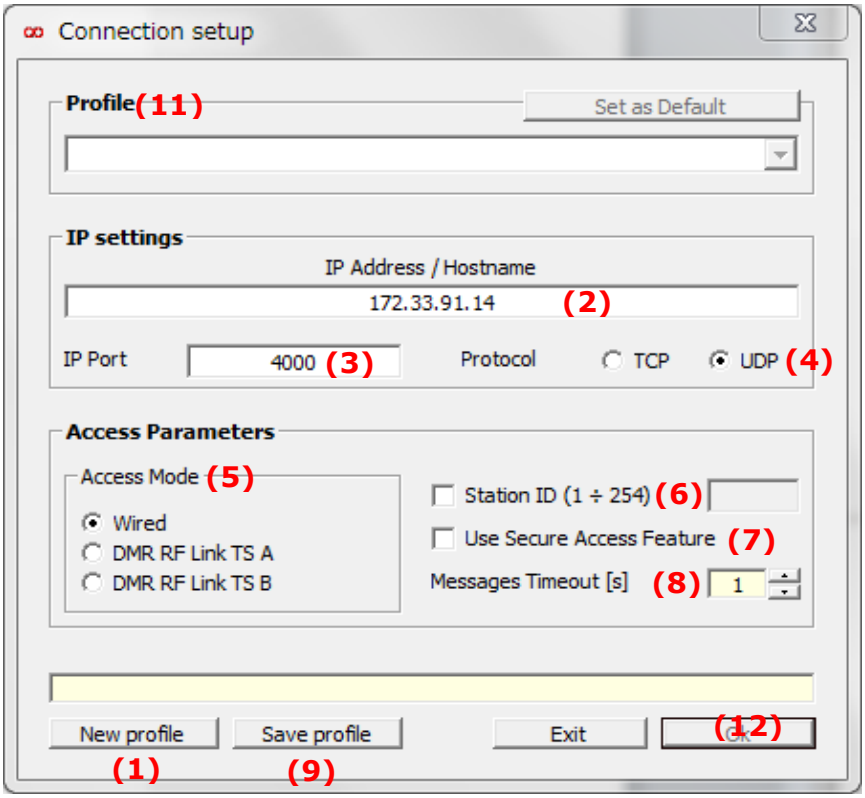


After installing, the application is available from the folder "C:\Radio_Activity\KAIROS\KAIROS_Manager.exe".

2. Connection setup

2.1. Connection setup

After double clicking on "KAIROS Manager.exe" the following window will appear. The IP address of the target equipment must be set to get access to the device. The main control window will appear which will give access to each equipment setting.



(1) New Profile: Press this button to create New Profile.

(2) IP Address / Hostname: Enter target KAIROS IP address.
If you don't know the target KAIROS IP address, there is a simple way to discover the IP by switching on KAIROS. Please refer to Appendix 4.1

(3) IP Port number: Default is "4000".

(4) Protocol : Select "UDP"

(5) Access Mode: Select "Wire" normally for cable LAN connection.
DMR RF Link TS A: Connection via RF-LINK on Time Slot A
DMR RF Link TS B: Connection via RF-LINK on Time Slot B
* To connect Remote KAIROS via RF-LINK, please refer to Appendix 4.2.

(6) Station ID: Uncheck for cable LAN connection.
Check here for RF-LINK connection.
* To connect Remote KAIROS via RF-LINK, please refer to Appendix 4.2.

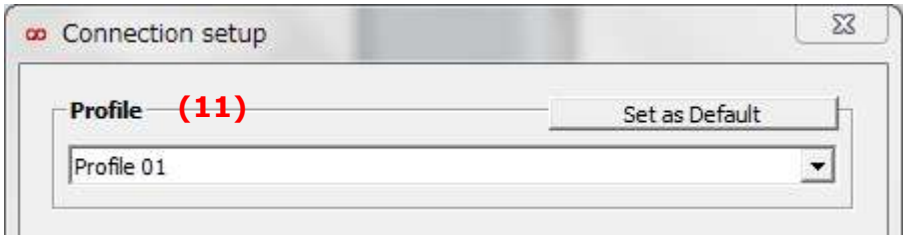
(7) Use Secure Access Feature: Uncheck if first time use the KAIROS.
If you want to set password to open KAIROS setting, you need to set User / Password in TLC secure Access, then you can check here and use secure access. (Refer to 3.1.5 Handle Users)

(8) Massages Timeout [s]: Timeout timer in case no connection.

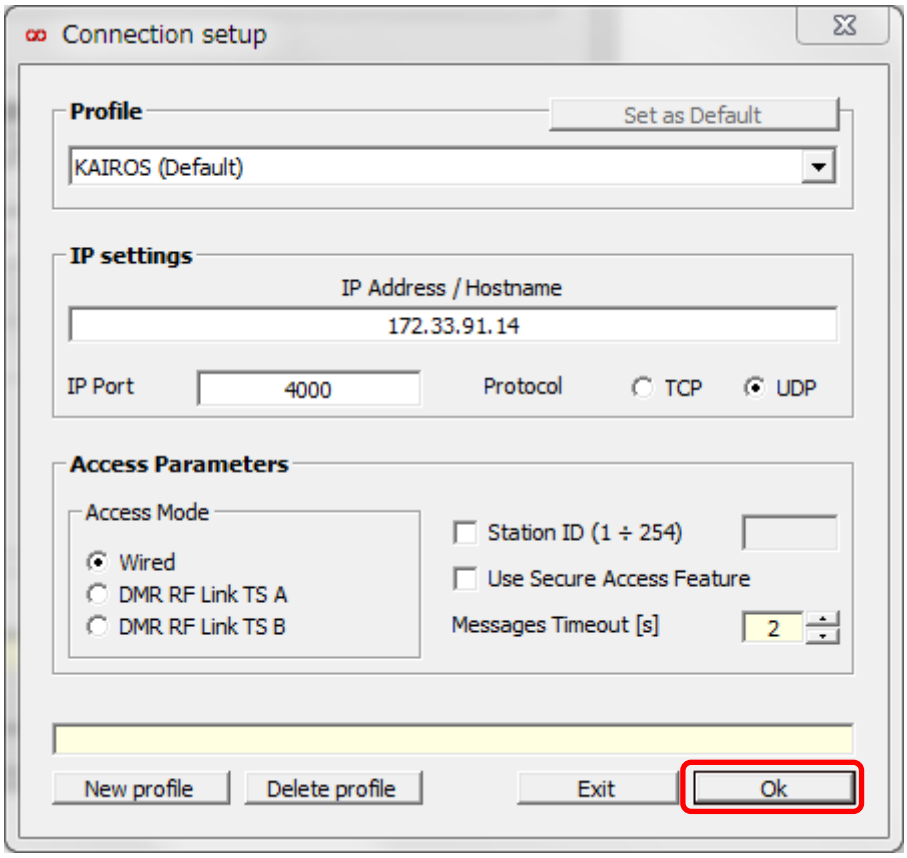
(9) Save profile : To save profile, press this button.

(10) Profile Name : Enter Profile Name to save, press OK.

(11) Profile: Select Profile to connect KAIROS.

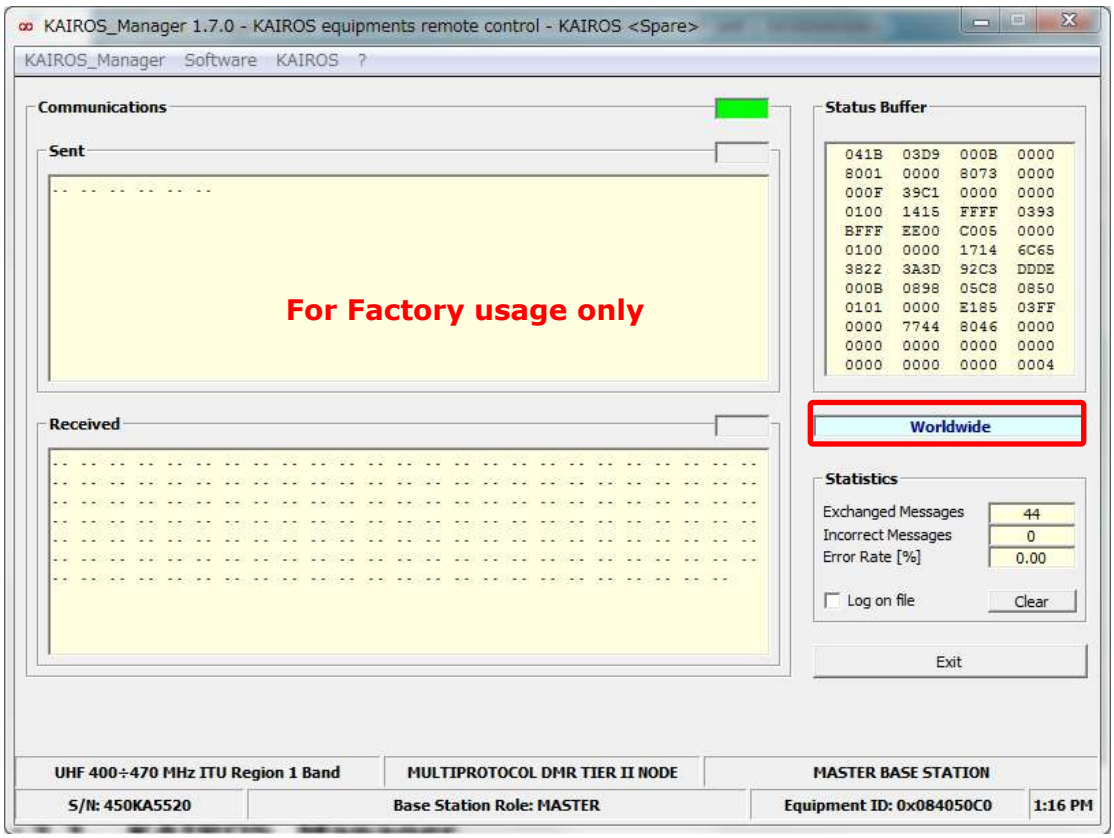


(12) Click "OK" to connect KAIROS, then open Main window.

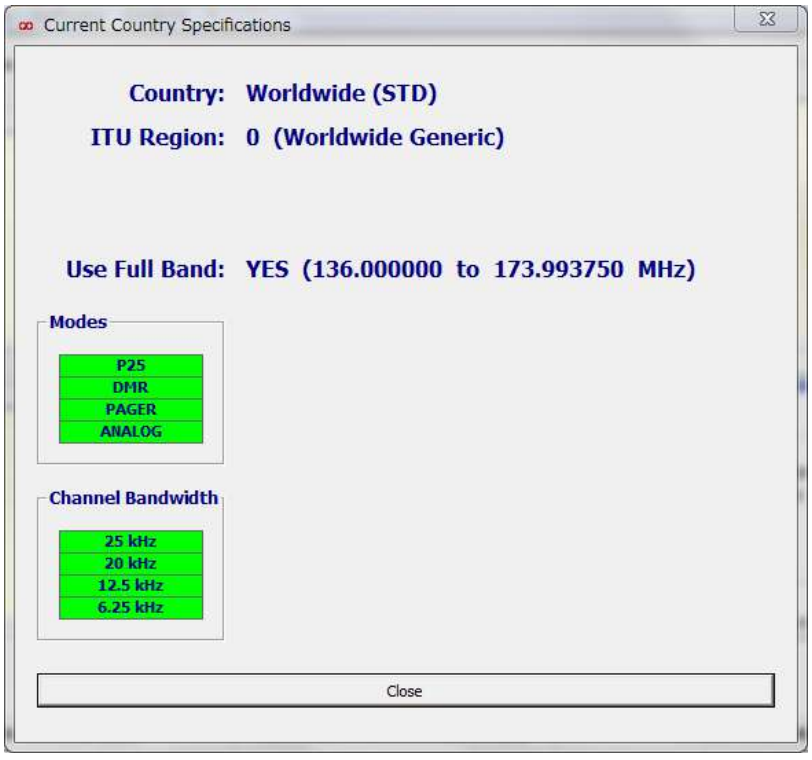


3. Main window

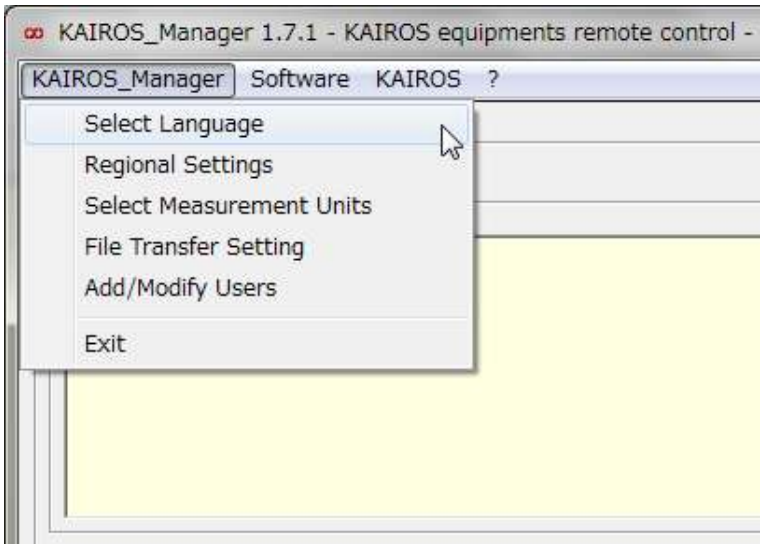
Following is a description of the function menus of the maim window.



If you click [Worldwide] area, following “Current Country Specifications” will appear.



3.1. KAIROS_Manager

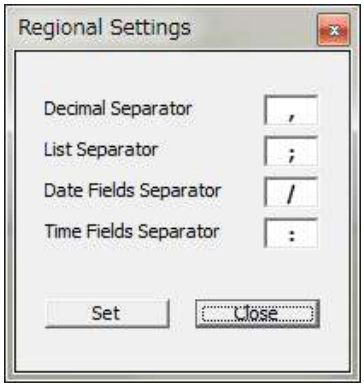


3.1.1. Select Language

This item is under developing.

3.1.2. Regional Settings

You can set Separator and etc. by here.

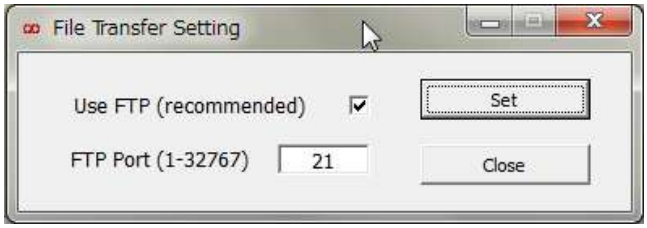


3.1.3. Select Measurement Units

You can define Measurement Units from EU or US.
The selection affects the measurement units of distance and temperature; they switch from km/°C to miles/°F and vice versa.
These units are used for modifying the network delay ("distance advance timing [km]") and for detecting the board and VCTCXO temperature.

3.1.4. File Transfer Setting

You don't need to change setting from default.
If uncheck "Use FTP" the data will be transferred by KAIROS manager port 4000.
If FTP default port is blocked by a router setting,

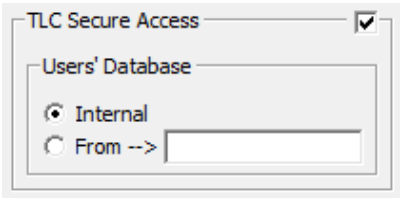


you can change it.

3.1.5. Add/Modify Users

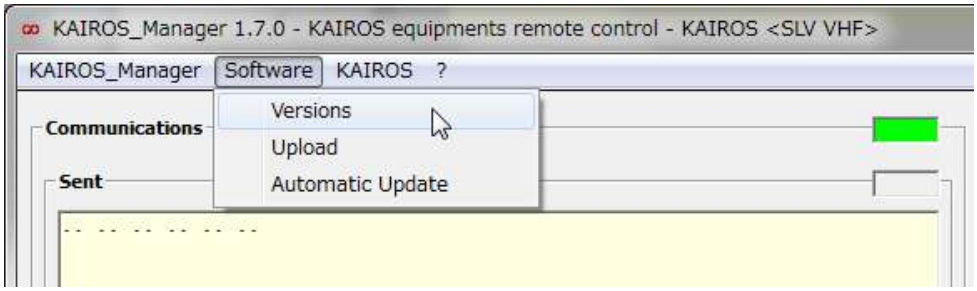
This is the setting for secure access for the KAIROS Manager.
After this setting, you will be no longer able to access the KAIROS in a standard way, but in the following mode:
- launch KAIROS Manager
- In the connection setup window, select the box "use Secure Access Feature"
- Select your user and your password to access the station

To use secure access, select "TLC secure access" box.
KAIROS-Configuration-Main Setup



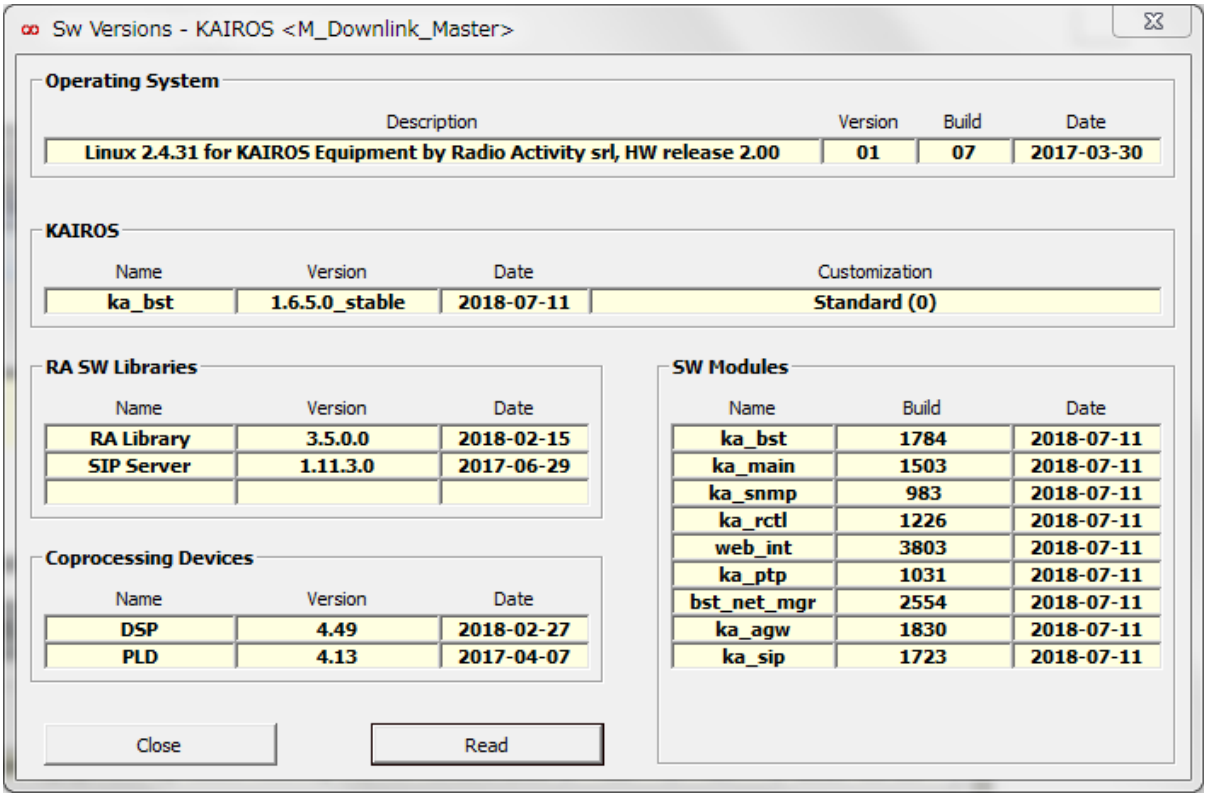
After you added a new User Name and Password, you have to open KAIROS manager by entering User Name and Password when you open KAIROS Manager the next time.

3.2. Software



3.2.1. Versions

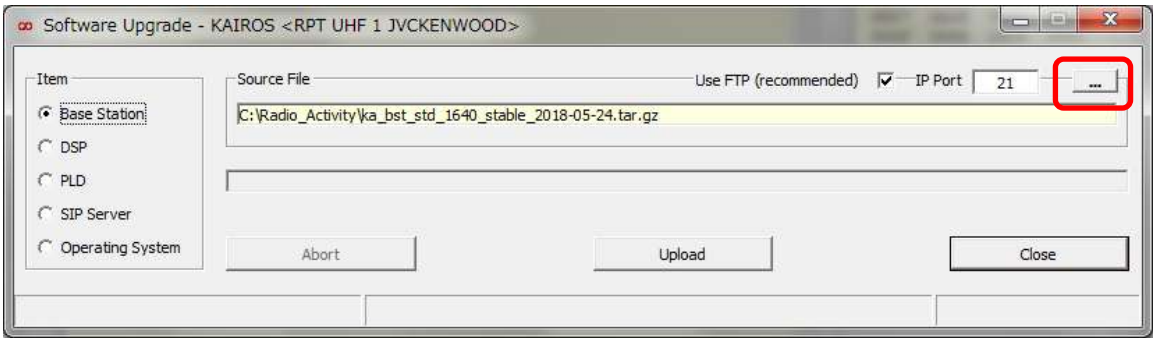
"Versions" allows the user to view versions of downloaded files in KAIROS.



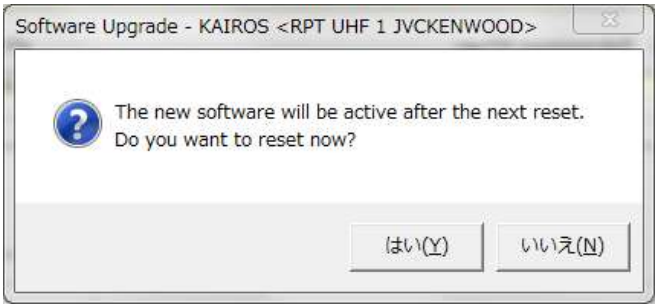
3.2.2. Upload

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.



After completed uploading, following window appears.

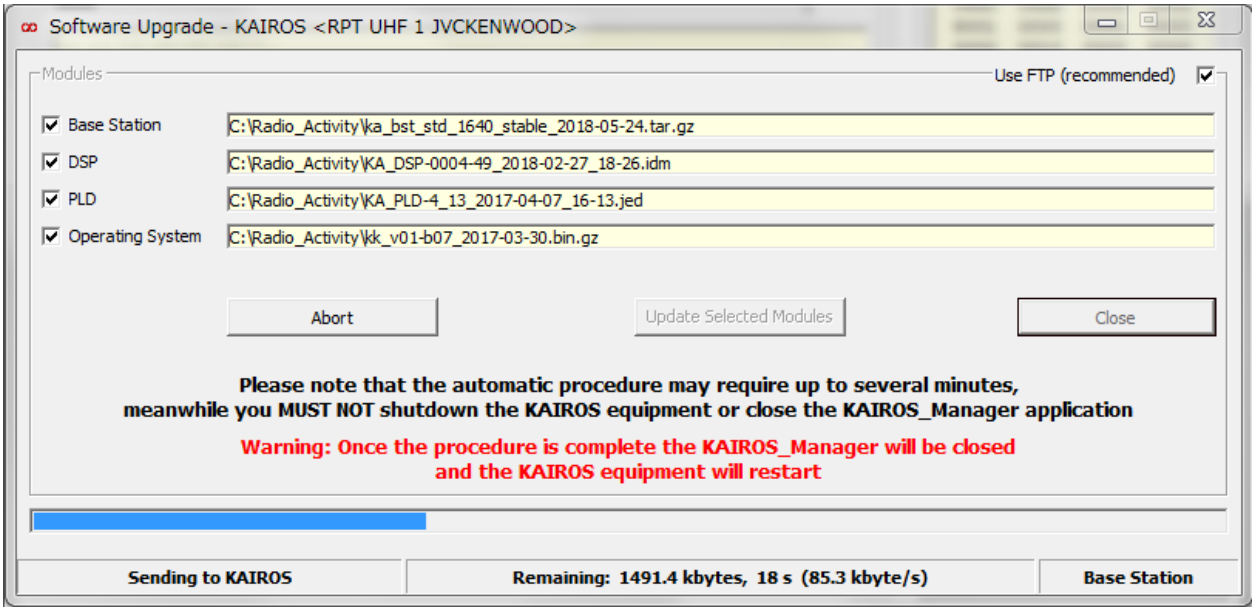


[Note]
Uploading time: No downtime required while uploading software.
Base Station: Approx. 1m 20s
DSP: Approx. 0m 12s
PLD: Approx. 0m 20s
SIP Server: Approx. 0m 40s
OS: Approx. 1m 0s
No KAIROS downtime required while uploading software.
Down time: To upgrade KAIROS, takes approx. 0m 40s to 4m 10s to reboot. (OS takes the longest downtime)

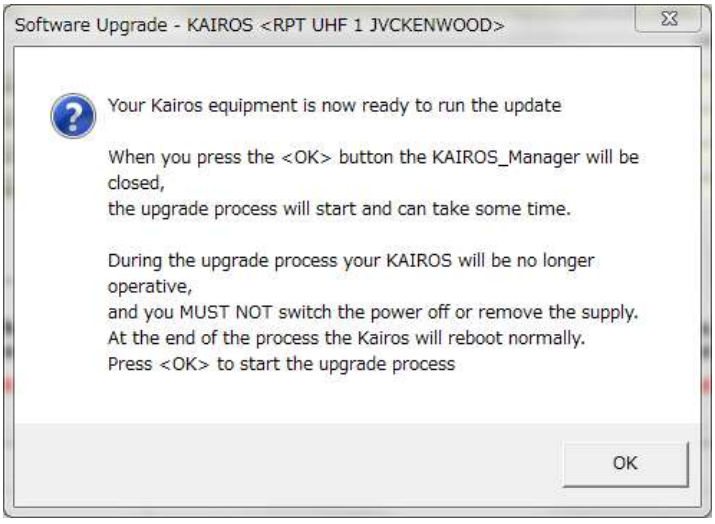
3.2.3. Automatic Update

To upload new SW automatically,

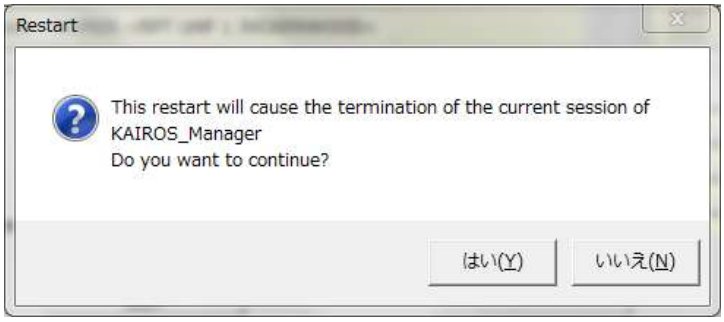
1. Select the module/s you need to download (microprocessor/DSP/FPGA/OS).
2. Select the file to be downloaded by clicking over the bar (browse).
3. Push "Update selected modules" button.
4. Wait for the end of the process.



After update is completed, the following window appears.



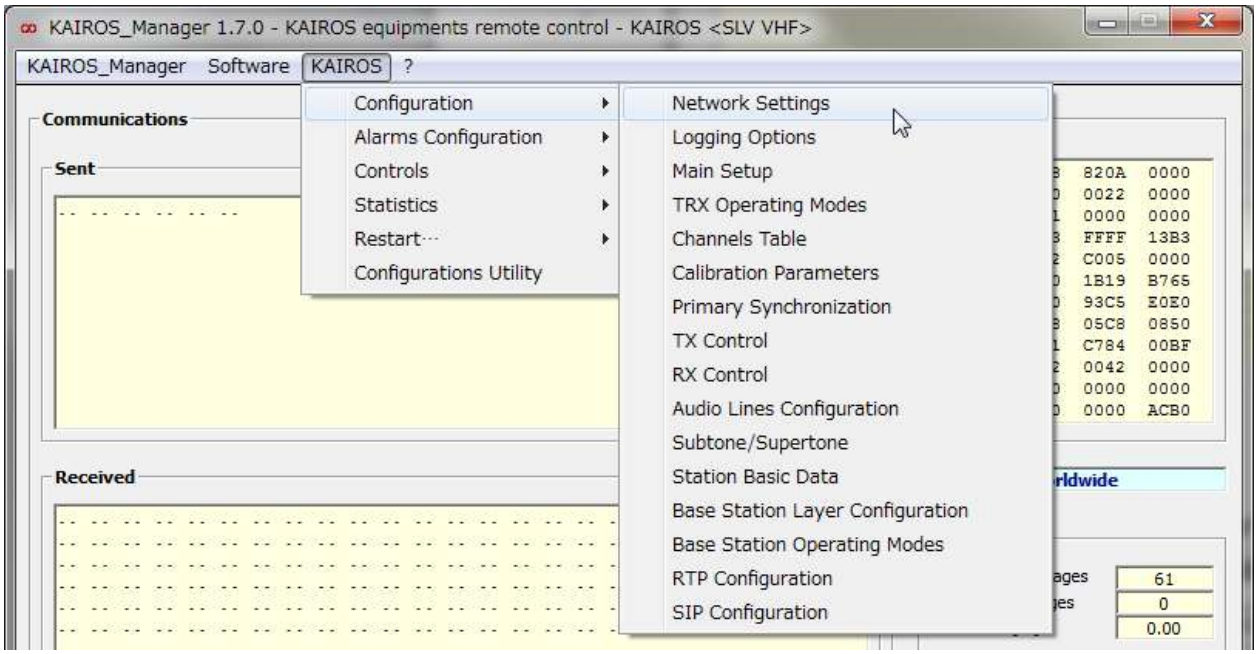
[Note]
Uploading time: if update all is selected, it takes total 3m 0s.
During the uploading, the KAIROS maintains normal operation. At the end of the upload process, the KAIROS is restarted and the Firmware is stored in flash memory. During this period, the KAIROS is upgrading and it takes about 4 minutes to resume normal operation.



3.3. KAIROS

"KAIROS" menu is the most frequently used and contains windows for systems setup, configuration, control, and restart of equipment. It is continuously changing according to the product developing and updating, but its main functions remain the same and they are explained here.

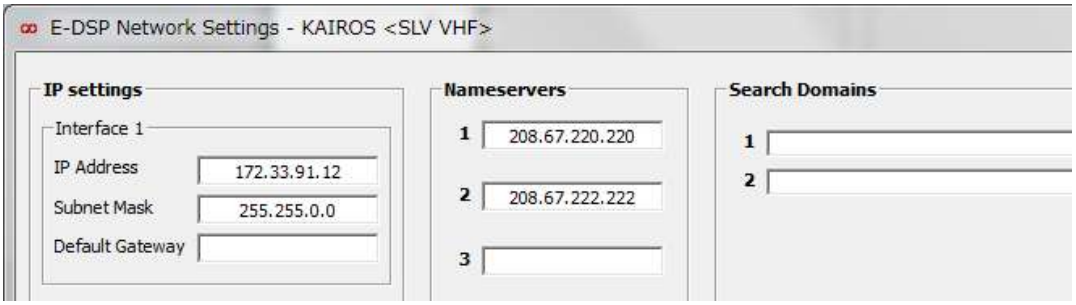
3.3.1. Configuration



3.3.1.1. **Network Settings**

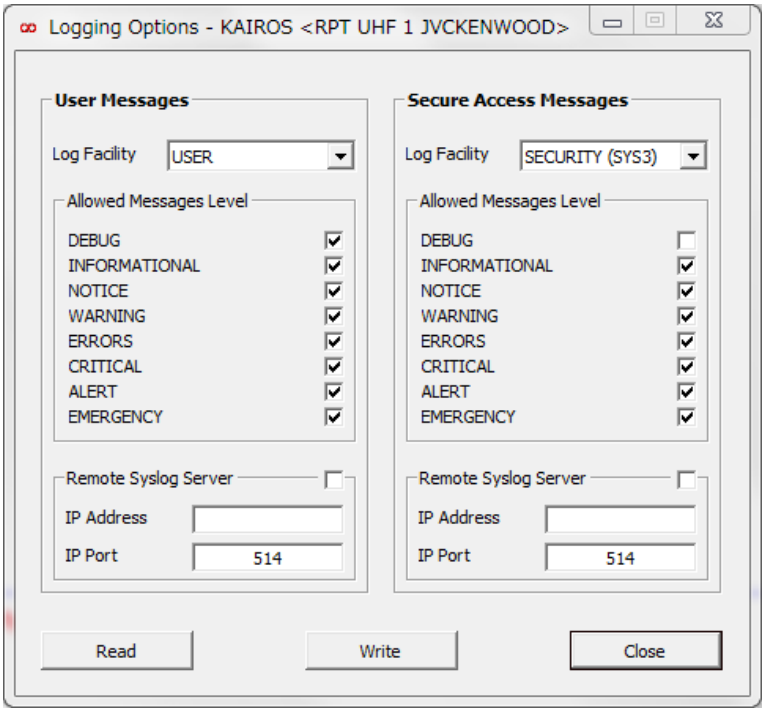
- IP Settings

It allows the user 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).



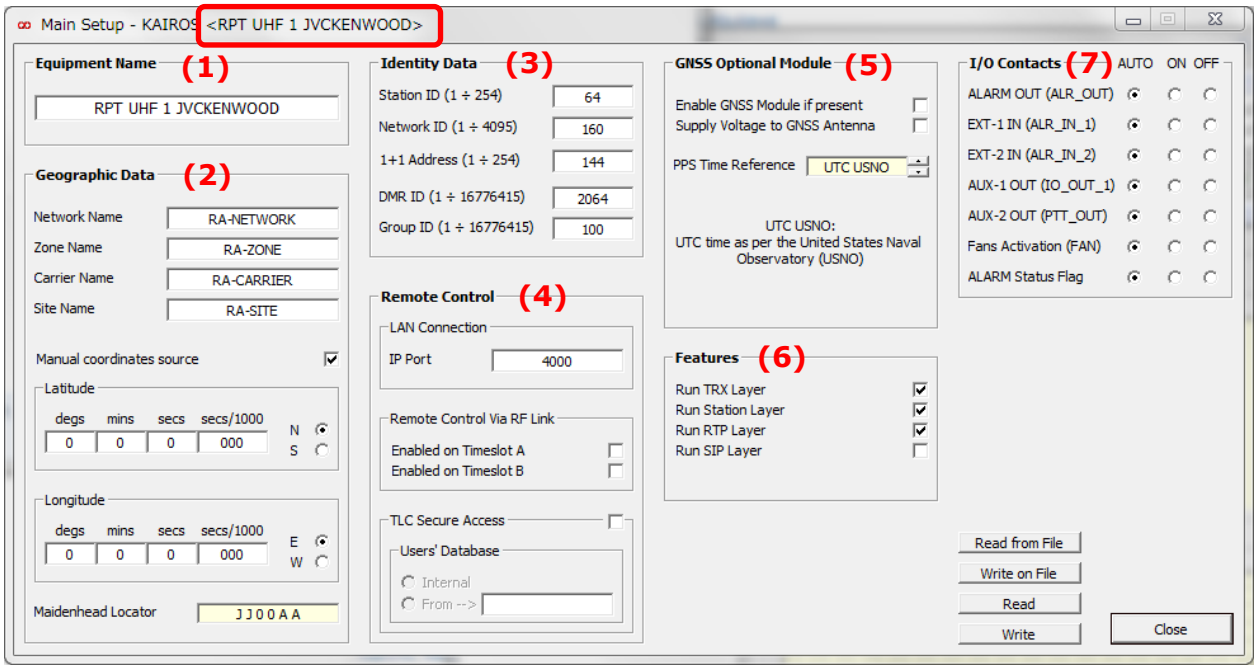
3.3.1.2. **Logging Options**

This setting is for developer only. Users don't need to touch it.
Logs are stored in internal KAIROS.
A remote Syslog server can be used by entering the IP Address and the IP port.



3.3.1.3. **Main Setup**

Allows the user to set-up identifying parameters for the equipment and other parameters referring to hardware configuration (internal serial ports settings, remote control port settings and GPS module interface settings).



(1) Equipment Name:

You can name the equipment here.
The name you assigned is shown on top of the window.

(2) Geographic Data:

This field is reference only. It doesn't affect KAIROS performance.
Manual coordinates source is, it will simply allow to write the position of the site for information purpose only, in case GPS is not mounted. This setting has no effect on any behavior of the system.

(3) Identify Data

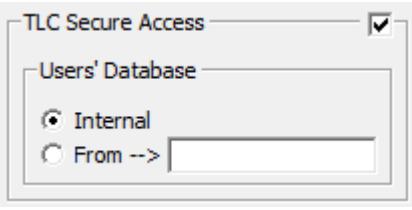
- Station ID: It is the ID of the station, to be used in RF link; or generally for accessing a station while being physically connected to another one; or for identifying a station in status messages and alarms messages.
- Network ID: It is used for identifying a network when sending DMR status messages from mobiles to network; or in Tier 3 configuration.
- 1+1 Address: ID for "1+1 Hot Standby" Redundancy. Refer to "3.3.1.4.1 TRX Configuration, (3) Type" for more detail.
- DMR ID: Unit ID as Mobile/Fixed Station also uses it for RF-Link.
- Group ID: It is the default destination ID for calls and messages generated by the station, if no other destination is specified.

(4) Remote Control

- LAN Connection: Enter IP port number to connect from KAIROS Manager and etc.
- Remote Control via RF Link: Check if you want to access a KAIROS through RF Link must be enabled here for all KAIROS which is on RF-Link.
- TLC Secure Access: This is the setting for secure access for the KAIROS Manager.

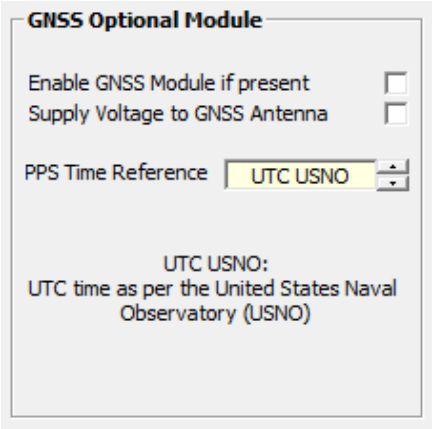
After this setting, you will be no more able to access the KAIROS in a standard way, but in the following mode:
- launch KAIROS Manager
- In the connection setup window, select the box "use Secure Access Feature"
- Select your user and your password to access the station

Internal: Use internal User's Database.
From →: Use another KAIROS User's Database



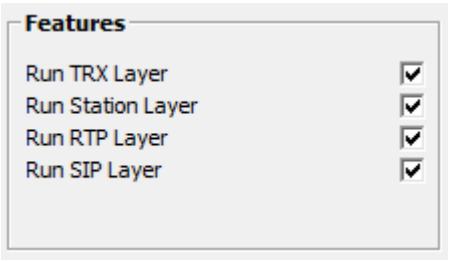
After you check this, you have to open KAIROS manager by entering User Name and Password.

(5) GNSS Optional Module



- Enable GNSS Module if present: Check if the KAIROS has built-in GPS receiver
- Supply Voltage to GNSS Antenna: Check to supply +5V 100mA for external GPS antenna through GPS antenna cable.
- PPS Time Reference: Set all KAIROS as same selection.
  - UTC USNO: UTC time as per the United States Naval Observatory (USNO), choose this normally.
  - GPS: GPS time
  - GLONASS: GLONASS time
  - UTC-SU: UTC time as per Russia. It is derived from GLONASS time and the application of the UTC delta-time parameter from GLONASS satellites
  - GP-GL: GPS time derived from GLONASS time. It is derived from the application of the GPS delta-time parameter from GLONASS satellites

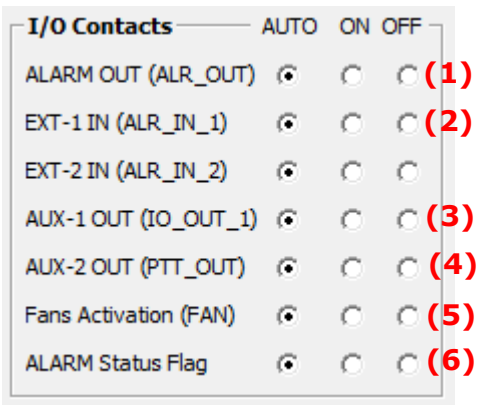
(6) Features

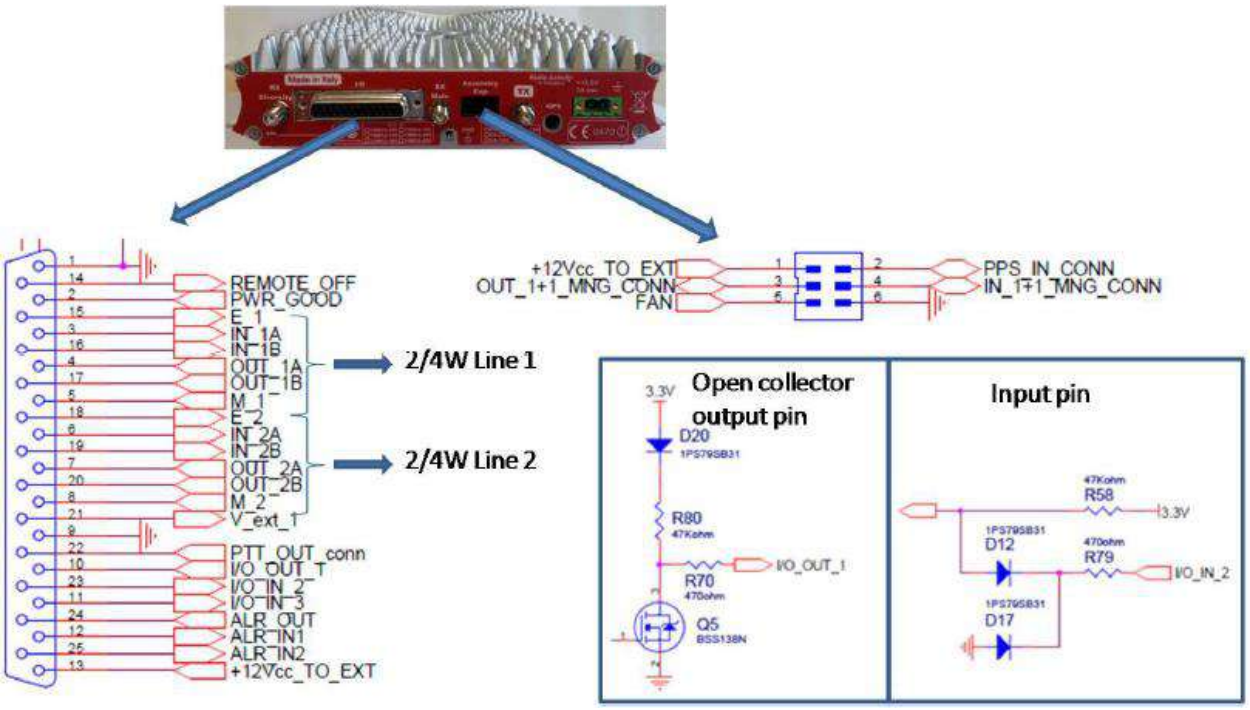


- Run TRX Layer: Microprocessor manages TX and RX peripheral modules. It is needed to make the DSP to start. It must always be active.
- Run Station Layer: Microprocessor manages the role of the base station inside the network. It manages the correct routing of signals, depending on the base station role. It is needed to make the processor to launch the main application. It must always be active.
- Run RTP Layer: Microprocessor manages (generates and receives) the RTP fluxes. RTP layer should be activated only if RTP interface is used.
- Run SIP Layer: Microprocessor manages the onboard SIP server and SIP fluxes. SIP and RTP layer should be activated only if SIP interface is used.

(7) I/O Contacts

KAIROS provides some I/O ports fitted into the 25 pin D-SUB connector and the 6 pins connector placed in the back. Some of these I/O are specialized (e.g.: PTT_out or ALRM_out) but can be re-defined for special applications.
I/O contacts are not isolated from ground, they are referred to ground and pre-polarized by +3.3V. Due to this configuration, for safety reason, they can be connected to very low voltage external circuits only. Here following it is descripted the standard applications of these auxiliary pins.





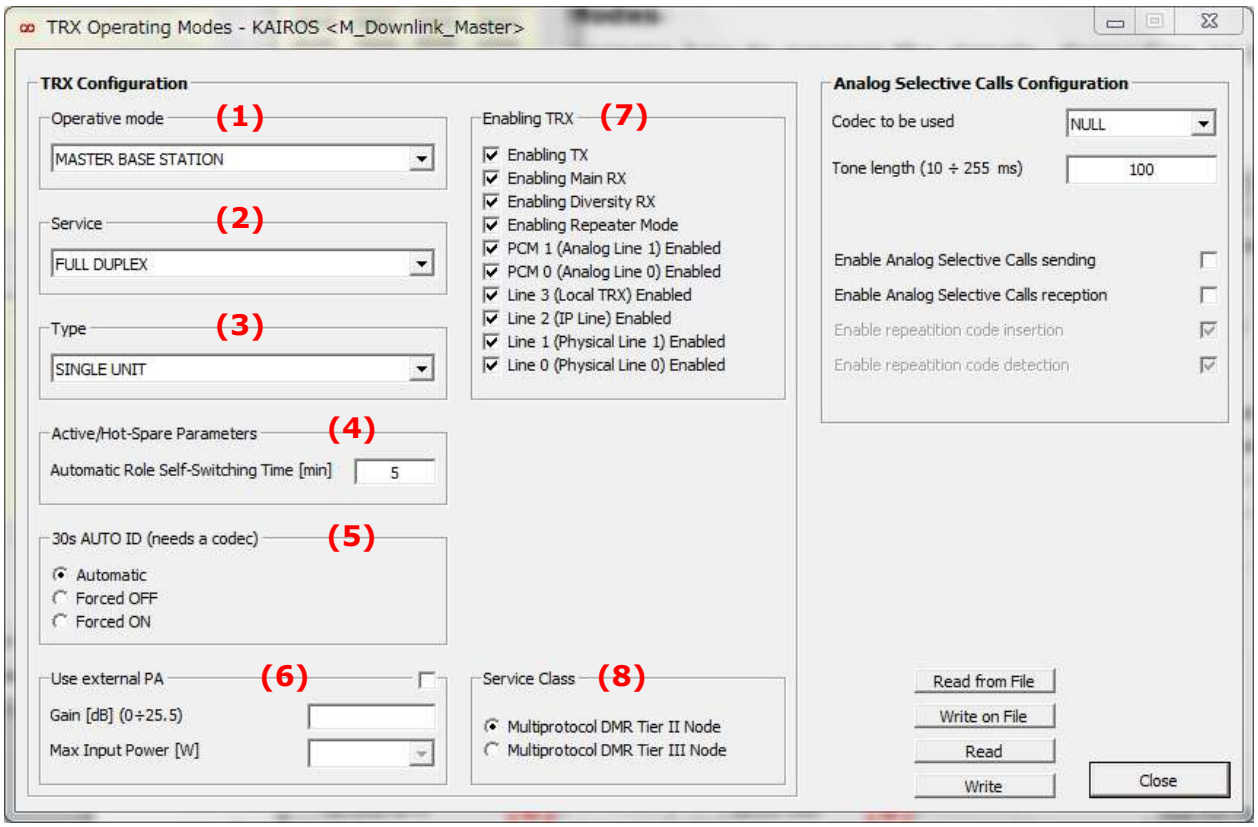
The I/O output pins (PWR_GOOD, M_1, M_2, PTT_OUT_conn, I/O_OUT_1, ALR_OUT, FAN, OUT_1+1_MNG_CONN) are open collector type able to switch up to 20mA/40Vdc. A 470 Ohm resistor limits the maximum current and a 47k resistor refers the output to the internal 3.3V.
The I/O input pins (REMOTE_OFF, E_1, E_2, I/O_IN_2, I/O_IN_3, ALR_IN1, ALR_IN2, PPS_IN_CONN) are internally pull-upped to the 3.3V. A pair of diodes protect the input from voltage below zero. This input switch on closing it to GND.

(1) ALR_OUT : [OUT] it is open from GND when the equipment detects an alarm condition. Power off is an alarm condition.
(2) ALR_IN1, ALR_IN2 : [IN] alarm input; closing them to GND produces an alarm advise to the Supervisor Centre. Each alarm can be configured via the setup tool; it is possible to define a DMR TXT message or a SNMP trap for the 0 to 1 transition and for the 1 to 0. Typical application is the open site/cabinet event.
(3) [OUT] general purpose output; it can be used in special applications that need to set an external device/relays.
(4) [OUT] it is closed to GND when the transmitter goes on air. It is possible to insert a pre-time to allow the right switching on time to an external RF power amplifier.
(5) [OUT] it is closed to GND when the temperature of the internal RF power amplifier rises above the threshold (typ 65°C). It can be used to switch on cooling fans in a cabinet.
(6) [OUT] it is open from GND when the equipment detects an alarm condition. Power off is an alarm condition.

For more detail for I/O port, please refer to Appendix 4.3

3.3.1.4. **TRX Operating Modes**

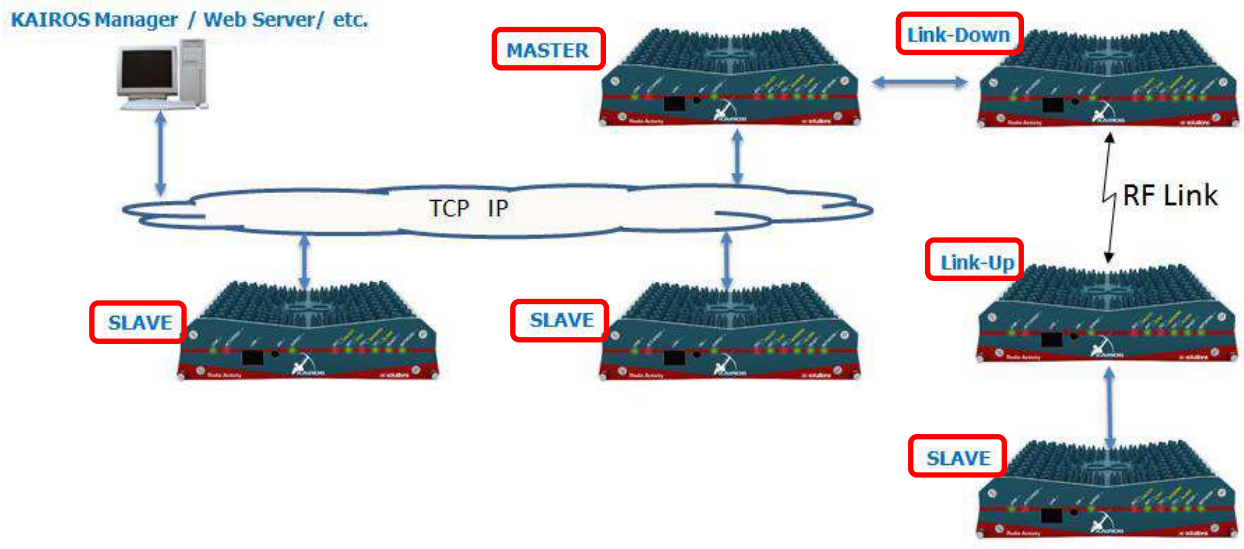
"TRX Operating modes" concerns how to process the signals, depending on the base station role, and which parameters are managed by the DSP.
This window allows setting the operative configuration of the base station:



3.3.1.4.1. TRX Configuration

(1) Operative mode

You have to assign "Operative mode" for each KAIROS.



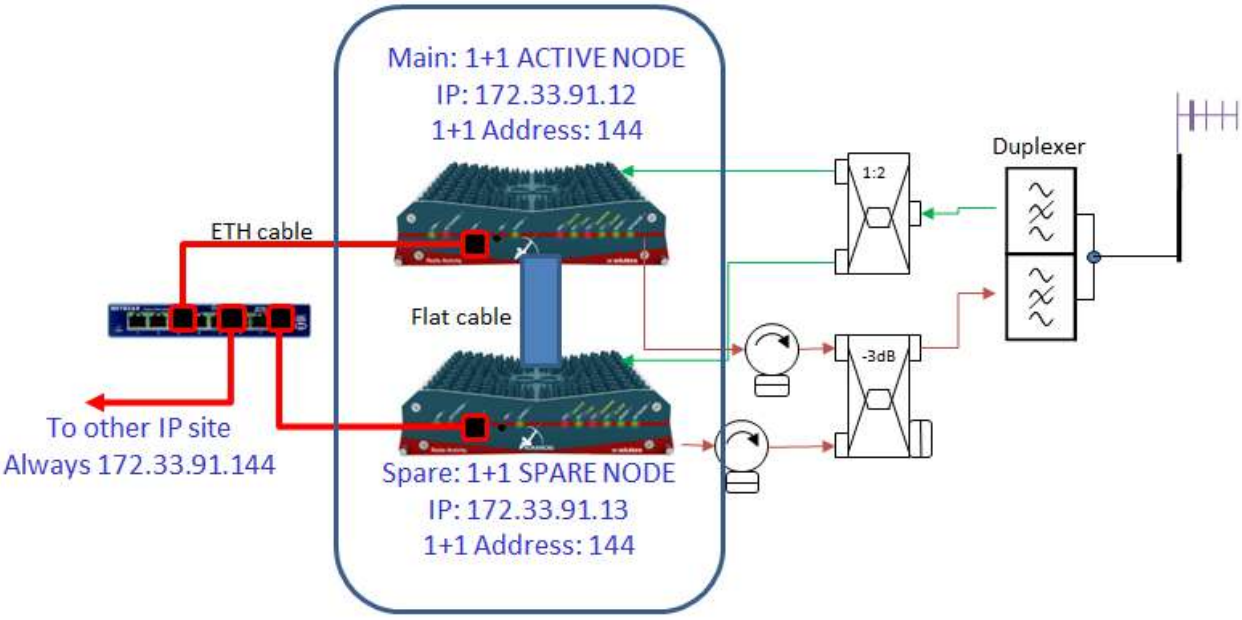
- BASE STATION NOT CONFIGURED: Not use normally.
- SINGLE REPEATER OR MOBILE/FIXED: Select this for Single repeater or Use KAIROS as Mobile/Fixed Station.
- MASTER BASE STATION: Select this for Master base station. Master is the only one in the network.
- SLAVE BASE STATION: Select this to all Slave stations.
- RF LINK-DOWN NODE: Select this for RF Link-Down node. For more detail for RF-Link, please refer to Appendix 4.4
- RF LINK-UP NODE: Select this for FR Link-Up node. For more detail for RF-Link, please refer to Appendix 4.4

(2) Service

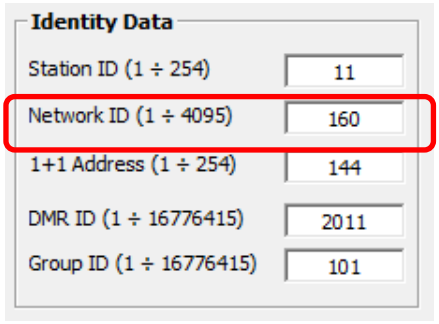
- FULL DUPLEX: For Full Duplex operation. Select this normally.
- HALF DUPLEX: For Half Duplex operation.
- SIMPLEX: For Simplex mode operation.

(3) Type

- SINGLE UNIT: Select this normally.
- 1+1 ACTIVE NODE: If the station is very important and must not be broken, you can set Spare KAIROS as redundancy. This selection is for Active node.
  "1+1 Address" which configured in "Main setup" is required. Both Main/Spare's "1+1" address must be set same address which is used as 2nd IP address for KAIROS.



Eg) Main KAIROS IP address is "172.33.91.12"
Spare KAIROS IP address is "172.33.91.13"
Both KAIROS's "1+1 Address" is "144"
2nd IP address for both Main and Spare become same address as "172.33.91.144".
Thus the IP address for "1+1 Station" is always seen the same IP address from others.



- 1+1 HOT SPARE NODE: For redundancy, this selection for Hot-Spare node.

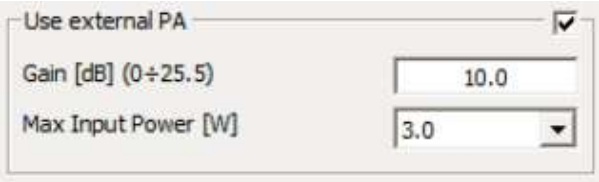
Note: 1+1 stations cannot be master for PTP for Synchronization.

(4) **Automatic Role Self-Switching Time [min]**: In case the Station is set as "1+1" redundancy, Active KAIROS can roll over by defined time in [min]. It effects for KAIROS lifetime.

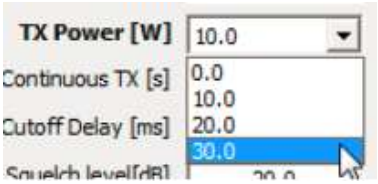
(5) **30s AUTO ID (needs a codec)**: In Analog mode only, This box sends the station ID with the selective call that you have set into main setup window. To send the ID of the base station in the format that is specified by the "Analog selective call configuration" box, into the upper right side of the same box. The ID is an automatic string, depending on the MAC address of the KAIROS.

(6) **Use external PA**: Check here if use external power amplifier. In case an external power amplifier is present. By entering the gain of the external amplifier, the displayed power into channel table is the product of the measured one with the gain. The "max input power" selects the maximum power that can be selected in channel table, to avoid destroying the amplifier.

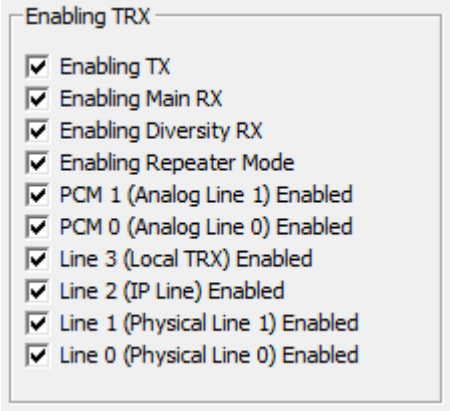
Ex) External PA: Gain 10 dB, Max Input Power 3.0W,



TX power selection in Channel Table becomes like following picture,



(7) **Enabling TRX**:

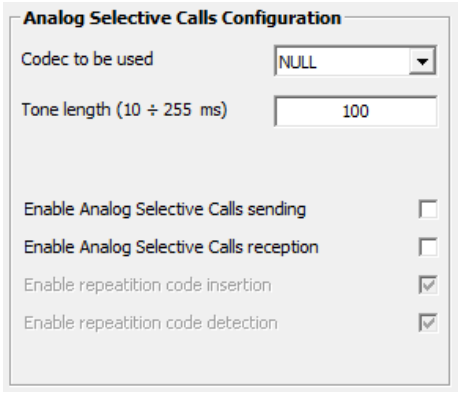


- Enabling TX: Check here to use TX.
- Enabling Main RX: Check here to use Main RX.
- Enabling Diversity RX: Check here to use Diversity RX. If no Diversity Antenna, uncheck.
- Enabling Repeater Mode: This is for Analog only. Although uncheck here, KAIROS works as repeater mode in digital mode.
- PCM 1(Analog Line 1) Enabled: To send Audio by RTP on IP network check here (Need Vocoder option). This is for TSB.
- PCM 0(Analog Line 0) Enabled: To send Audio by RTP on IP network check here (Need Vocoder option). This is for TSA.
- Line 3 (Local TRX) Enabled: If the KAIROS is used by local input/output by local PTT, check here.
- Line 2 (IP Line) Enabled: For DMR Simulcast / Multicast, check here.
- Line 1 (Physical Line 1) Enabled: If the KAIROS has local console (Old type), check here.
- Line 0 (Physical Line 0) Enabled: If the KAIROS has local console (Old type), check here.

(8) **Service Class**: Select Tier 2 or 3.

3.3.1.4.2. Analog Selective Calls Configuration

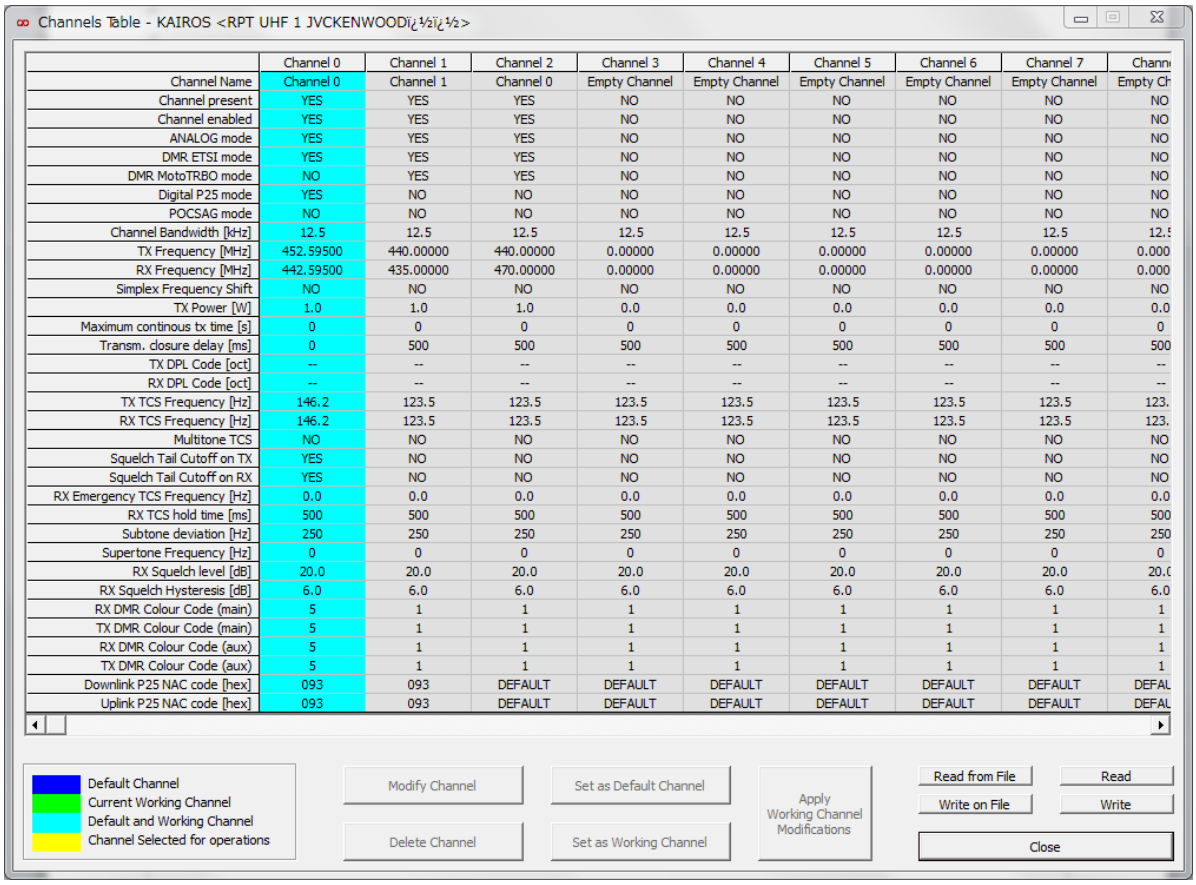
This settings are for Selective Calls for Analog 5-tone.
In Digital communication, you can omit here.

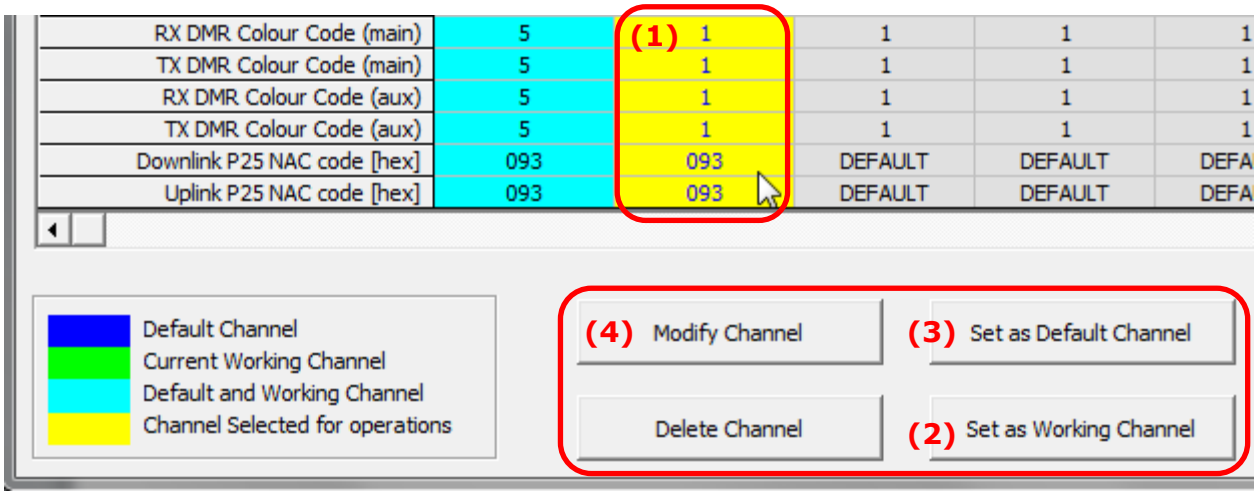


3.3.1.5. **Channel Table**

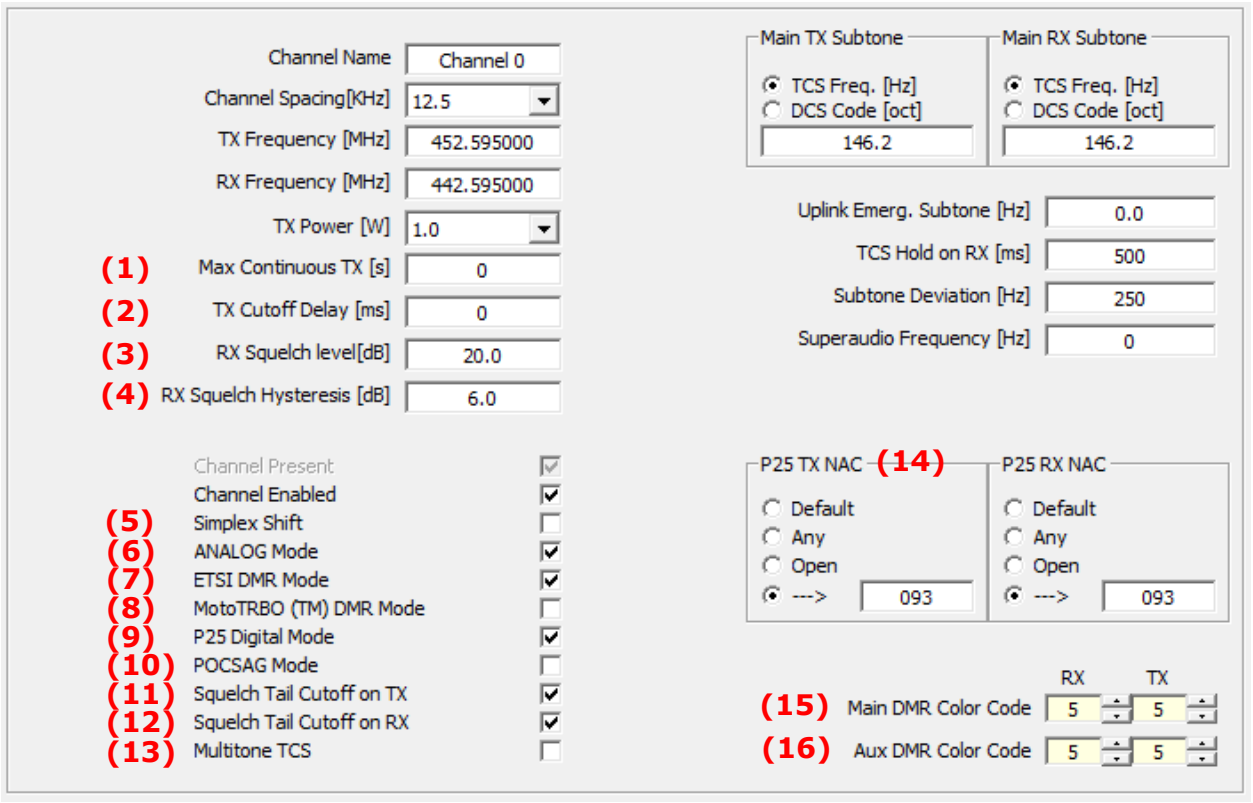
You can see the channel setting in this table.

Total number of channels is 200. (Channel 0 to 199)





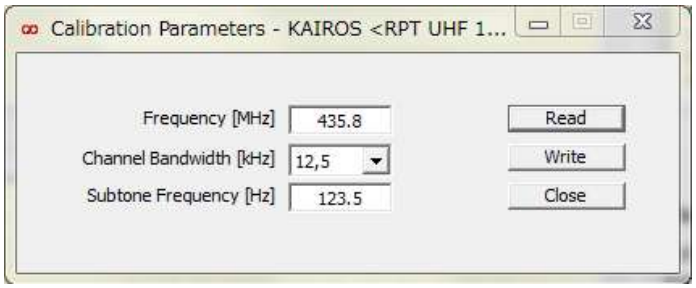
- To change Channel, click on the target channel (1), then press button (2).
- To set the channel as Default channel (Start-up channel), press button (3).
- To modify the channel, press button (4) or double click on the target channel.



(1) Max Continuous TX [s]: Time out timer for Analog only. (0(off) to 600)
(2) TX Cutoff Delay [ms]: TX Hang time for Analog only. (0 to 5000)
(3) RX Squelch level [dB]: Threshold level for both Analog in SINAD and it affects Digital as well. (0 to 25.5)
(4) RX Squelch Hysteresis [dB]: Squelch Hysteresis in dB for Analog only. (0 to 25.5)
(5) Simplex Shift: To avoid desensitization of the RX by TX VCO frequency, it consists in moving the frequency of the TX VCO, out of the current channel during reception.
(6) ANALOG Mode: Analog FM mode.
(7) ETSI DMR Mode: Check here for KENWOOD DMR
(8) MotoTRBO™ DMR Mode: N/A
(9) P25 Digital Mode: For P25 Phase 1
(10) POCSAG Mode: POCSAG for paging feature.
(11) Squelch Tail Cutoff on TX: "Squelch tail cutoff on TX" is normally never used, unless you are dealing with RF-linked networks. It consists in deleting the last 30ms of audio signal before deactivating the TX.
(12) Squelch Tail Cutoff on RX: It cuts the last approx. 30 ms of voice before the squelch close, in order to cut the noise at the end of a call in RX.
(13) Multitone TCS: Check for multiple TCS for RX, Enter other Subtones in "Subtone Control - Additional Subtones".
(14) This is NAC setting for P25 Phase 2.
(15) DMR Color Code for TX and RX
(16) DMR Color Code as 2nd color code. A KAIROS can receive two different color codes.

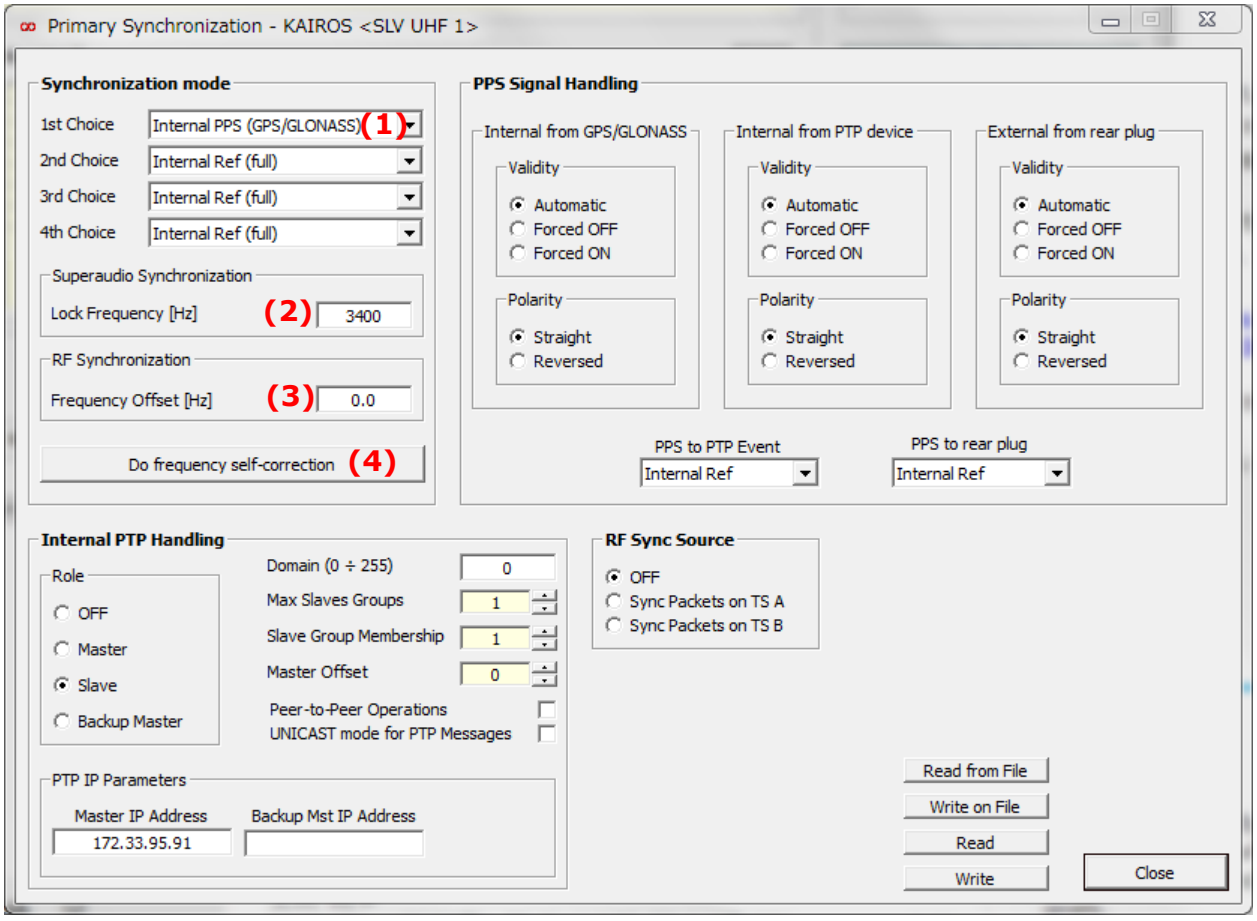
3.3.1.6. **Calibration Parameters**

To obtain better results from self-test process, it is recommended to set the calibration frequency as near as possible to the transmitter frequency; if there is a range of allowed frequencies for transmission, it is recommended to set the center of this range as the calibration frequency.



3.3.1.7. **Primary Synchronization**

KAIROS has various kind of Synchronization, such as GPS, PTP, PPS and so on.
This window is settings for Synchronization.



3.3.1.7.1. Synchronization mode

This is used for setting the source of synchronization of the current KAIROS.

(1) Choices: There are 4 level priorities for synchronization choice.
KAIROS use 1st Choice for its synchronization. If 1st choice is not available, it will shift to 2nd choice. If 2nd is not available, will shift to 3rd. It will try until 4th choice.
Followings are synchronization choices; (Choices which are often use written in **Bold** letters)

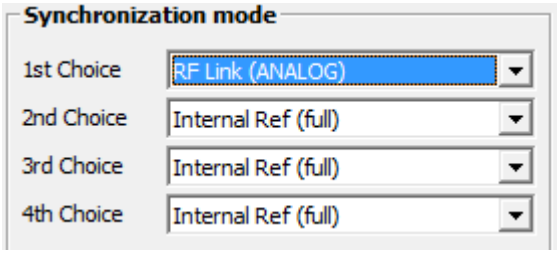
- Internal Reference (timing only): This is used for accessing a base station like a mobile, without the need to align the status machines to network delays. Not use this normally.
- **Internal Reference (full)**: This is used for accessing a base station like a mobile, with the need to align the status machines to network delays. In case, Network Synchronization is not using GPS for all slaves, the Master of Synchronization can use this choice.
- **Internal PPS (GPS/GLONASS)**: PPS stands for Pulse Per Second. This is used for the synch source of PPS is generated by internal GPS receiver in the KAIROS.
- External PPS (uncolored): This is used for if the synch source of PPS is not generated by a Kairos, that is without a PWM modulation for aligning the status matches.
- **External PPS (full)**: This is used for if the synch source of PPS is generated by a KAIROS, which is modulated aligning the status match by PWM modulation.
- **Internal PTP**: Precision Time Protocol over IP. If this protocol is supported by the IP network, KAIROS can synchronize through TCP/IP network without GPS.
  1+1 stations cannot be master for PTP.
- Superaudio tone: This is an old style synch source, via 4Wire, through a pattern made by tones on super-audio band (3-3.4KHz). Not use this nowadays.
- RF Link (ANALOG): In case of GPS failure, the link transceiver is able to recover a time and frequency reference from the Analog signaling coming from the Master station.
- **RF Link (DIGITAL)**: In case of GPS failure, the link transceiver is able to recover a time and frequency reference from the DMR signaling coming from the Master station. This reference isn't as precise as the GPS one but it is enough accurate to assure simulcast operation with small degradations in the overlap area.
  Note: If you use RF link as Synchronization, KAIROS network synchronize only while DMR transmitting by any call. If nothing calls, RF-Linked stations transmit DMR synchronization packets every 90 sec.
- External Radio Network: It was used in the past to extend existing networks by competitors, with Radio Activity's systems, but it is unused nowadays.

(2) Superaudio Synchronization, Lock Frequency [Hz]: Old Synchronization method in Analog FM. Nowadays it is not used.

(3) RF Synchronization, Frequency Offset [Hz]: Old Synchronization method in Analog FM. Nowadays it is not used.

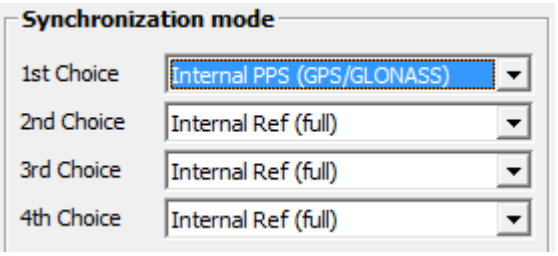
(4) Do frequency self-correction: As long as KAIROS is connected GPS or PTP as synchronization, its TX/RX frequency is always corrected by them. But if a single KAIROS repeater on mountain which is isolated from IP network, also no GPS used. In this case, KAIROS frequency only can rely on VCTCXO for its reference.
If technicians need to align TX frequency, there are two choices by "Do frequency self-correction".

[Method 1]



Select RF link (analog) as first choice of synchronization mode; push "write" button.
- Apply to the main RX input an RF signal by the RF signal generator, with a field strength of -70dBm, at the RX nominal frequency.
- In case the squelch is not opening, move the generated frequency until the squelch opens.
- Push the button "Do frequency self-correction"
- Move the generated frequency towards the nominal frequency, at steps of 1kHz typically.
- Push the button "Do frequency self-correction" at every step, until you will be able to maintain the squelch open with generating the nominal frequency.
- Push the button "Do frequency self-correction" to complete the self-tuning!

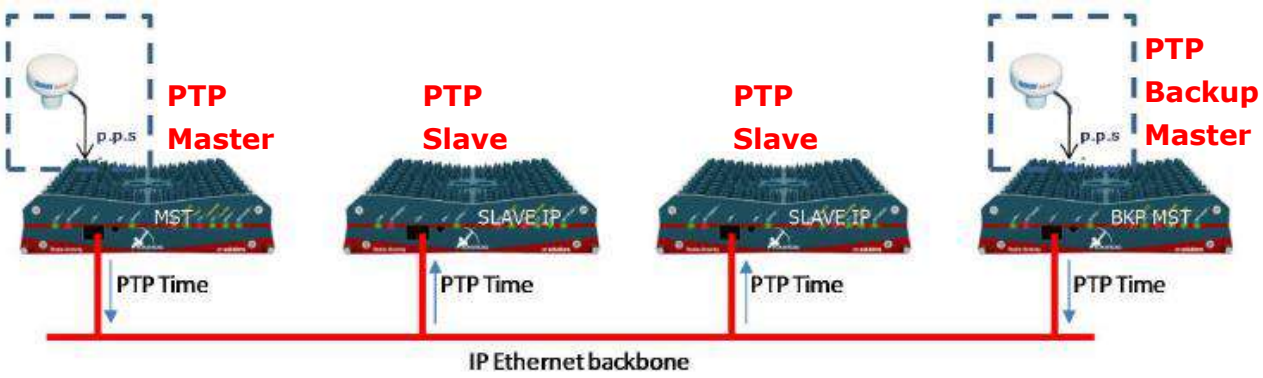
[Method 2]

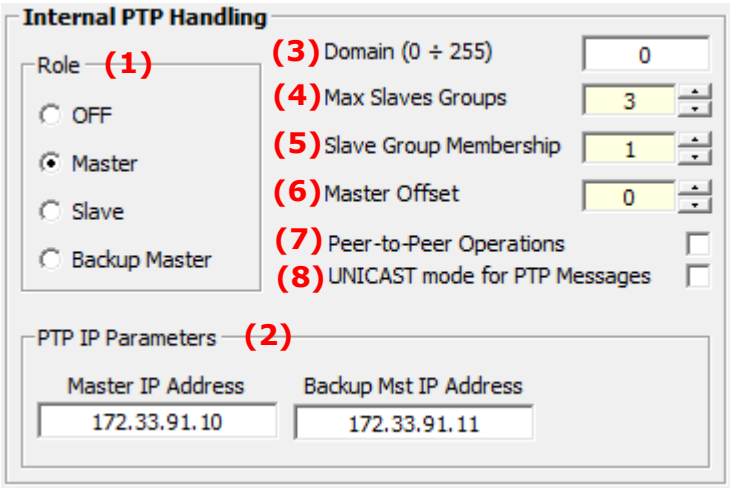


In case the Kairos is equipped with GPS board, the method is simpler:
- Launch KAIROS Manager and open the menu: Kairos – Configuration - Primary Synchronization
- Select Internal PPS (GPS/GLONASS) as first choice of synchronization mode; push "write" button.
- Wait for the Kairos to be synchronized by GPS.
- Push the button "Do frequency self-correction" to complete the self-tuning!

3.3.1.7.2. Internal PTP Handling

For synchronizing KAIROS through PTP, equipment must be connected via TCP/IP backbone. The PTP standard we are using is IEEE-1588-2008, end-to-end/one-step type.
It requires an IP connection that is transparent to multicast (because PTP works with multicast packets) and with a quite stable latency in order to evaluate the delay with the minimum error as possible. Typically this requirement is satisfied if the available bandwidth is very greater than the used one (>10 times) and if it is dedicated to radio connection, that is, if there are no other services which may suddenly change the latency.





(1) **Role**: it is the role of KAIROS from the point of view of the PTP
Master: It is the only one PTP Master in the KAIROS IP Network.
Note: 1+1 Hot Standby Station cannot be assigned PTP Master.
Slave: Others are all slave.
Backup master: It is working as Slave normally. In case of Mater is broken, it will promote to be a Master.

(2) **PTP IP Parameters**:
Master IP Address: IP Address for PTP Master. All PTP Slaves including Backup Master must be set PTP Master IP Address here.
Backup Mst IP Address: IP Address for Backup Mater. All PTP Slaves must be set this in case PTP Master broken.

(3) **Domain** (0 to 255): like for TCP/IP systems, it represents a sub-set of PTP devices; al the devices of the same system must have the same domain.

(4) **Max Slaves Groups**: The number of messages generated by the master, each time it starts a delay detection process. Each message is targeted to a group of slaves, which will immediately answer to the master, as soon as they receive such a message. The less the number of slaves per group (ideally just one), the better the estimation of the delay

(5) **Slave Group Membership**: the number of the group, which the slave belong to. Enter different membership number for Slaves here. If PTP Synchronization network has 10 PTP Slaves, each Slave have different member ship number from 1 to 10 in this box. For the

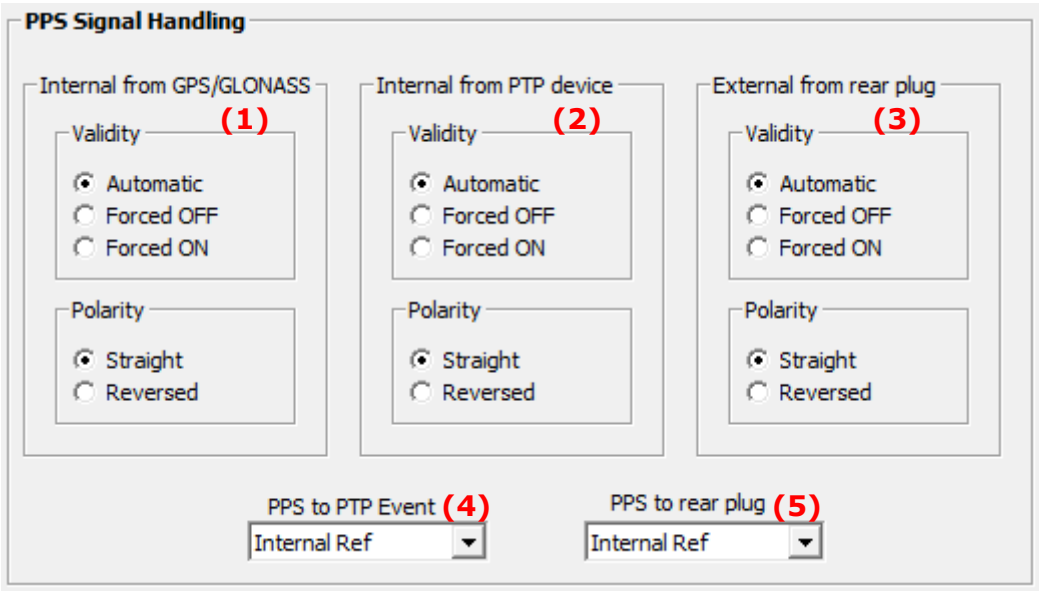
PTP Master, enter 0 in it.

(6) **Master Offset**: practically unused, it is aimed to add a fixed time offset to the instant when messages are sent.

(7) **Peer-to-Peer Operations**: it may be checked if the Ethernet switches are set in transparent clock, 1 step mode.

(8) **UNICAST mode for PTP Messages**: It is still unused; it is intended for a future proprietary method for using PTP over networks which do not allow multicast packets.

3.3.1.7.3. PPS Signal Handling

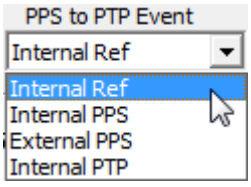


(1) **Internal from GPS/GLONASS**: Normally, choose "Automatic" and "Straight".

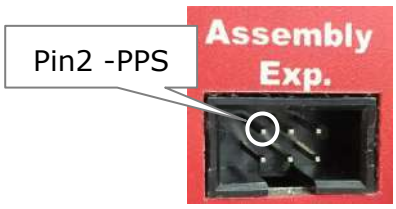
(2) **Internal from PTP device**: Normally, choose "Automatic" and "Straight".

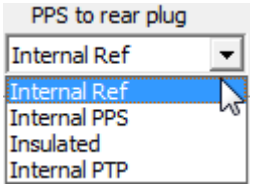
(3) **External from rear plug**: Normally, choose "Automatic" and "Straight".

(4) **PPS to PTP Event**: This is setting which PPS source will be used to make PTP event. Normally, Internal Ref is fine.



(5) **PPS to rear plug**: This is setting to choose PPS source to rear plug (Pin2) for PPS.
External PPS output from a KAIROS can support up to 10 units of other KAIROS to supply their External PPS Synchronization.

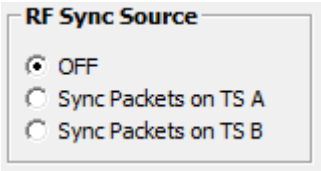




Option cable: KA-1+1

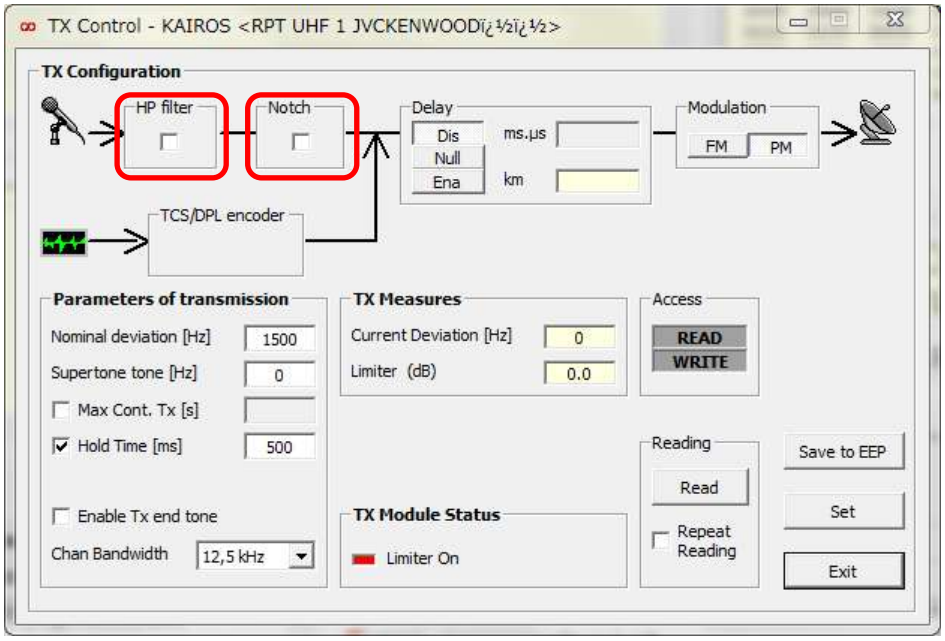
3.3.1.7.4. RF Sync Source

RF Link station should use GPS for Synchronization. But in case of its GPS has some problem, DMR RF Sync support Synchronization for as temporary. This selection is to choose slot for it.



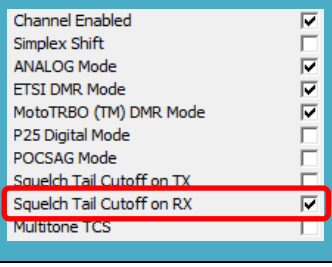
3.3.1.8. **TX Control**

This window allows configuring transmitter parameters for Analog FM only, especially RF-Link on Analog FM. For other DMR typical parameters please refer to "Configuration - Base Station layer configuration" menu.



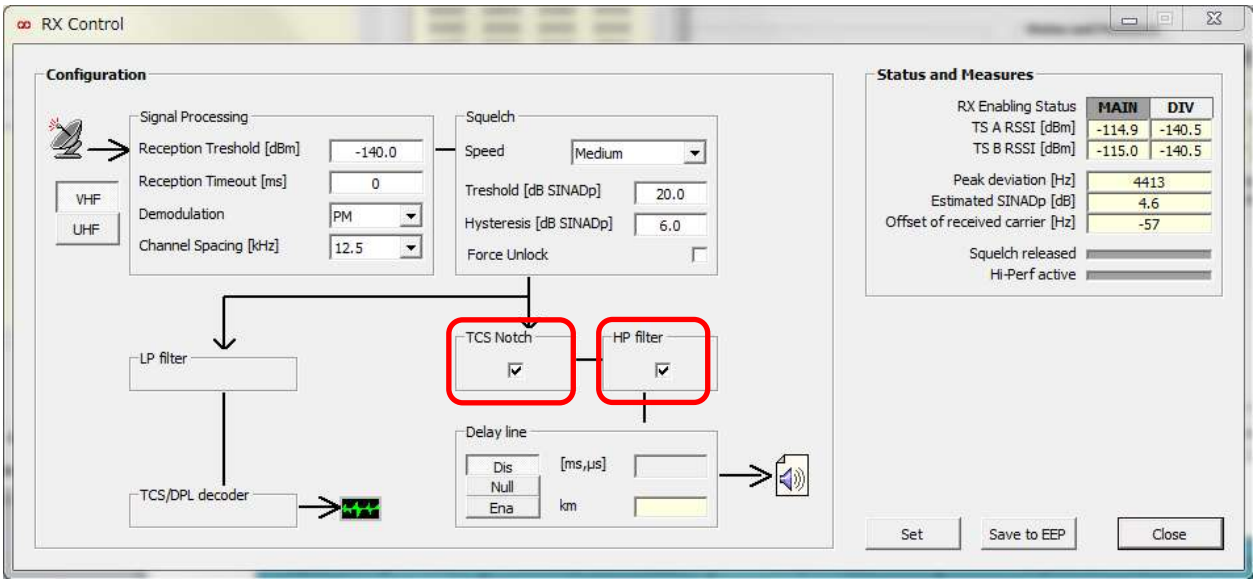
TX Control configuration in RF-Link

Operating Mode	HP filter	Notch	Squelch Tail cut off on TX in Channel Table
Master/Slave	Uncheck	Uncheck	Check
Link-up	Uncheck	Uncheck	Uncheck
Link-down	Uncheck	Uncheck	Uncheck



3.3.1.9. **RX Control**

This window allows configuring receiver parameters for Analog FM only. For others DMR typical parameters please refer to "Configuration - Base Station layer configuration" menu.



RX Control configuration in RF-Link

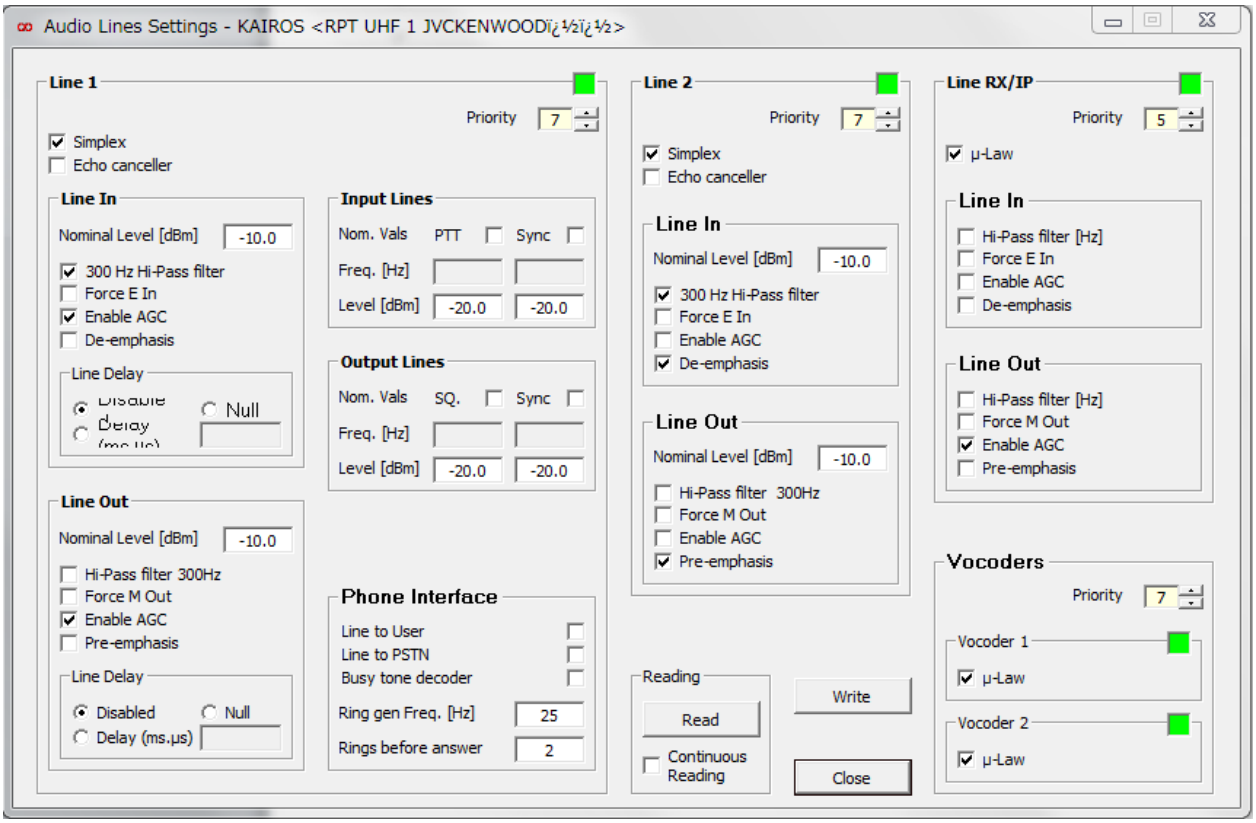
Operating Mode	300Hz HP filter TCS Notch	Expander	Squelch Tail cut off on RX in Channel Table
Master/Slave	Check	Check	Check
Link-up	Uncheck	Uncheck	Check
Link-down	Check	Uncheck	Check

3.3.1.10. **Audio Lines Settings**

This window allows configuring the physical analog line interface of the base station. Line 1 and 2 correspond to the physical 4W lines on the I/O connector; line RX/IP is a virtual line over TCP/IP connection; Vocoders are virtual internal line to DSP.

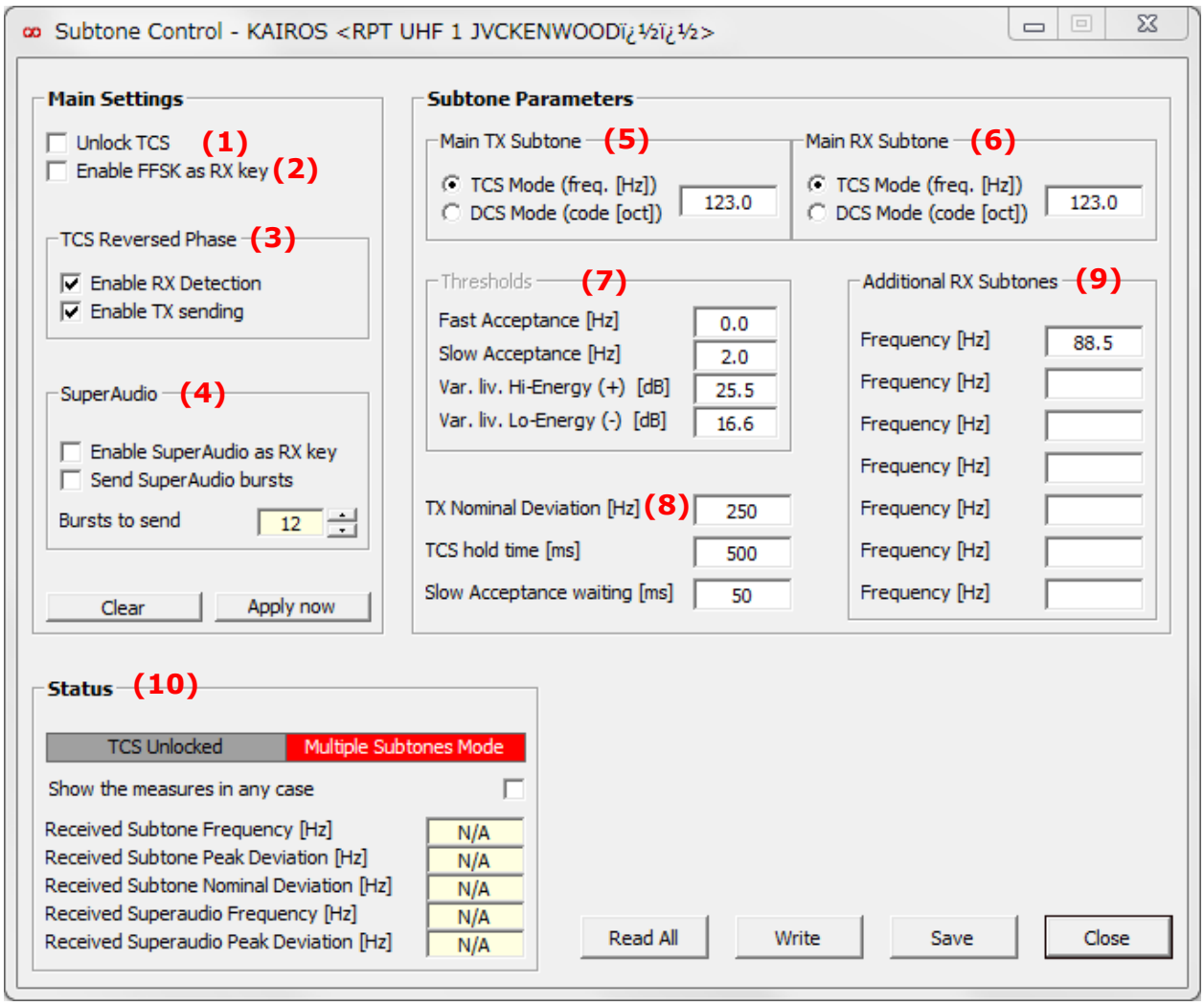
For each input and output line it is possible:

- 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



3.3.1.11. **Subtone/Supertone**

Subtone means Sub-Audio on Analog FM such as TCS (QT) and DCS (DQT).



(1) Unlock TCS: To by-pass the TCS/DPL controls check here.
If check here, KAIROS repeats by all RX signal without Decoding TCS.

(2) Enable FFSK as RX key: "Enable FFSK as RX key" is a FFSK modulated code sequence that is used to unlock the squelch. When a signal is received by the RX, the squelch immediately opens, waiting to decode the correct FFSK code sequence. If the expected string is not received, the squelch closes.

(3) Enable RX Detection: This is selection whether TCS decodes revere burst tone to close Squelch without tail-noise or not. Normally check here.

(4) SuperAudio: No use.

(5) Main TX Subtone: Select TCS or DCS and enter its value for TX. You don't need to change this setting because this is set by channel setting.

(6) Main RX Subtone: Select TCS or DCS and enter its value for RX. You don't need to change this setting because this is set by channel table setting.

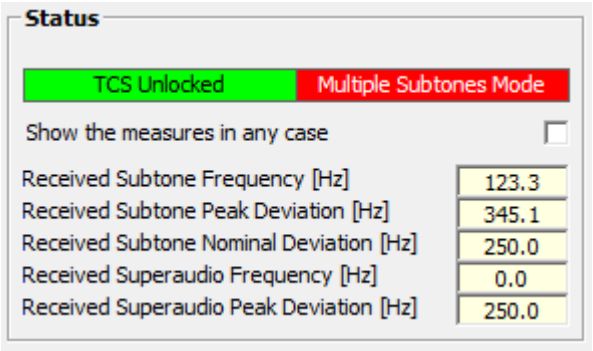
(7) Thresholds: This is setting for characteristic for TCS. Don't change here.

(8) Other TCS setting: Don't change here.

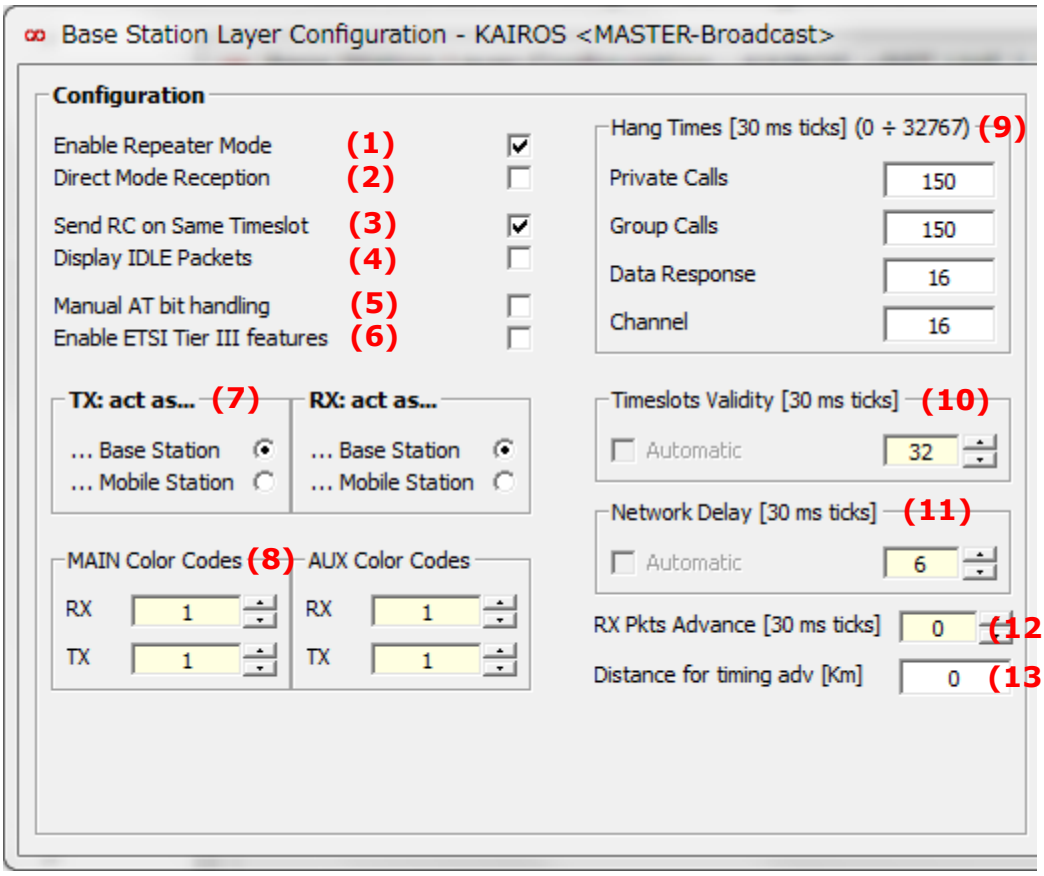
(9) Additional RX Subtones: If the KAIROS has Multi CTCSS license to decode Multi TCS,

you may enter other tones here.

(10) Status: This is Status monitor for TCS.



3.3.1.12. Base Station Layer Configuration



(1) Enable Repeater Mode: Check here if the KAIROS needs to be Local Repeater when isolated from network.

(2) Direct Mode Reception: Usually uncheck here. If check it, the KAIROS receives in direct mode (Not repeater mode) which is different from Mobile station mode in repeater.

(3) Send RC on Same Timeslot: Check if the KAIROS has to support "Enhanced Encryption" feature for mobile unit.

(4) Display IDLE Packets: Uncheck normally. To remote control the stations via RF, enable it on Ts A or Ts B on all the repeaters used as links, including Master if necessary; enable the flag «display IDLE packets» on slave links.

(5) Manual AT bit handling: Uncheck. This is for factory usage only.

(6) Enable ETSI Tier III features: Uncheck while Tier 2 operation.

(7) TX: act as… / RX: act as…: Select Base Station normally. For RF up link and down link, must transmit as Base Station and Receive as Mobile Station.

(8) MAIN (AUX) Color Codes: Color code setting for Main and AUX. You don't need to

change this setting because this is set by channel table setting.

(9) Hang Times: Setting for Hang Times for each call.

- Private Calls: Hang time after Individual Call.
- Group Calls: Hang time after Group Call.
- Data Response: Hang time after Data TX.
- Channel: Additional Hang time follows by Private/ Group/ Data.

This can be Beacon transmission length as well.

Ex) Hang time for Individual call: 150+16=166. (166 x 30ms = 4980ms)

In RF-down-link, Channel Hang Time is used for synchronization. In up-link it is set to 16, its minimum value. In down-link, there is not a minimum value, but normally it is worth to keep that value greater than 30, Recommendation is 100 (about 3 second). For more detail for RF-Link, please refer to Appendix 4.4

(10) Timeslots Validity: "Timeslot validity" makes sense in a radio network: it has no meaning in case of a single repeater. "Timeslot validity" is the duration of the interval of time from current instant backward, which the time-stamps of received packets must belong to, in order to be taken into account for elaboration (transmission or voting). It is normally never used, but in case of critical linking backbones, where it is preferable to reduce the duration of the acceptance time window of some stations. It is not referred to mobiles, but to repeaters. It can be seen as the maximum lifetime of a packet, reaching a repeater of a network. If the radio network is well-designed, that parameter can be left to its maximum value, which does not affect any of the network.

(11) Network Delay: Delay compensation, to compensate for different path delays in simulcast network. For 2 Level network, enter 6 here. If the network is complex, ask JVCKENWOOD Tech support.

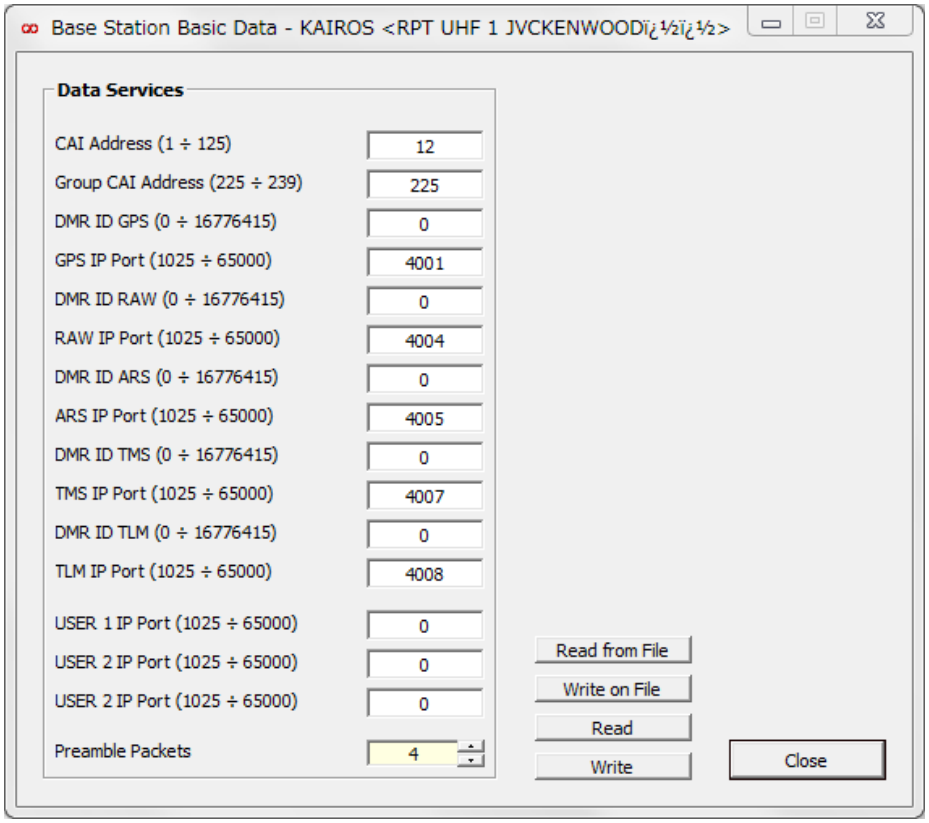
(12) RX Pkts Advance: Set some value in only RF-Link station.

(13) Distance for timing adv [km]: Normally No use here for IP linked station.
For the RF-linked remote site, on up-link to master only. In order to compensate for the flying delay in case of GPS failure on the up-link. The same setting on broadcast base is used for reducing the network delay correspondingly.

3.3.1.13. **Base Station Basic Data**

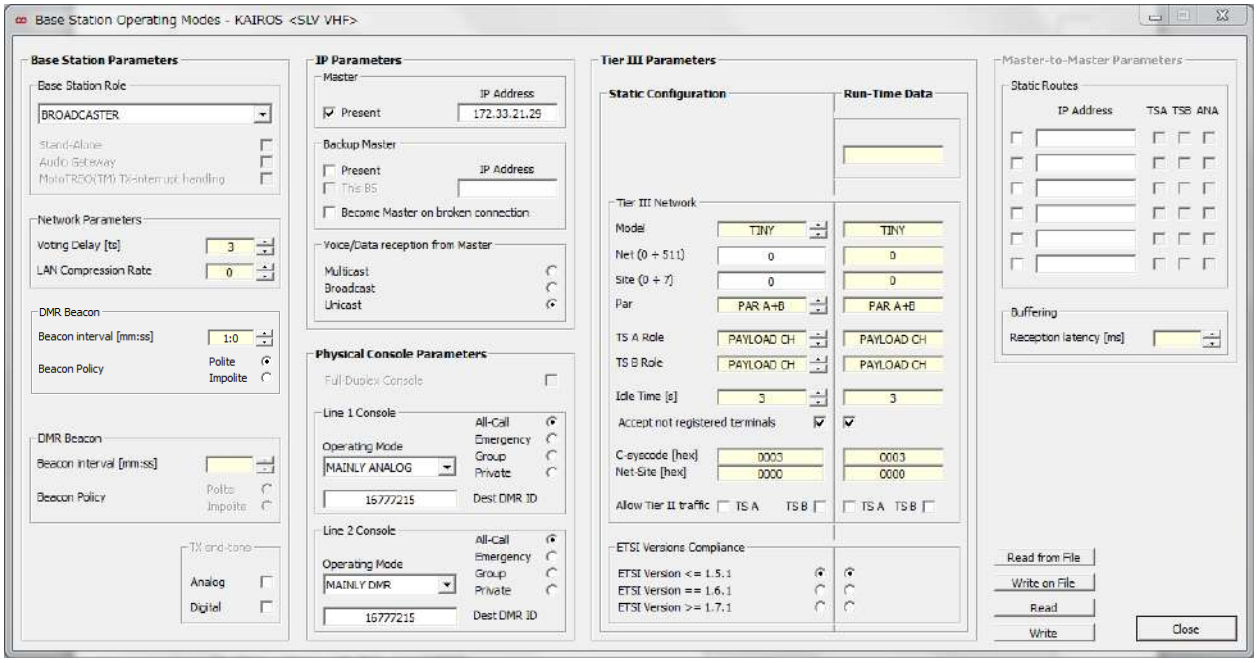
This setting is for a KAIROS act as Motorola repeater.

You don’t need to change port setting from default basically.



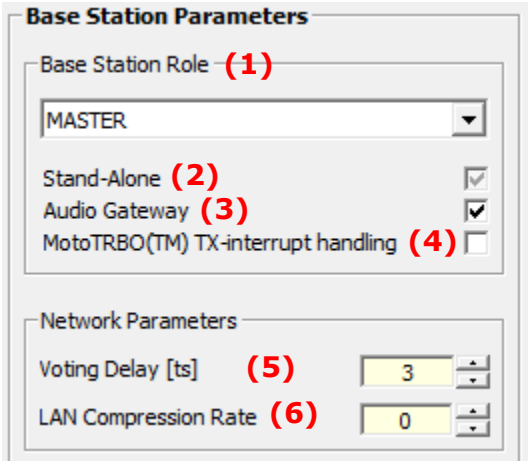
3.3.1.14. **Base Station Operating Modes**

This window 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.



3.3.1.14.1. **Base Station Parameters**

(1) Base Station Role



- MASTER: For Master station which choose best signal from Voted signals from slave (Including Master itself).
- SUBMASTER: It's same as Slave normally, in case of Master broken, Sub-Master will promote to be a Master.
- BROADCASTER: Usually for Slave. A KAIROS needs to cover Mobile stations as a repeater selects this.
- HALF-TK AUX MASTER: N/A
- LINK DOWN TO NET: For a KAIROS for RF-Link which is near to Master Side select this. For more detail for RF-Link, please refer to Appendix 4.4
- LINK UP TO MASTER: For a KAIROS for RF-Link which is Slave Broadcaster select this. For more detail for RF-Link, please refer to Appendix 4.4
- SUBM LINK DOWN TO NET: This is as same as LINK DOWN TO NET, but for Sub-Master.
- SUBM LINK UP TO MASTER: This is as same as LINK UP TO MASTER, but for Sub-Master.
- MOBILE/FIXED: KAIROS will be Mobile/ Fixed Station. It doesn't support repeat function.

(2) Stand-Alone: Uncheck normally. If check it, the KAIROS will be isolated from other KAIROS.

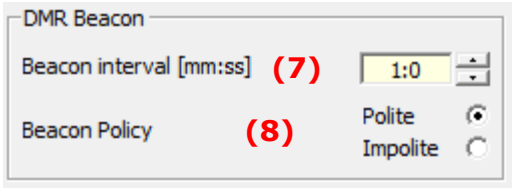
(3) Audio Gateway: We recommend using a KAIROS Gateway as an Audio Gateway, but in case you would like to assign a KAIROS as an Audio Gate way, check here. Need Vocoder option.

(4) MotoTRBO™ TX-interrupt handling: N/A

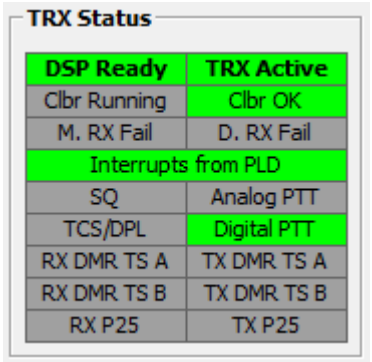
(5) Voting Delay [ts]: Delay compensation, to compensate for voting delays in simulcast network. For 2 Level network, enter 3 here. If the network is complex, ask JVCKENWOOD Tech support.

(6) LAN Compression Rate: Parameter is 0 or 1 at this moment.
0: No compress packets on IP
1: Compress packets on IP

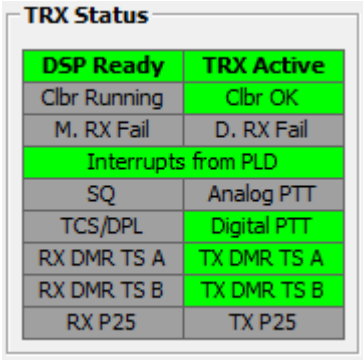
(7) Beacon interval [mm:ss]: You can set here for Master Base station only.
Enter Beacon interval timing here in 30 second step. This setting for Master Station only. Slave stations follow the timing of Master station.
Beacon transmission duration is defined by Channel Hang time in Base Station Layer Configuration
[Note] Beacon interval timer will be renewed by last transmission such as repeating TX.



(8) Beacon Policy:
Polite: The beacon never disturbs conversation.
Impolite: The beacon disturbs conversation.

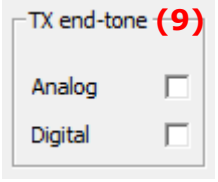


Polite

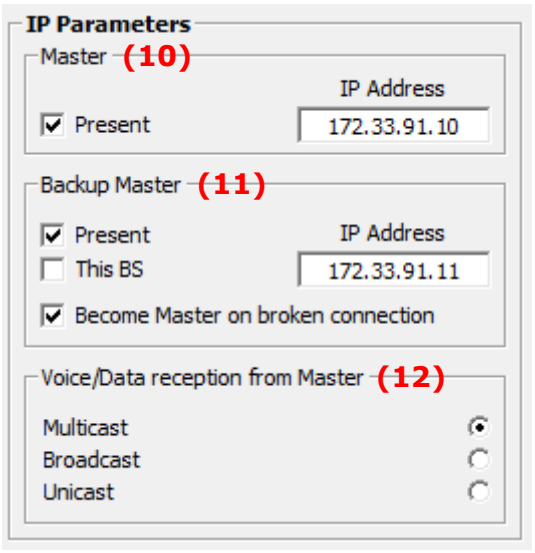


Impolite

(9) TX end-tone: KAIROS will add 0.5 sec TX end-tone before stop transmission. It can be applied for Master station and Single repeater.



3.3.1.14.2. IP Parameters

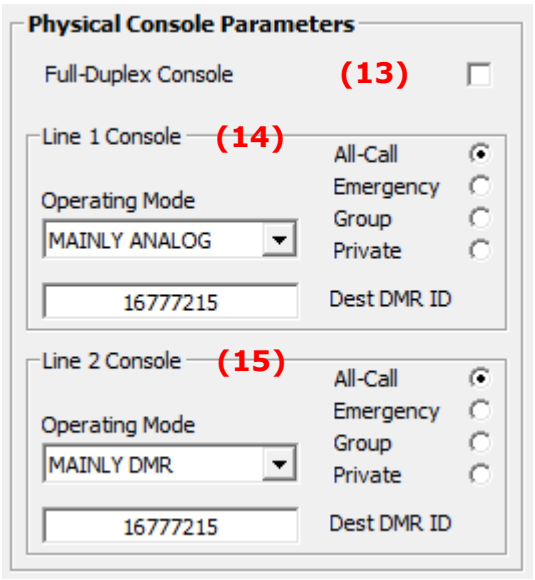


(10) Master IP address: You must set Master IP address for all slaves. (including Sub-master)

(11) In case you assign a Slave as a Backup Master, enter this setting. (It is recommended for network redundancy)

(12) Voice/ Data reception from Master: Choose one to be same as IP network.

3.3.1.14.3. Physical Console Parameters



(13) Full-Duplex Console: It allows Full Duplex conversation by physical console from rear 25pin port.

(14) Line 1 Console: The setting for Physical console from rear 25pin port line 1.

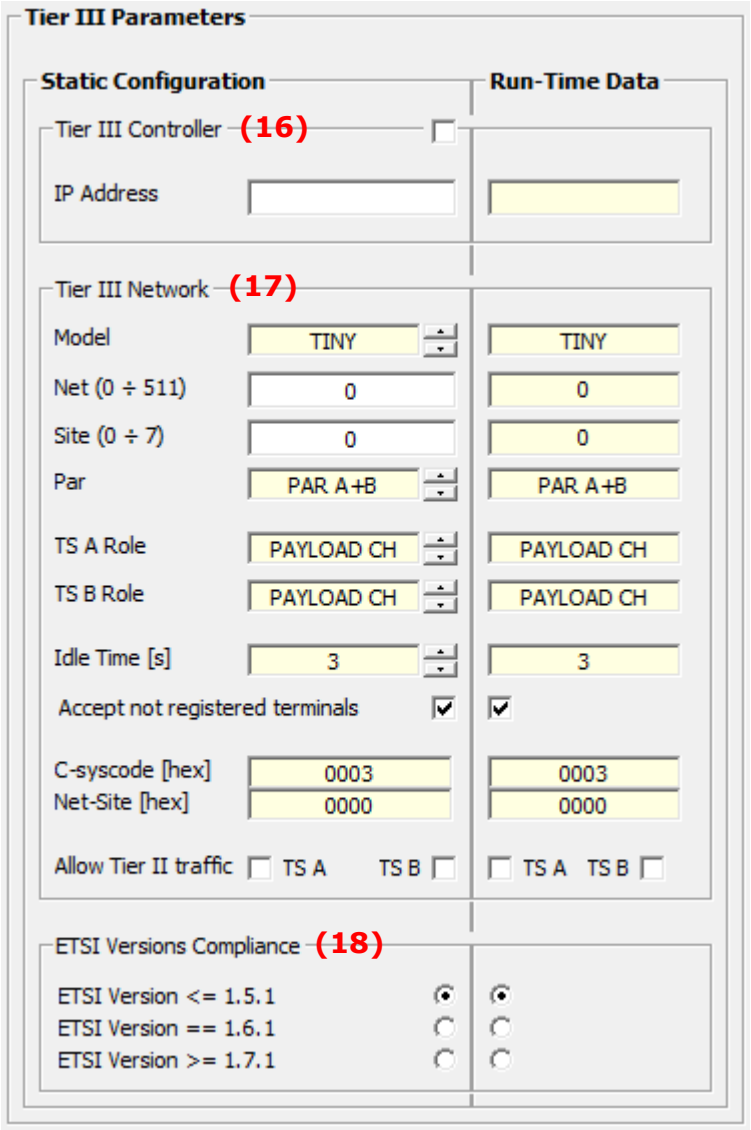
(15) Line 2 Console: The setting for Physical console from rear 25pin port line 2

3.3.1.14.4. Tier III Controller

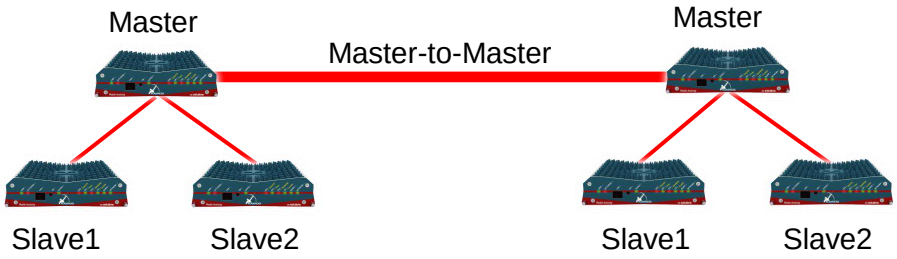
If your network is for Tier II, you don't need to change anything here.
We will update here Tier 3 in Feb 2019.

3.3.1.14.5. Tier III Network

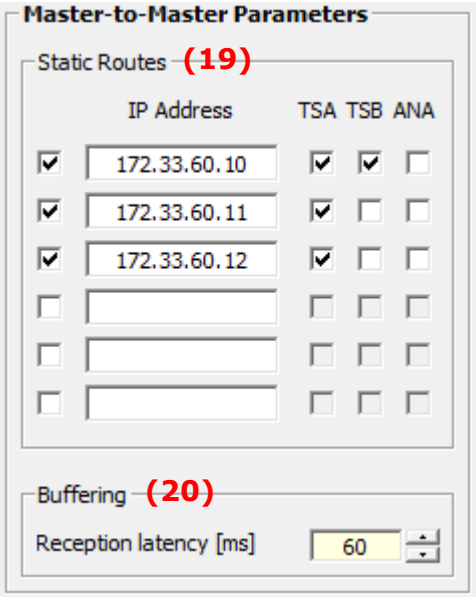
If your network is for Tier II, you don't need to change anything here.
We will update here in Feb 2019.



3.3.1.14.6. Master-to-Master Parameters



The Tier II/III, even in Analog, Controller can now instruct a Master Base Station to set up one or more dynamic Master-to-Master (M2M) route to exchange data with another Master Base Station. This is required for a Multisite Network.



Note: Master-to-Master functions is totally ASYNCHRONOUS, thus it cannot be used for any simulcast purpose.

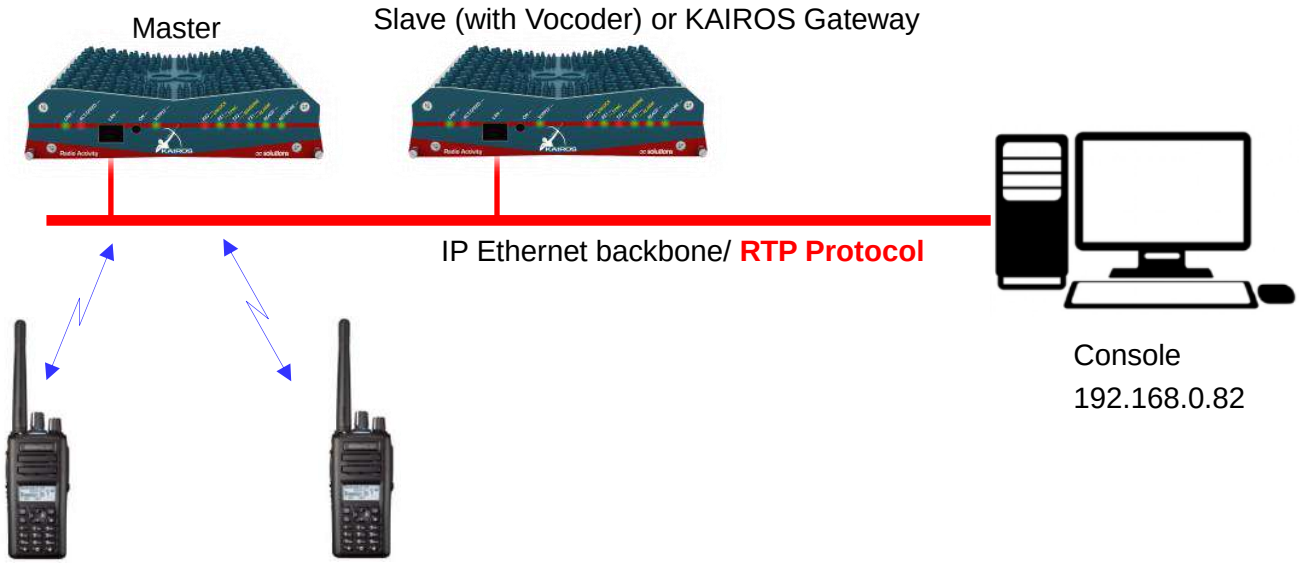
(19) Static Routs: Set target Master IP address and check DMR slot/ Analog which you want to transfer Voice/Data to other Master.

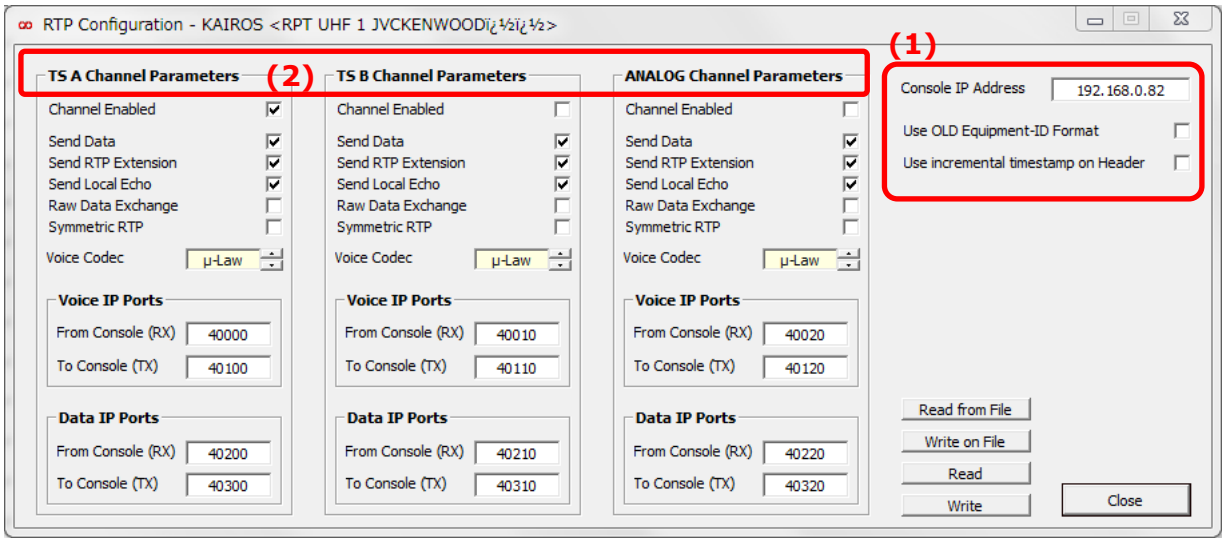
(20) Buffering: Choose Reception latency in 60 [ms]

3.3.1.15. **RTP Configuration**

This window is for configuration of RTP which connect KAIROS Tier 2 and Tier 3 networks to dispatching applications using Real Time Protocol to exchange voice and data along with the current status of the radio channels using RTP extension header.

[Note] Optional Vocoder Unit is required for RTP.

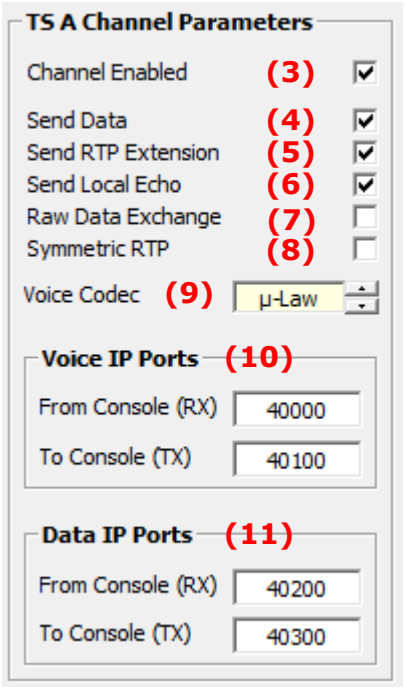




(1) Console IP Address: Enter Console IP Address.
Use OLD Equipment-ID Format: Uncheck.
Use incremental timestamp on Header: Uncheck.

(2) TS A Channel Parameters: For Timeslot A
TS B Channel Parameters: For Timeslot B
ANALOG Channel Parameters: For Analog FM.

3.3.1.15.1. TS A(B) / ANALOG Channel Parameters



(3) Channel Enabled: Check here if you need RTP.

(4) Send Data: To send RTP data to console, check here.

(5) Send RTP Extension: Normally Uncheck. In order to send Extension header data, check here.

(6) Send Local Echo: Normally Uncheck. In order to send Local Echo check here.

(7) Raw Data Exchange: Uncheck. N/A

(8) Symmetric RTP: If check here, TX port number will be same as RX port number.

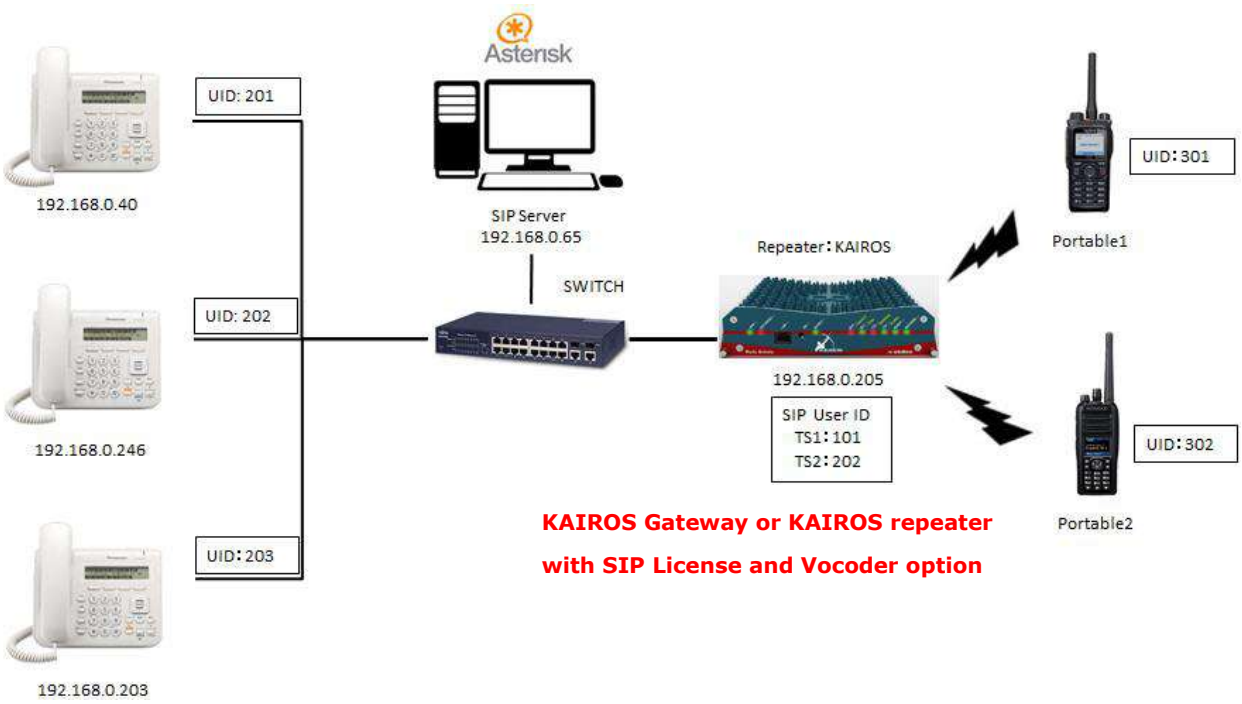
(9) Voice Codec: Choose one from ANA, a-Law, u-Law to be same as console codec. Select u-Law normally.

(10) Voice IP Ports: Set IP ports for Voice to be same as Console IP ports.

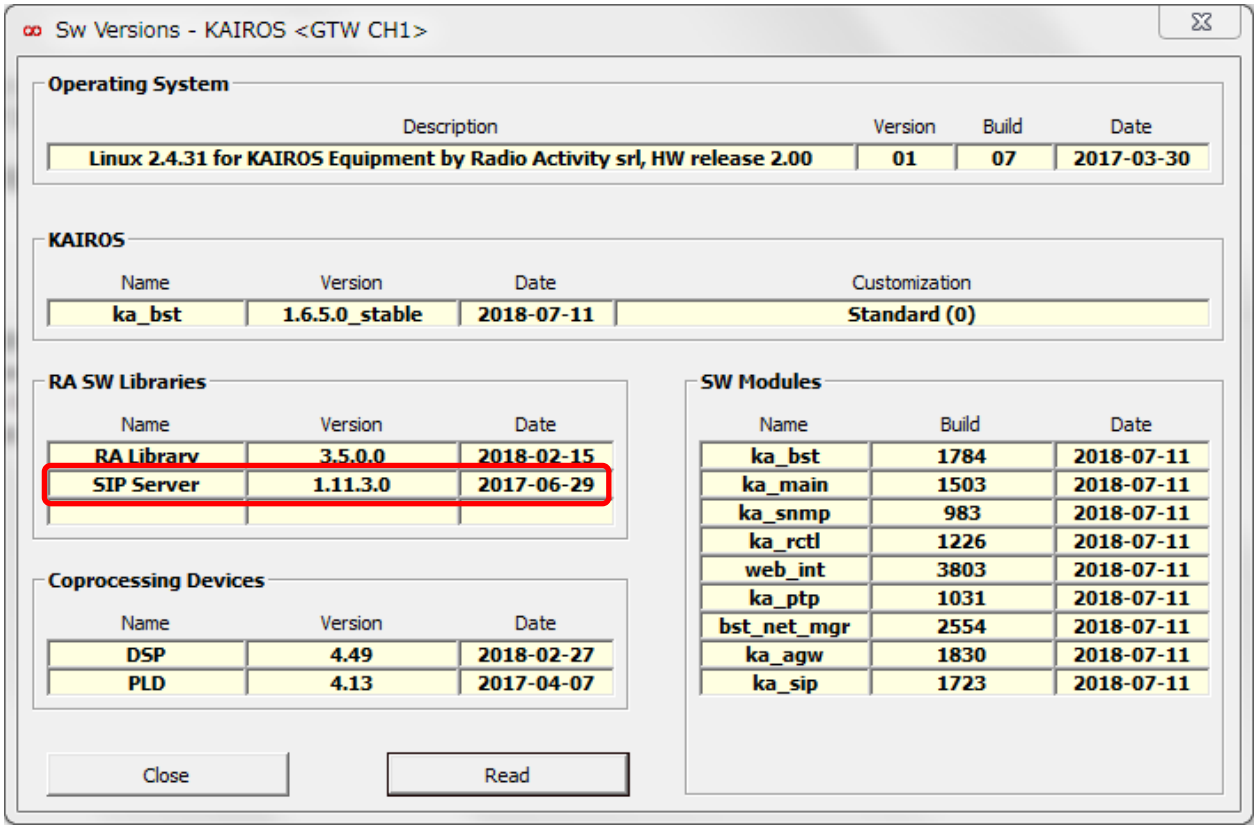
(11) Data IP Ports: Set IP ports for Data to be same as Console IP ports.

3.3.1.16. **SIP Configuration**

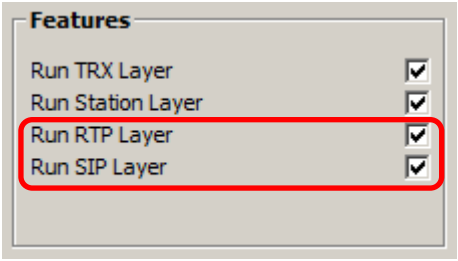
KAIROS supports SIP Server (Asterisk) which can make communication between Mobile unit and SIP Phone.



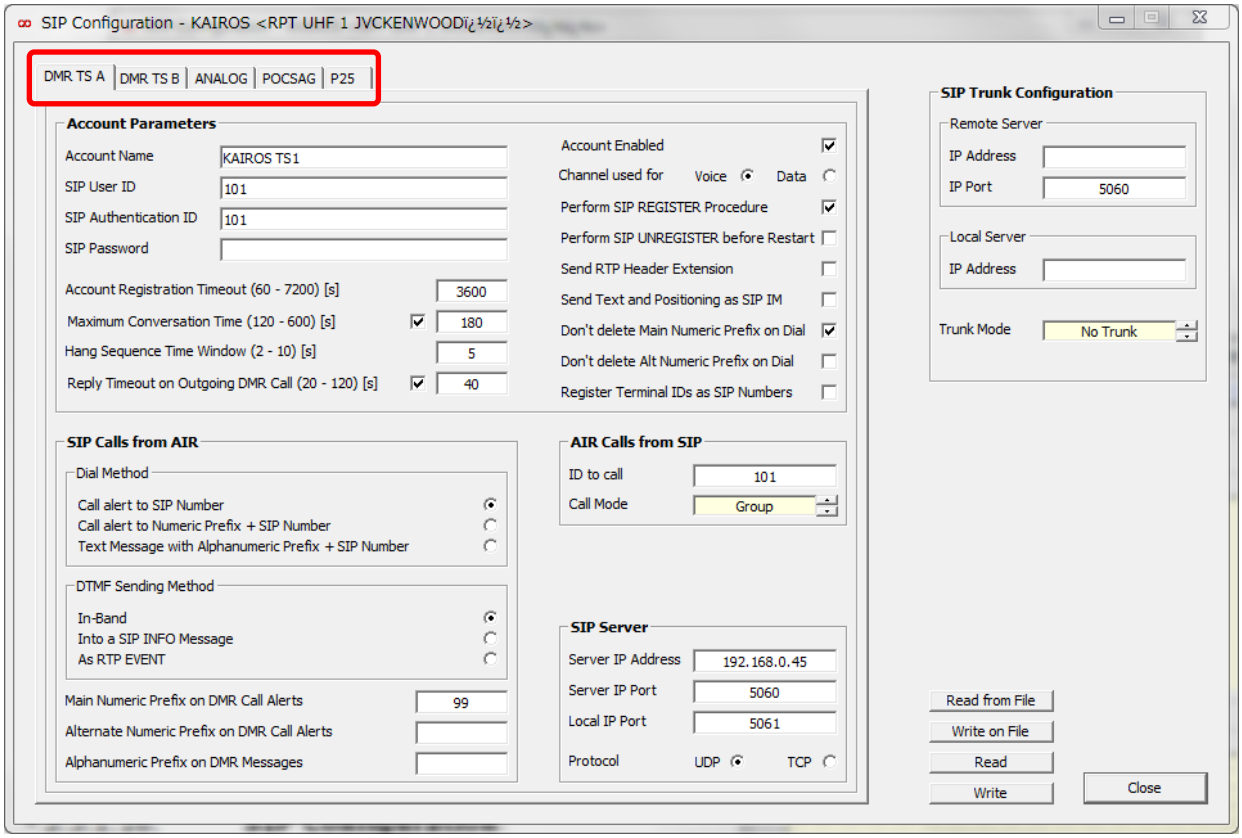
If the target KAIROS for SIP is not activated SIP License, you need to activate SIP license by Web Server (Browser), and upload SIP library file to KAIROS by KAIROS Manager.
Confirm the KAIROS is installed SIP server Library from Software – Versions.



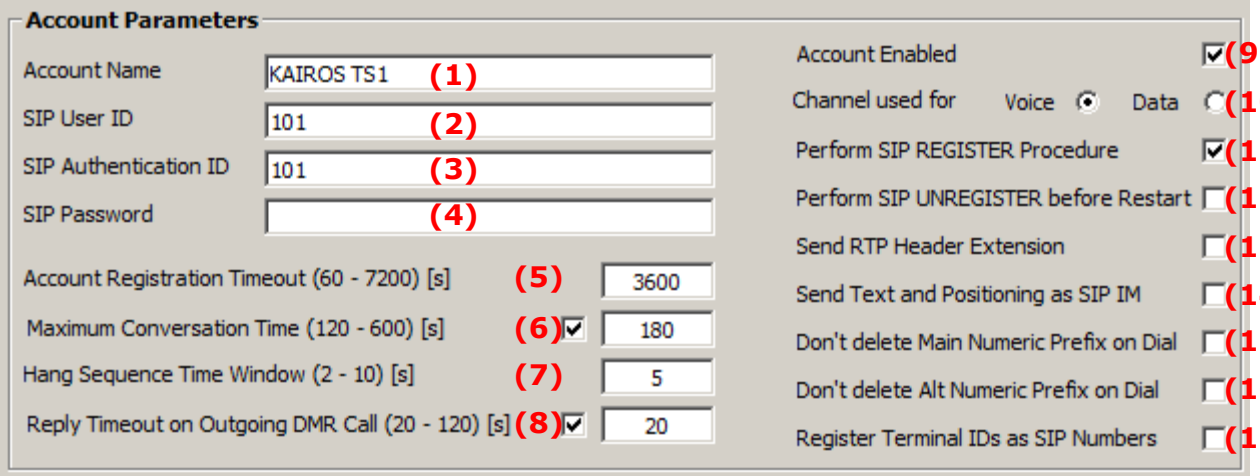
Also confirm “Run RTP/SIP Layer” from Configuration – Main Setup.



It is possible to enable a KIROS as a SIP client account for each radio channel. (At the moment only DMR TSA, TSB and Analog are supported)

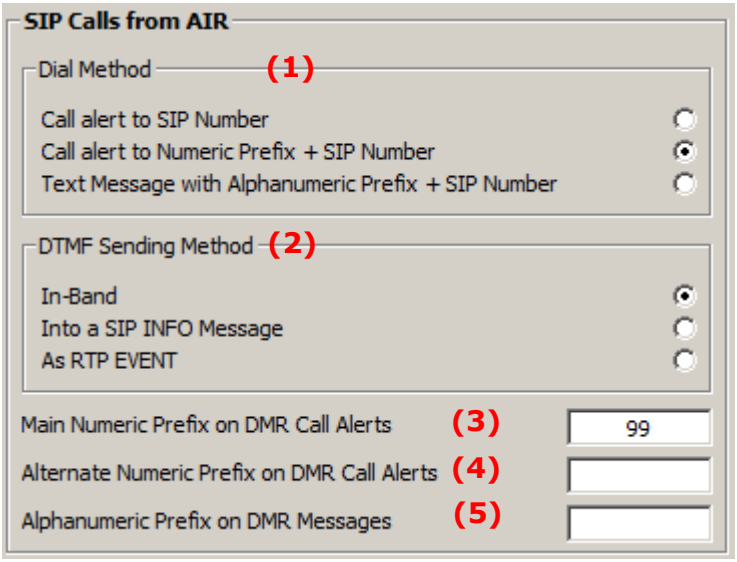


3.3.1.16.1. Account Parameters



(1) Account Name: Enter any name.
(2) SIP User ID: Extension number which is same as SIP server (Asterisk).
(3) SIP Authentication ID: Enter same number as SIP User ID.
(4) SIP Password: N/A (Do not enter)
(5) Account Registration Timeout: Timeout time for registration to SIP server.
(6) Maximum Conversation Time: If uncheck here, no limitation. (Managed by repeater TOT)
(7) Hang Sequence Time Window: Time window for detecting the 3 PTTs On/Off sequence to hang-up a SIP call.
(8) Reply Timeout Outgoing DMR Call: Time until hang-up a SIP to DMR call if nobody answers on the radio.
(9) Account Enabled: Check here to use SIP feature on target time slot.
(10) Channel used for: Choose “Voice” normally.
(11) Perform SIP REGISTER Procedure: Check here normally.
(12) Perform SIP UNREGISTER before Restart: Uncheck here normally.
(13) Send RTP Header Extension: It allows sending RTP Header Extension.
(14) Send Text Positioning as SIP IM: It allows text message from console
(15) Don’t delete Main Numeric Prefix on Dial: Uncheck here normally.
(16) Don’t delete Alt Numeric Prefix on Dial: Uncheck here normally.
(17) Register Terminal IDs as SIP Numbers: Uncheck here normally.

3.3.1.16.2. SIP Calls from AIR



(1) Dial Method: Choose middle. Using this method each call alerts whose destination DMR ID's initial digits matches with one of the two numeric prefixes (Main Numeric Prefix and Alternate Numeric Prefix) will produce a SIP call addressed to a SIP resource having the same SIP contact URL of the target DMR ID. It is possible to set whether or not sending the selected prefix to the SIP Server. This is the only method currently available in the current release 1.6.0.0 and it will be provided in a future software release.

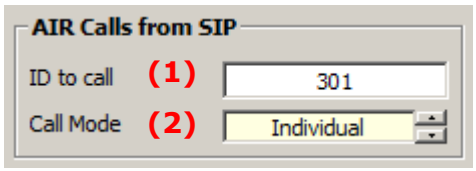
(2) DTMF Sending Method: Choose "In-Band". It is the only way to exchange DTMF tones between radio portables and SIP Telephones in the current release.

(3) Main Numeric Prefix on DMR Call Alerts: Additional prefix of extension number.
e.g.) SIP phone extension : 101
Numeric Prefix on DMR: 99
UID to call SIP phone from mobile : 99101

(4) Alternate Numeric Prefix on DMR Call Alerts: 2nd Prefix if you need.

(5) Alphanumeric Prefix on DMR Messages : N/A

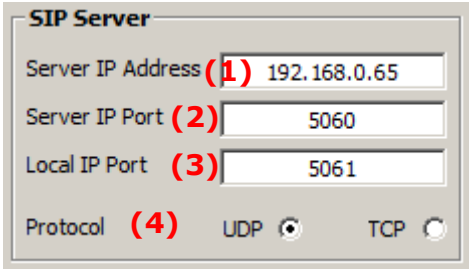
3.3.1.16.3. AIR Call from from SIP



(1) ID to call: ID for Air calls between KAIROS and mobile.

(2) Call Mode: Choose Individual / Group

3.3.1.16.4. SIP Server



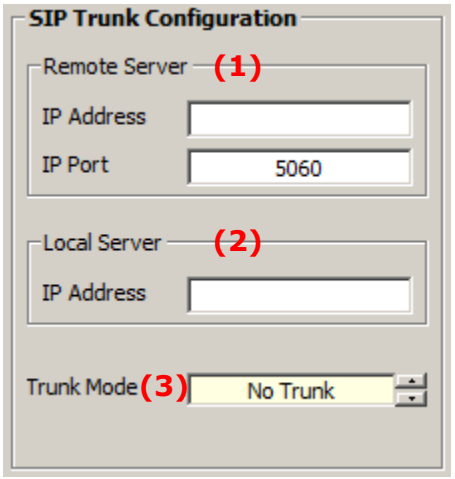
(1) Server IP Address: IP address of SIP Server

(2) Server IP Port: Enter same port number with SIP server.

(3) Local IP Port: Enter same port number with SIP server.

(4) Protocol: Enter same protocol with SIP server.

3.3.1.16.5. SIP Trunk Configuration



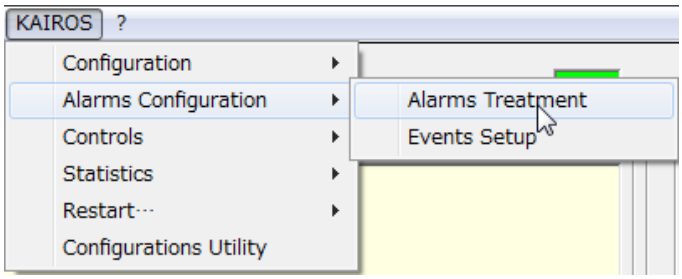
It is a Server to connection between two different SIP servers (usually KA-SIP Server and customer's external PBX). It provides an alternative to a SIP Client – Server connection between the KA-SIP layer which acts as a SIP client and the customer's external VoIP PBX acts as SIP Register Server.

(1) Remote Server: Set IP information for SIP Trunk Server.

(2) Local Server: If assign SIP Trunk Server to another KAIROS, enter IP address in here.

(3) Trunk Mode: No Trunk means using KAIROS itself.

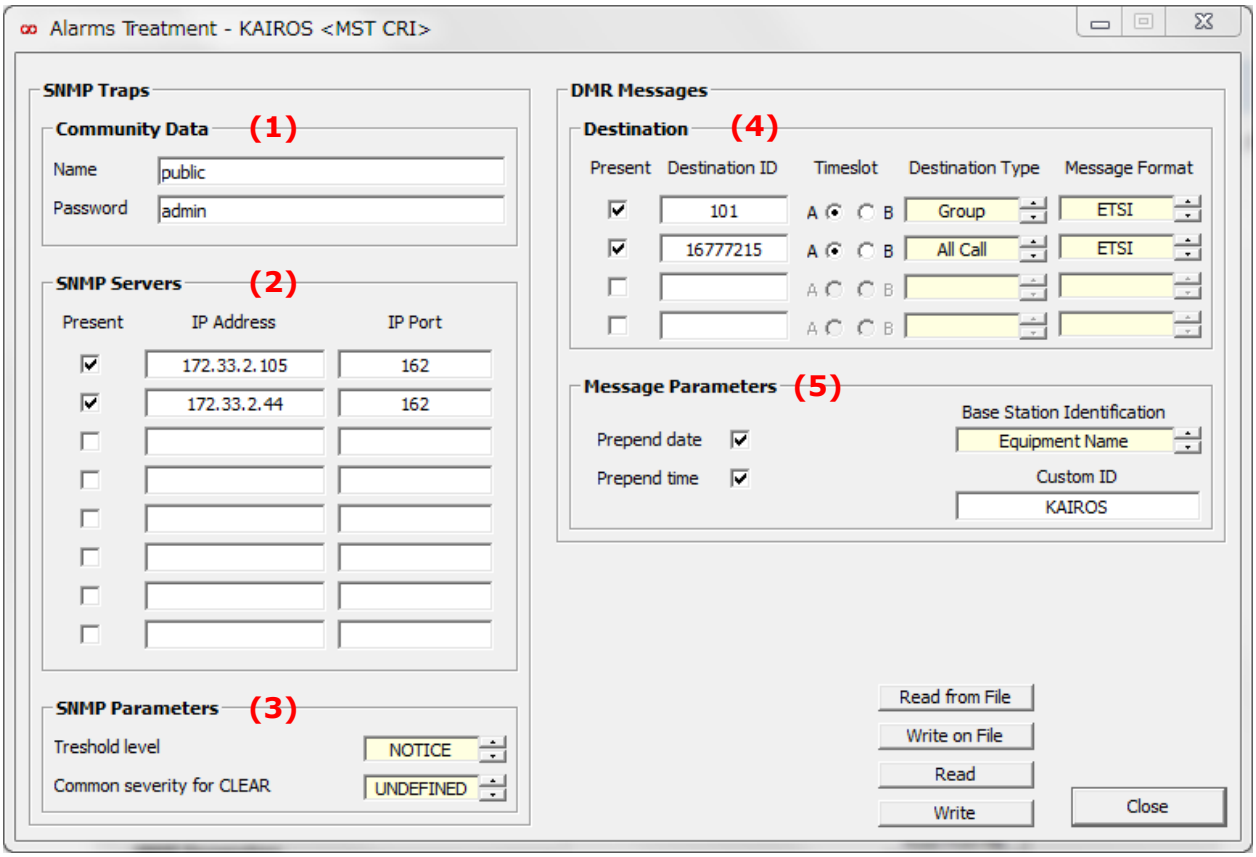
3.3.2. Alarm Configuration



The software on a KAIROS Base Station continuously monitors a lot of functional parameters, which can take the state of good or bad during a period. We can divide them into two major groups: analog parameters and logic parameters.
The analog parameters can take any value between a minimum and a maximum (i.e.: voltage, temperature…)
The logic parameters normally point out specific facts occurred over time (i.e.: the activation of an input contact)

3.3.2.1. **Alarm Treatment**

It sets the general parameters of the Alarm or Notice Events notification.



(1) Community Data

- Name: Name of the SNMP Community
- Password: Password of the SNMP System

(2) SNMP Servers

- Present: If you want to add a server, specifying its IP Address, you at first must check this checkbox; if you want to remove a server, simply uncheck this checkbox.

- IP Address: Specifies the IP Address of an SNMP Server to which the Trap will be sent.
- IP Port: Specifies the IP Port number (in the range 20÷65000) of the server to which the Trap will be sent.

(3) SMNP Parameters

- Threshold level: Specifies the severity level under which an SNMP trap will not be sent.
- Common Severity for CLEAR: Specifies a unique severity degree for all the CLEAR Events, which takes priority over the per-Alarm CLEAR severity degree (in addition to the already shown severity degrees (see above, Severity Degree of an Alarm Event), this list-box provides an UNDEFINED value, which means that a CLEAR Event will assume the severity degree specified in the Events Setup window).

(4) Destination

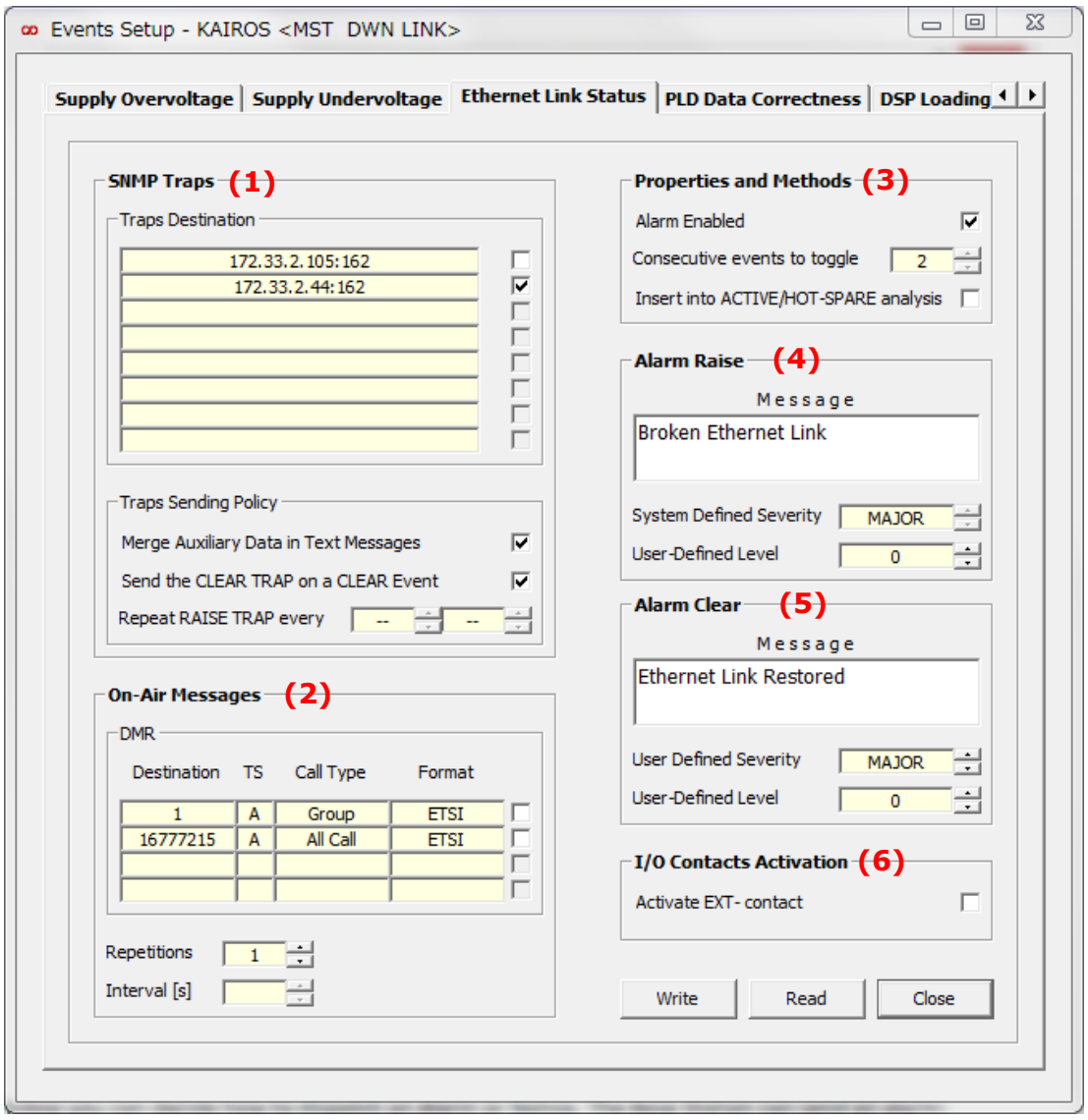
- Present: If you want to add a DMR Destination, you first must check this checkbox; if you want to remove a DMR Destination, simply uncheck this checkbox.
- Destination ID: Specifies the Destination ID, which can be an Individual ID or a Group ID, according to the Destination type.
- Timeslot: Specifies the Timeslot (A or B) which a text message will be sent on.
- Destination Type: Specifies the type of the Destination ID (currently the only choice is between "ALL CALL" and "GROUP ID")
- Message Format: Specifies the format of the text messages that will be sent.

(5) Message Parameters

- Prepend date: If checked, the related text of an Event will be prepended by the UTC date of an Event occurrence, in (YYYY-MM-DD) format.
- Prepend time: If checked, the related text of an Event will be prepended by the UTC time of an Event occurrence, in (HH:MM) format.
- Base Station Identification: You can choose here how the Base Station will be identified in the DMR text message sent; the current choices are:
  - None: No identification string will be inserted.
  - Equipment Name: The name of the Station, as set in the Main Setup window.
  - Station ID: The Station ID value, as set in the Main Setup window.
  - Equipment S/N: The Serial Number of the Station, assigned from Factory, normally displayed in the main window of KAIROS_Manager.
  - Equipment ID (hex): The Equipment ID of the Station, assigned by Factory, normally displayed in hex format in the main window of KAIROS_Manager.
  - Custom String: The identification will be the string chosen by the user, set in the following item
- Custom ID: Sets your own Identification String to be sent if Custom String has been chosen in the previous item.

3.3.2.2. **Events Setup**

Configures how to handle and dispatch every single event.



(1) SNMP Traps / Traps Destination: In this section you will find all the previously configured SNMP Servers (IP Address + IP Port number): if you want the Station to send the trap related to the Event to one or more of the listed servers, simply check the checkboxes associated to the servers. If you don't want the Station to send the trap, then uncheck all.
SNMP Traps / Traps Sending Policy: For every Alarm Event, in this section you can decide Traps sending policy.

(2) On-Air Messages: In this section you will find all the previously configured DMR Destinations (ID + Timeslot + Type + Format): if you want the Station sends to one or more of the listed destinations the event-related text message, simply check the checkboxes associated to the destinations. If you don't want the Station sends the message, uncheck all.

(3) Properties and Methods: In this section you will define the behavior of an Event, as follows:

- Alarm Enabled: Enables or disables all the actions subsequent to the detection of the Event.
- Consecutive events to toggle: Specifies how many consecutive detections of the Event are needed to toggle the status of the Alarm; note that in some Events this parameter is not enabled to the User.
- Insert into ACTIVE/HOT-SPARE analysis: Here you can specify if the Event participates to the Equipment Status Analysis which can produce an ACTIVE-to-SPARE role exchange in a 1+1 environment; please, note that not all Events are qualified to participate to that analysis, and currently not all qualified Events, even selectable, will participate to the analysis: it is limited to the followings:
  - Ethernet Link Status
  - No TX Power
  - TX Power too low
  - TX Power too high
  - TX SWR Alarm
  - TX Power Reduction
  - BS Temperature
  - TX Temperature

(4) Alarm Raise / Message: Here you can specify the text of the messages that will be sent to configure SNMP Server(s) and through the DMR RF channel; you can insert a free-format ANSI text up to 47 alphanumeric characters. Please note that some Alarms don't have a CLEAR event: in this case an appropriate reminder will be displayed instead of the Message textbox of the Alarm Clear section.

Alarm Raise / System Defined Severity: Here you can specify the severity degree for the displayed alarm. While the user can define the CLEAR Event severity degree for every alarm, the user can define the RAISE Event severity degree only for some alarms, because for some others it is still Factory-defined and cannot be changed. The range of values is as shown above, in Severity Degree of an Alarm Event. If you didn't specify any SNMP Server in the Alarms Treatment window, the User-Defined Severity value has no meaning.

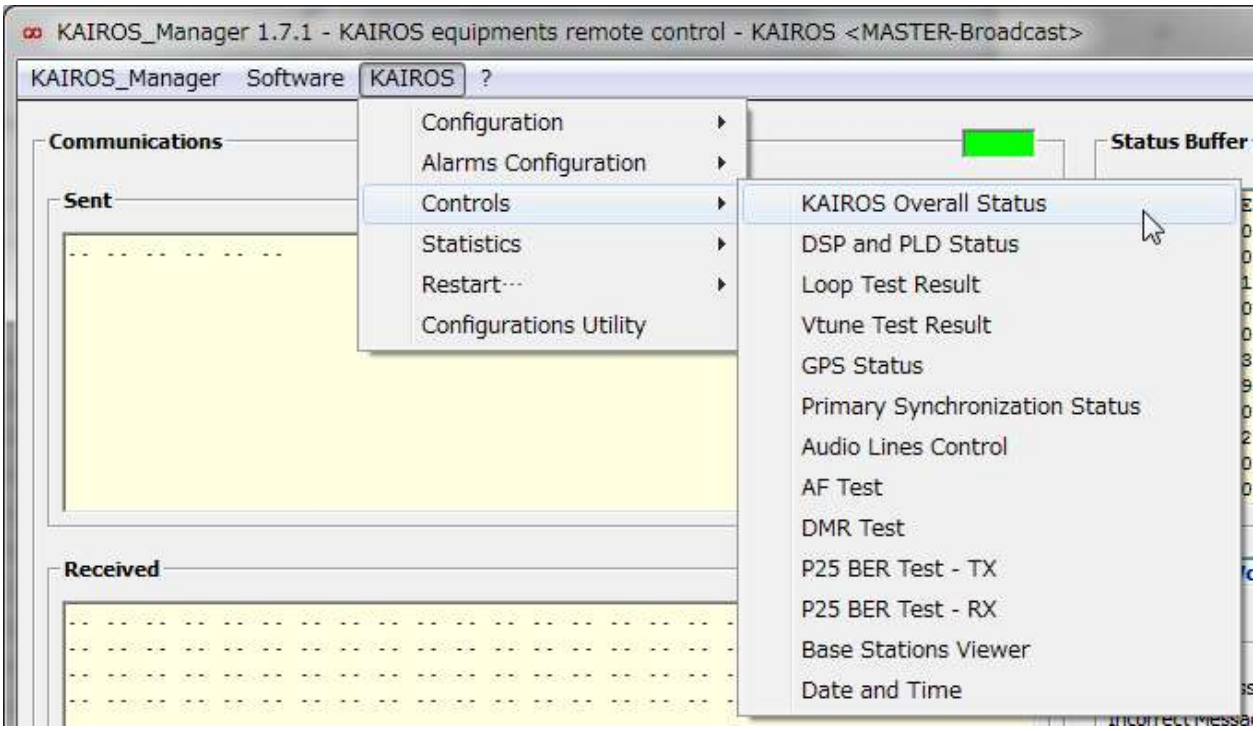
Alarm Raise / User-Defined Level: Here You can specify a value, in the range 0 to 15, which will be inserted into the SNMP Trap; the SNMP Server can use this value as an additional filter, or a customized priority/significance for that alarm. If you didn't specify any SNMP Server in the Alarms Treatment window, the User-Defined Level value has no meaning.

(5) Alarm Clear: it is written in the (4) Alarm Raise.

(6) I/O Contacts Activation: If checked, the RAISE Event of the alarm will participate in the activation of the ALARM OUT contact on the rear DB25 connector.

3.3.3. Controls

To know KAIROS Statuses, Click Controls then choose the one which you want to know.

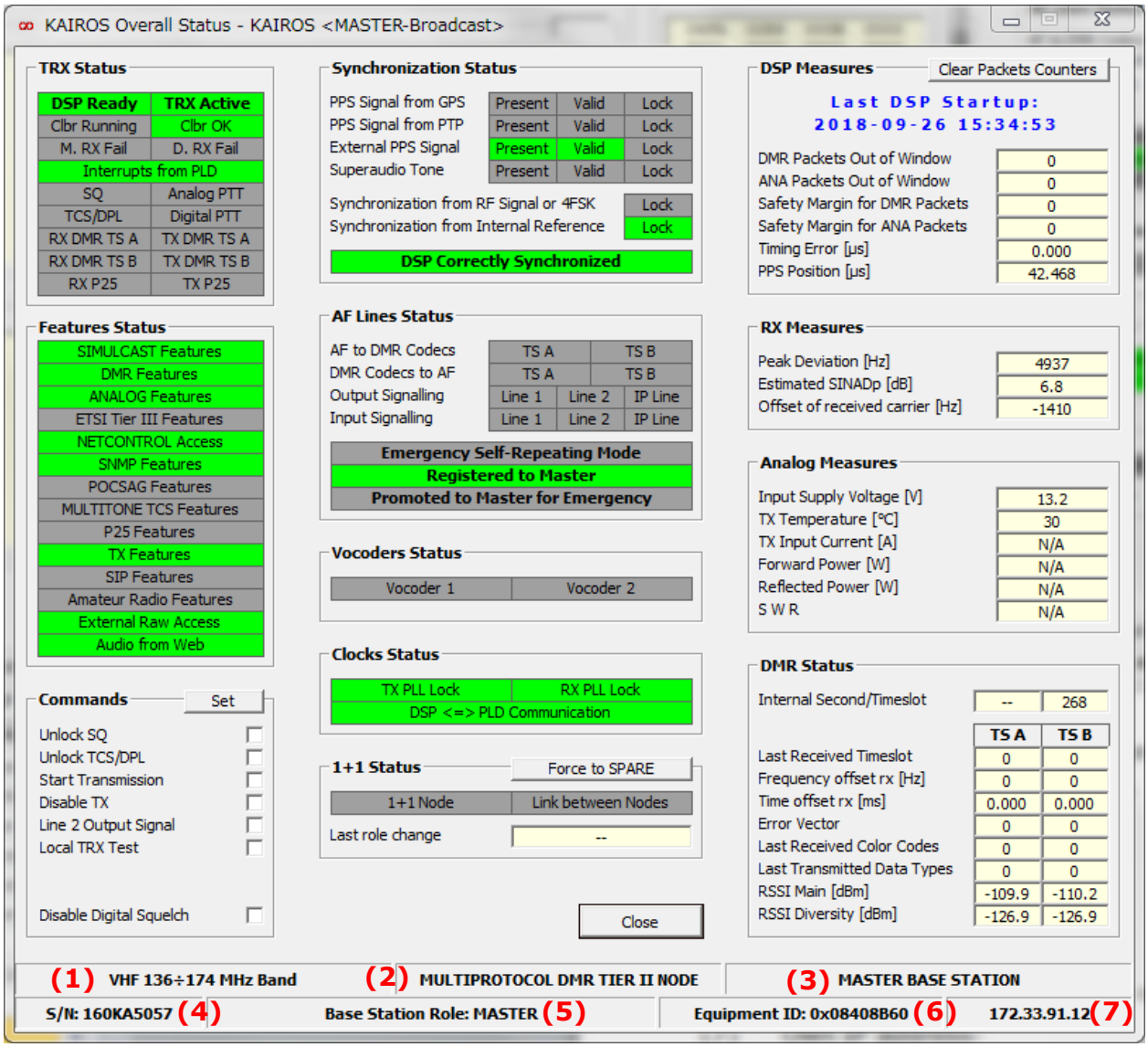


3.3.3.1. **KAIROS Overall Status**

You can know various basic statuses from this window.

Gray means “Not Active”

Green means “Active”



There are some useful information on the bottom bar.

(1) Frequency Band Information

(2) Service Class

(3) TRX Operative Mode

(4) Serial Number

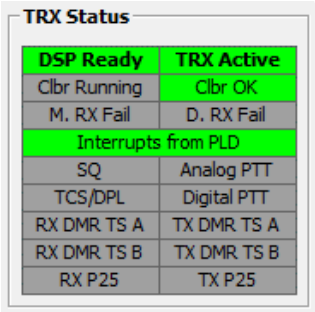
(5) Base Station Role

(6) Equipment ID which is match with MAC address. You can’t change it.

(7) Own IP address

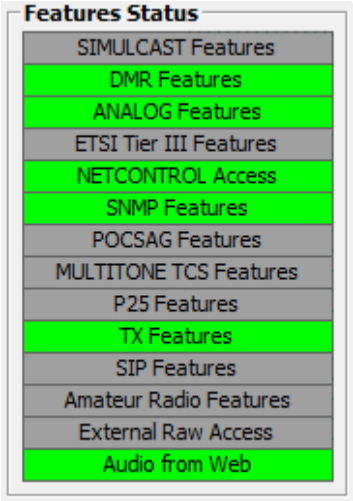
Detail explanation for each item is written from the next page.

3.3.3.1.1. TRX Status



Item	Description
DSP Ready	The ready for the DSP working. Basically Green.
TRX Active	The activeness for TX/RX. Basically Green. In case the KAIROS in stand-by mode in 1+1 Hot stand-by for redundancy here will be Gray.
Clbr Running	During calibration is running it turns to Green.
Clbr OK	It turns to Green if the calibration was done as OK.
M.RX Fail	Normally Gray unless Main Receiver has a problem.
D.RX Fail	Normally Gray unless Diversity Receiver has a problem.
Interrupts from PLD	The status for the DSP is interrupted from PLD. (Programmable Logic Device) Basically Green.
SQ	Busy Status. While the RX block is receiving signal, it turns on Green. If the KAIROS is disabled RX, here is always Gray.
Analog PTT	On-Air Status for Analog. While transmitting in analog, it turns on Green. If the KAIROS is disabled TX, here is always Gray.
TCS/DPL	It turns Green when the received correct QT / DQT signal.
DIGITAL PTT	On-Air Status for Digital. While transmitting in digital, it turns on Green. If the KAIROS is disabled TX, here is always Gray.
RX DMR TS A	It turns green when the DMR signal (Slot A) is being received.
TX DMR TS A	It turns green when the DMR signal (Slot A) is being transmitted.
RX DMR TS B	It turns green when the DMR signal (Slot B) is being received.
TX DMR TS B	It turns green when the DMR signal (Slot B) is being transmitted.
RX P25	It turns green when the P25 is being received.
TX P25	It turns green when the P25 is being transmitted.

3.3.3.1.2. Feature Status

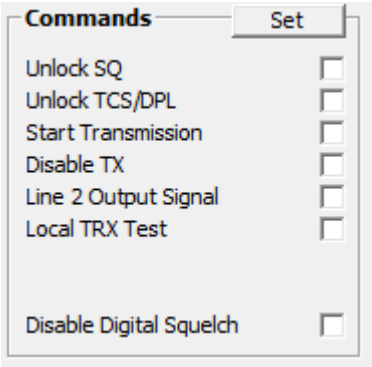


You can see various licensed feature's enabling status. Enabling features are turned on Green.
For example, on the picture case, SIMULCAST is Gray but it doesn't mean the KAIROS is not activated SIMULCAST License.
In case you don't use Simulcast mode, it turns off Green.
If you just want to check feature's license activated status, use Web server function by Firefox browser.
Procedure to activate license, we have the other document "KAIROS LICENSES GUIDE", please contact to JVCKENWOOD.

Item	Description
SIMULCAST Features	It turns green if the Simulcast Feature is enabled. If the Simulcast license is not present, the repeater will not work in simulcast mode.
DMR Features	It turns green if the DMR Feature is enabled.
ANALOG Features	It turns green if the Analog mode license is enabled. This license is always activated for all KAIROS as default setting.
ETSI Tier III Features	It turns green if the DMR Tier III (Trunking) Feature is enabled.
NETCONTROL Access	It turns green if the NETCONTROL license is activated. Net Control is the Radio equipment monitoring and remote control SW tool for Windows-based platforms. It allows sites supervision both by the final Customer and the Installer/Maintainer via an IP-link. License to connect and remotely manage the radio base stations is included. Each base station of the network is displayed as a colored icon showing its status. The NetControl license must be activated on the KAIROS itself (not on the DMR_NetControl software tool), so you need a NetControl license for every KAIROS you have.
SNMP Features	It turns green if the SNMP license is activated. If you want the Station to send the trap related to the Event to SNMP servers need this License.
POCSAG Features	It turns green if the POCSAG (Post Office Code Standardization Advisory Group) Feature is enabled.
MULTITONE TCS Features	It turns green if the MULTITONE TCS license is activated. It allows the use of up to 8 different CTCSS contemporary.
P25 Features	It turns green if the P25 Feature is enabled.
TX Features	It turns green if the TX Feature is enabled. This license is always activated for all KAIROS as default setting except KA-TI-02 (Gateway).
SIP Features	It turns green if the SIP Feature is enabled.

Amateur Radio Features	It turns green if the Amateur Radio license is activated. Amateur radio feature consists in enabling all the features of a KAIROS, apart from the SIP agent, and to limit the usable bandwidth to the Amateur Radio band only.
External Raw Access	It turns green if the External RAW Access license is activated. This is for software developer only.
Audio from Web	It turns green if the Audio from Web license is activated. This license is always activated for all KAIROS as default setting.

3.3.3.1.3. Commands

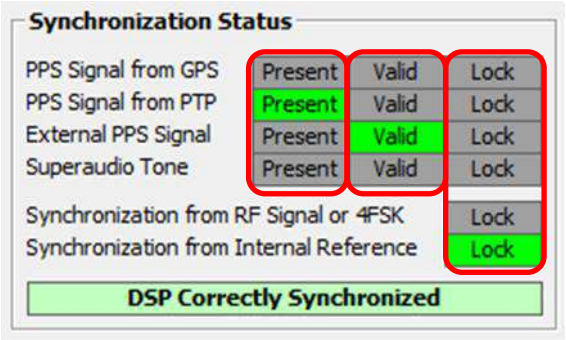


The "Commands" section contains the following radio related controls:

- Unlock SQ: To unlock the squelch threshold in order to activate the Rx in Analog mode.
- Unlock TCS/DPL: To by-pass the TCS/DPL controls;
- Start Transmission: To start transmitting silence;
- Disable TX: To block the transmission;
- Line 2 Output Signal: To activate the signal of "channel on air" sent to the console connection.
- Local TRX Test: Check here to lock RX and DSP mode of Analog signal to perform RX performance test.
- Disable Digital Squelch: While receiving DMR signal, if you check and set here, the KAIROS will maintain its behavior as receiving.

3.3.3.1.4. Synchronization Status

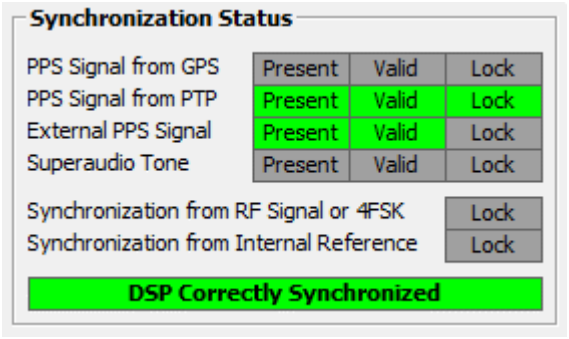
You can check the synchronization status of KAIROS.



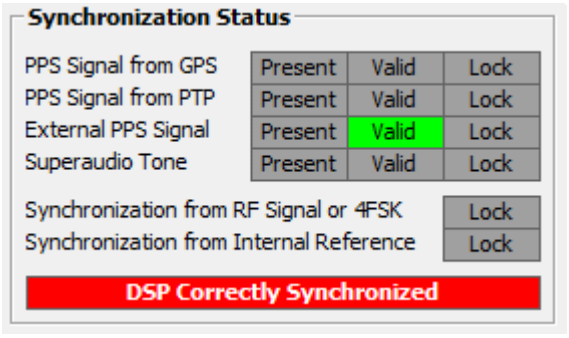
- Present: It turns green if the Signal for Synchronization exists. There may be more than one Green.
- Valid: It turns Green when the synchronization signal is Valid. There may be more than one Green.
- Lock: It turns Green the signal KAIROS uses for synchronization. It displays only one.

DSP Correctly Synchronized: You can see that the figure above is not synchronized with other devices. It uses the Internal Reference only. (Light Green means "Synchronization" is locked by Internal Reference as 2nd choice)

The figure on the right shows the status of synchronization with PTP.

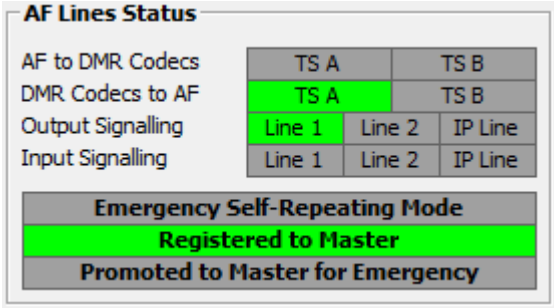


The figure on the right shows that it is not synchronized. DSP Correctly Synchronized turns on Red.



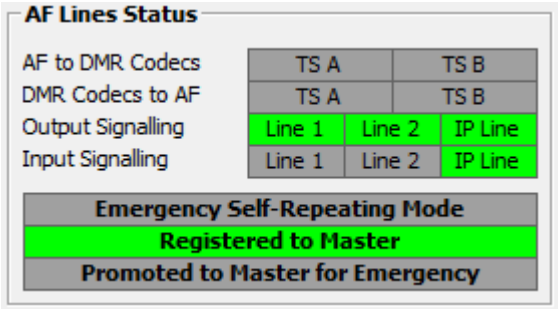
3.3.3.1.5. AF Lines Status

- AF to DMR Codecs: If the KAIROS installed Vocoder option, it turns Green when Vocoder input AF from external input line. (Physical console)



- DMR Codecs to AF: If the KAIROS installed Vocoder option, it turns Green when Vocoder output AF by receiving DMR signal.

- Output Signaling: If the KAIROS installed Vocoder option, while Analog signal outputs to Line1, Line2, and/or IP Line by receiving signal or IP network, turns on Green.



- Input Signaling: If the KAIROS installed Vocoder option, while Analog signal inputs from Line1, Line2, and/or IP Line, turns on Green.

- Emergency Self-Repeating Mode: Normally Gray. If a Slave failed to register the Master, here will

be Red, and Slave enters Self-Repeating Mode as fail-safe. Under this mode, the repeater works as isolated from other repeaters. Repeater adds "Pi-Pi-Pi" tone on Down-link signal to indicate that the repeater working as this mode.

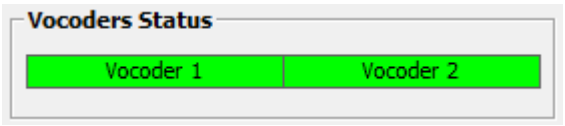
- Registered to Master: Normally Green. If a Slave failed to register the Master, here will be Red. You need to check the Master IP address setting on Slave.

- Promoted to Master for Emergency: In case Master stopped its role, a Slave which is assigned Back-up-Master will be automatically promoted to Master with indicating Yellow. If damaged Master was recovered, Back-up-Master, which is temporarily promoted to Master, will automatically be demoted back to Slave.

3.3.3.1.6. Vocoders Status

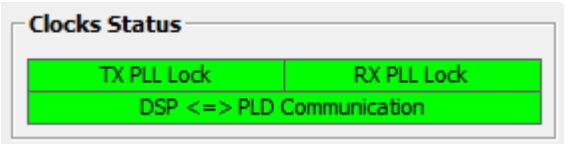
If the KAIROS has Option Vocoder, it turns on Green here.
If no built-in Vocoder, always gray.

Note: Vocoder 1 for TS A, Vocoder 2 for TS B.



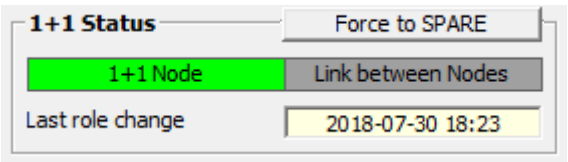
3.3.3.1.7. Check Status

- TX PLL Lock: It turns green if clock for TX PLL working.
- RX PLL Lock: It turns green if clock for RX PLL working.
- DSP <=> PLD Communication: It turns green if the communication between DSP and PLD work fine.



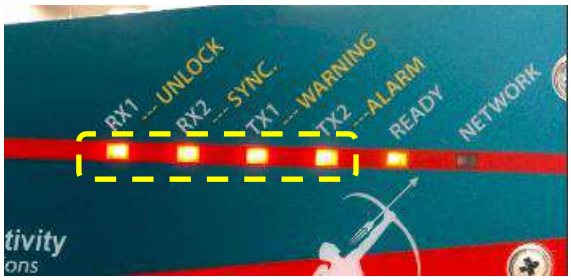
3.3.3.1.8. 1+1 Status

- Force to SPARE: By pressing this button, KAIROS which is working as Main in 1 + 1 redundancy turns to SPARE.
- 1+1 Node: It turns green if the KAIROS is set as 1+1 Hot/Standby redundancy.
- Link between Nodes: It has not been developed yet. It's for future usage.

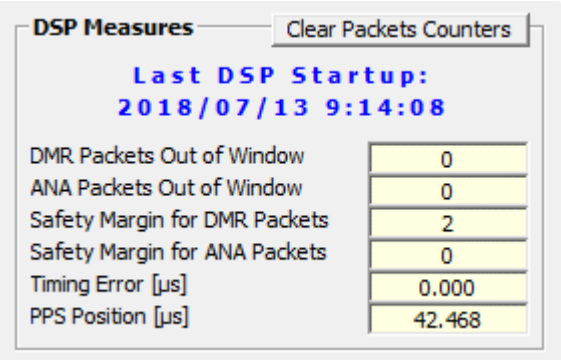


- Last role change: It shows last role date and time on 1+1 Hot/Standby mode.

Note: The KAIROS while TRX is not active, 4 LEDs (RX1, RX2, TX1, TX2) light orange for 1 sec every 10 sec.

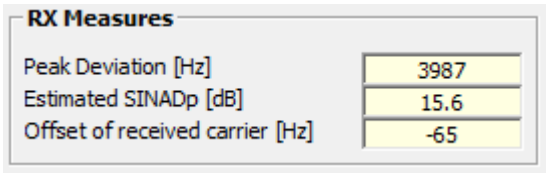


3.3.3.1.9. DSP Measures



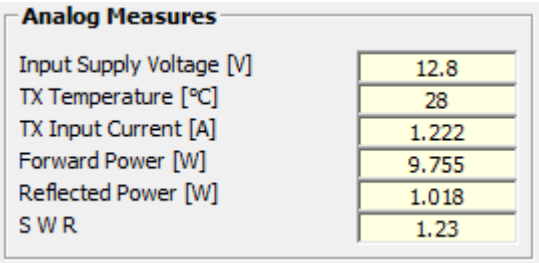
Item	Description
DMR Packets Out of Window	Normally 0. If the number is stable (not increasing), DMR network is working well.
ANA Packets Out of Window	Normally 0. If the number is stable (not increasing), Analog network is working well.
Safety Margin for DMR Packets	Normally greater than 1. If the number is often 1 or 0, increase the network delay.
Safety Margin for ANA Packets	Normally greater than 1. If the number is often 1 or 0, increase the network delay.
Timing Error [us]	Receiving Signal Timing error from expected timing. Less than 10 [us] is OK.
PPS Position [us]	PPS Position error from expected timing of PPS based on current synchronization. Less than 10 [us] is OK.

3.3.3.1.10. RX Measures



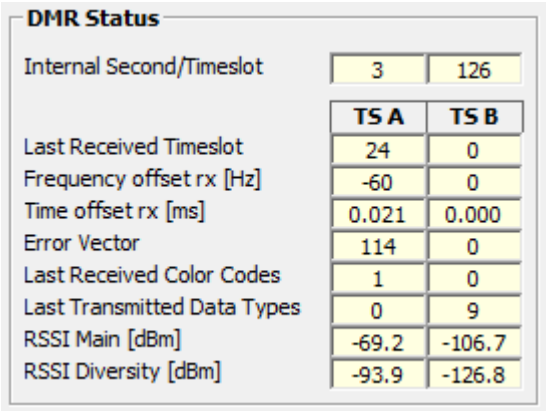
Item	Description
Peak Deviation[Hz]	It shows Peak Deviation while RX.
Estimated SINADp [dB]	It shows Peak SINAD while RX.
Offset of received carrier [Hz]	It shows carrier offset of RX signal.

3.3.3.1.11. Analog Measures



Item	Description
Input Supply Voltage [Hz]	It shows DC input Voltage.
TX Temperature [℃]	It shows Temperature around TX circuit.
TX Input Current [A]	It shoes the drained current by the TX Final power amplifier.
Forward Power [W]	It shows forward TX power which is detected by KAIROS internal circuit. Normally it shows similar power to the setting of TX power.
Reflected Power [W]	It shows reflected TX power which is detected by KAIROS internal circuit. If this number is close to Forward Power, check TX cabling and Antenna.

3.3.3.1.12. DMR Status



Item	Description
Internal Second/Timeslot	It's internal counter.
Last Received Timeslot	It shows Last received Timeslot.
Frequency offset rx [Hz]	It shows Frequency offset of RX Signal. Normally it's less than 100.
Time offset rx [ms]	It shows Time offset of RX. Normally it's less than 0.05
Error Vector	It shows Vector Error
Last Received Color Codes	It shows Last Received Color Code
Last Transmitted Data Types	It shows Last Transmitted Data type
RSSI Main [dBm]	It shows RSSI (Received Signal Strength Indication) of Main receiver.
RSSI Diversity [dBm]	It shows RSSI (Received Signal Strength Indication) of Diversity receiver.

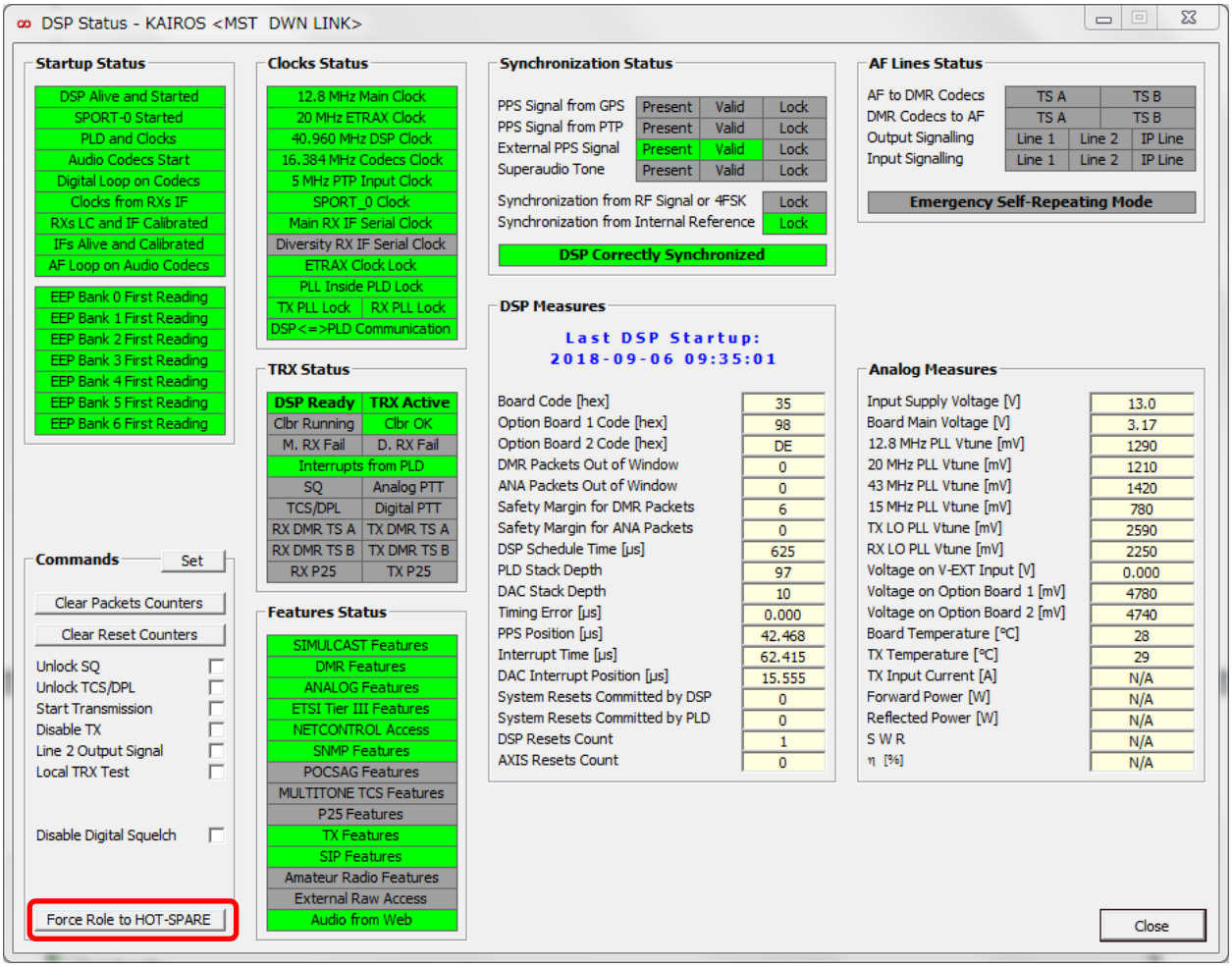
3.3.3.2. **DSP and PLD Status**

This Window shows DSP and PLD Status that is for factory usage.

Some of them are repeated from Overall Status on here.

Basically, you can refer to Overall Status to know the KAIROS information.

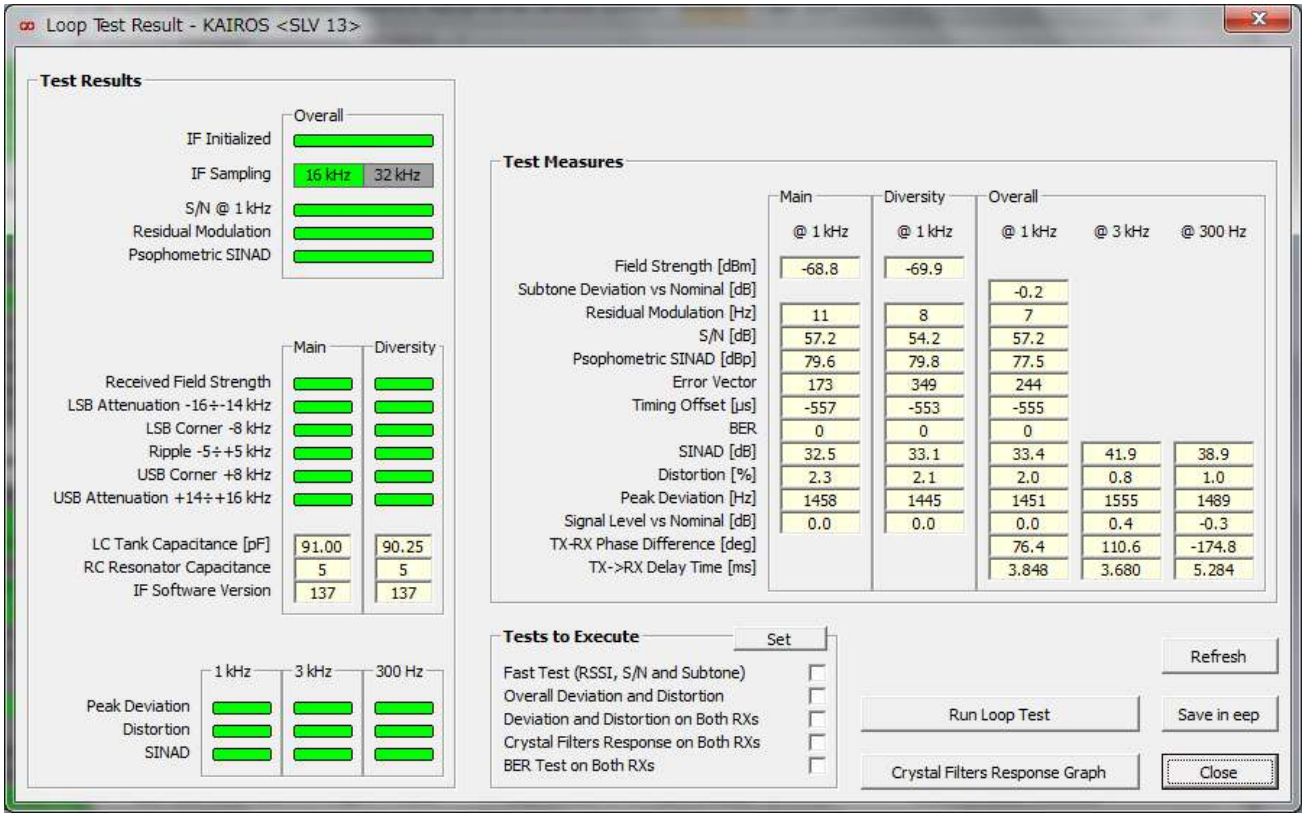
As long as there is no Red indicator, you can omit this window.



- Force Role to HOT-SPARE: By pressing this button, KAIROS which is working as Main in 1 + 1 redundancy turns to SPARE.

3.3.3.3. **Loop Test Result**

This menu allows to check the overall performances of synthesizer and of RX. Check all the boxes about "Test to execute"; push "set" button and then "Run loop test". At the end of the test the table with the measurements is filled in and the corresponding flags are green if the test is positive, or red if the test is negative. In this case, depending on the red flags, it is possible to identify the possible cause of the problem.



3.3.3.3.1. Test Results

Item	Description (Overall)
IF Initialized	Normally Green when IF block ready.
IF Sampling	Sampling mode for IF. 16kHz on DMR. Green means OK.
S/N @ 1kHz	1kHz internal test tone. Green means OK.
Residual Modulation	Residual noise on Modulation. Green means OK.
Psophometric SINAD	SINAD test. Green means OK.

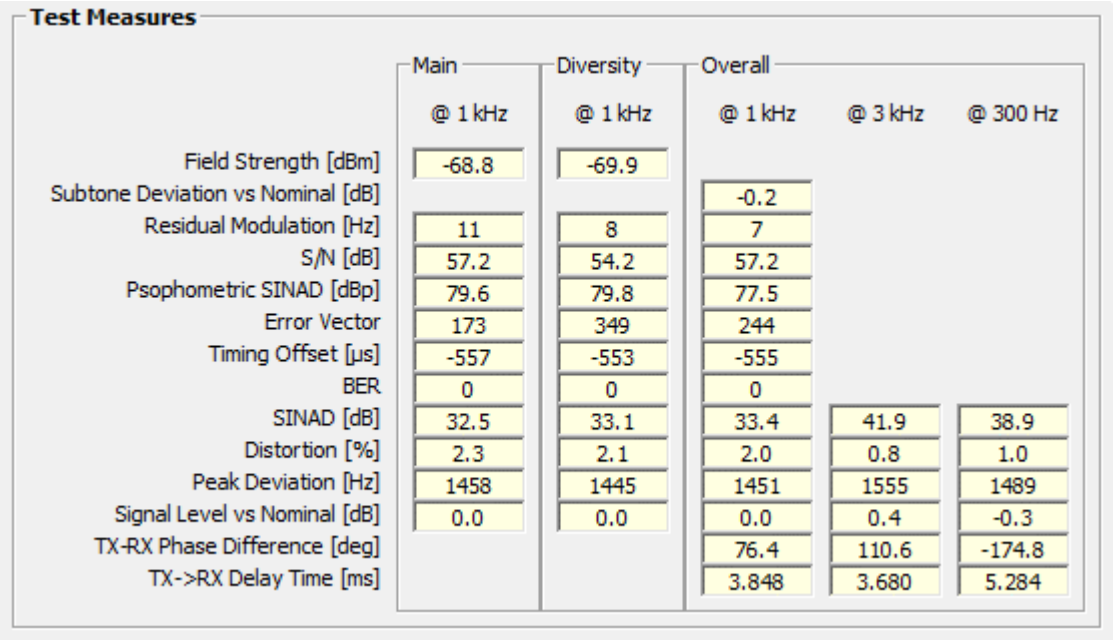
Item	Description (Main, Diversity)
Received Field Strength	Test result of field strength for Main and Diversity receiver.
LSB Attenuation-16 - 14 kHz	Attenuation test result of Lower Side of IF Filter at -16 to -14kHz
LSB Corner - 8 kHz	Attenuation test result of Lower corner of IF Filter at -8kHz
Ripple -5% + 5 kHz	Ripple Test result of IF filter at +/- 5kHz.
USB Corner + 8 kHz	Attenuation test result of Upper corner of IF Filter at +8kHz
USB Attenuation +14 + 16 kHz	Attenuation test result of Upper Side of IF Filter at -16 to -14kHz
LC Tank Capacitance [pF]	This is the Value of LC Tank Capacitance which is in the PLD.

RC Resonator Capacitance	This is the Value of RC Resonator Capacitance which is in the PLD.
IF Software Version	Software Version for IF.

Item	Description (1kHz, 3kHz, 300Hz)
Peak Deviation [Hz]	Green means OK.
Distortion	Green means OK.
SINAD	Green means OK.

3.3.3.3.2. Test Measures

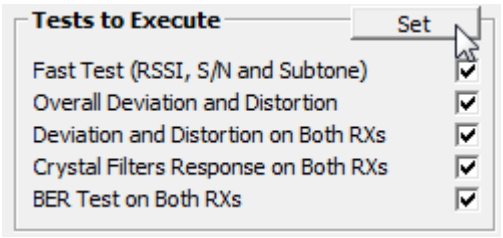
The table with the measurements is filled in

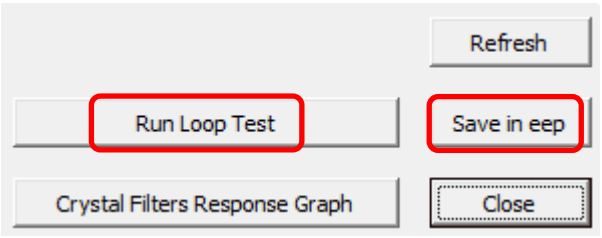


3.3.3.3.3. Test to Execute

Check all the check-boxes in "Test to execute"; push "set" button and then "Run loop test". Please make sure that no signal is applied to the RX input while performing this test, else some wrong results are possible.

At the end, save the results by pushing the "Save in eep" button.

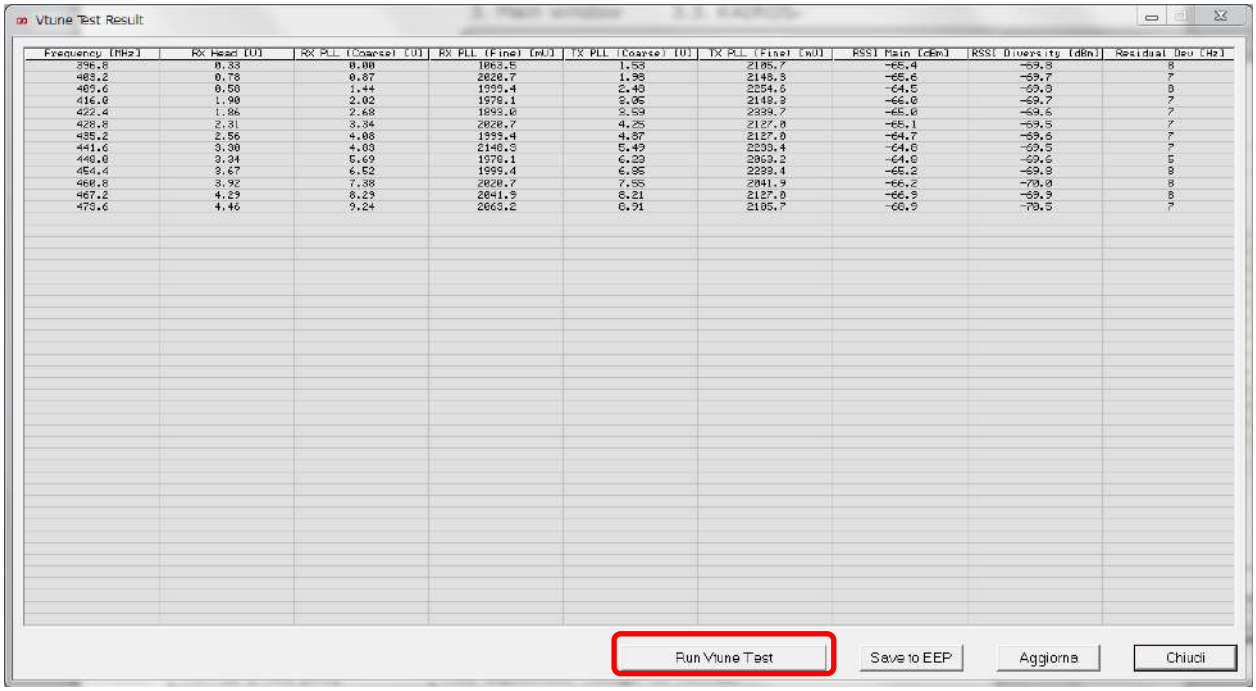




The tuning of Kairos is completed. The self-test is able to check every parameter of the modulator and of the demodulator, except for the TX output power and the RX sensitivity, which should be tested by external devices.

3.3.3.4. **Vtune Test Result**

The Kairos embeds a DSP based algorithm for self-tuning the input filters of the main and diversity RX, the coarse control voltage of the local VCOs of TX and RX and for self-testing the overall performances of the synthesizer and receiver. This test is performed by internally connecting the output of the synthesizer to the input of the RX and by comparing the transmitted pattern to the received one.



To make this test,

Step 1: If the KAIROS is in **UHF band (KA-450 and KA-500 only) connect a 50 ohm dummy load to the input of diversity RX**; else if the KAIROS is in **VHF or other band, leave the RX input (both Main and Diversity) open**.

Step 2: Push the button "Run Vtune test"; wait the end of the test and "save to EEP". During this test the Kairos fills in a lookup table with the tuning voltage (as a function of the frequency) of the RX input filters and the coarse control voltage of the VCOs. This test is performed by Factory just once during the life of the equipment, because every slight change during aging will be compensated by internal fine tuning.

Step 3: Remove the dummy load.

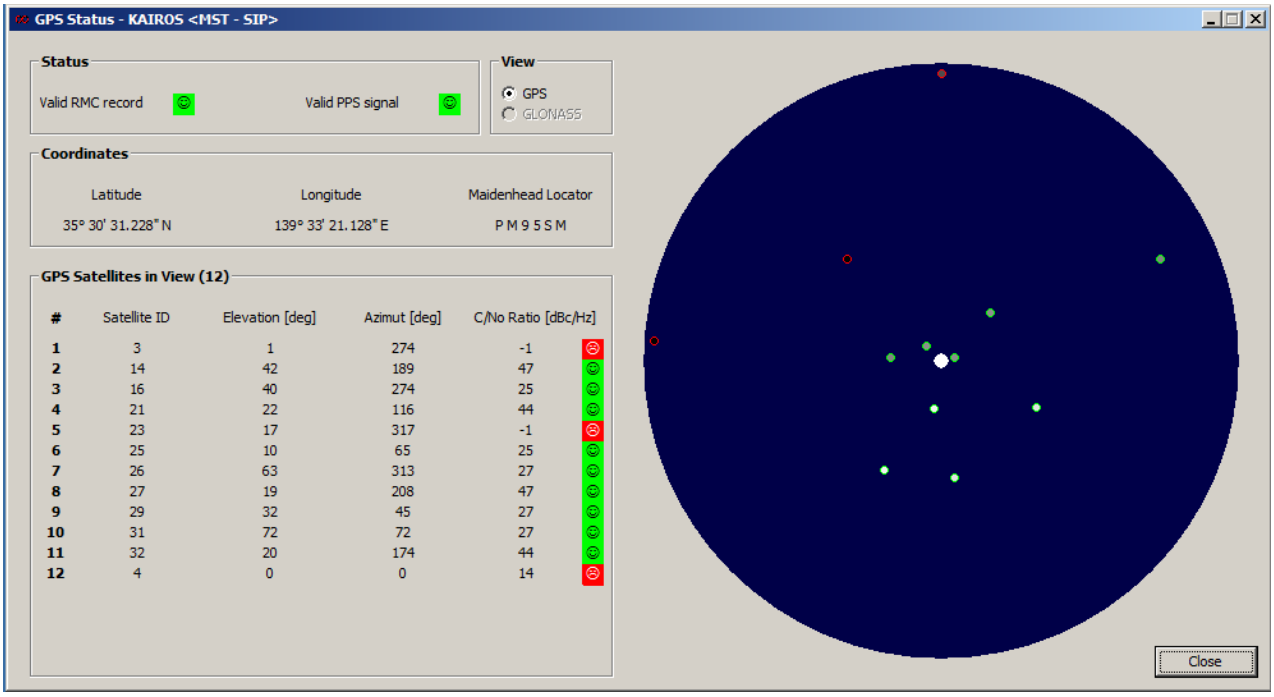
Step 4: Open the menu Kairos – Controls - Loop test result.

Step 5: Do Loop Test Result (3.3.3.3)

Item	Description
Frequency [MHz]	Test Frequency
RX Head [V]	BPF Voltage for RX front-end
RX PLL (Coarse) [V]	Coase adjustment Voltage for RX PLL
RX PLL (Fine) [mV]	Fine adjustment Voltage for RX PLL

TX PLL (Coarse) [V]	Coase adjustment Voltage for TX PLL
TX PLL (Fine) [mV]	Fine adjustment Voltage for TX PLL
RSSI Main [dBm]	RSSI level for Main RX
RSSI Diversity [dBm]	RSSI level for Diversity RX
Residual Dev [Hz]	Deviation by Residual noise

3.3.3.5. **GPS Status**



 Bad Condition

 Good Condition

3.3.3.5.1. Status

Item	Description
Valid RMC record	While the GPS receiver Re-code Valid RMC sentence, it becomes Green.
Valid PPS Signal	While the GPS receiver outputs Valid PPS signal, it becomes Green.

3.3.3.5.2. View

Item	Description
GPS/GLONASS	It Shows a GPS receiving mode.

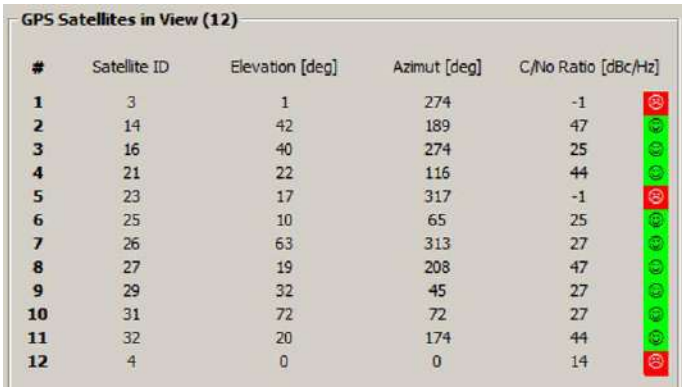
3.3.3.5.3. Coordinates

Item	Description
Latitude	Latitude information
Longitude	Longitude information
Maidenhead Locater	Grid Square Locator of positioning location.

3.3.3.5.4. GSP Satellites in View

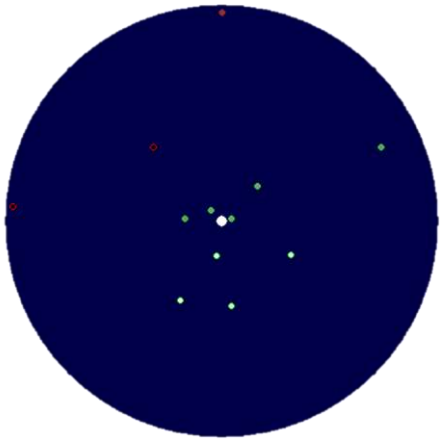
It can show Signal Status of each Satellite.

If GPS receiver receives more than 3 Satellites (More than 3 Greens), it can positioning location, also output valid PPS signal.

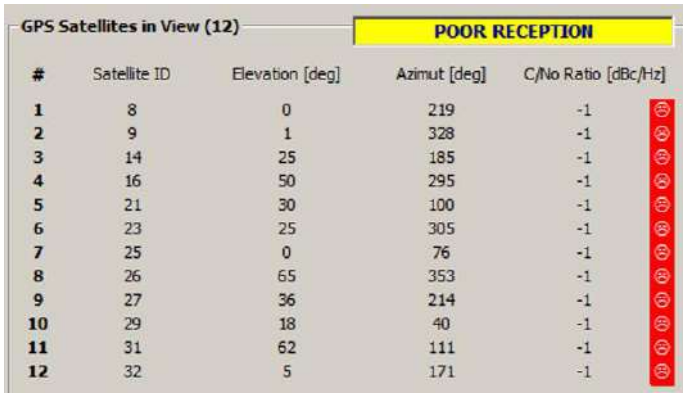


GPS Satellites in View (12)

#	Satellite ID	Elevation [deg]	Azimut [deg]	C/No Ratio [dBc/Hz]
1	3	1	274	-1
2	14	42	189	47
3	16	40	274	25
4	21	22	116	44
5	23	17	317	-1
6	25	10	65	25
7	26	63	313	27
8	27	19	208	47
9	29	32	45	27
10	31	72	72	27
11	32	20	174	44
12	4	0	0	14



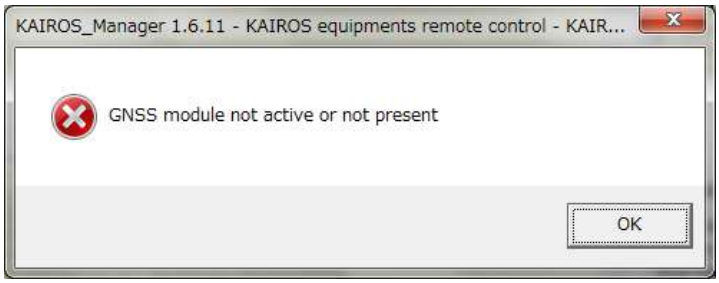
If the GPS receiver can't catch GPS signal due to GPS antenna or cable problem, it shows "POOR RECEPTION"



GPS Satellites in View (12) POOR RECEPTION

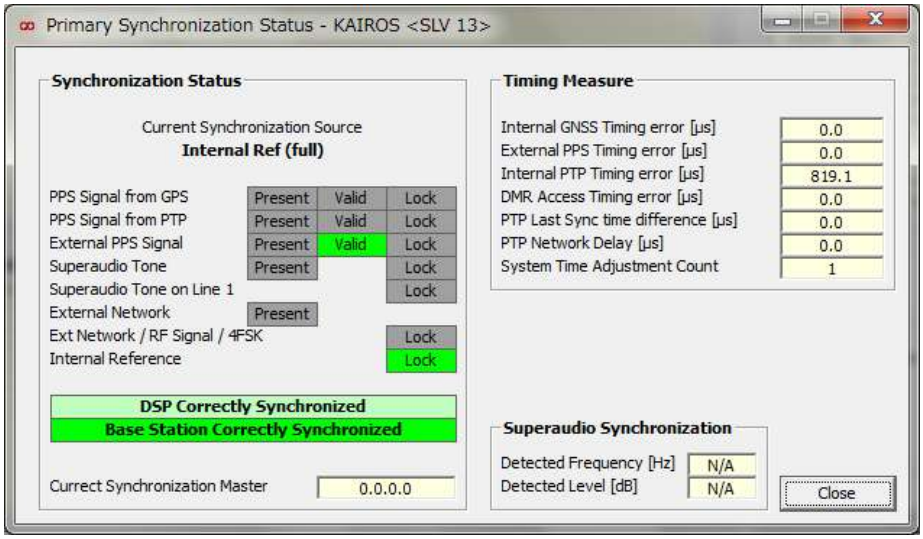
#	Satellite ID	Elevation [deg]	Azimut [deg]	C/No Ratio [dBc/Hz]
1	8	0	219	-1
2	9	1	328	-1
3	14	25	185	-1
4	16	50	295	-1
5	21	30	100	-1
6	23	25	305	-1
7	25	0	76	-1
8	26	65	353	-1
9	27	36	214	-1
10	29	18	40	-1
11	31	62	111	-1
12	32	5	171	-1

If KAIROS is not installed GPS receiver unit or not active due to some reason, following message pops up.



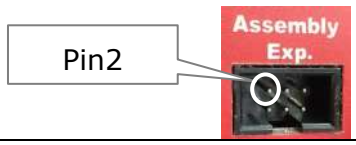
3.3.3.6. **Primary Synchronization Status**

This is a specialized window for Synchronization.



3.3.3.6.1. Synchronization Status

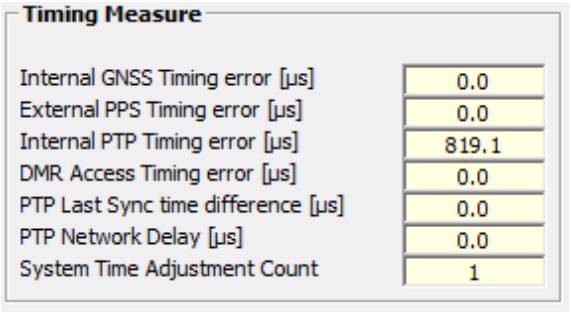
- Present: It turns green if the Signal for Synchronization exists. There may be more than one Green.
- Valid: It turns Green when the synchronization signal is Valid. There may be more than one Green.
- Lock: It turns Green the signal KAIROS uses for synchronization. It displays only one.

Item	Description
Current Synchronization Source	Here it shows what method KAIROS is currently synchronizing by.
PPS Signal from GPS	Here it shows PPS signal from Internal GPS receiver. (Option)
PPS Signal from PTP	Here it shows PPS signal from PTP.
External PPS Signal	Here it shows PPS signal from External connector Pin2. Connector locates on its rear panel. 
Superaudio Tone	Here it shows presence and lock status of Superaudio tone which is an old style synch source, via 4Wire, through a pattern made by tones on super-audio band (3-3.4KHz). Not use this nowadays.
Superaudio Tone on Line 1	Here it shows Superaudio Tone which on Line 1 status.
External Network	Here it shows whether External Network for Synchronization is present.
Ext Network / RF Signal / 4FSK	Here it shows Lock status by External Network for Synchronization.
Internal Reference	Here it shows Lock status by Internal Reference for Synchronization. Though “Internal Reference” is not the 1st choice for Synchronization but in case it lights here up, it means 1st choice Synchronization has some problem.

	Here it shows whether DSP is synchronized correctly or not. Usually here is Green as Correctly Synchronized. Light Green means “Synchronization” is locked by Internal Reference as 2nd choice
	Here it shows whether Base Station is synchronized correctly or not. Usually here is Green as Correctly Synchronized.

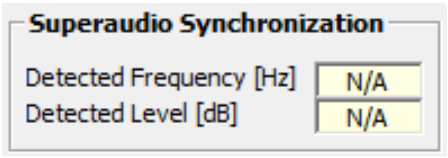
3.3.3.6.2. Timing Measure

This window shows Timing measure information for various synchronization source.



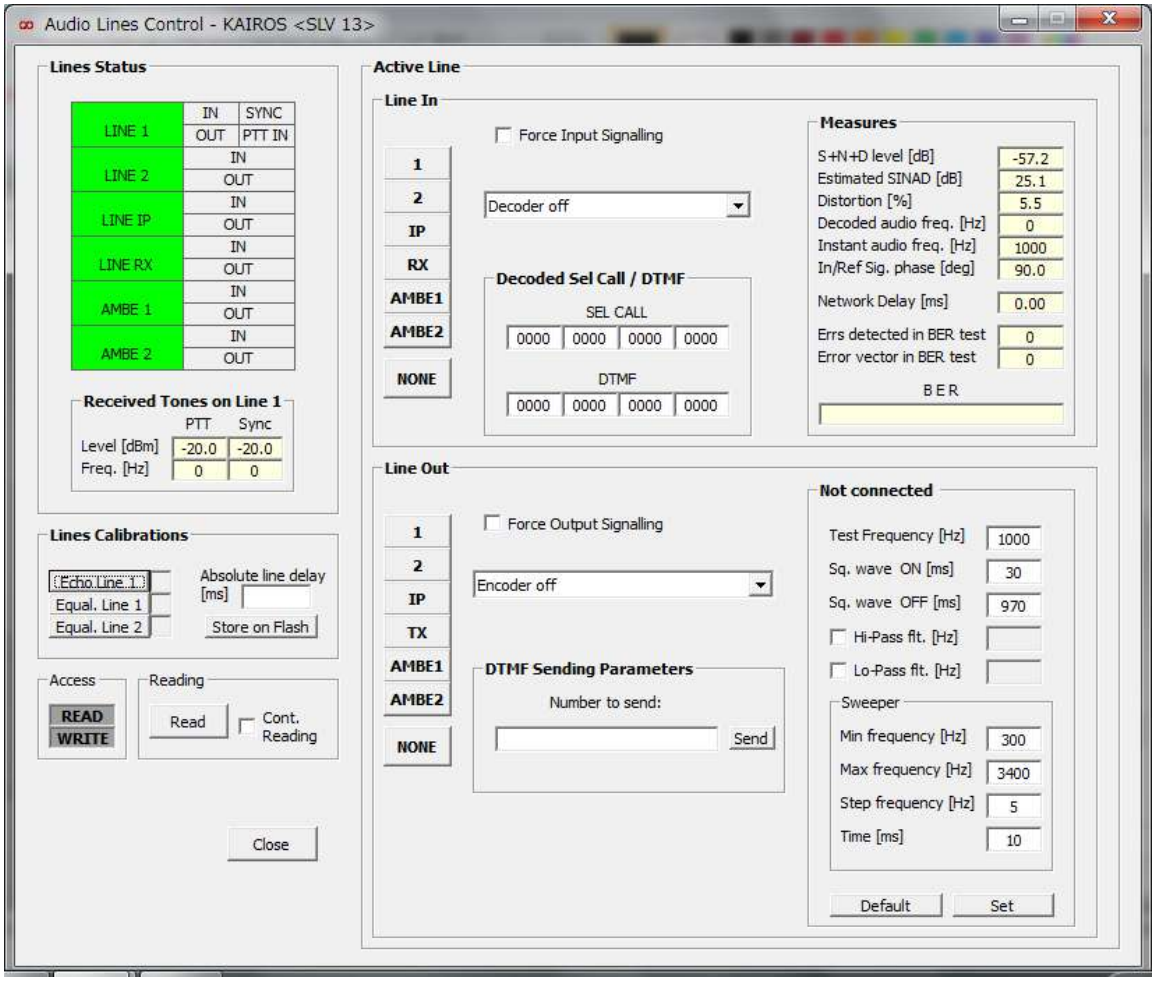
3.3.3.6.3. Superadudio Synchronization

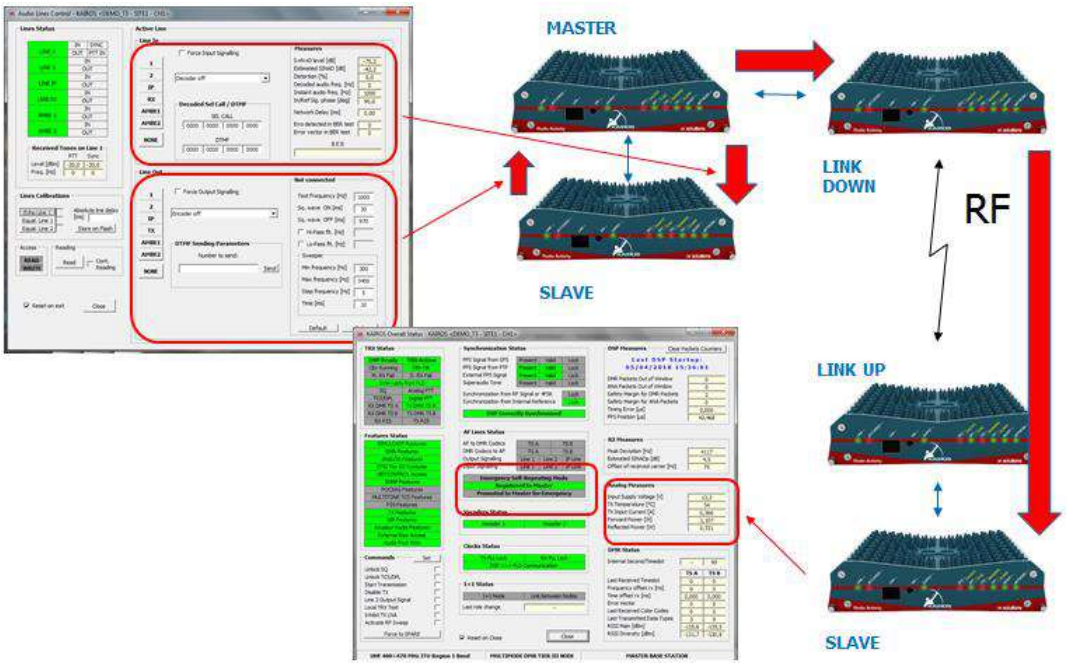
This is Old Synchronization method in Analog FM. It is not used nowadays.



3.3.3.7. **Audio Line Control**

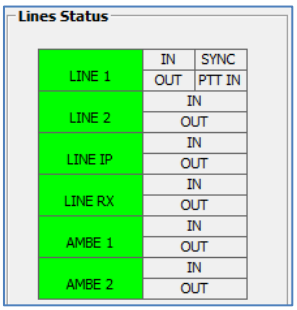
Audio line control is a tool for a technician to investigate KAIROS connections by ganerate signal by DSP. Line Out for the genarator, Line In for the detecter.





3.3.3.7.1. Line Status

This is indicator to show which LINE of IN/OUT is active now.
IN means "Line In", OUT means "Line Out".



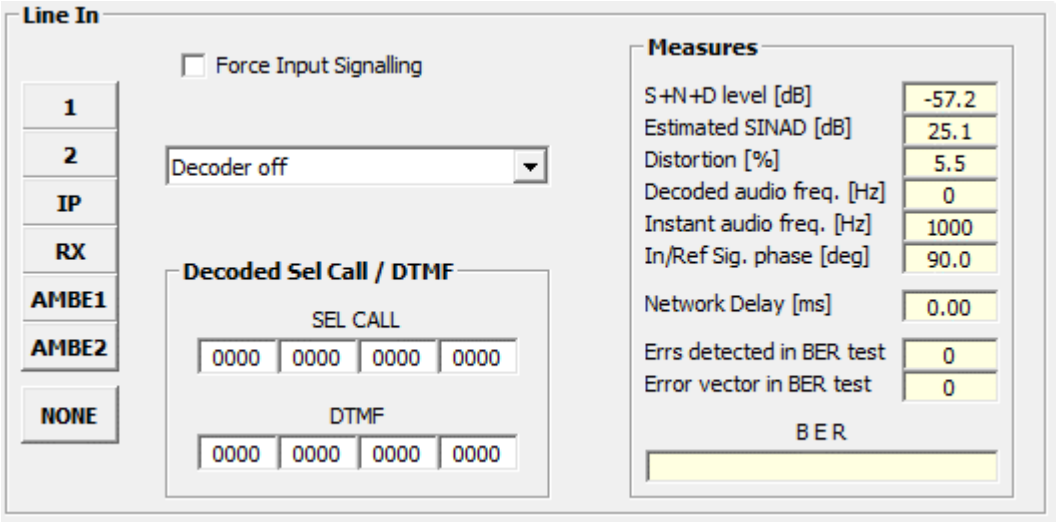
Item	Description
LINE 1	Input port Line 1 for AUX port.
LINE 2	Input port Line 2 for AUX port
LINE IP	Input from IP Network
LINE RX	Input from RX
AMBE 1	Input from AMBE 1
AMBE 2	Input from AMBE 2

3.3.3.7.2. Active Line

- Line In

It is a tool to force input audio from selected Input Line to decode the signal.
Check "Cont. Reading" then press "Read" to display the Measures in "Line In" window.

Select button such as "IP", then check "Force Input Signalling" to updade Measures.

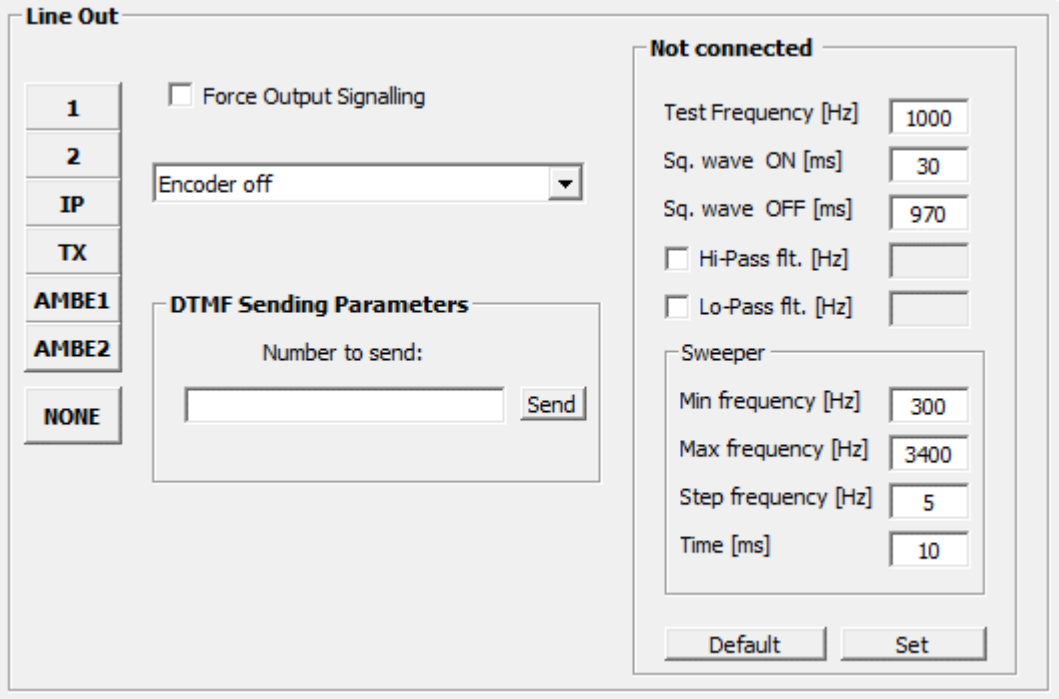


- Line Out

It is a tool to force output audio from selected Output Line.

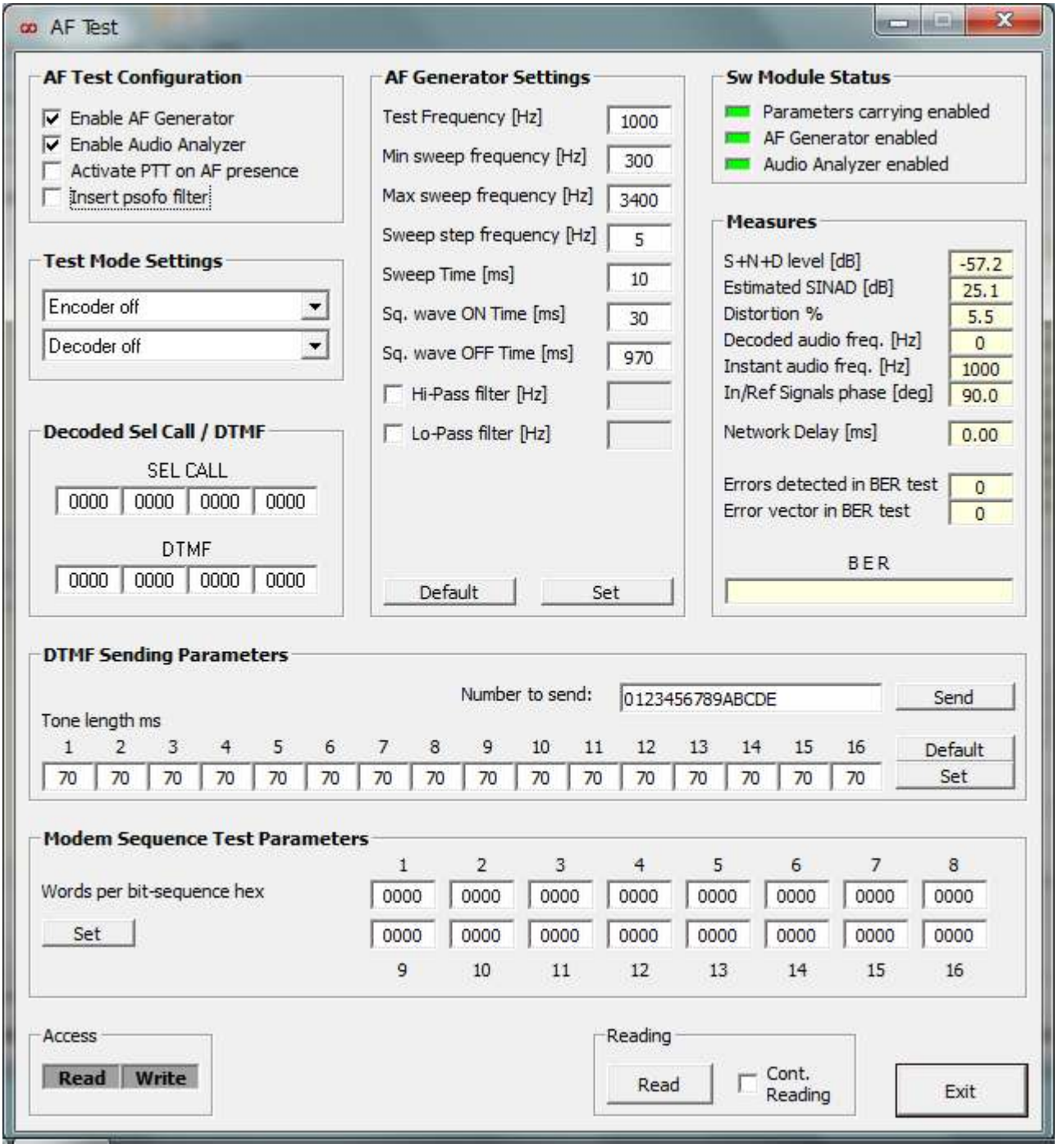
If you would like to send audio on IP line, press “IP” then check “Force Output Signalling”, you can choose signal pattern from pull-down selection.

You can modify the signal waveform by entering numbers on the right side.

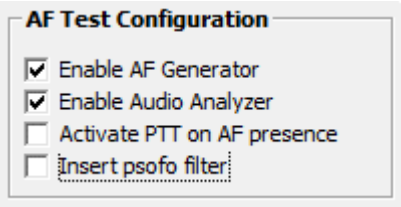


3.3.3.8. **AF Test**

This is a setting window to support Audio Line Control.



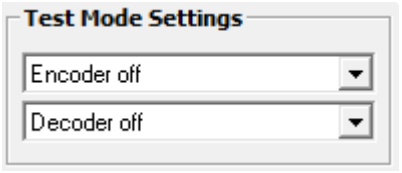
3.3.3.8.1. AF Test Configuration



Item	Description
Enable AF Generator	Check here normally to generate AF signal.
Enable Audio Analyzer	Check here normally to activate Audio Analyzer.
Activate PTT on AF presence	If check here active PTT by Audio source.
Insert psofo filer	If check here decoder adds DSP filter (300-3kHz)

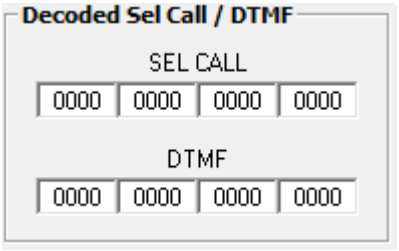
3.3.3.8.2. Test Mode Settings

You can set Encoder / Decoder on /off by pull-down setting.

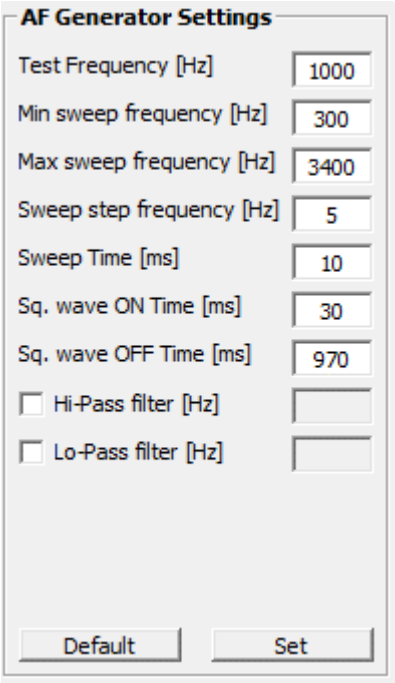


3.3.3.8.3. Decoded Sel Call / DTMF

Decoded Sel call / DTMF code will be displayed here.

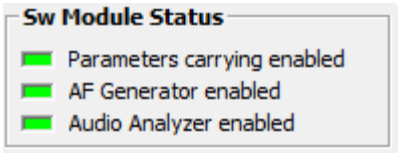


3.3.3.8.4. AF Generator Settings



Item	Description
Test Frequency [Hz]	You can define Test tone frequency. Usually 1000Hz.
Min sweep frequency [Hz]	Minimum frequency of sweep tone.
Max sweep frequency [Hz]	Maximum frequency of sweep tone.
Sweep step frequency [Hz]	Step frequency of sweep tone.
Sq. wave ON Time [ms]	Square Wave On time.
Sq. wave OFF Time [ms]	Square Wave Off time.
Hi-Pass filter [Hz]	Hi-Pass filter Enable/Disable, cutoff Frequency
Lo-Pass filter [Hz]	Low-Pass filter Enable/Disable, cutoff Frequency

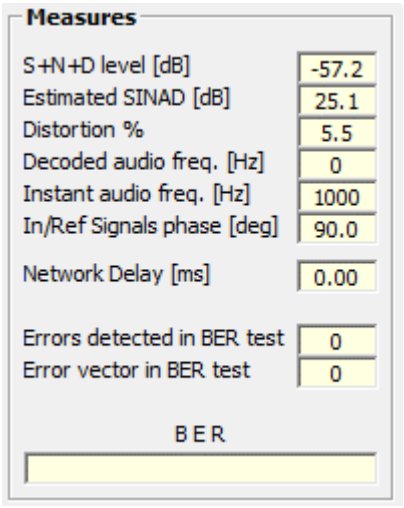
3.3.3.8.5. Sw Module Status



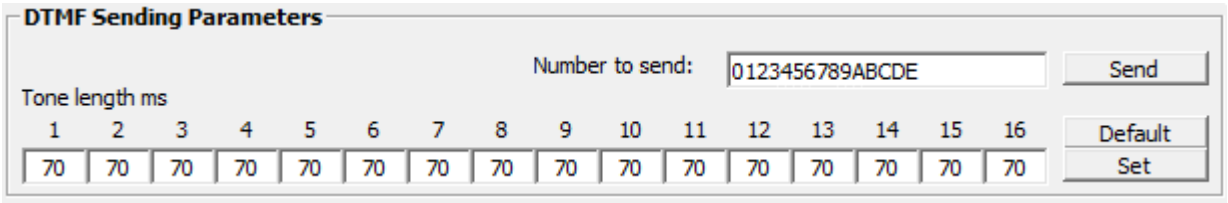
Item	Description
Parameters carrying enabled	It turns on Green if AF Generator Settings are loaded correctly
AF Generator enabled	It turns Green if the AF Generator Module is ready.
Audio Analyzer enabled	It turns Green if the Audio Analyzer Module is ready.

3.3.3.8.6. Measures

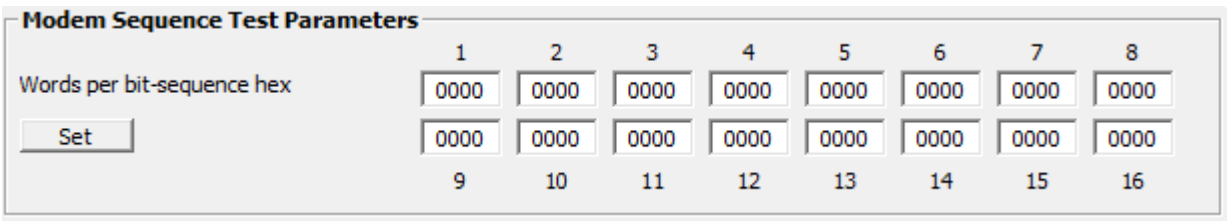
Here you can read the Measures



3.3.3.8.7. DTMF sending Parameters

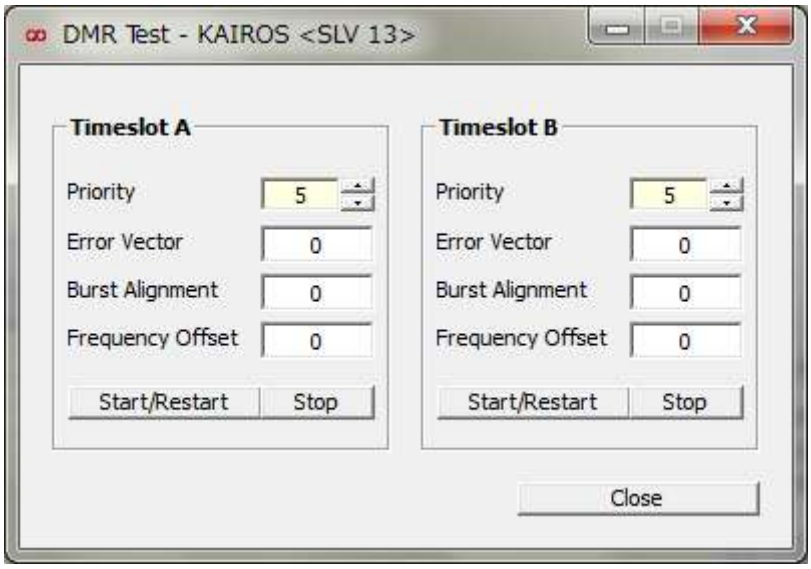


3.3.3.8.8. Modem Sequence Test Parameters



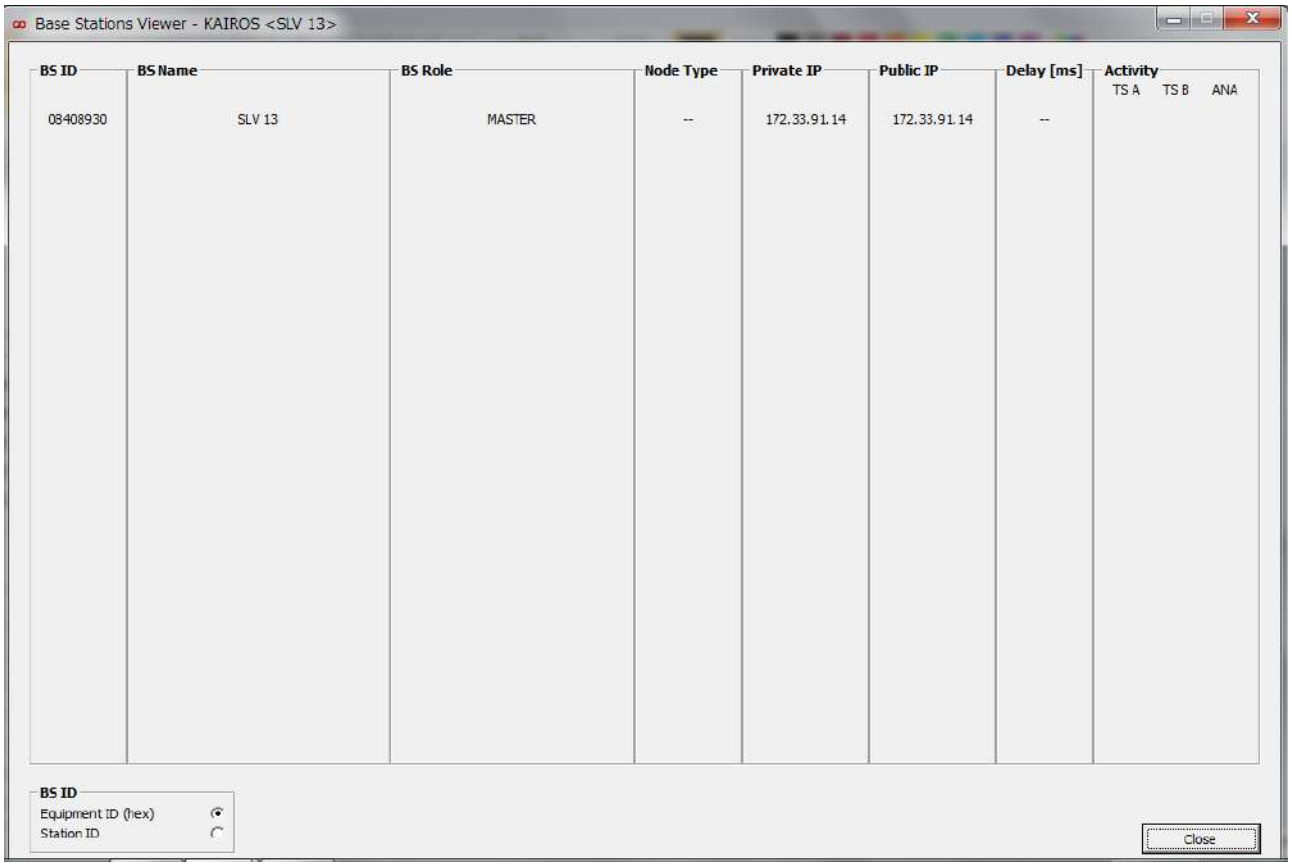
3.3.3.9. **DMR Test**

Here you can set DMR Test signal.



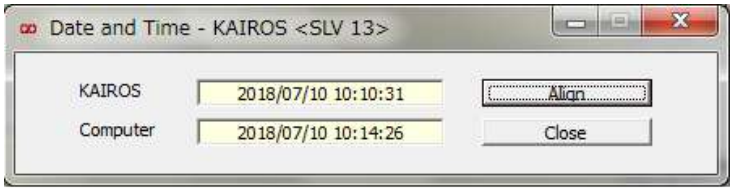
Item	Description
Priority	TX priority setting. Bigger number is higher priority.
Error Vector	0-200: Very Good 200-600 Good 600-800: Critical 800-1200: Intermittent receiving. 1200-1500: No communication, Squelch Closed
Burst Alignment	Time offset in DMR
Frequency Offset	Frequency offset in DMR

3.3.3.10. **Base Stations Viewer**



Item	Description
BS ID	Base Station ID
BS Name	Base Station Name
BS Role	Base Station Role
Node Type	Node type
Private IP	Private IP address
Public IP	Public IP address
Delay [ms]	Delay time of IP network
Activity	Here can display Active slot for each station of network. Yellow for the KAIROS which is receiving. Green for the KAIROS which is receiving and chosen as the best signal by voting.

3.3.3.11. **Data and Time**



You can adjust RTC time in KAIROS to your computer time.

This time in KAIROS is not for Synchronization, but to add time on alarm message.

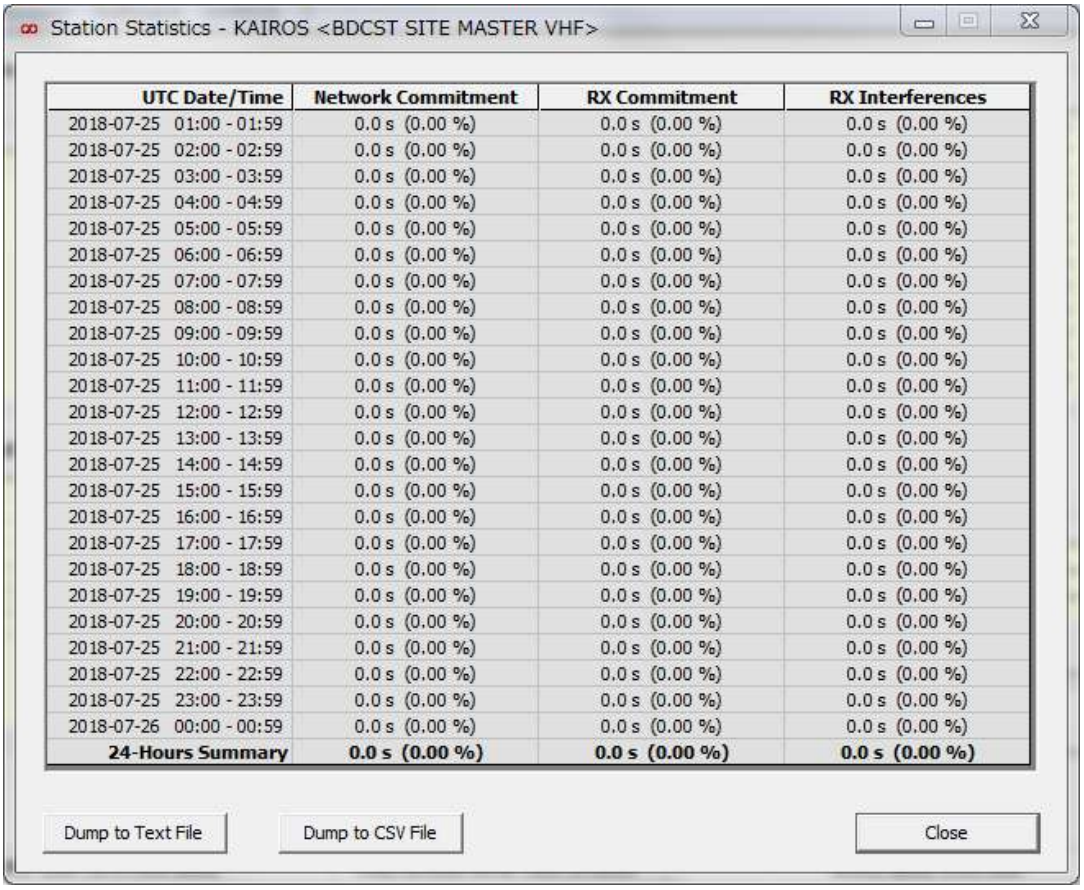
3.3.4. Statistics

KAIROS can show following Statistics;

3.3.4.1. **Station Statistics**

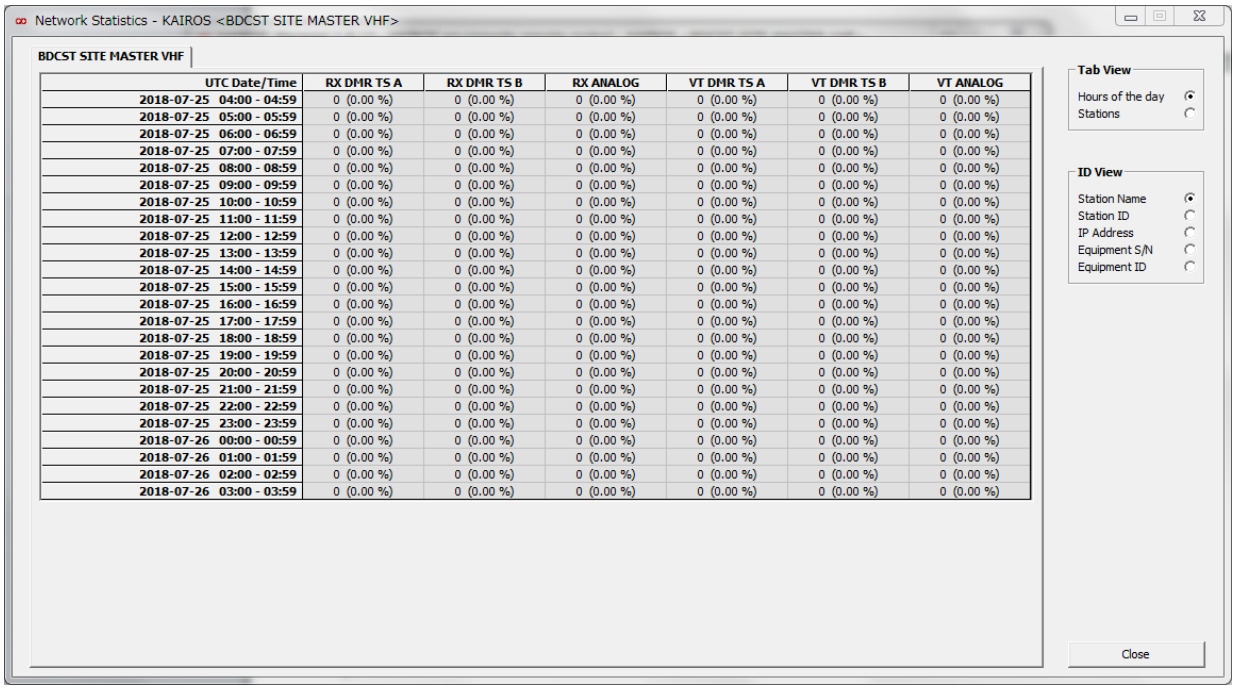
It shows station statistics in Analog only.

You can know the RX frequency is affected by interference by comparing Network Commitment.



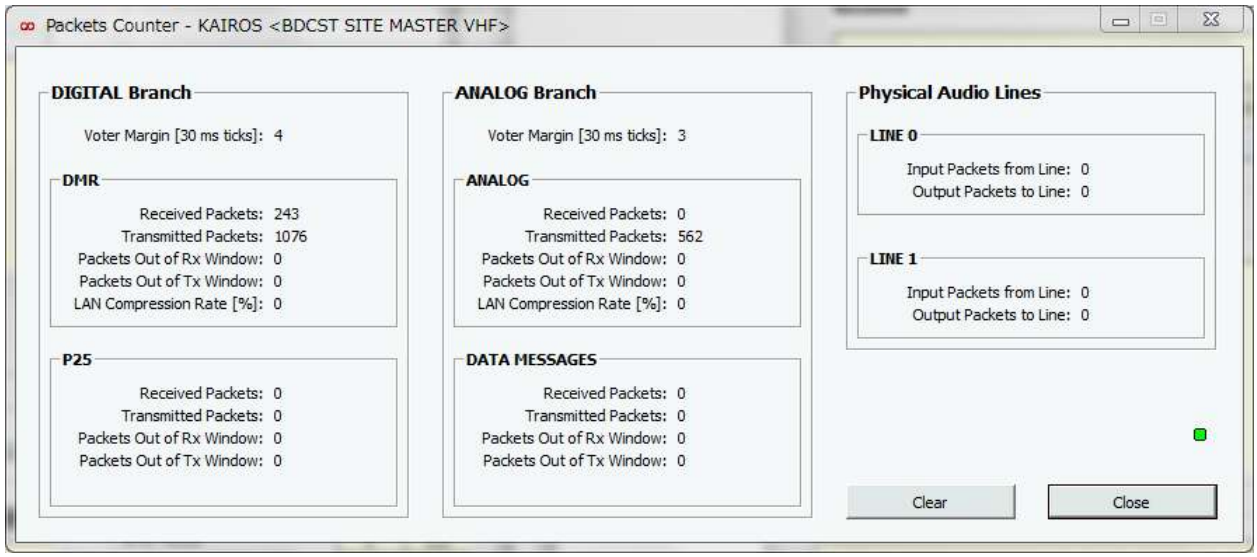
UTC Date/Time	Network Commitment	RX Commitment	RX Interferences
2018-07-25 01:00 - 01:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 02:00 - 02:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 03:00 - 03:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 04:00 - 04:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 05:00 - 05:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 06:00 - 06:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 07:00 - 07:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 08:00 - 08:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 09:00 - 09:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 10:00 - 10:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 11:00 - 11:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 12:00 - 12:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 13:00 - 13:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 14:00 - 14:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 15:00 - 15:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 16:00 - 16:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 17:00 - 17:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 18:00 - 18:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 19:00 - 19:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 20:00 - 20:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 21:00 - 21:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 22:00 - 22:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-25 23:00 - 23:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
2018-07-26 00:00 - 00:59	0.0 s (0.00 %)	0.0 s (0.00 %)	0.0 s (0.00 %)
24-Hours Summary	**0.0 s (0.00 %)**	**0.0 s (0.00 %)**	**0.0 s (0.00 %)**

3.3.4.2. **Network Statistics**



UTC Date/Time	RX DMR TS A	RX DMR TS B	RX ANALOG	VT DMR TS A	VT DMR TS B	VT ANALOG
2018-07-25 04:00 - 04:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 05:00 - 05:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 06:00 - 06:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 07:00 - 07:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 08:00 - 08:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 09:00 - 09:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 10:00 - 10:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 11:00 - 11:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 12:00 - 12:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 13:00 - 13:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 14:00 - 14:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 15:00 - 15:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 16:00 - 16:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 17:00 - 17:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 18:00 - 18:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 19:00 - 19:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 20:00 - 20:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 21:00 - 21:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 22:00 - 22:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-25 23:00 - 23:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-26 00:00 - 00:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-26 01:00 - 01:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-26 02:00 - 02:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)
2018-07-26 03:00 - 03:59	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)

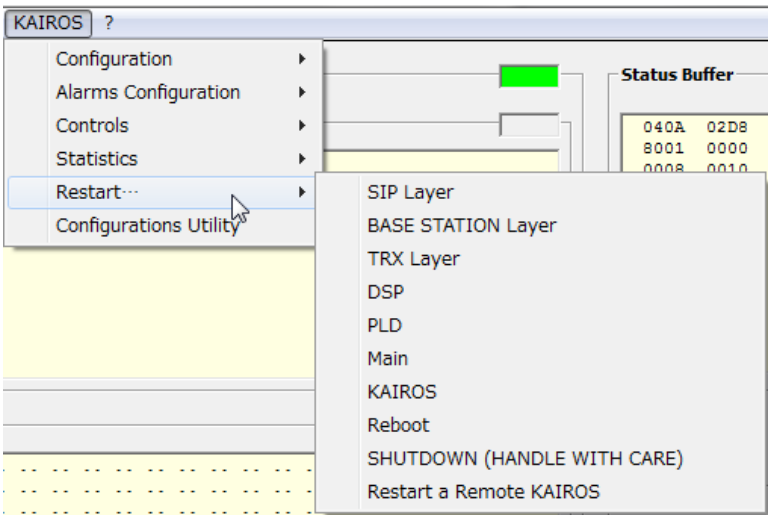
3.3.4.3. **Packets Counter**



3.3.5. Restart...

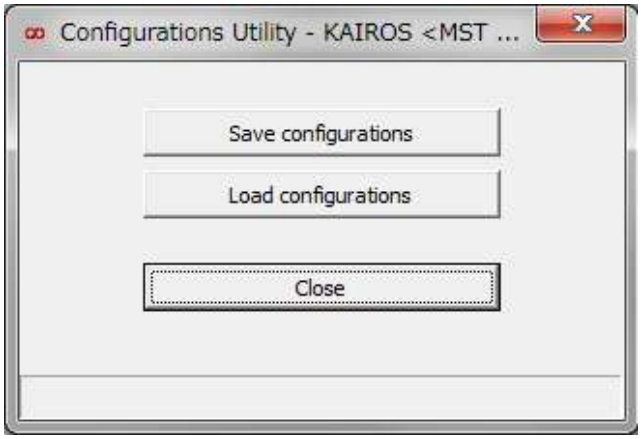
From this menu, you can choose to perform a layer-specific re-start, or a complete restart of a power off.

Warning: If you Shutdown a remote equipment, the only way to power it back on is by hitting the physical button on-site.



- KAIROS: Restart all application in KAIROS.
- Reboot: Restart from Linux OS
- Restart a Remote KAIROS: If you need to restart a KAIROS which is beyond RF-Link. (A KAIROS which cannot be connected by IP network)

3.3.6. Configurations Utility

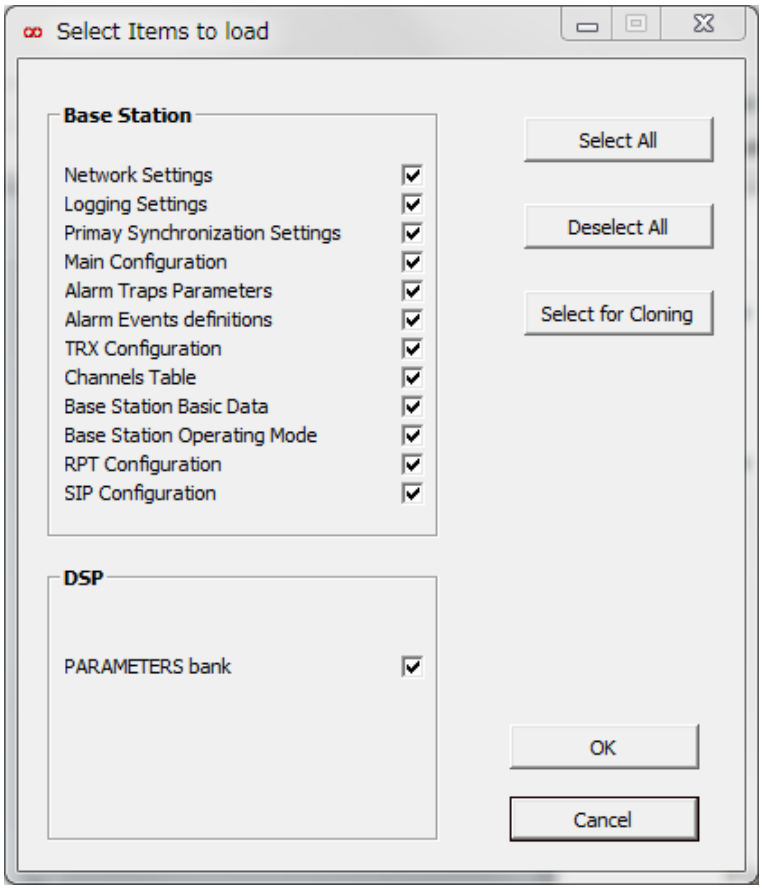


3.3.6.1. **Save configurations**

You can save KAIROS (TRX+DSP) configurations into file.

3.3.6.2. **Load Configurations**

After press Load configurations, following "Select Items to Load" window will appear.



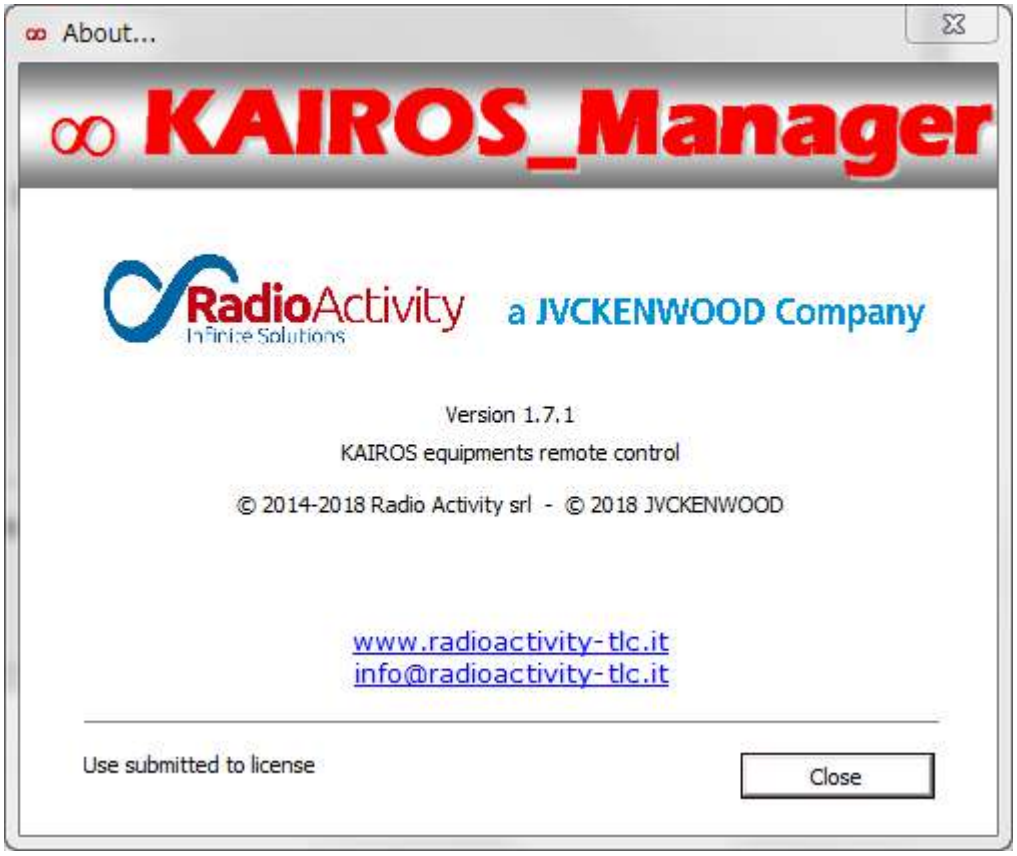
In this window, you can select item which you want to load.
By using Load Configurations, you can do not only save/load, but also do cloning.
If you clone KAIROS by load data, please take note following Tips,

Note:

- Network Settings: You need to pay attention in case you check "Network Settings", it will affect KAIROS IP address after restart.
- Main Configuration: This part includes some Identify Data.
- Channels Table: You can load file to different frequency's model, like Load VHF file to UHF, in that case, you need to uncheck Channels Table, otherwise your KAIROS will be unlocked.

3.4. ?

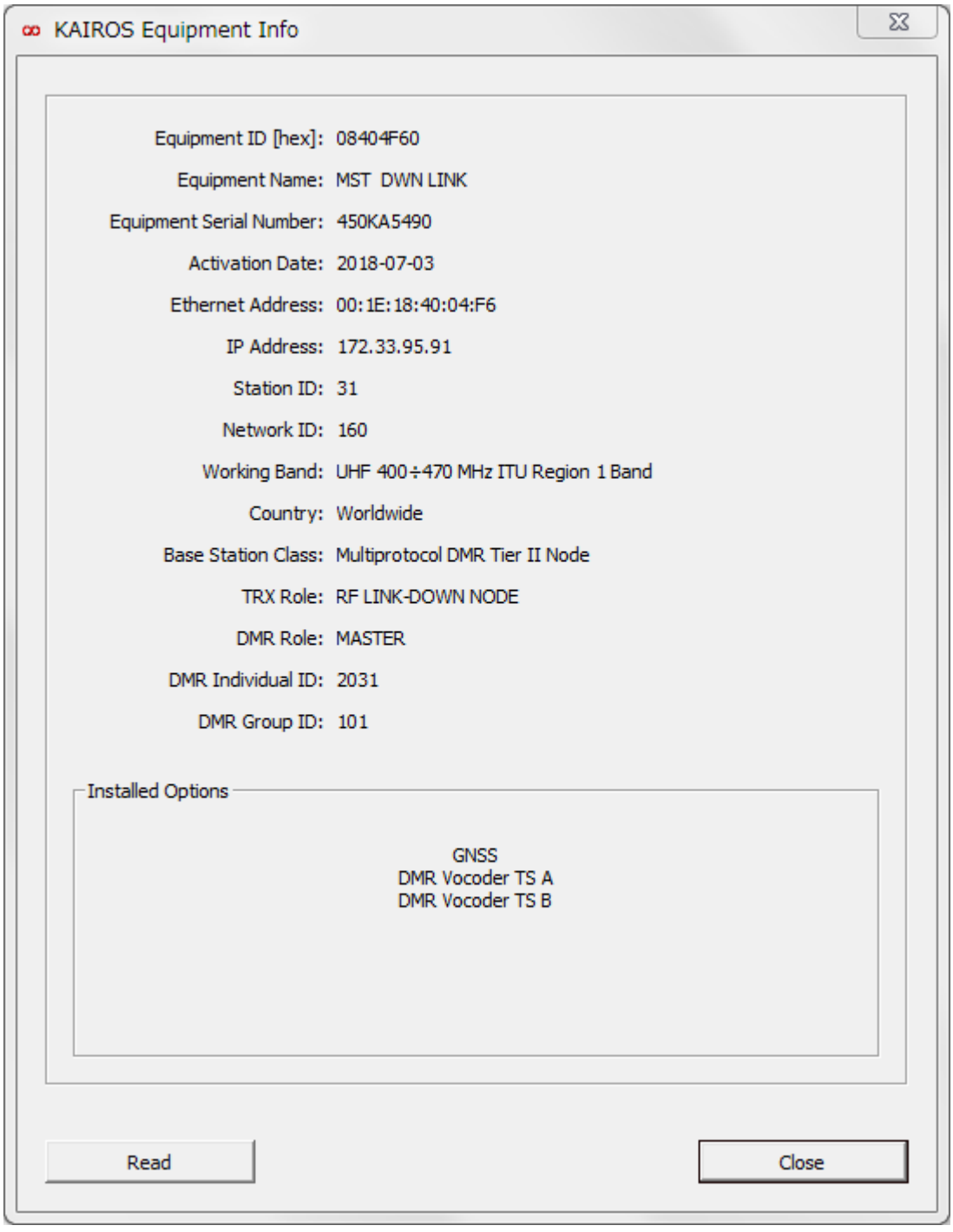
3.4.1. About...


About...
KAIROS_Manager
RadioActivity
Infinite Solutions
a JVCKENWOOD Company
Version 1.7.1
KAIROS equipments remote control
© 2014-2018 Radio Activity srl - © 2018 JVCKENWOOD
www.radioactivity-tlc.it
info@radioactivity-tlc.it
Use submitted to license
Close

3.4.2. KAIROS Equipment Info

It shows some Equipment Information.

You can know installed options status by this window without open physical KAIROS.



4. Appendix

4.1. IP Discover

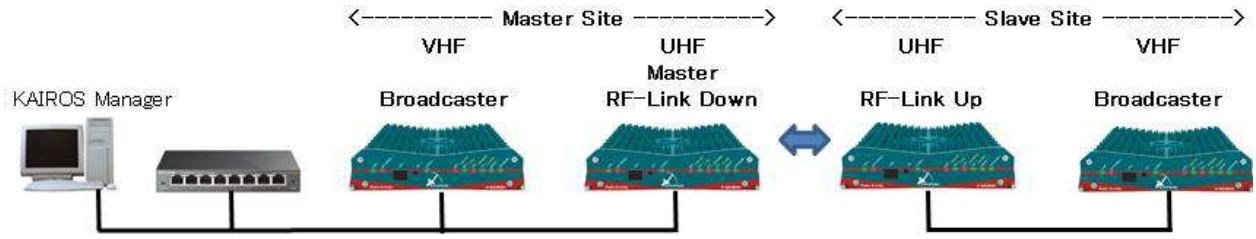
When KAIROS is placed in field or coming back from a site, maybe a problem to connect to it if the IP address is unknown. A simple way to discover the IP is switching on KAIROS with the following procedure.

1. Switch off the equipment.
2. At equipment switched off, press the on/off button for at least 4 sec (all Radio LED will be orange), until the Radio LED start to flash orange slowly.
3. Release the on/off button => the Radio LED start to flash green fast.
4. Press again the on/off button within 4 seconds => the equipment goes in "IP discover status"
5. KAIROS performs all the setup procedure but its IP becomes: 172.33.16.140/16; during this status the Radio Led flash orange every 2 seconds to advise that the equipment is in a maintenance status.
6. Connect the setup tool to 172.33.16.140/16 address to see/change the IP currently in use in the equipment.
7. At the end of the procedure switch off the equipment pressing the on/off button for at least 2 sec as usual.

At the next power on, the equipment will assume the last IP saved.

4.2. Remote KAIROS

To connect Remote KAIROS via RF-LINK by KAIROS Manager, you need to pay attention for some settings.

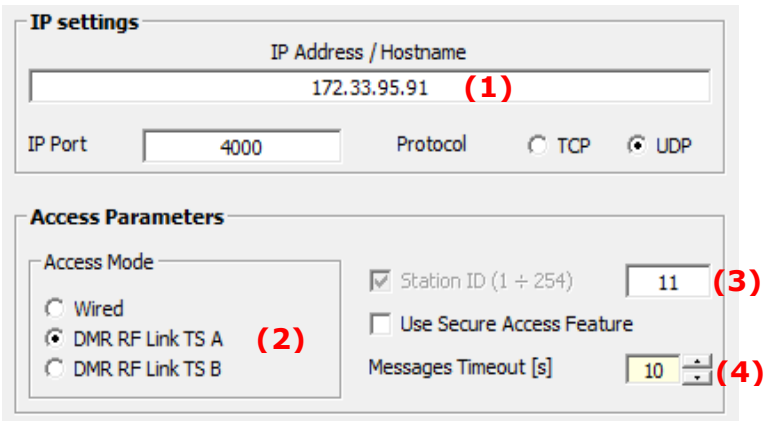


Important items are written in **Bold**.

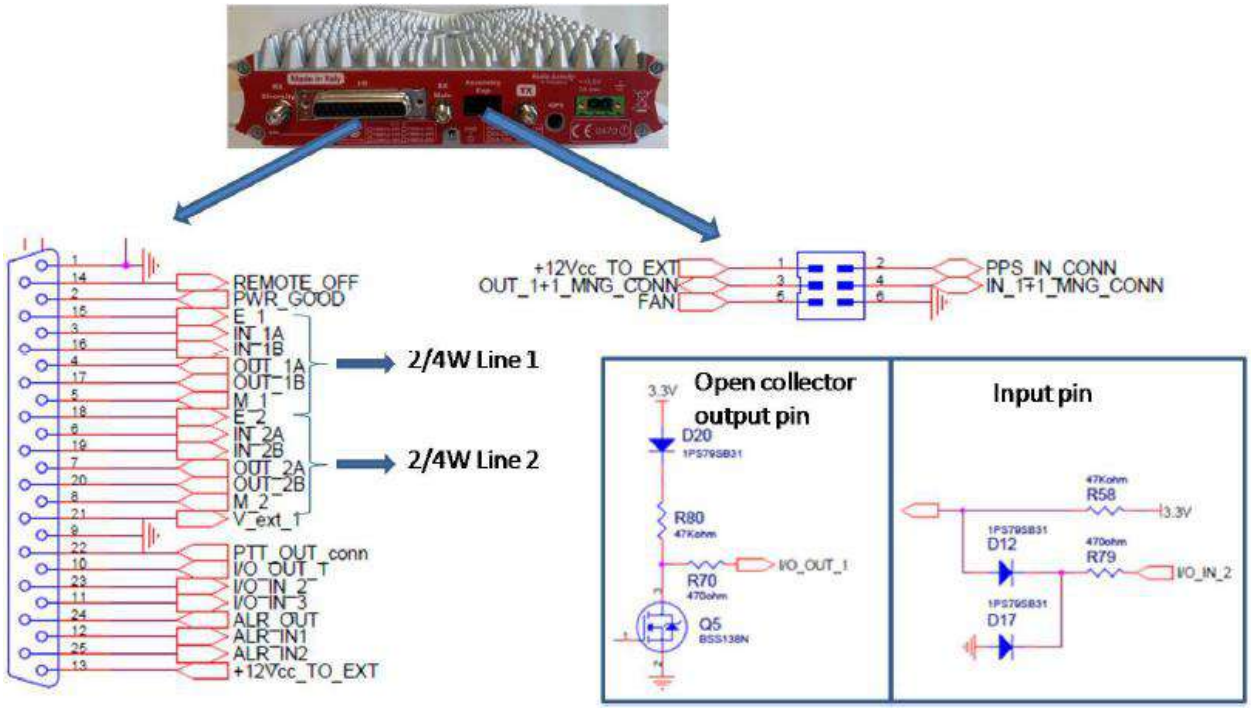
Item	MST Broadcaster	MST RF-Link Down	SLV RF-Link Up	SLV Broadcaster	Note
IP Address	172.33.91.12	172.33.95.91	172.33.95.92	172.33.91.13	Unique IP address
Subnet mask	255.255.0.0	255.255.0.0	255.255.0.0	255.255.0.0	
Station ID	**10**	**15**	**16**	**11**	**Unique ID**
Network ID	160	160	160	160	Same ID
DMR ID	**2010**	**2015**	**2016**	**2011**	**Unique ID**
TX Frequency	Freq VHF a1	Freq UHF a	Freq UHF b	Freq VHF a2	Recommended
RX Frequency	Freq VHF b1	Freq UHF b	Freq UHF a	Freq VHF b2	Recommended
Color code	**1**	**1**	**1**	**1**	**Same CC**
Synchronization	EXT PPS	Internal Ref (Full)	Internal Ref (Full)	EXT PPS	Recommended
Remote Control via RF Link	N/A	Slot A	Slot A	Slot A	Recommended
Display IDLE Packets	N/A	**Yes**	**Yes**	**Yes**	Recommended

Ex) To connect Slave Broadcaster.

(1) Enter RF-Link Down IP Address.
(2) Choose DMR RF Link to Access.
(3) Enter target remote KAIROS Station ID.
(4) Increase Message Timeout more than 10 [s] is recommended.



4.3. I/O Port



DB25 Connector

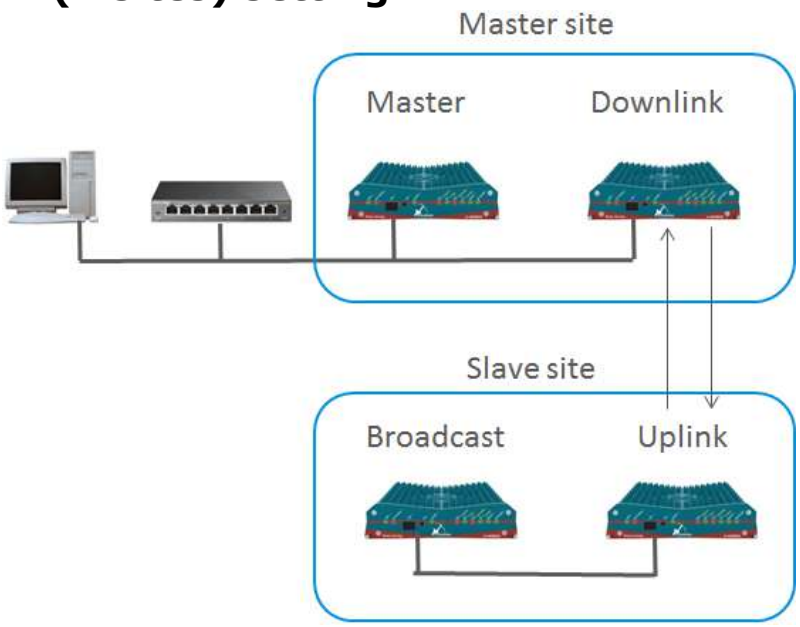
Pin No.	Signal Name	I/O	Signal Type	Description	Spec	Typ.	Remarks
1	GND	-	GND	GND	-	-	-
2	PWR_GOOD	O	Digital	Power On Output	H: Not Good L: OK	3.3V 0	Open Collector Output Pin.
3	IN_1A	I	Analog	Audio Input for Analog (PM) Audio Input for DMR TS1	Around 1V p-p	1 Vp-p	For DMR need Vocoder option.
4	OUT_1A	O	Analog	Audio Output for Analog (PM) Audio Output for DMR TS1		480mV	For DMR need Vocoder option.
5	M_1	O	Digital	Squelch Control for Analog Squelch Control for DMR TS1	H: Not Busy L: Busy	3.3V 0	
6	IN_2A	I	Analog	Audio Input for Analog (FM) Audio Input for DMR TS2	Around 1V p-p	1 Vp-p	For DMR need Vocoder option.
7	OUT_2A	O	Analog	Audio Output for Analog (FM) Audio Output for DMR TS2		1V	For DMR need Vocoder option.
8	M_2	O	Digital	Squelch Control for Analog Squelch Control for DMR TS2	H: Not Busy L: Busy	3.3V 0	Open Collector Output Pin.
9	GND	-	GND	GND	-	-	-
10	IO_OUT_1	O	Digital	AUX Output1	H: Not Active L: Active	3.3V 0	Open Collector Output Pin.

11	IO_IN_3	I	Digital	AUX Input3	H: External Device OFF L: External Device ON	3.3V 0	
12	ALR_IN1	I	Digital	Alarm Input1	H: Alarm OFF L: Alarm ON	3.3V 0	
13	+12Vcc_TO_EXT	O	Analog	Power Supply for General Purpose External Device	-	Vcc V	Max 400mA.
14	REMOTE_ONOFF	I	Digital	Power On/ Off Control	H (250msec): Power ON L (3sec): Power OFF	3.3V 0	
15	E_1	I	Digital	External PTT Switch1	H: External PTT OFF L: External PTT ON	3.3V 0	
16	IN_1B	I	Analog	Audio Input for Analog (PM) Audio Input for DMR TS1	Around 1V p-p	1 Vp-p	For DMR need Vocoder option.
17	OUT_1B	O	Analog	Audio Output for Analog (PM) Audio Output for DMR TS1		480mV	For DMR need Vocoder option.
18	E_2	I	Digital	External PTT Switch2	H: External PTT OFF L: External PTT ON	3.3V 0	
19	IN_2B	I	Analog	Audio Input for Analog (FM) Audio Input for DMR TS2	Around 1V p-p	1 Vp-p	For DMR need Vocoder option.
20	OUT_2B	O	Analog	Audio Output for Analog (FM) Audio Output for DMR TS2		1V	For DMR need Vocoder option.
21	V_ext_1	I	Analog	Not isolated inputs for voltage sensing. ADC port form Analog to Digital. It can be used by Net Control software at this mement.		0 to 20 V	10k Ohm / 0 to 20V referred to ground.
22	PTT_OUT	O	Digital	PTT Output	H: Not Active L: Active	3.3V 0	Open Collector Output Pin.
23	IO_IN_2	I	Digital	AUX Input2	H: External Device OFF L: External Device ON	3.3V 0	
24	ALR_OUT	O	Digital	Alarm Output	H: Alarm OFF L: Alarm ON	3.3V 0	Open Collector Output Pin.
25	ALR_IN2	I	Digital	Alarm Input2	H: Alarm OFF L: Alarm ON	3.3V 0	

6pin Connector for flat cable

Pin No.	Signal Name	I/O	Signal Type	Description	Typ.	Remarks
1	+12V	O	DC	This pin provides 13.2V, limited at 400mA, to supply a general purpose external device	13.2V	
2	PPS_IN_ CONN	I/O	Digital	This pin supports an external PPS signal or can share the internal PPS (from GPS receiver or from the PTP or from other sourced synch). As described previously, a bus connection between different co-located KAIROS realizes a multiple GPS reception with automatic backup. This pin can also be configured to accept an external synchronous clock or an external pulse per second signal. Contact Factory for further details.	3.3V 0	
3	OUT_1+1_ MNG_CONN	O	Digital	These pins support a simple protocol to allow two KAIROS to functioning as 1+1 (main and spare) redundancy equipment.	3.3V 0	
4	IN_1+1_ MNG_CONN	I	Digital	These pins support a simple protocol to allow two KAIROS to functioning as 1+1 (main and spare) redundancy equipment.	3.3V 0	
5	FAN	O	Digital	It is closed to GND when the temperature of the internal RF power amplifier rises above the threshold (typ 65°C). It can be used to switch on cooling fans in a cabinet.	3.3V 0	
6	GND	I	Analog	GND terminal	0V	

4.4. RF-Link (2 sites) setting



Important items are written in **Bold**.

Item	Master	RF-Link Downlink	RF-Link Uplink	Slave Broadcaster	Note
Own IP Address	172.33.91.12	172.33.95.91	172.33.95.92	172.33.91.13	Unique IP address
Subnet mask	255.255.0.0	255.255.0.0	255.255.0.0	255.255.0.0	Recommended
Master IP Address	N/A	172.33.91.12	N/A	172.33.95.92	**Important**
Remote Control via RF Link	N/A	Slot A	Slot A	Slot A	Recommended
Operative Mode	**Master**	**RF Link-Down**	**RF Link-Up**	**Slave**	**Important**
Base Station Role	**MASTER**	**LINK DOWN TO NET**	**LINK UP TO MATER**	**BROADCASTER**	**Important**
Voting Delay	**3**	N/A	N/A	N/A	**Important**
Network Delay	**8**	**6**	**2**	**8**	**Important**
Station ID	**250**	**77**	**64**	**65**	**Unique ID**
Network ID	**160**	**160**	**160**	**160**	**Same ID**
DMR ID	2048	2077	2048	2049	Unique ID
TX Frequency	Any F1tx	Any **F2tx**	Any **F3rx**	Any F1tx	**Important**
RX Frequency	Any F1rx	Any **F3rx**	Any **F2tx**	Any F1rx	Important
Color code	**1**	**1**	**1**	**1**	**Same CC**
Synchronization	GPS	EXT PPS(Full)	GPS	EXT PPS(Full)	Recommended
Display IDLE Packets	N/A	**Yes**	**Yes**	**Yes**	Recommended
TX: act as…	Base Station	Base Station	Base Station	Base Station	Important
RX: act as…	Base Station	**Mobile Station**	**Mobile Station**	Base Station	**Important**
Hang Times, Private/Group Calls	150	0	0	150	Recommended
Hang Times, Data	16	0	0	16	Recommended

Hang Times, Channel	16	100	100	16	Recommended
RX Pkts Advance	0	**2**	**6**	0	**Important**