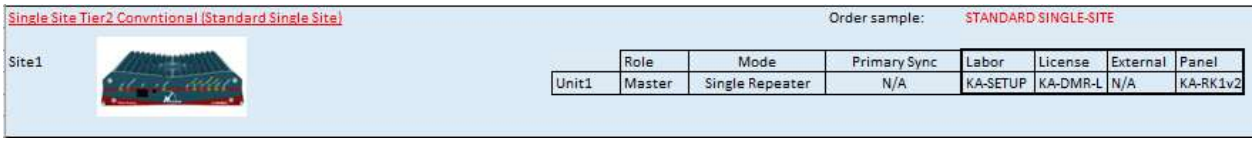
Kairos Setup Procedure **Rev1.3** **7/24/2018 JKUSA R&D**

This document covers setup procedure following the Standard Structures.

1. Standard Structure

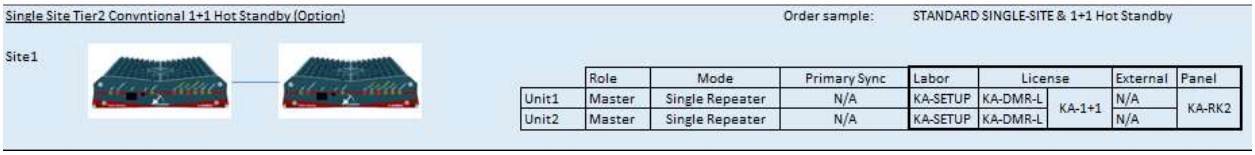
1.1 Single Repeater



	Role	Mode	Primary Sync	Labor	License	External	Panel
Unit1	Master	Single Repeater	N/A	KA-SETUP	KA-DMR-L	N/A	KA-RK1v2

No synchronization is required. The most simple, easy solution to expand coverage.

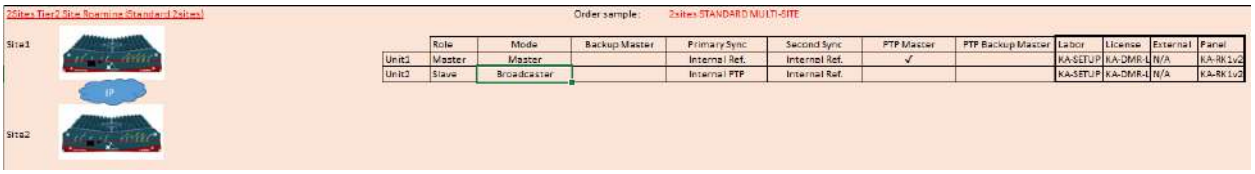
1.2. Single Repeater + Hot Standby Repeater (Option)



	Role	Mode	Primary Sync	Labor	License		External	Panel
Unit1	Master	Single Repeater	N/A	KA-SETUP	KA-DMR-L	KA-1+1	N/A	KA-RK2
Unit2	Master	Single Repeater	N/A	KA-SETUP	KA-DMR-L		N/A	

Hot Standby repeater is ready for emergency case. KA-1+1 includes a cable to sync physically.
The 2nd repeater must have same configuration except Station ID.
1+1 Hot Standby is a strong point of Kairos. TKR-D series do not have any function for redundancy.

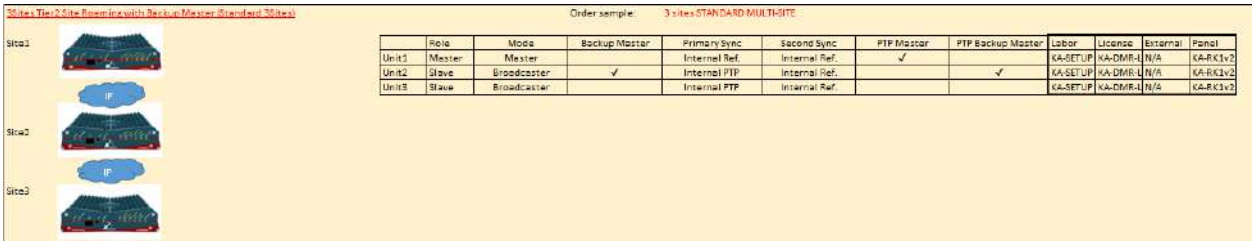
1.3. 2sites Roaming System



	Role	Mode	Backup Master	Primary Sync	Second Sync	PTP Master	PTP Backup Master	Labor	License	External	Panel
Unit1	Master	Master		Internal Ref.	Internal Ref.	✓		KA-SETUP	KA-DMR-L	N/A	KA-RK1v2
Unit2	Slave	Broadcaster		Internal PTP	Internal Ref.			KA-SETUP	KA-DMR-L	N/A	KA-RK1v2

All of voice streaming have to through the Master Repeater. Slave repeater start to repeat the voice streaming locally when the Master Repeater offline.
Beacon Sync is required to realize roaming behavior on subscribers. Kairos has VCTCXO internally. Repeaters on the other sites will use this Master Reference via IP Network for synced Beacon transmitting. PTP algorithm allows this synchronization between Master and Slave.
PTP sync is a strong point of Kairos. The sync quality is better than TKR-D series. Beacon Sync Quality is very important for site roaming subscribers.

1.4. 3sites Roaming System



	Role	Mode	Backup Master	Primary Sync	Second Sync	PTP Master	PTP Backup Master	Labor	License	External	Panel
Unit1	Master	Master		Internal Ref.	Internal Ref.	✓		KA-SETUP	KA-DMR-L	N/A	KA-RK1v2
Unit2	Slave	Broadcaster	✓	Internal PTP	Internal Ref.		✓	KA-SETUP	KA-DMR-L	N/A	KA-RK1v2
Unit3	Slave	Broadcaster		Internal PTP	Internal Ref.			KA-SETUP	KA-DMR-L	N/A	KA-RK1v2

Backup Master Repeater is available. A Slave repeater will become Backup Master Repeater. The function of Master Repeater immediately rollover to the Backup Master Repeater. Backup Master Function allows Inter-site call capability between the online sites.

Centralized Voting Structure based on RA simulcast system allows to having wide coverage by RX only site as an option. The Mater selects the best signal between the sites having same RX frequency selected. Backup Master Function covers the weak point of single point system structure.

1.5. 3sites Simulcast System

	Role	Mode	Backup Master	Primary Sync	Secondary Sync	PTP Master	PTP Backup Master	Labor	License		External		Panel
Unit1	Master	Master		Internal PPS	Internal Ref	✓		KA-SETUP	KA-DMR-L	KA-SI-T2	KA-GPS	GPS-ANT	KA-RK1v2
Unit2	Slave	Broadcaster	✓	Internal PPS	Internal PTP		✓	KA-SETUP	KA-DMR-L	KA-SI-T2	KA-GPS	GPS-ANT	KA-RK1v2
Unit3	Slave	Broadcaster		Internal PPS	Internal PTP			KA-SETUP	KA-DMR-L	KA-SI-T2	KA-GPS	GPS-ANT	KA-RK1v2

The concept is same as 3sites roaming system, however just 1 frequency is required on this system. KA-SI-T2 allows Simulcast Setup on the repeaters. KA-GPS and GPS-ANT for each repeater are mandatory to synchronize the TX timing in a system. PTP connection is still available as a second choice when the GPS connection is broken. DMR Simulcast solution is available now.

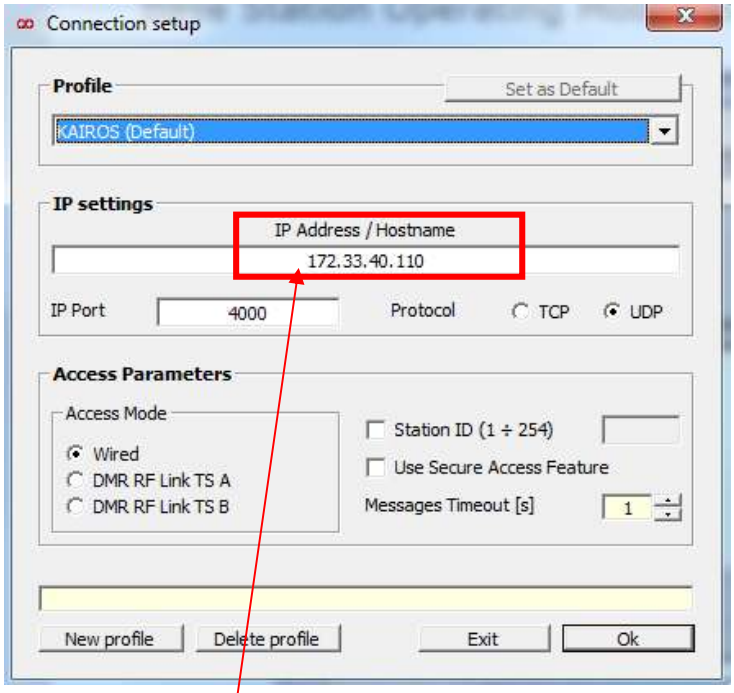
1.6. IP/RF Link Mixed System

	Role	Mode	Backup Master	Primary Sync	Second Sync	PTP Master	PTP Backup Master	Labor	License	External	Panel
Unit1	Master	Master		Internal Ref.	Internal Ref.	✓		KA-SETUP	KA-DMR-L	N/A	KA-RK2
Unit2	Link Down to Net	RF Link Down		Internal PTP	Internal Ref.			KA-SETUP	KA-DMR-L	N/A	
Unit3	Slave	Broadcaster	✓	Internal PTP	Internal Ref.		✓	KA-SETUP	KA-DMR-L	N/A	KA-RK1v2
Unit4	Slave	Broadcaster		Internal PTP	Internal Ref.			KA-SETUP	KA-DMR-L	N/A	KA-RK2
Unit5	Link Up to Master	Rf Link Up		RF Link (DMR)	Internal Ref.	✓		KA-SETUP	KA-DMR-L	N/A	

RF Link is available if you cannot provide IP Connection for sites communication. There are no additional license for RF Link Connectivity. You can use RF Link Solution even if it is simulcast system. TKR-D series is not capable to RF Link Connectivity. We can offer this solution to a customer who wants DMR but does not have IP connection between sites.

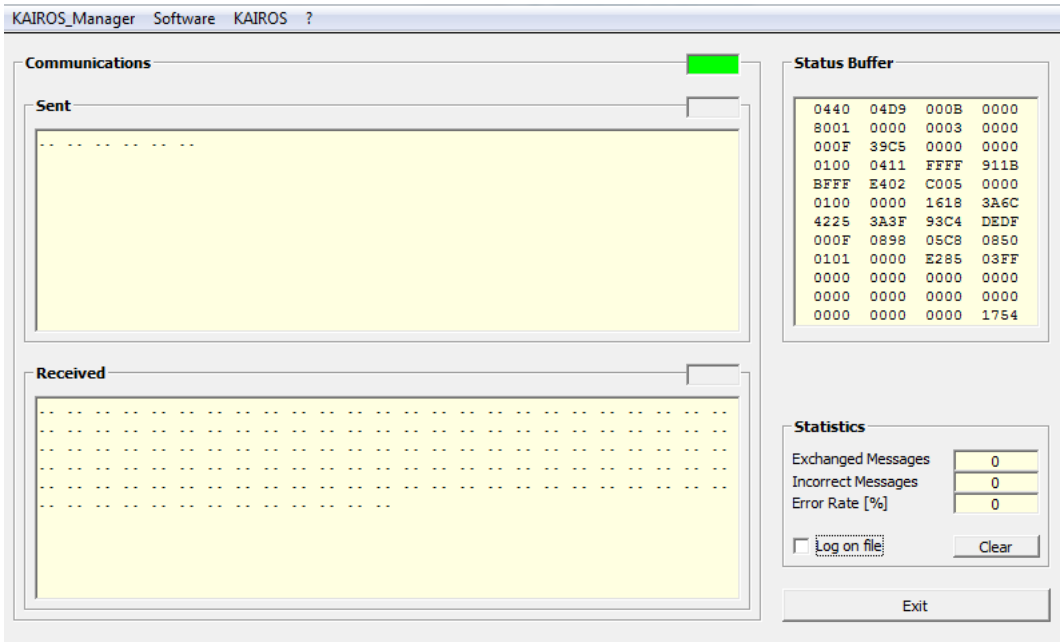
2. Setup Procedure
    2.0. Common Procedure
        a. Open Kairos Manager

<u>Connection Setup</u>

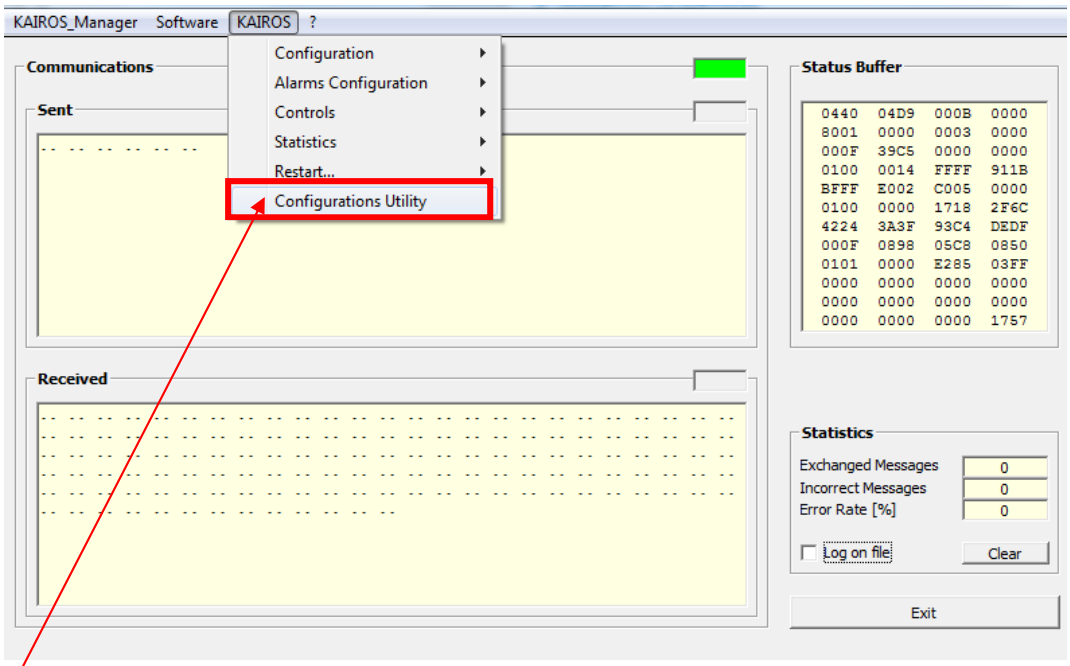


        b. Connect to the default IP Address attached on the label.

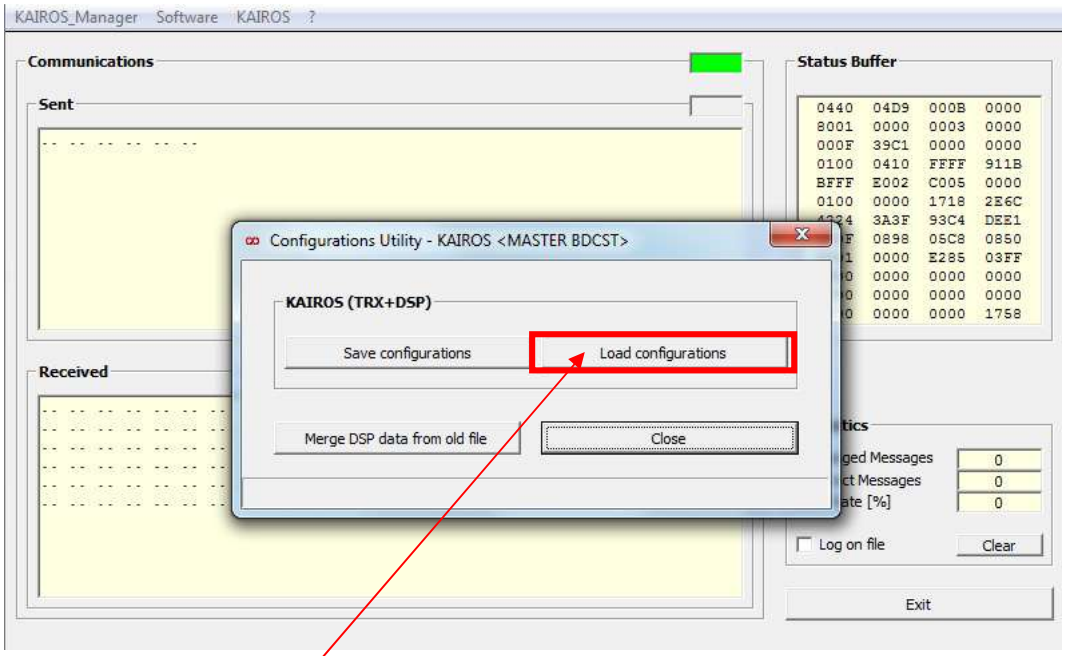
<u>Main Menu</u>



        c. Select Configuration Utility from KAIROS main menu.

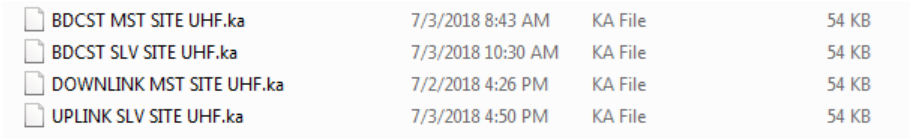


Configuration Utility



d. Select Load configuration

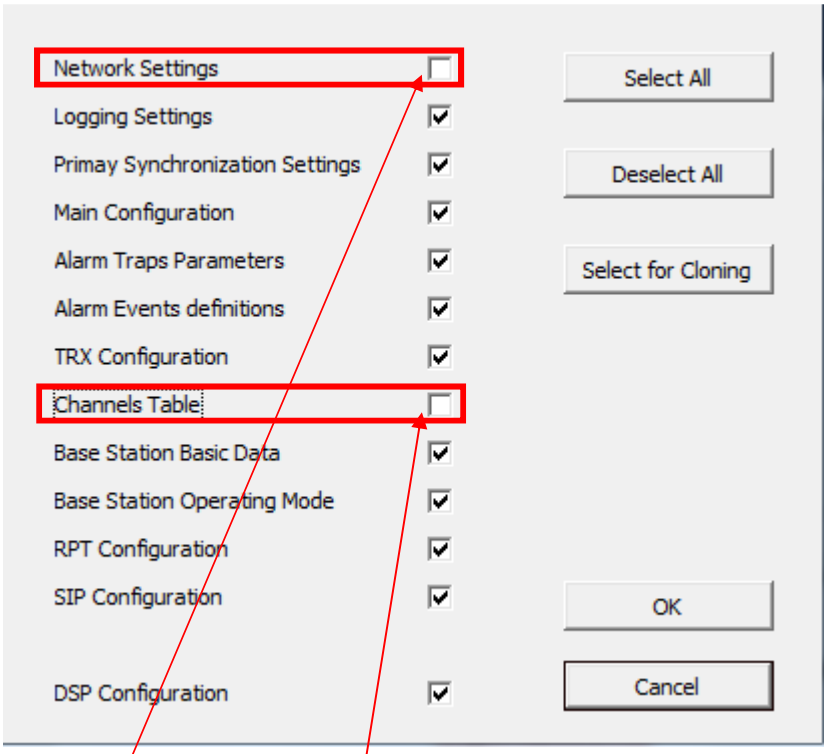
Load Configuration



You can select the default configuration provided by AFCO.

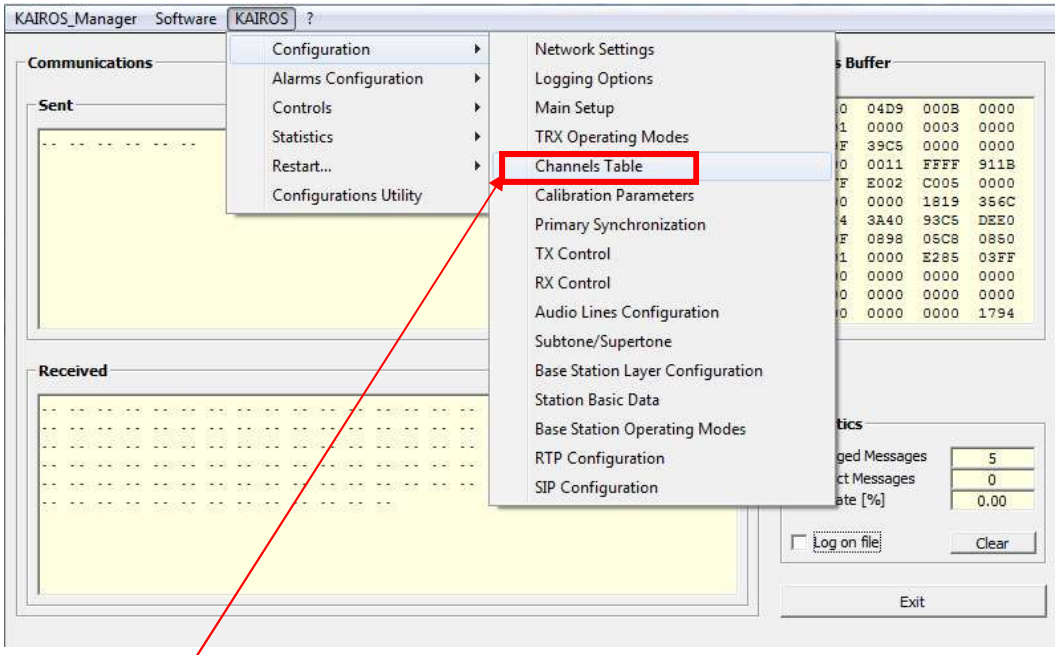
- MST.ka (for Standard IP Link)
- SLV.ka (for Standard IP Link)
- BDCST MST SITE.ka (for Standard RF Link)
- BDCST SLV SITE.ka (for Standard RF Link)
- DOWNLINK MST SITE.ka (for Standard RF Link)
- UPLINK SLV SITE.ka (for Standard RF Link)

e. Select load items

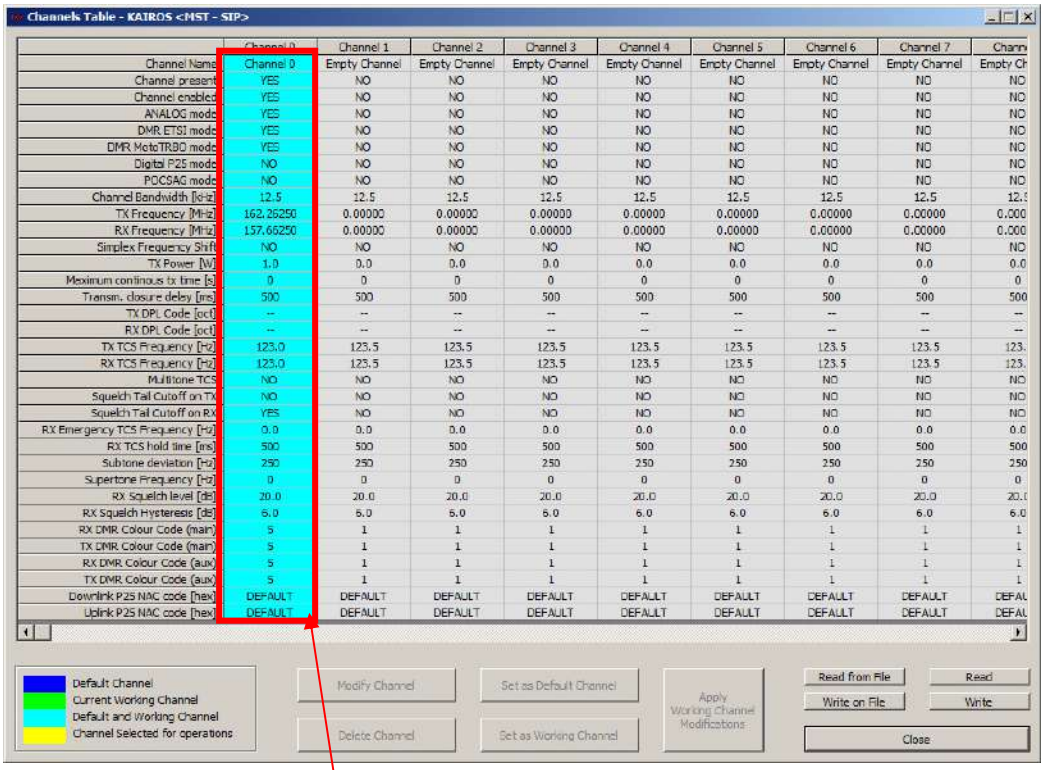


The Default File has own IP Address and the model is KA450 But you can ignore these deleting Network Setting and Channel Table from the load items.

f. Edit Channel Table

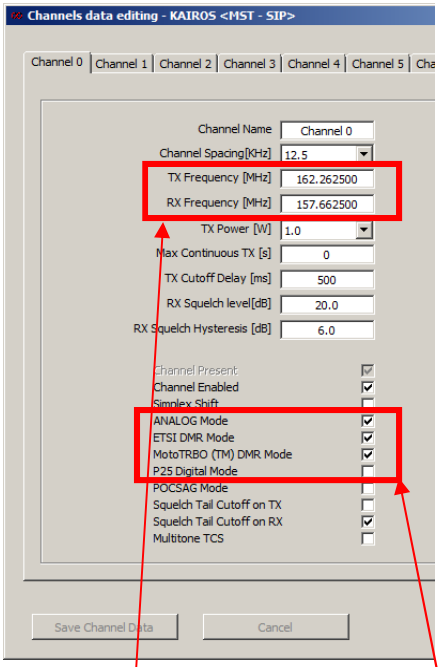


Channel Table



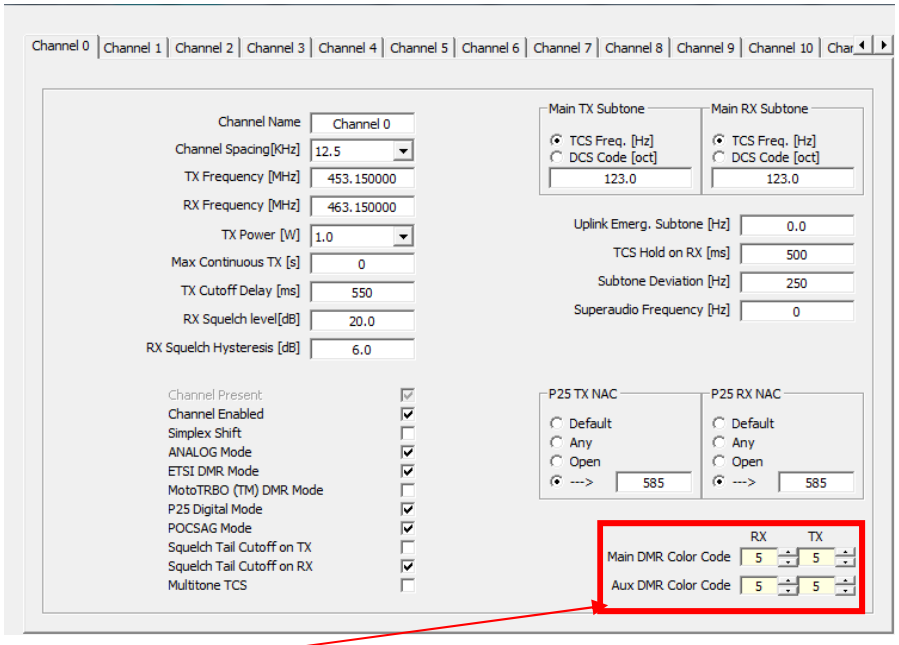
You can double Click on the Channel Number to edit the detail.

Channel Data Edit



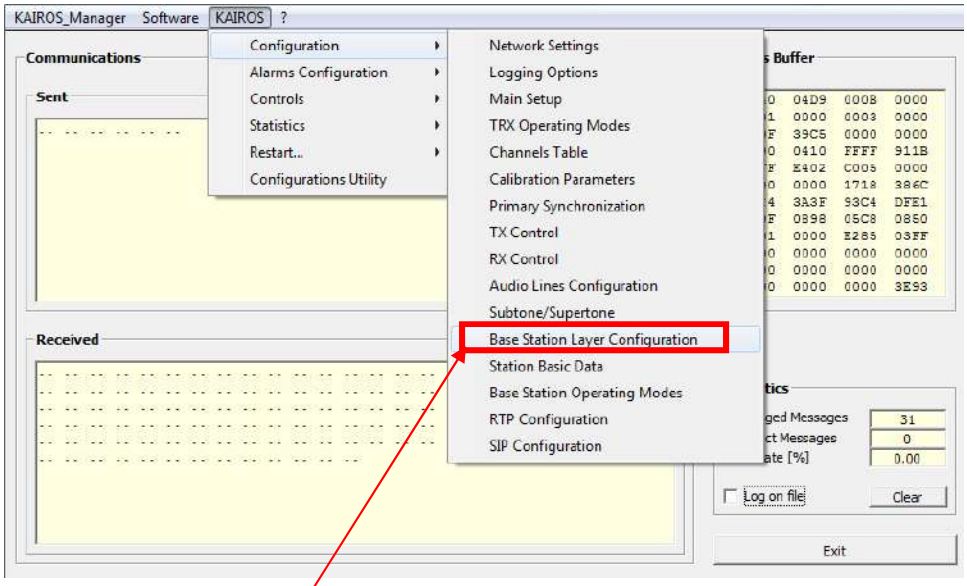
Modify the TX/RX Frequency and the operation mode following the customer's requirement. You can selsct ANALOG/ETSI DMR/P25 at one time. MotoTRBO DMR mode is for compatibiliity of Motorola subscribers.

CC Edit

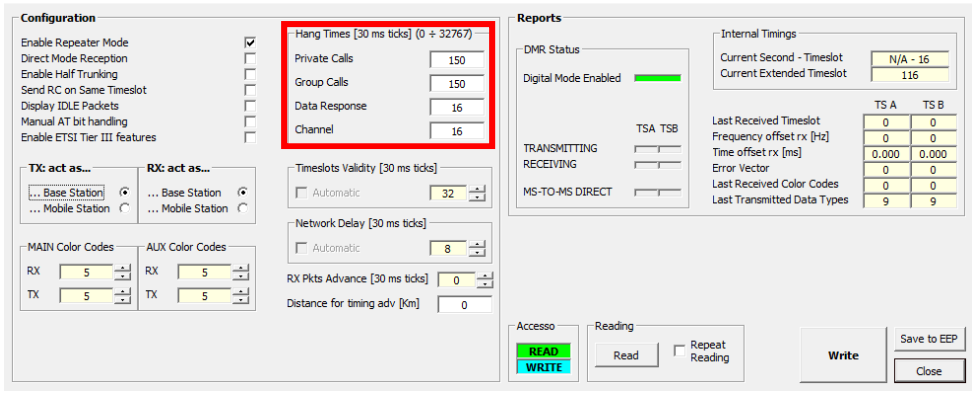


You can modify CC for Tx and Rx both.

g. Edit Base Layer Configuration.

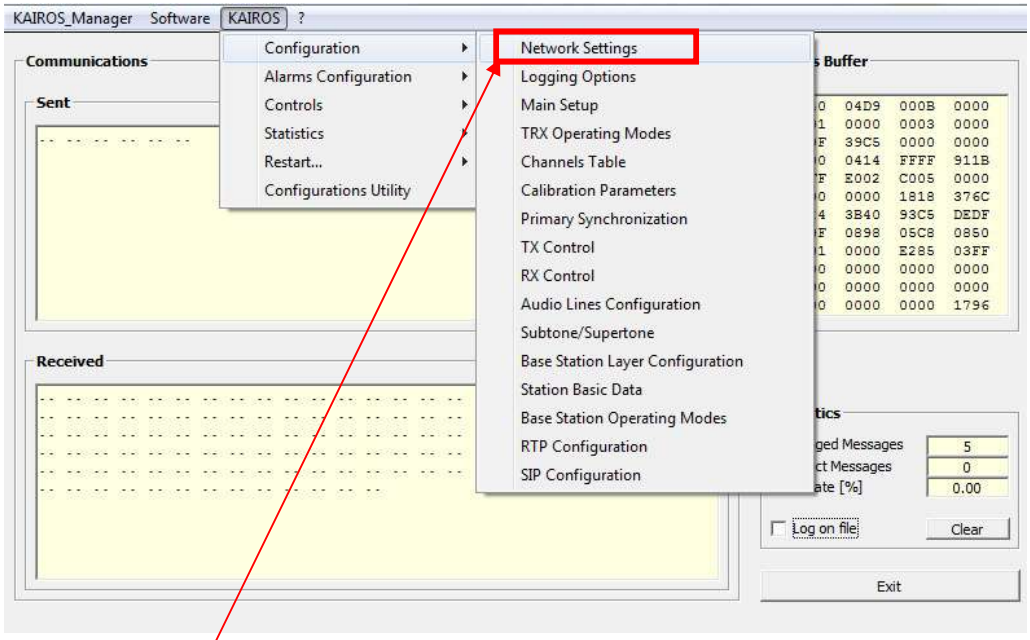


Base Layer Configuration

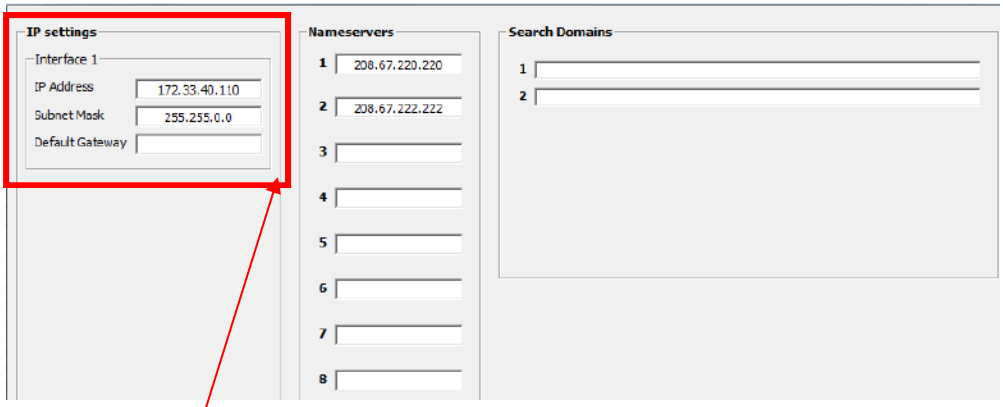


You can modify each Hand Timer. The step is 30[ms] based on DMR frame rate. And basically all repeaters in system will have same value.

h. Edit IP setting

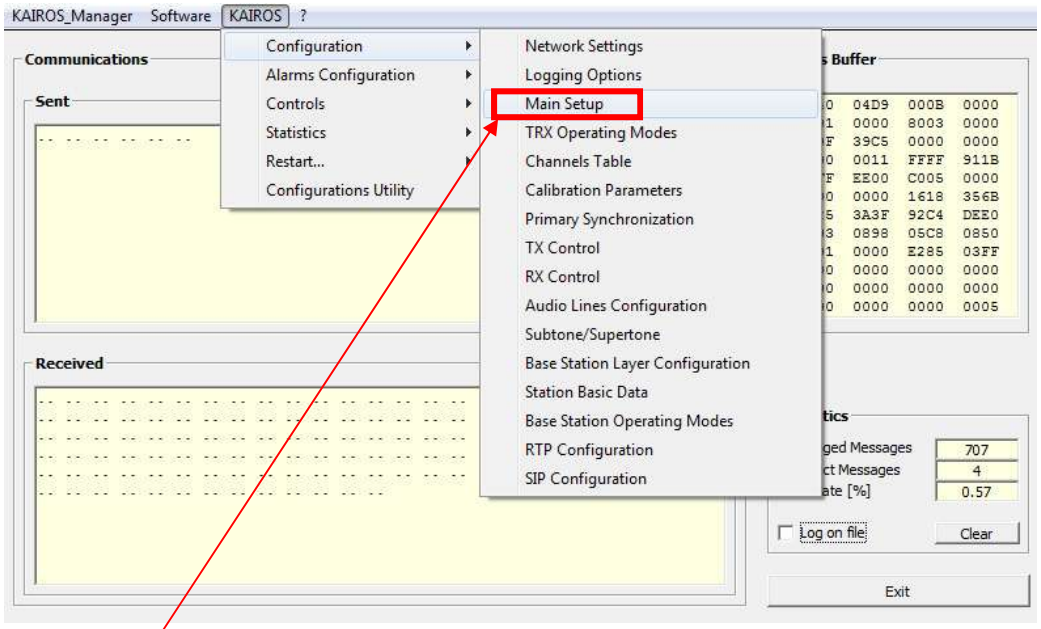


Network Setting

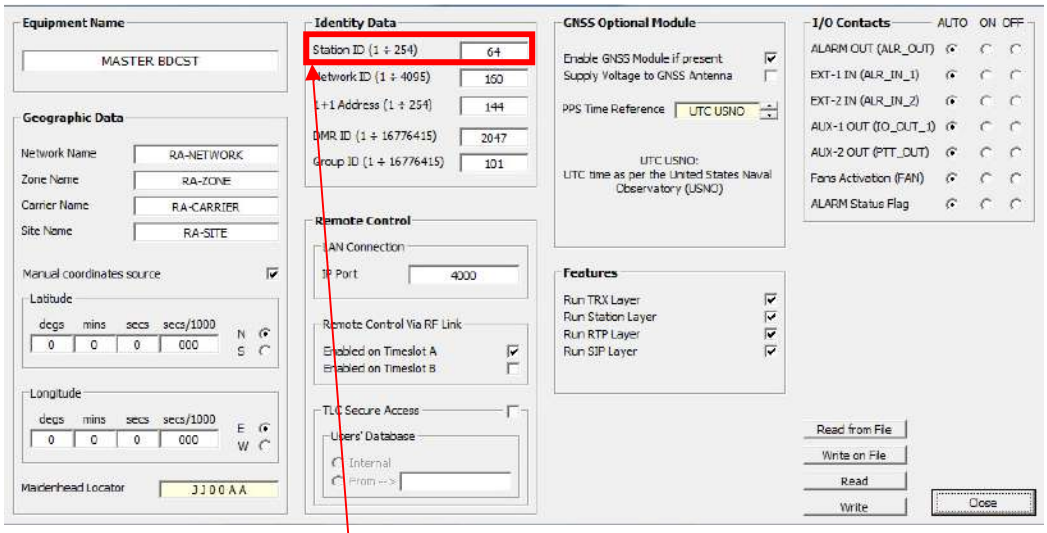


You can edit the IP Address follwing customer requirement. Please use midified IP Address to login to Kairos Manager from next time.

i. Edit Repeater ID



Main Setup



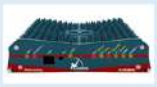
You must setup the Staion ID for each repeater in the network separately.

2.1. Single Repeater

Single Site Tier2 Convntional (Standard Single Site)

Order sample: STANDARD SINGLE-SITE

Site1



	Role	Mode	Sync Master	Labor	License	External	Panel
Unit1	Master	Single Repeater	N/A	KA-SETUP	KA-DMR-L	N/A	KA-RK1v2

Site1

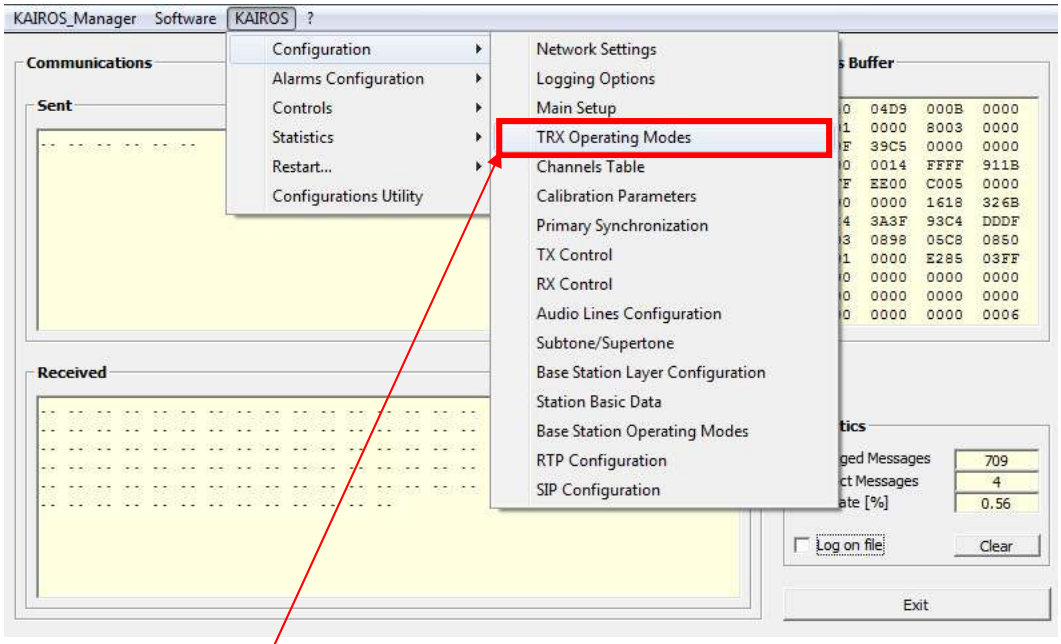
Unit1: Master Repeater

A. Single Repeater Setup

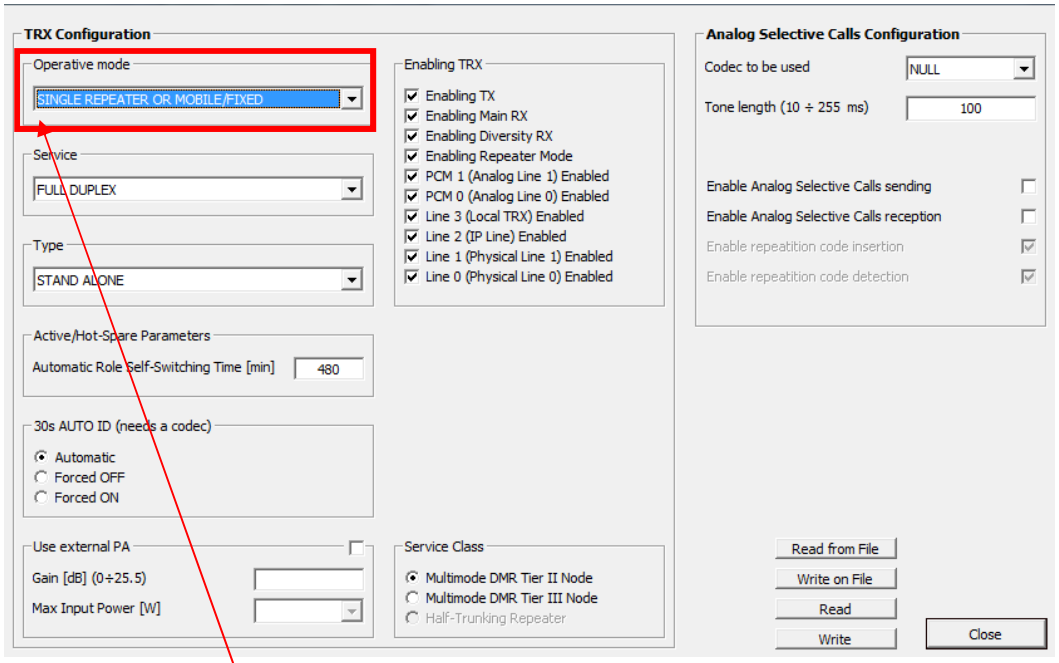
a. Read (Open) default setting from Kairos following common procedure.
   All stocks of Kairos already done the Single Repeater Setup by Radio Activity. Load Configuration is not required.

b. Modify the same items following common procedure.

c. Modify TRX Mode.

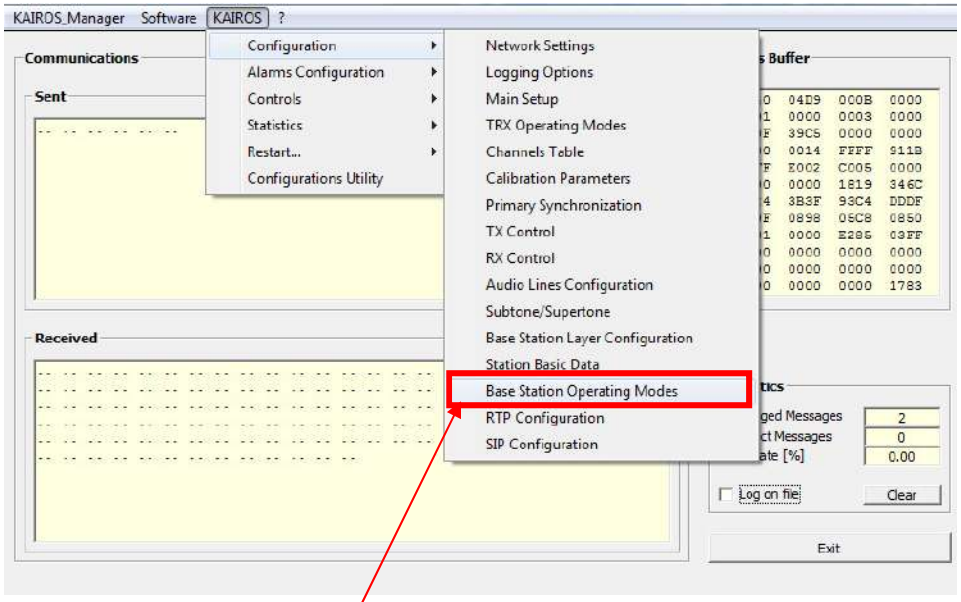


TRX Operation Mode

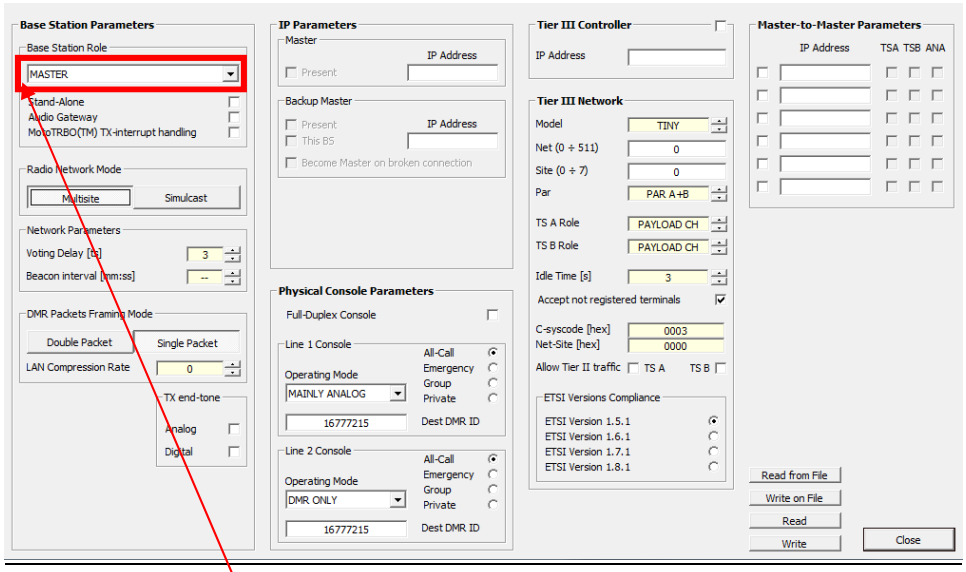


Operation Mode is SINGLE REPEATER OR MOBILE,FIXED

d. Modify Base Station Operation Role.



Base Station Operation Mode



Base Station Role is MASTER

2.2. Single Repeater + Hot Standby Repeater

Single Site Tier2 Convntional 1+1 Hot Standby (Option)

Order sample: STANDARD SINGLE-SITE & 1+1 Hot Standby

Site1

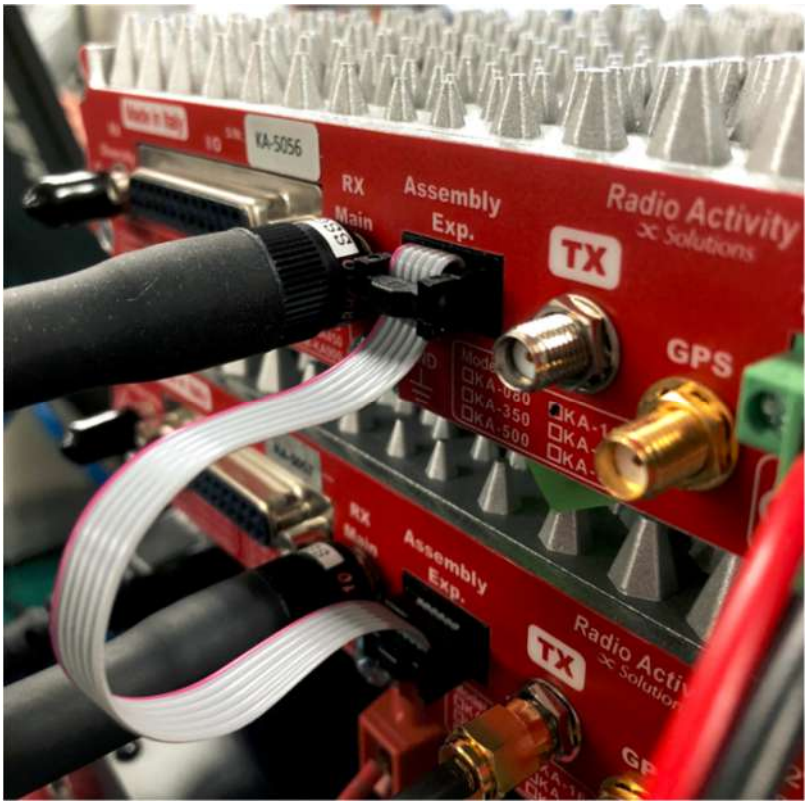
	Role	Mode	Primary Sync	Labor	License		External	Panel
Unit1	Master	Single Repeater	N/A	KA-SETUP	KA-DMR-L	KA-1+1	N/A	KA-RK2
Unit2	Master	Single Repeater	N/A	KA-SETUP	KA-DMR-L		N/A	

Site1

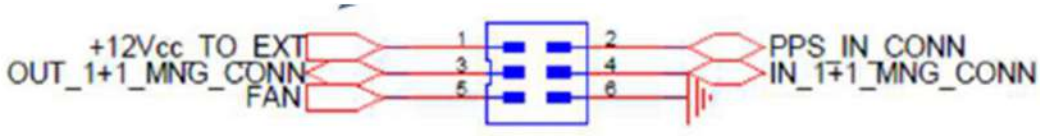
Unit1: Master Repeater

Unit2: Standby Repeater for Unit1

Sync Cable is required to tie the 2repeaters for redundancy.



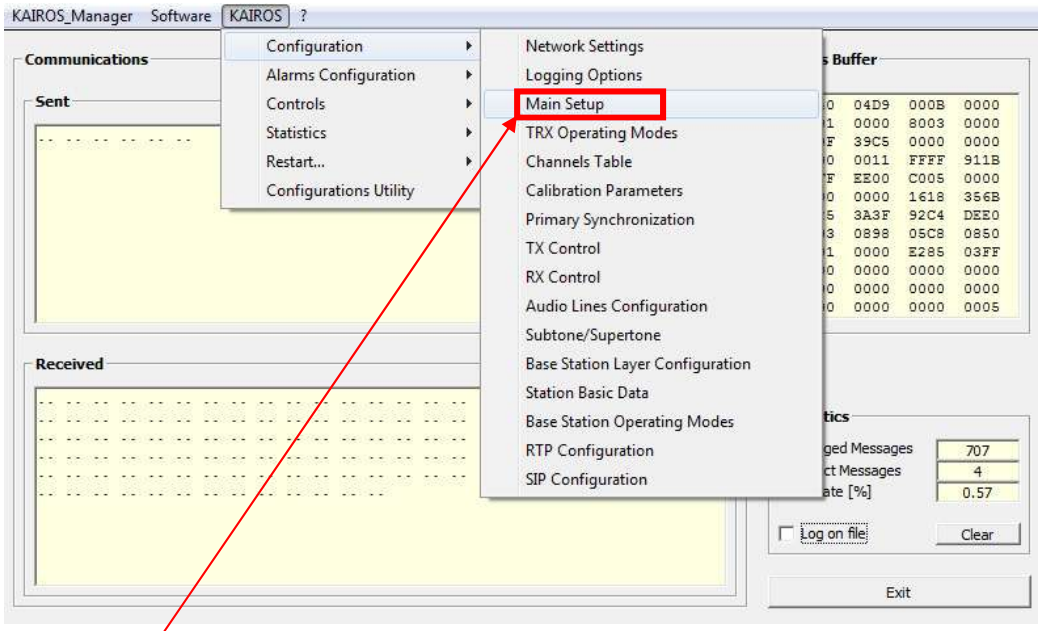
This cable can be provided when the customer purchased KA-1+1 option.



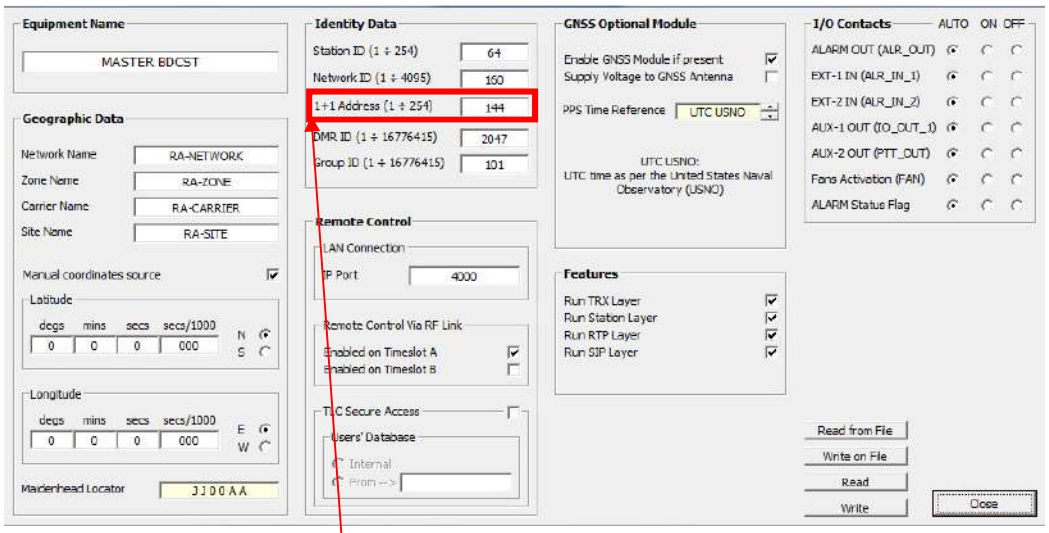
A. Primary Repeater Setup

a. Modify the same items following Single Repeater Setup.

b. Edit Main Setup.

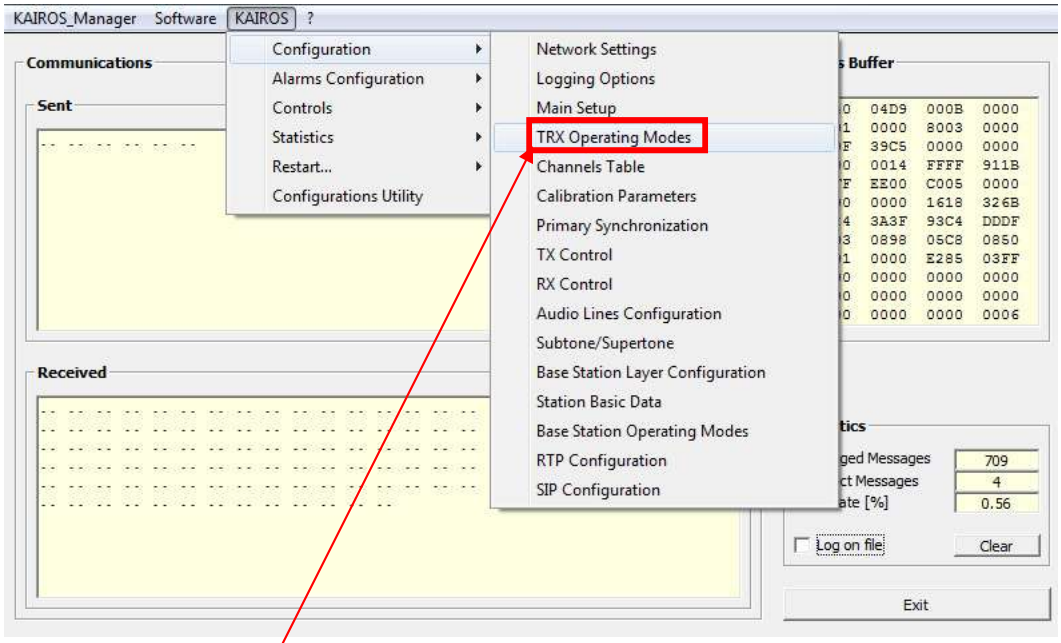


Main Setup

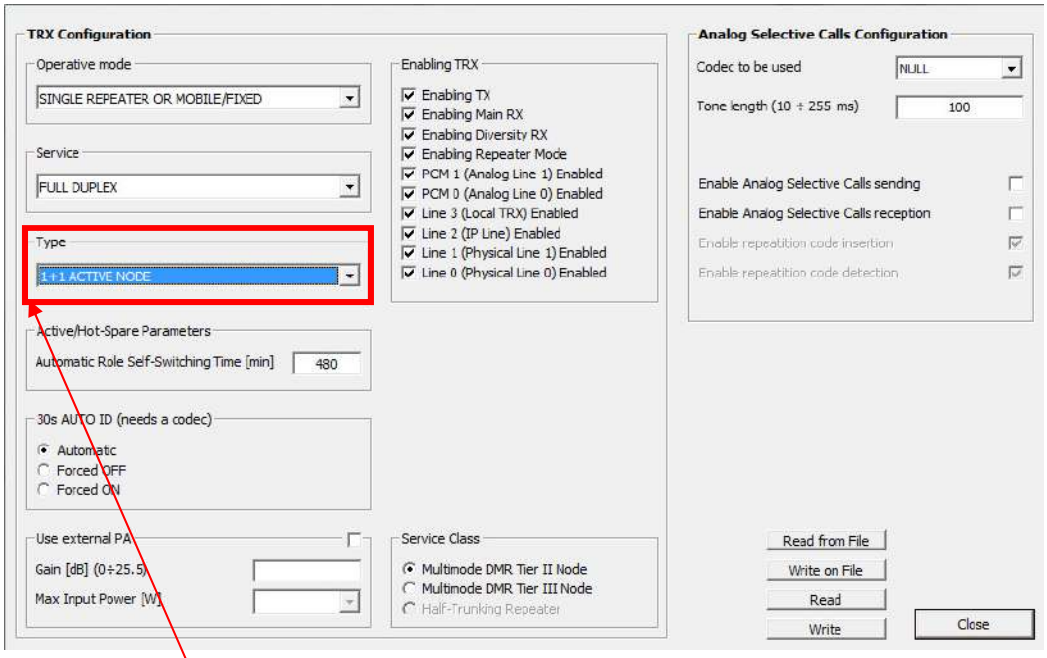


You can modify 1+1 Address which works on active repeater between the 2repeaters. This address must be used on last 3digit following his network address. In this case scenario, it is 172.33.40.144.

c. Edit TRX Operation Modes.



TRX Operation Modes

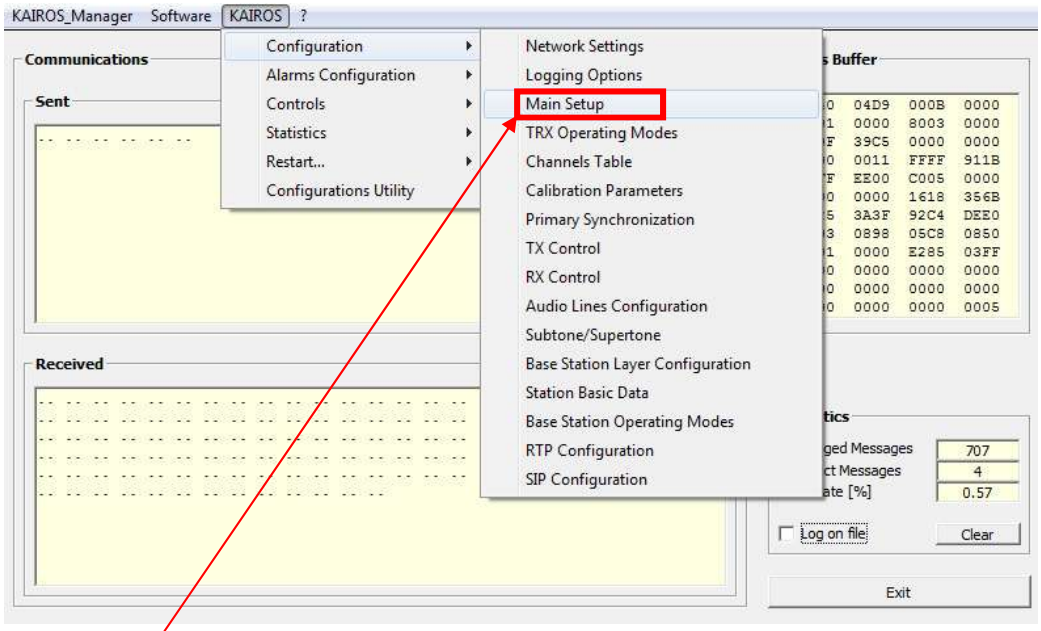


You must select 1+1 ACTIVE NODE on the primary repeater.

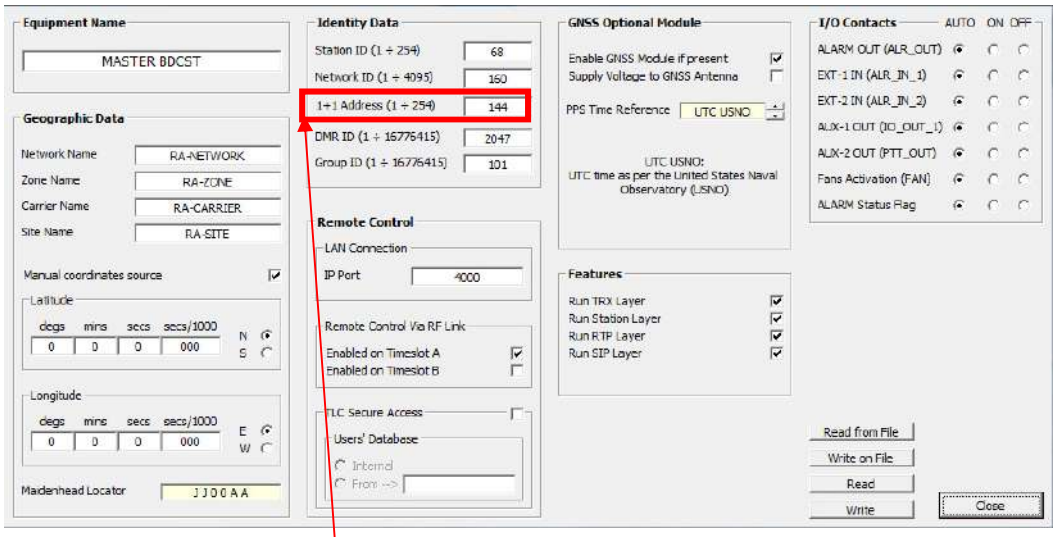
B. Secondary Repeater Setup

a. Modify the same items following Single Repeater Setup.

b. Edit Main Setup.

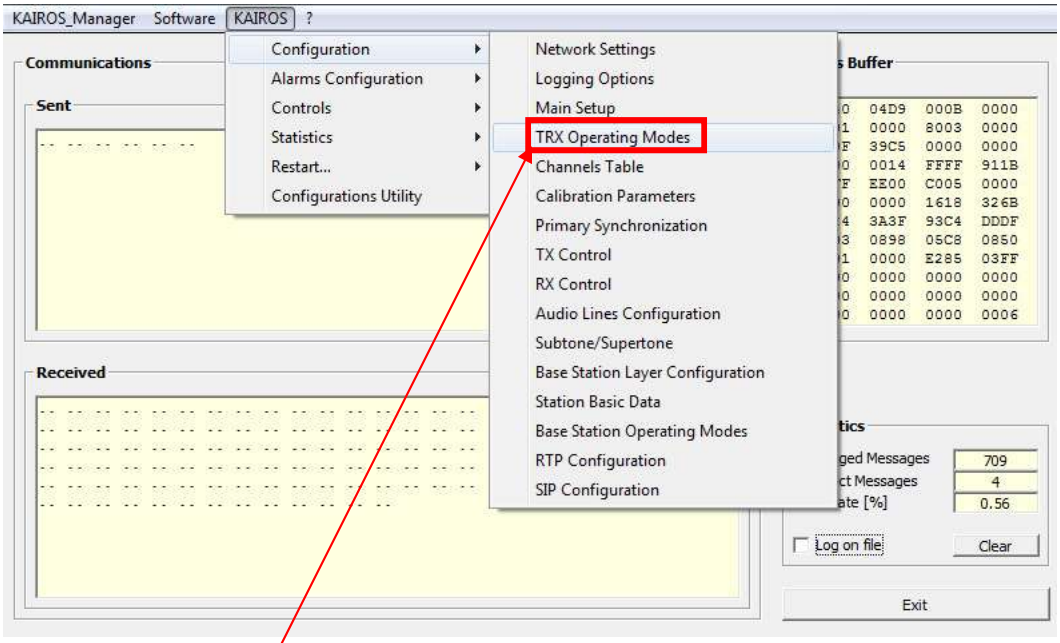


Main Setup

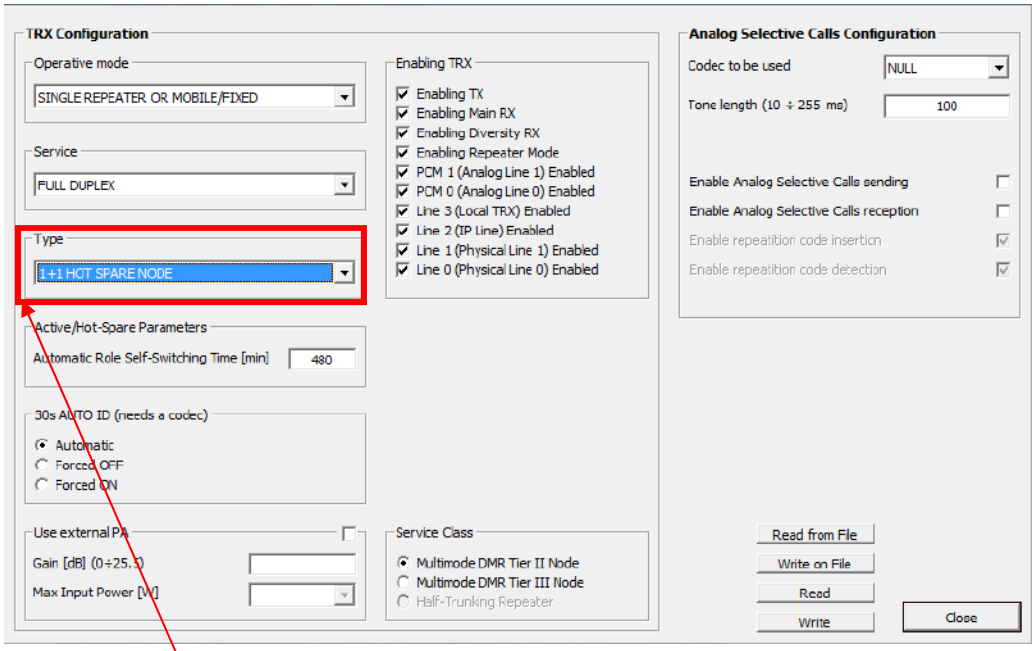


You can modify 1+1 Address which works on active repeater between the 2repeaters. This address must be used on last 3digit following his network address. In this case scenario, it is 172.33.40.144. This address has to be same as the Primary Repeater Setup.

c. Edit TRX Operation Modes.



TRX Operation Modes

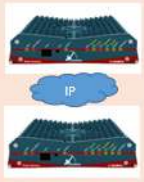


You must select 1+1 HOT SPARE NODE on the secondary repeater.

2.3. 2sites Roaming System

2Sites Tier2 Site Roaming (Standard 2sites)

Order sample: 2sites STANDARD MULTI-SITE



	Role	Mode	Primary Sync	Second Sync	Labor	License	External	Panel
Unit1	Master	Master	Internal Ref.	Internal Ref.	KA-SETUP	KA-DMR-L	N/A	KA-RK1v2
Unit2	Slave	Broadcaster	Internal PTP	Internal Ref.	KA-SETUP	KA-DMR-L	N/A	KA-RK1v2

Site1

Unit1: Master Repeater

Site2

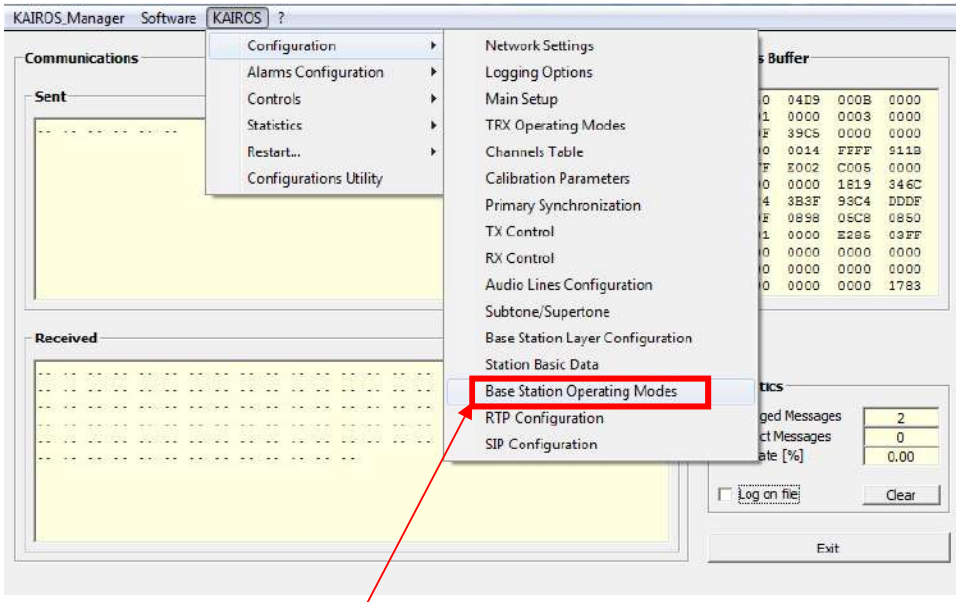
Unit2: Slave Repeater

A. Master Repeater Setup

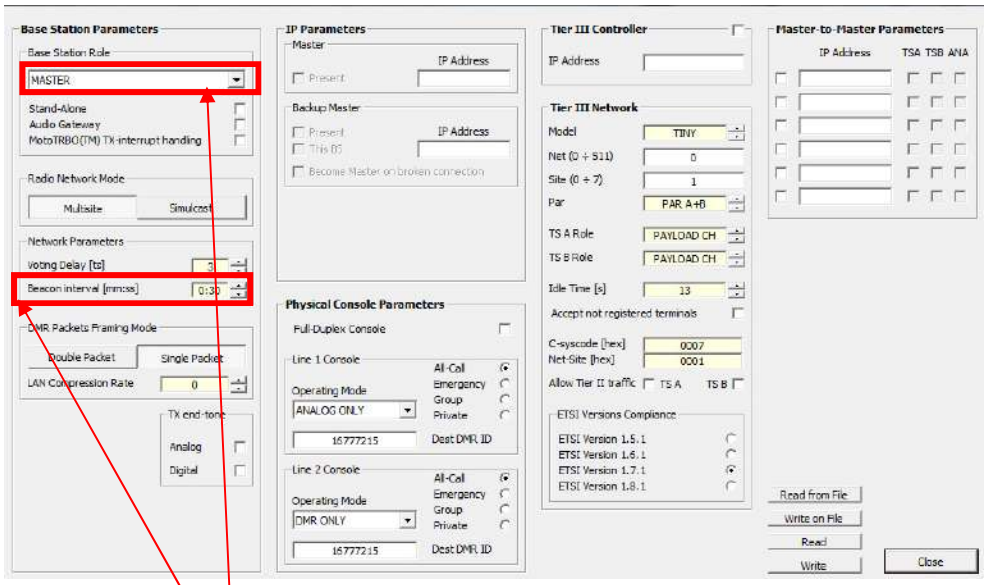
a. Open “MST.ka” following common procedure.

b. Modify the same items following common procedure.

c. Select Base Station Operation Mode.



Base Station Operation Mode

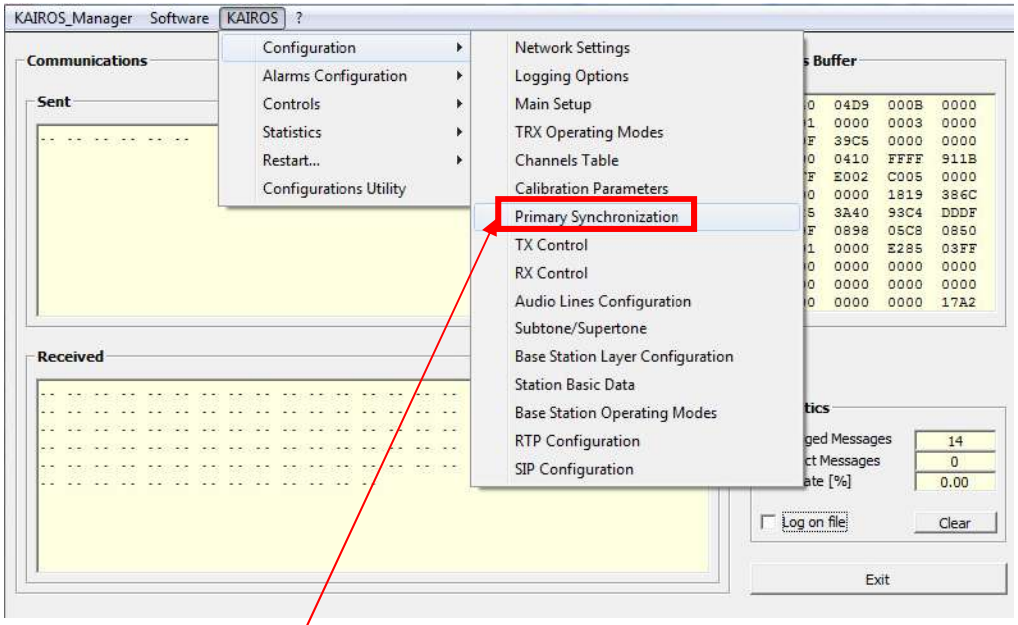


You can modify Beacon Interval

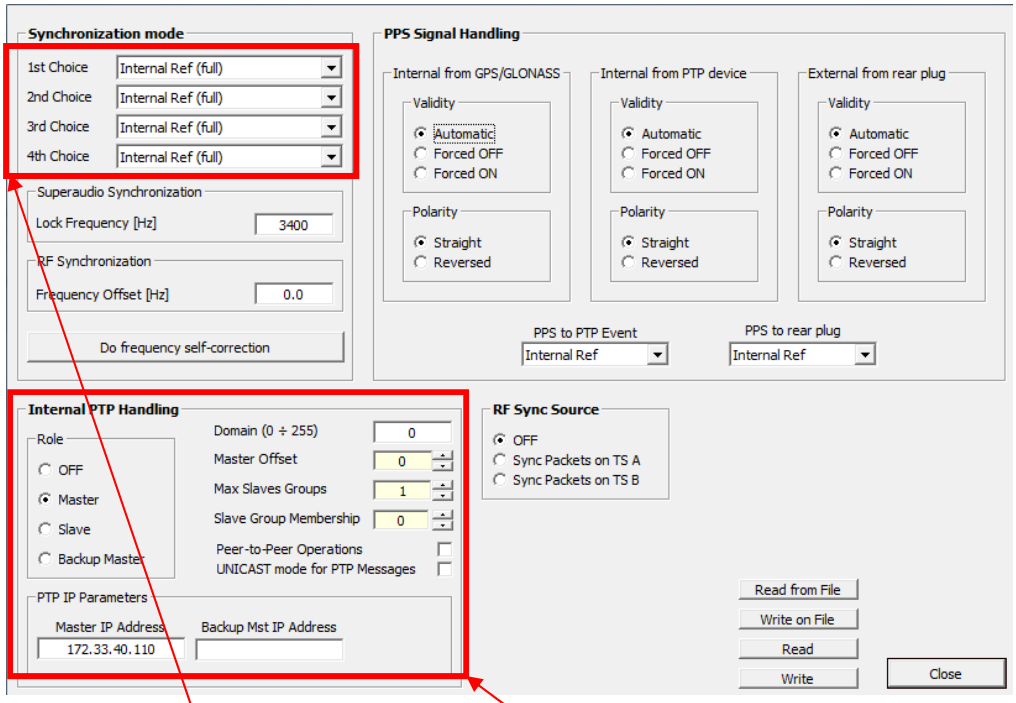
d. Modify Base Station Role.

Base Station Role is MASTER

e. Select Primary Synchronization

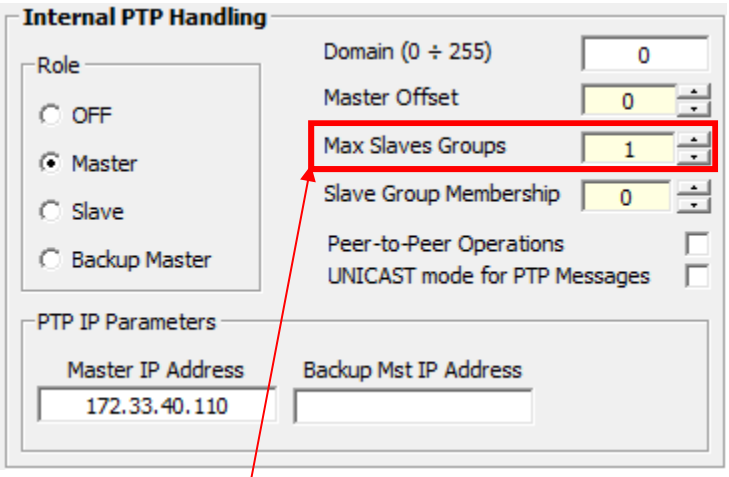


Primary Synchronization



You can modify Synchronization Mode and Internal PTP Handling Mode. You can separate the PTP master repeater and the Master Repeater as a role. It depends on the position on the rack or the network posion in the system. In this case senario, there is no external referense and the Master Repeater will provide his Internal Ref. (VCTCXO) to Slave Repeater. The 1st choice must be Internal Ref (full) and the role of PTP Handling mast be Master.

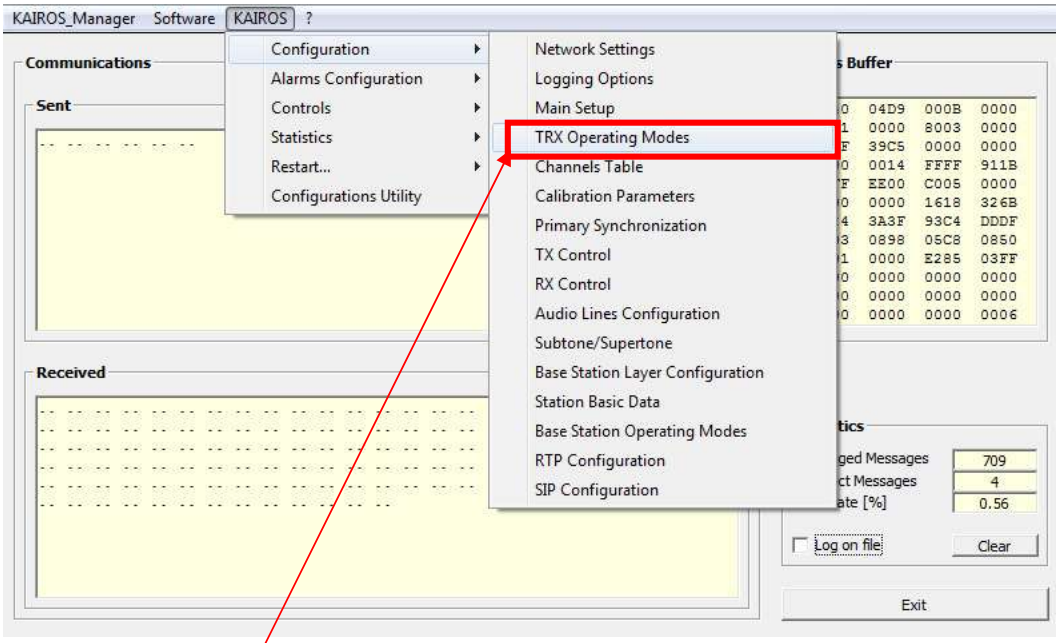
Internal PTP Handling



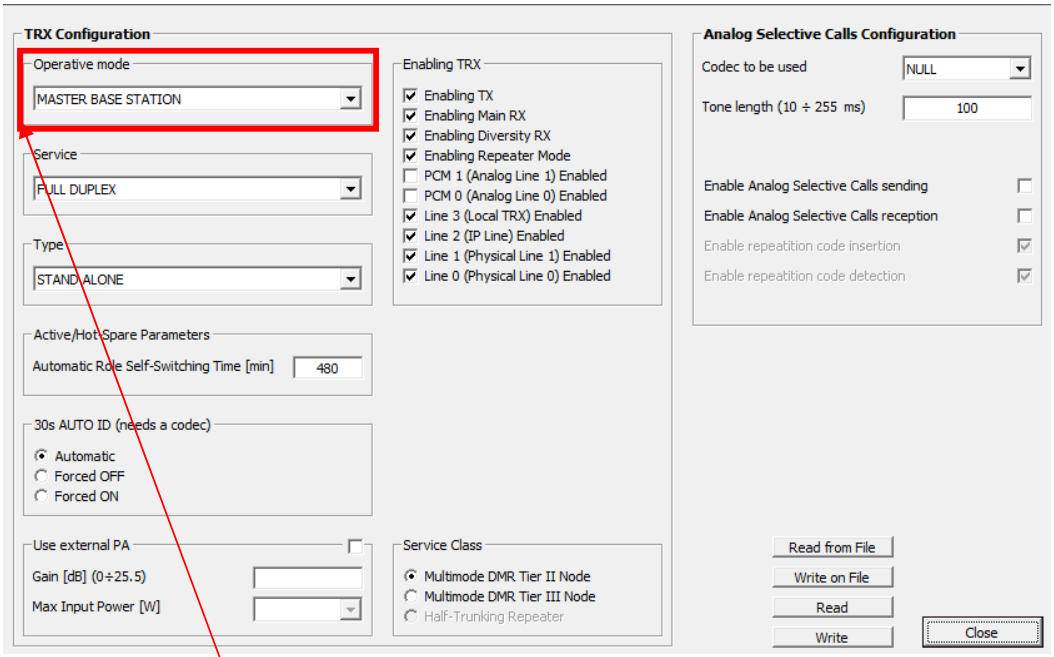
The PTP Slave follows PTP Master as his timing of any transmitting.

You can modify the Max Slaves Group Number which is the maximum number of direction from the PTP Master who provides the PTP signal. In 2sites case, you can select “1” because there is just 1Slave Repeater. Slave Group Membership must be 0 on the PTP Master.

f. Modify TRX Operation Mode



TRX Operation Mode



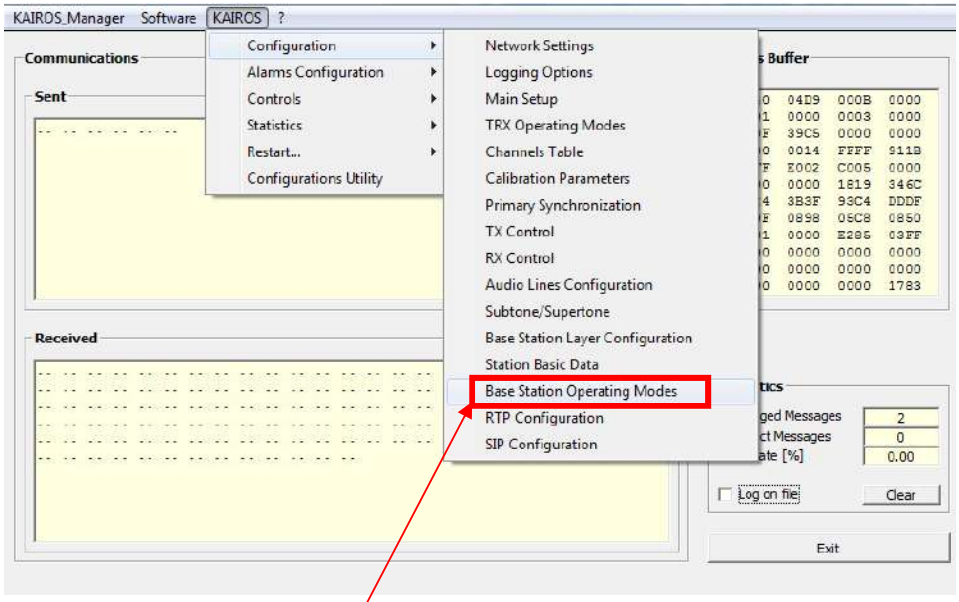
Operation Mode is MASTER BASE STATION

B. Slave Repeater Setup

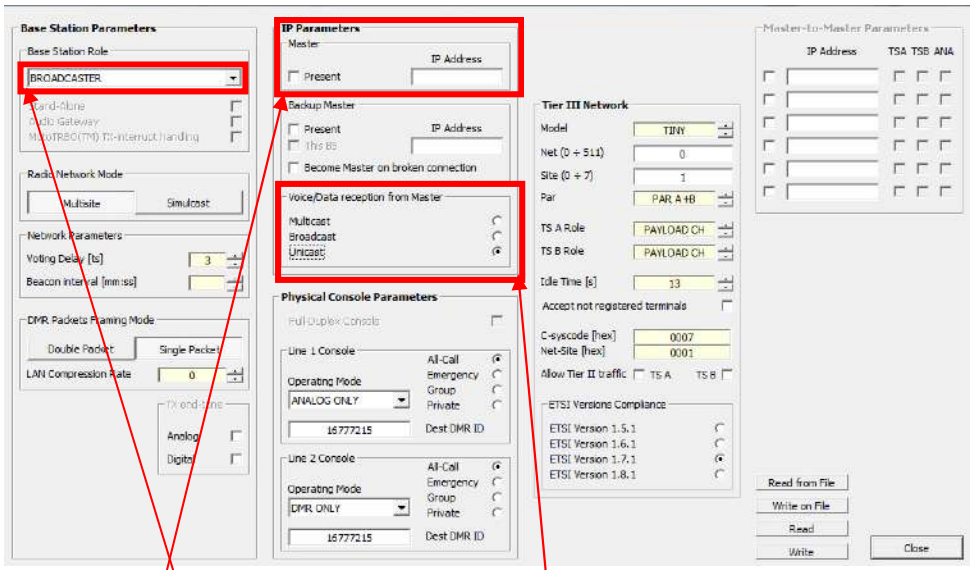
a. Open “SLV.ka” following common procedure.

b. Modify the same items following common procedure.

c. Select Base Station Operation Mode.



Base Station Operation Mode

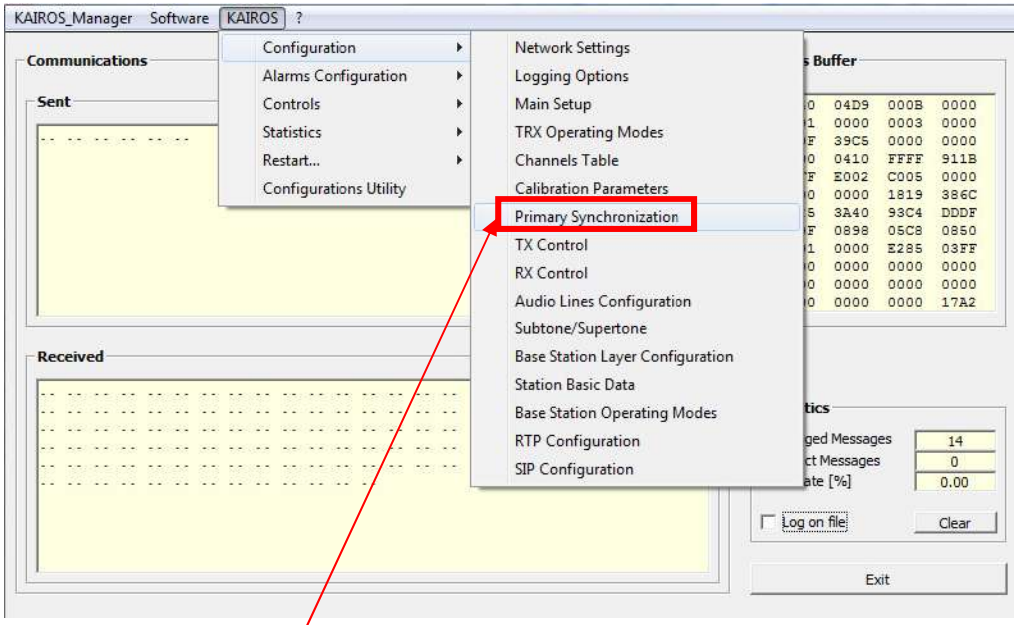


You can edit Master Repeater IP Address and Data Reception Method following customer requirement. Beacon Interval is Blank because all Slave Repeater follows Master Beacon timing.

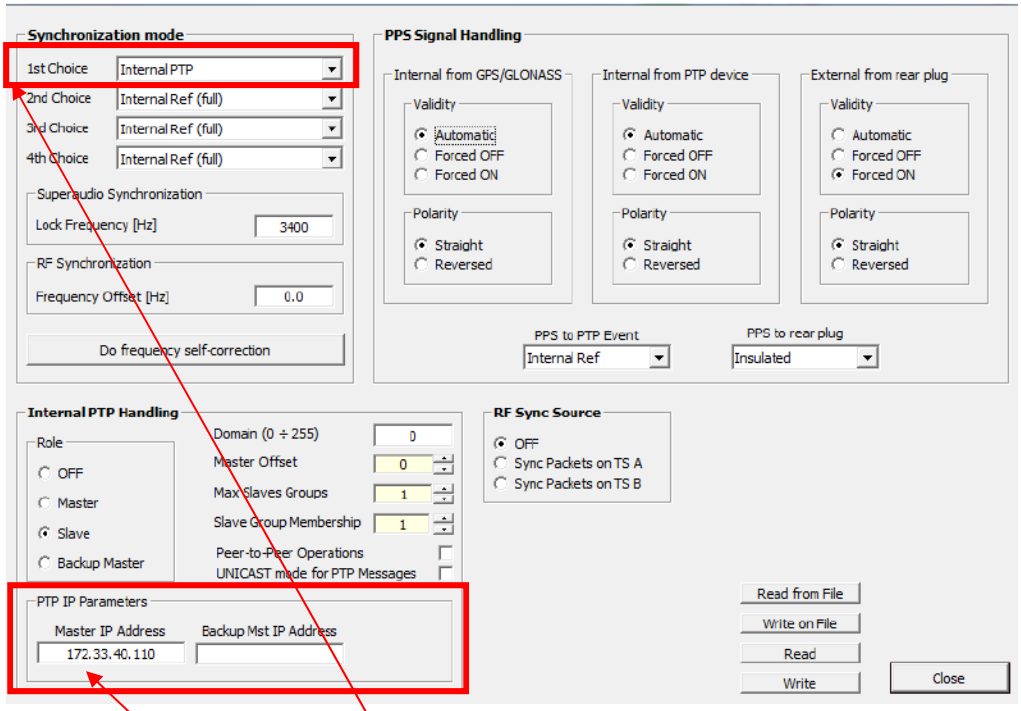
d. Modify Base Station Role

Base Station Role is BROADCASTER

e. Select Primary Synchronization

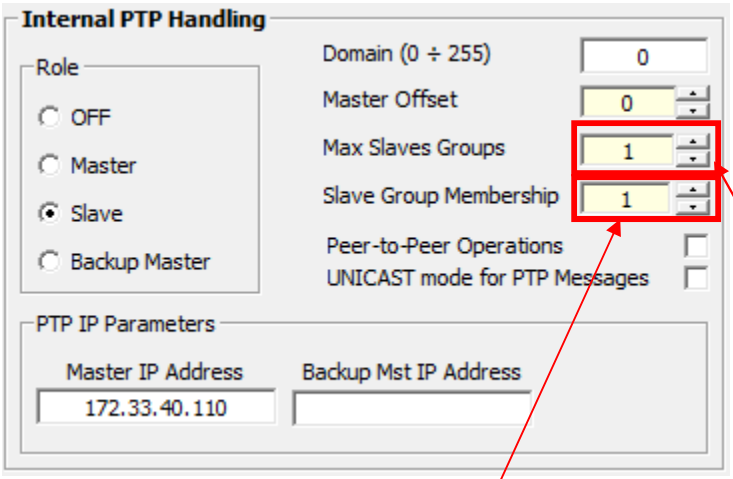


Primary Synchronization



In this case senario, the Master Repeater will provide his Internal Ref. (VCTCXO) to Slave Repeater. The 1st choice must be Internal PTP and the role of PTP Handling mast be Slave. And you must edit PTP Master IP Address to get the PTP signal from the Master.

Internal PTP Handling

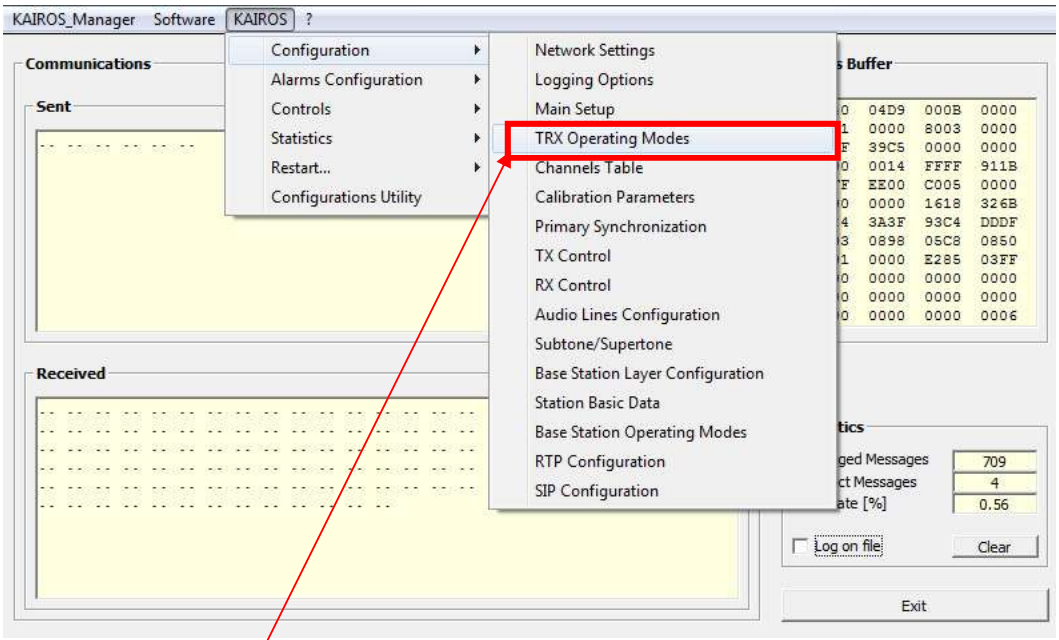


The PTP Slave follows PTP Master as his timing of any transmitting.

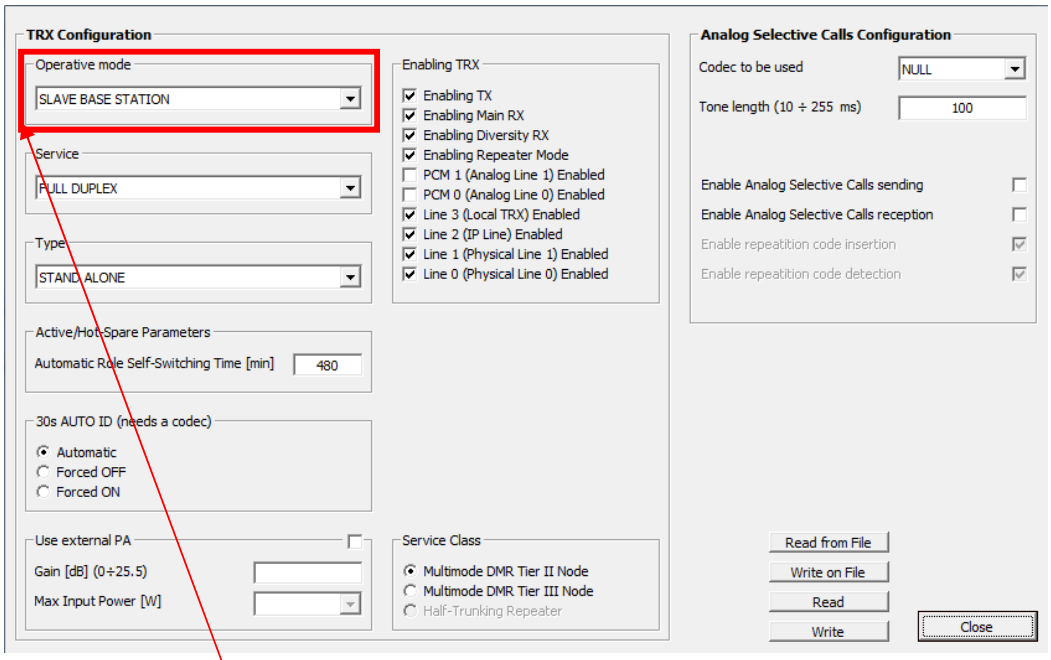
You can modify the Max Slaves Group Number even if it is on the PTP Slave because some PTP Slave becomes Slave Group Master. But it is kind of an option for complicated site structure. In this case senario, I simply suggest Max Slaves Groups on PTP Slave is "1" because there is just 1 slave repeater. Basically this number should be the number of Slaves.

Slave Group Membership must not be 0 on the PTP Slave. Each PTP Slave should have different number except the case of a Slave under Slave PTP Master.

f. Modify TRX Operation Mode



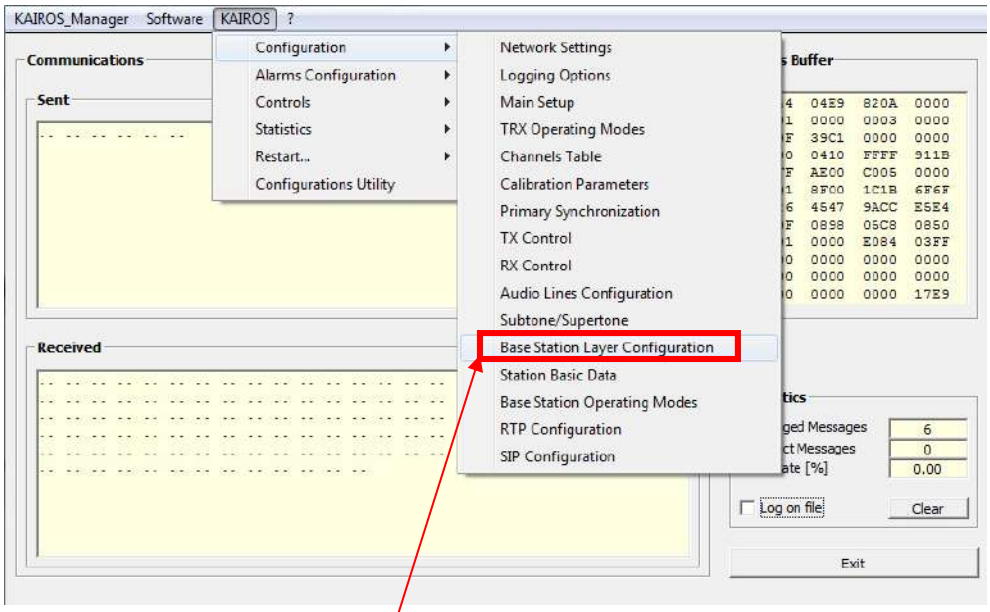
TRX Operation Mode



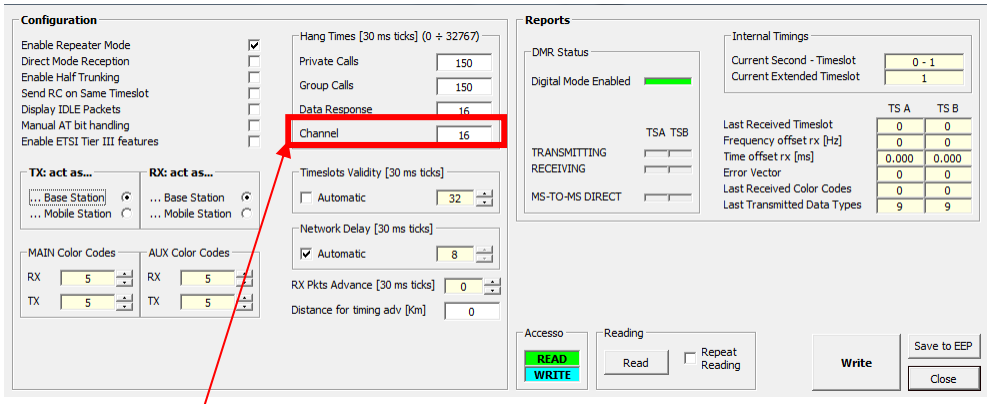
Operation Mode is SLAVE BASE STATION.

C. Beacon Duration Time (Common Setup)

a. Select Base Station Layer Configuration.



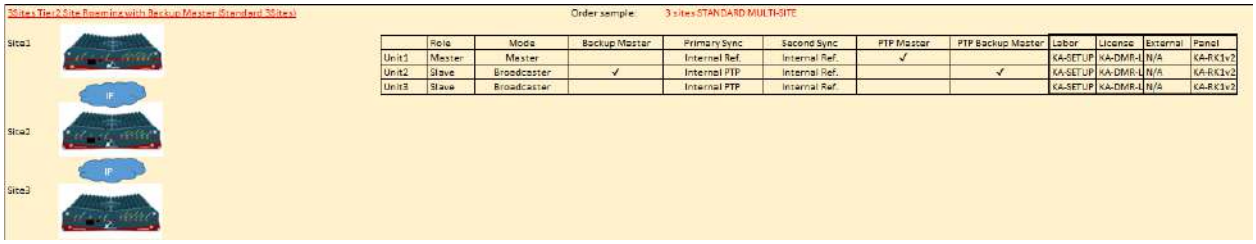
Base Station Layer Configuration



You can modify Channel Hang Time it affect Beacon Duration Time. You must modify this value to each repeaters and it must be same value for expected site roaming behavior on subscriber units.

This affect for voice and data transmission. Channel Hang Time does not allow any interruption from subscriber units which use Busy System Lockout during the timer. I do not recommend to setup long duration for this setting.

2.4. 3sites Roaming System



	Role	Mode	Backup Master	Primary Sync	Second Sync	PTP Master	PTP Backup Master	Labor	License	External	Panel
Unit1	Master	Master		Internel Ref.	Internal Ref.	✓		KA-SETUP	KA-DMR-L	N/A	KA-RK1v2
Unit2	Slave	Broadcaster	✓	Internal PTP	Internal Ref.		✓	KA-SETUP	KA-DMR-L	N/A	KA-RK1v2
Unit3	Slave	Broadcaster		Internal PTP	Internal Ref.			KA-SETUP	KA-DMR-L	N/A	KA-RK1v2

Site1

Unit1: Master Repeater

Site2

Unit2: Backup Master Repeater

Site3

Unit3: Slave Repeater

A. Master Repeater Setup

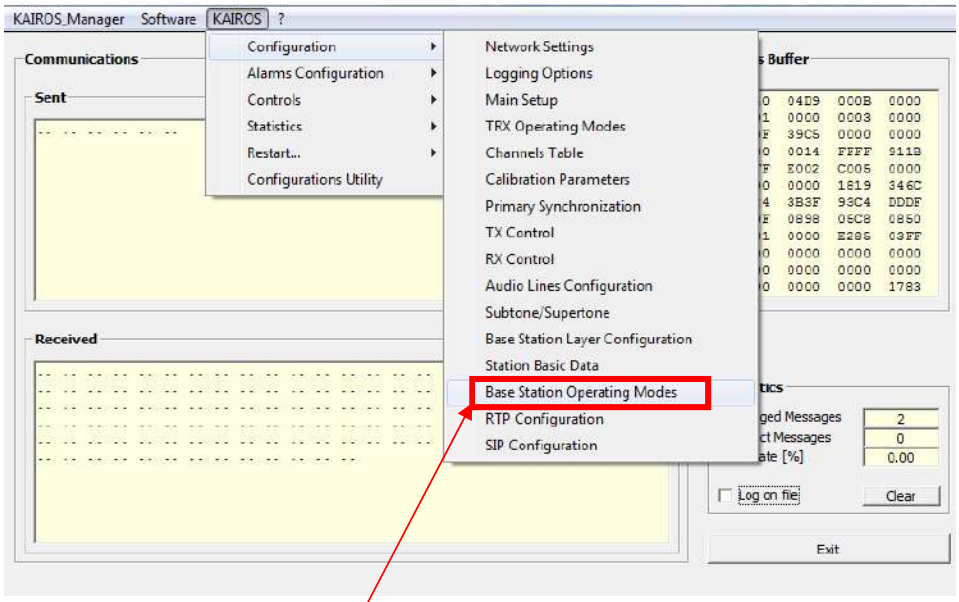
a. Modify the same items following procedure 2.3. (Master Repeater Setup)

B. Backup Master Repeater Setup

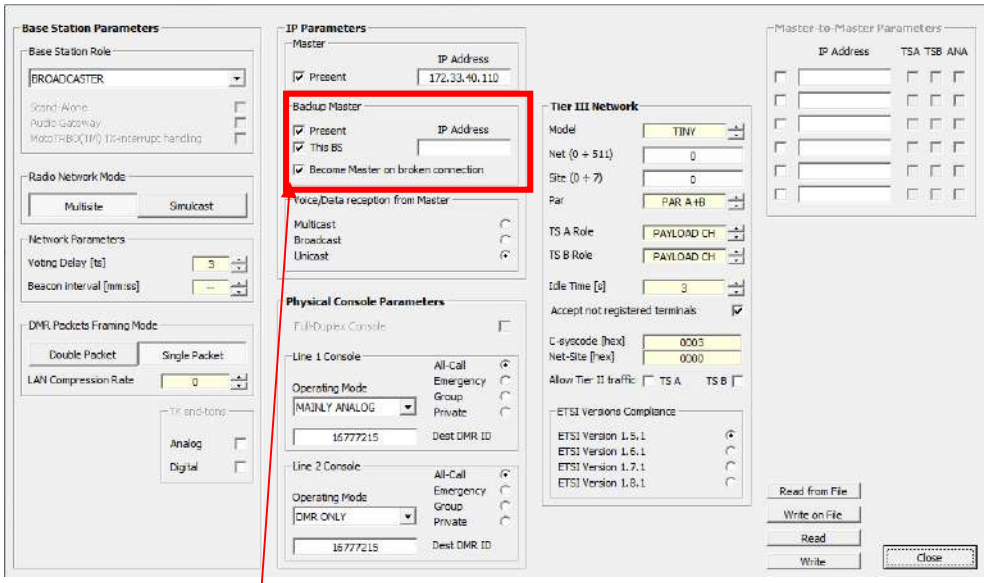
a. Pick a Slave Repeater for Backup Master Repeater.

b. Modify the same items following procedure 2.3. (Slave Repeater Setup)

c. Select Base Station Operation Mode.

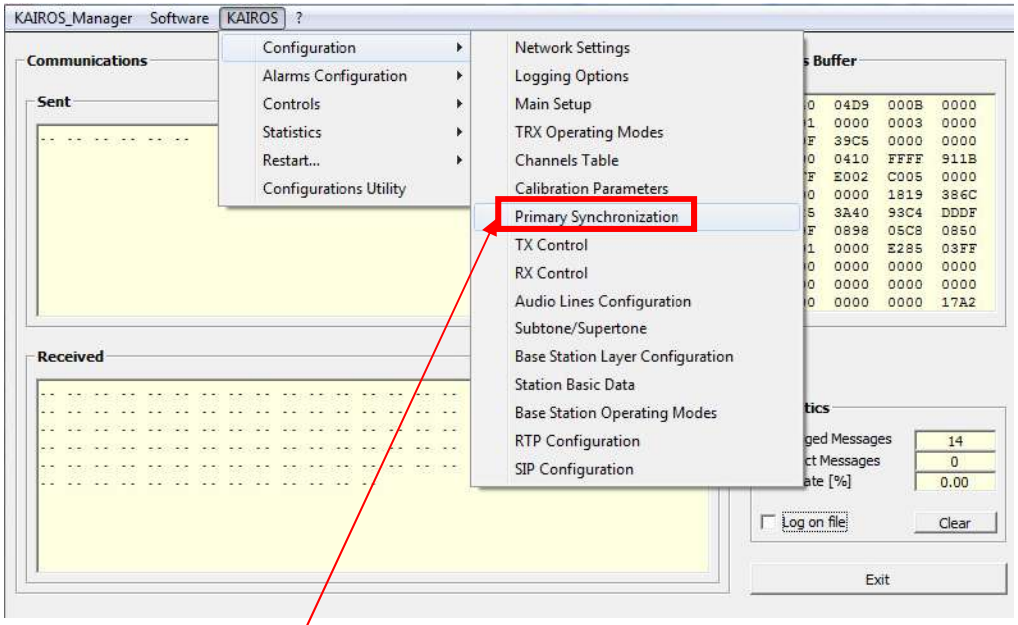


Base Station Operation Mode

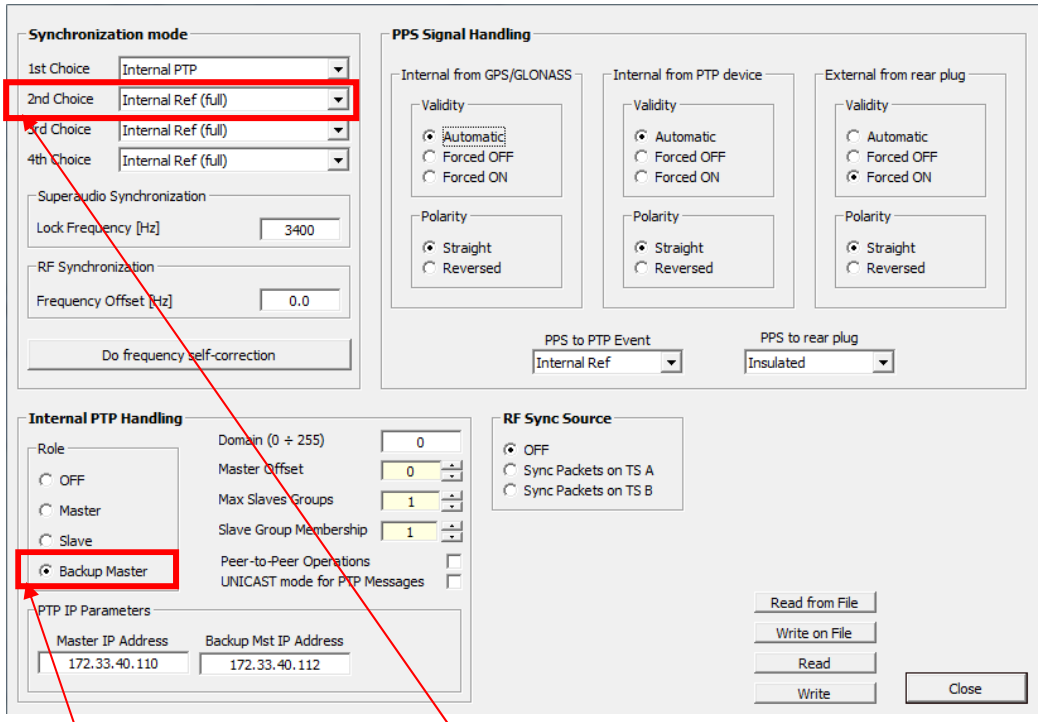


You must all check in Backup Master setup.

d. Select Primary Synchronization



Primary Synchronization

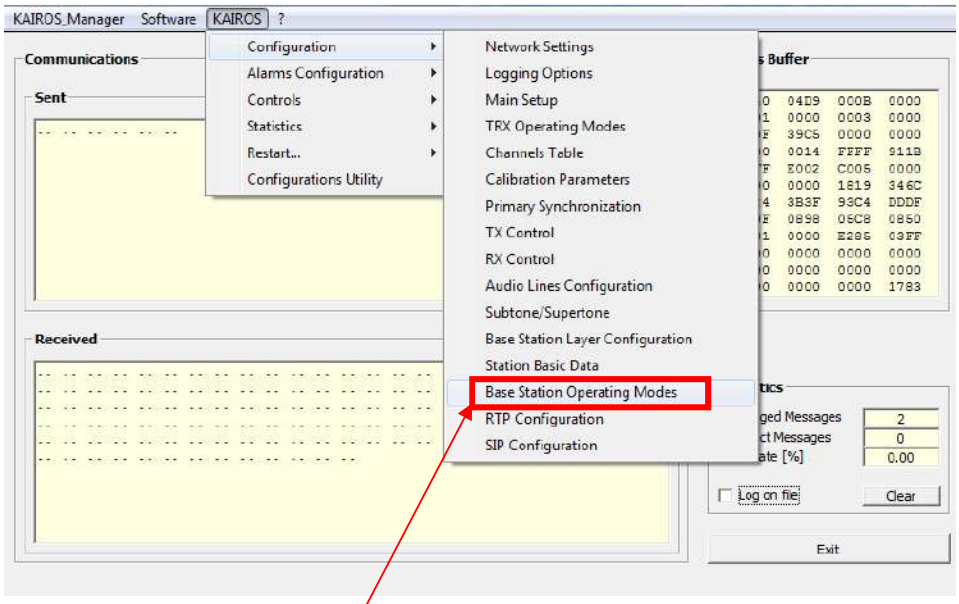


In this case senario, this Slave Repeater becomes Master Repeater when the Primary Master Repeater offline. The 2nd choice must be Internal Ref. (full) and the role of PTP Handling mast be Backup Master.

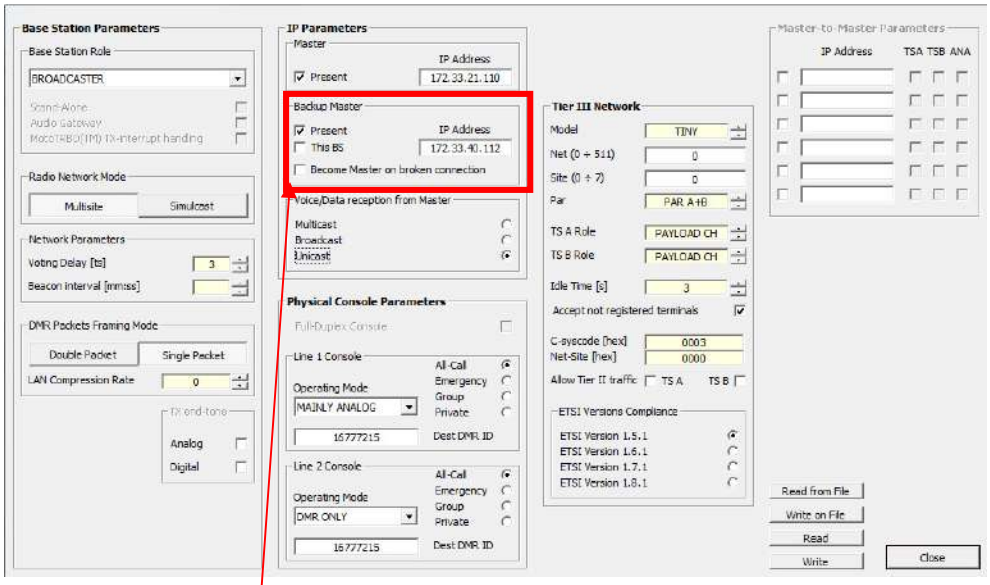
C. Slave Repeater Setup

a. Modify the same items following procedure 2.3. (Slave Repeater Setup)

b. Select Base Station Operation Mode.

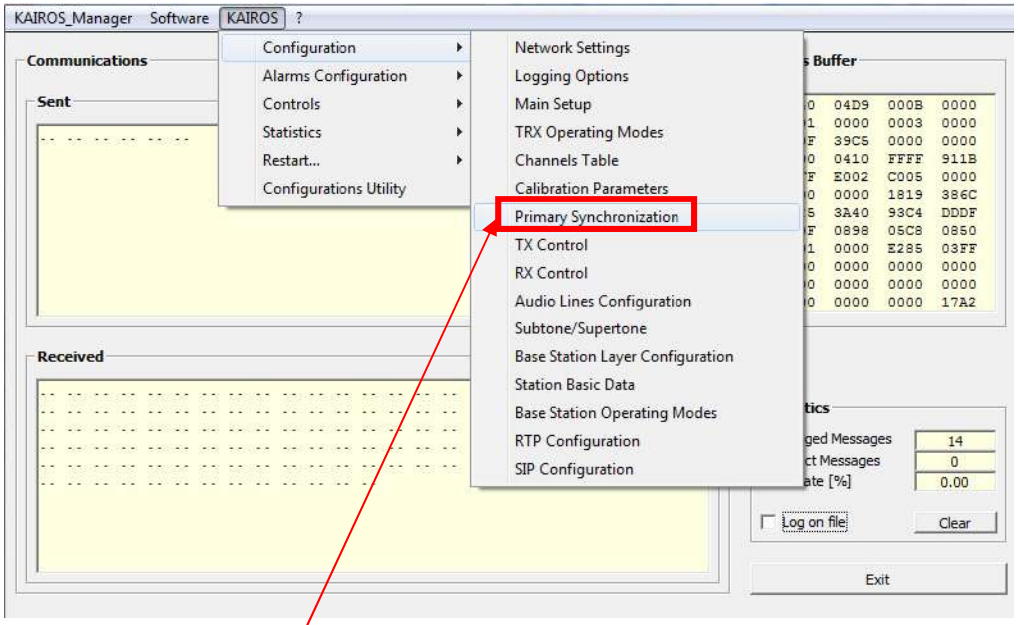


Base Station Operation Mode

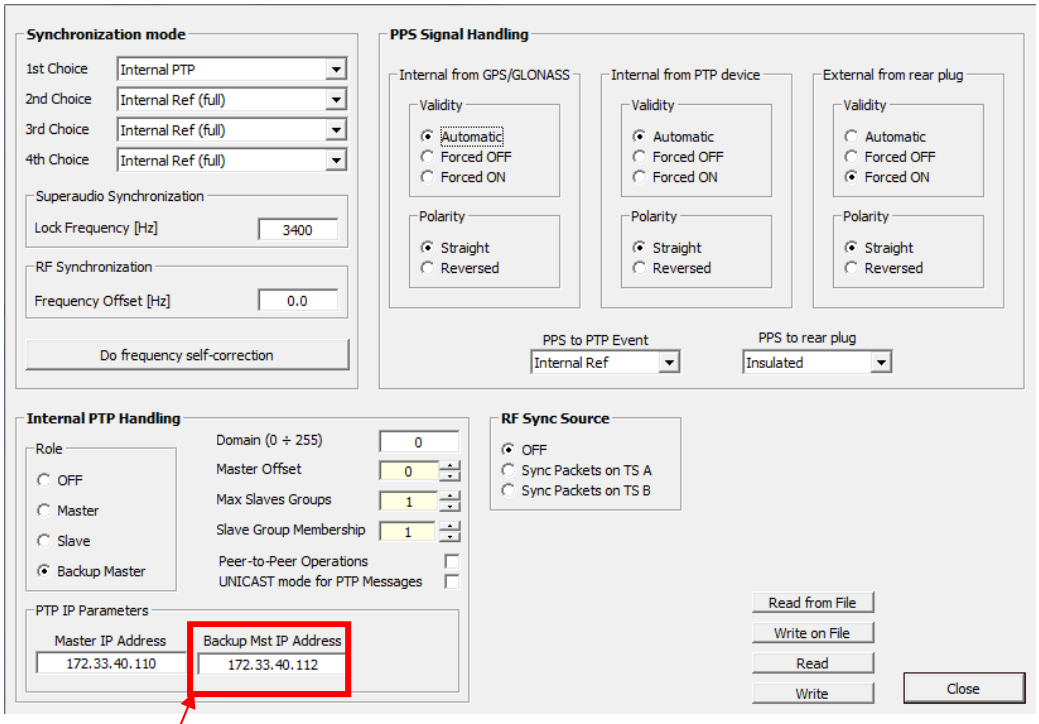


You must edit Backup Master IP Address.

c. Select Primary Synchronization

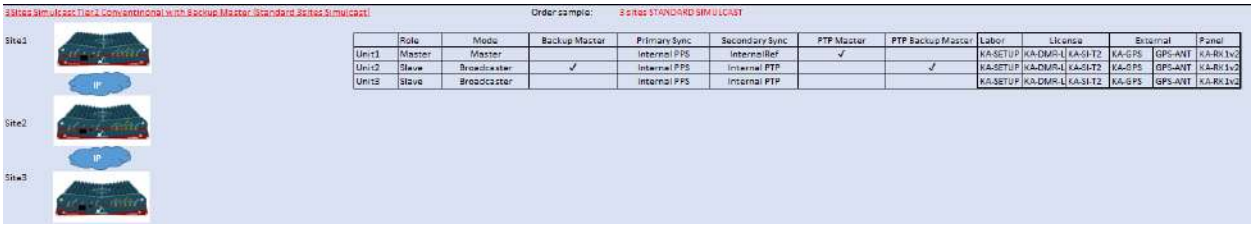


Primary Synchronization



You must edit Backup Master Repeater IP Address on all of Slave Repeaters.

2.5. 3sites Simulcast System



	Role	Mode	Backup Master	Primary Sync	Secondary Sync	PTP Master	PTP Backup Master	Labor	License		External		Panel
Unit1	Master	Master		Internal PPS	InternalRef	✓		KA-SETUP	KA-DMR-L	KA-SI-T2	KA-GPS	GPS-ANT	KA-RK1v2
Unit2	Slave	Broadcaster	✓	Internal PPS	Internal PTP		✓	KA-SETUP	KA-DMR-L	KA-SI-T2	KA-GPS	GPS-ANT	KA-RK1v2
Unit3	Slave	Broadcaster		Internal PPS	Internal PTP			KA-SETUP	KA-DMR-L	KA-SI-T2	KA-GPS	GPS-ANT	KA-RK1v2

Site1

Unit1: Master Repeater

Site2

Unit2: Backup Master Repeater

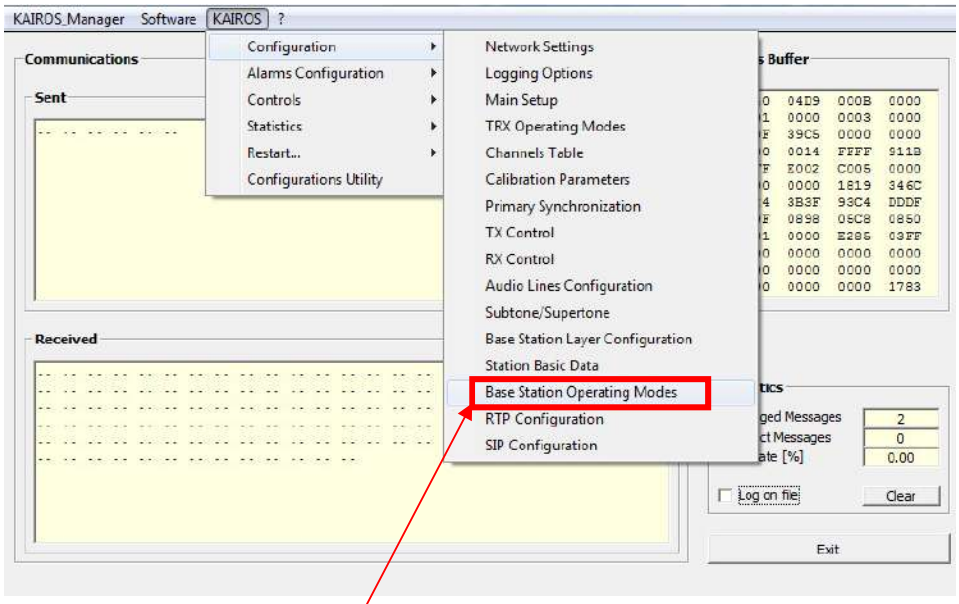
Site3

Unit3: Slave Repeater

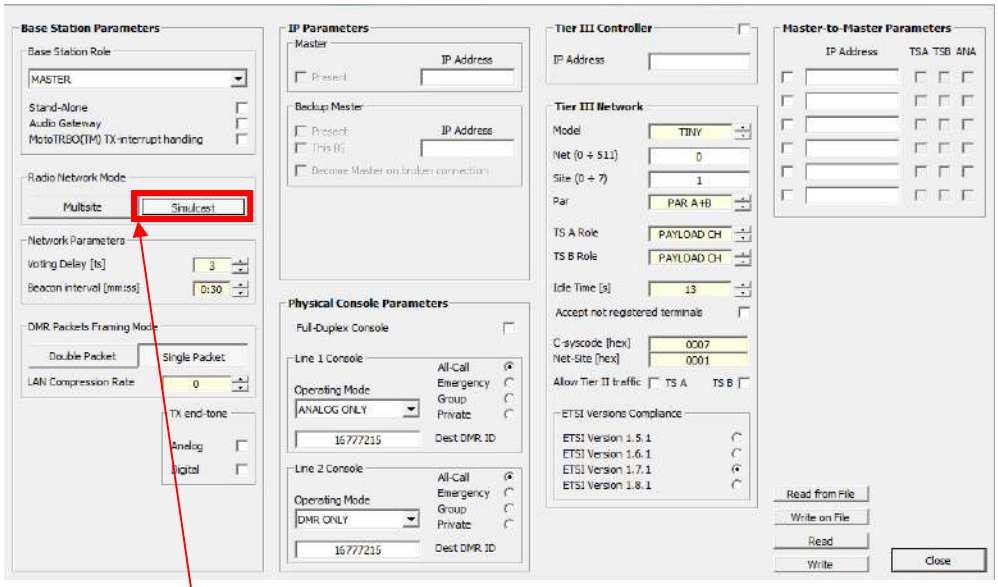
A. Simulcast Repeater Setup

a. Modify the same items following procedure 2.4. (for each repeater role)

b. Select Base Station Operation Mode.

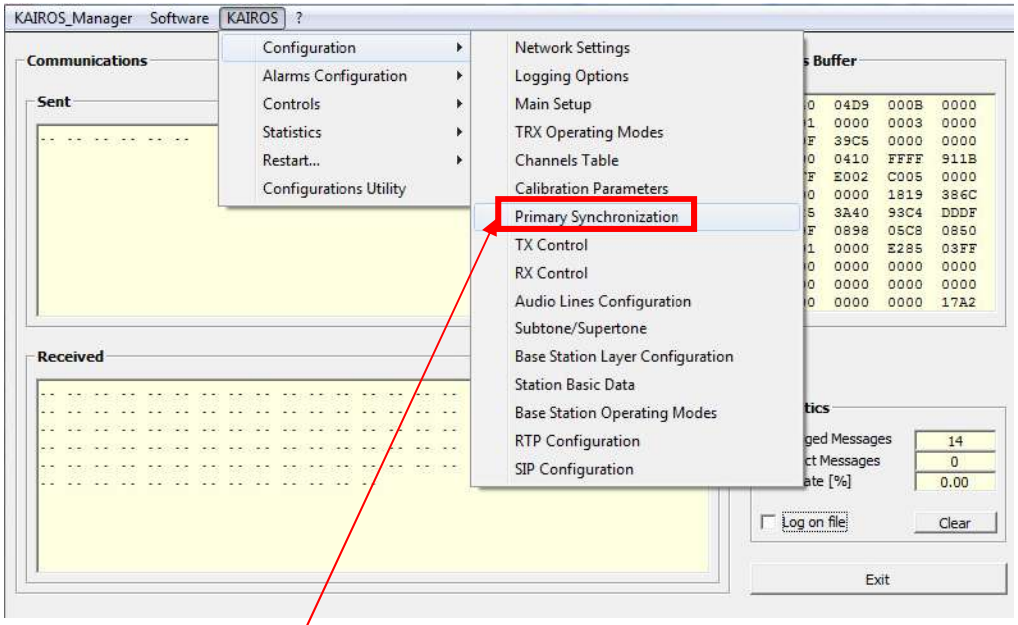


Base Station Operation Mode

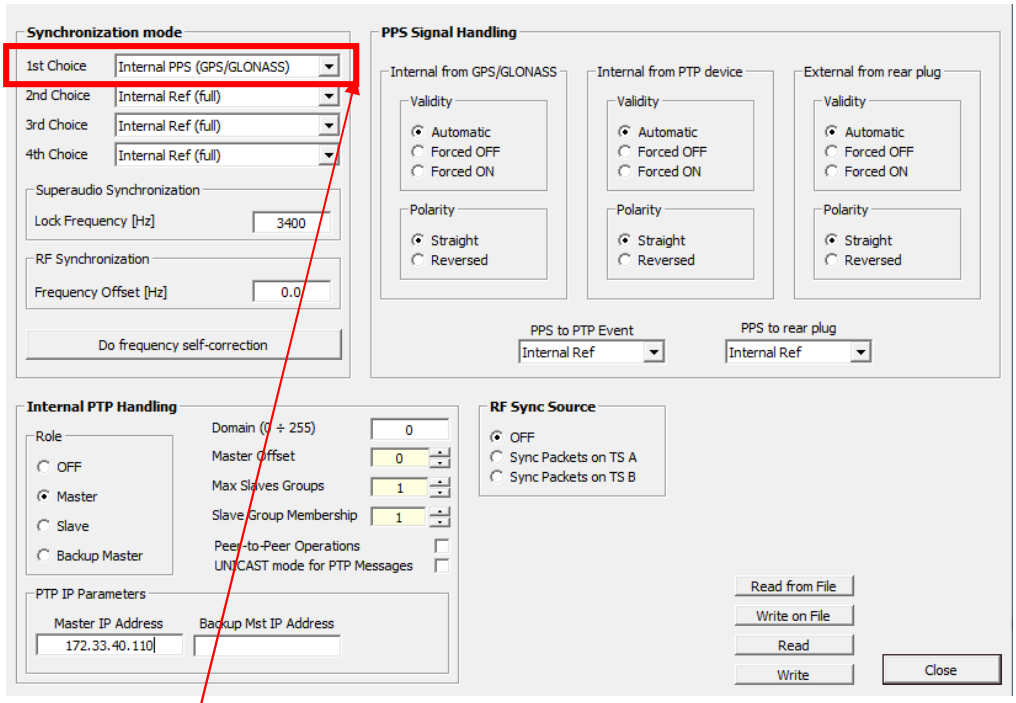


You must select Simulcast Mode. Beacon Interval Time is not available when you select Simulcast.

c. Select Primary Synchronization.



Primary Synchronization



You must select Internal PPS for 1st Choice.

2.6. IP/RF Link Mixed System

Case1

	Role	Mode	Backup Master	Primary Sync	Second Sync	PTP Master	PTP Backup Master	Labor	License	External	Panel
Unit1	Master	Master		Internal Ref.	Internal Ref.	✓		KA-SETUP	KA-DMR-L	N/A	KA-RK2
Unit2	Link Down to Net	RF Link Down		Internal PTP	Internal Ref.			KA-SETUP	KA-DMR-L	N/A	
Unit3	Slave	Broadcaster	✓	Internal PTP	Internal Ref.		✓	KA-SETUP	KA-DMR-L	N/A	KA-RK1v2
Unit4	Slave	Broadcaster		Internal PTP	Internal Ref.			KA-SETUP	KA-DMR-L	N/A	KA-RK2
Unit5	Link Up to Master	RF Link Up		RF Link (DMR)	Internal Ref.	✓		KA-SETUP	KA-DMR-L	N/A	

Site1

Unit1: Master Repeater

Unit2: RF Down Link Repeater on Master Site

Site2

Unit3: Backup Master Repeater

Site3

Unit4: Broadcaster on Slave Site

Unit5: RF Up Link Repeater on Slave Site

- These 2repeaters have to be connected by PPS cable.

A. Master Repeater Setup

a. Select BDCST MST SITE.ka.

b. Modify the same items following procedure 2.4. (Master Repeater Setup)

B. Backup Master Repeater Setup

a. Select BDCST SLV SITE.ka.

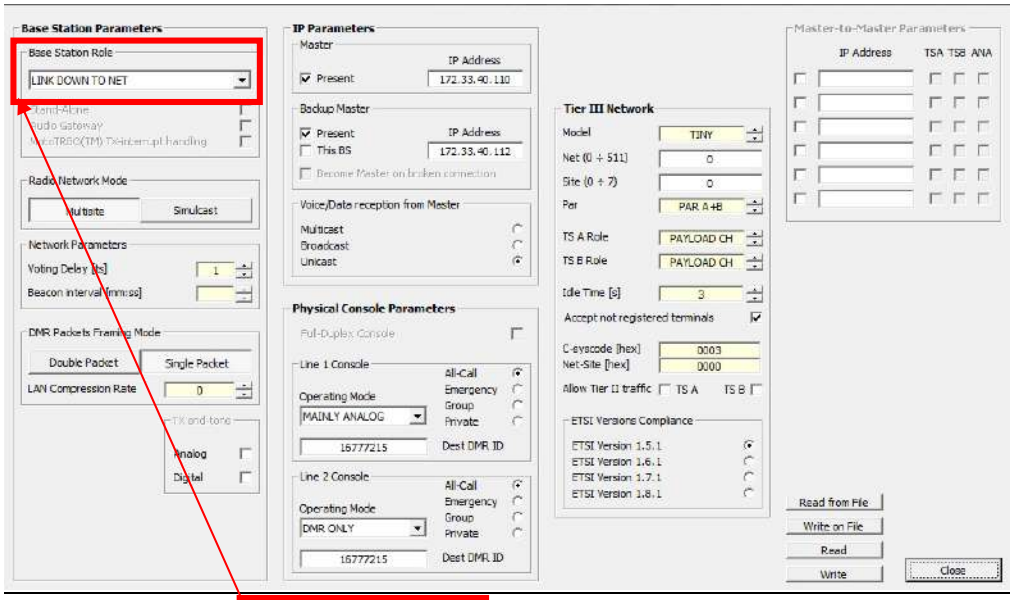
b. Modify the same items following procedure 2.4. (Backup Master Repeater Setup)

C. RF Down Link Repeater on Master Site Setup

a. Select DOWNLINK MST SITE.ka.

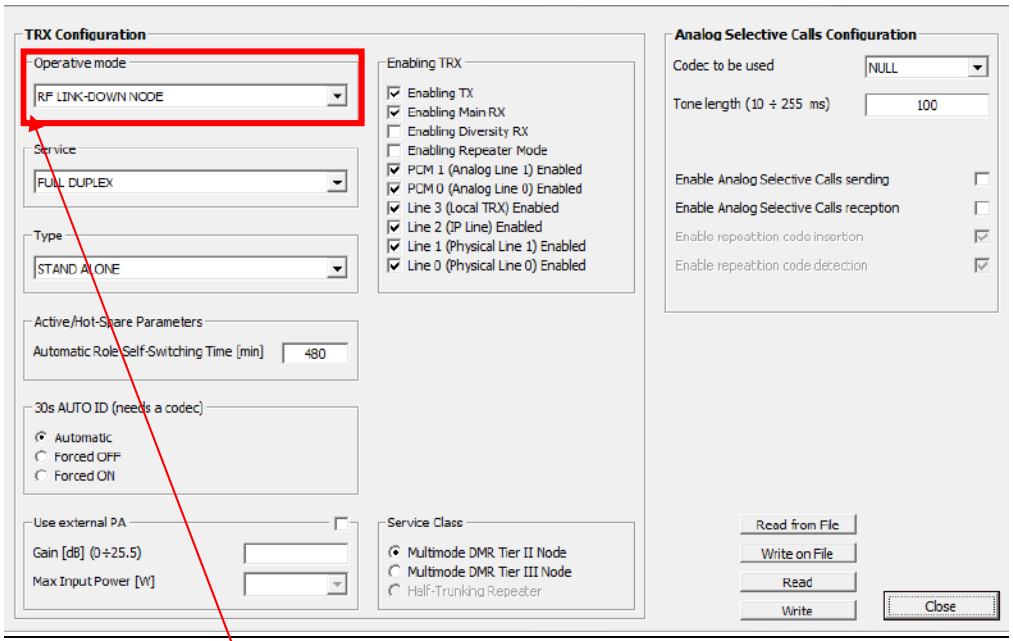
b. Modify the same items following procedure 2.4. (Slave Repeater Setup)

c. Modify Base Station Role



Base Station Role is LINK DOWN TO NET.

d. Modify TRX Operation Mode



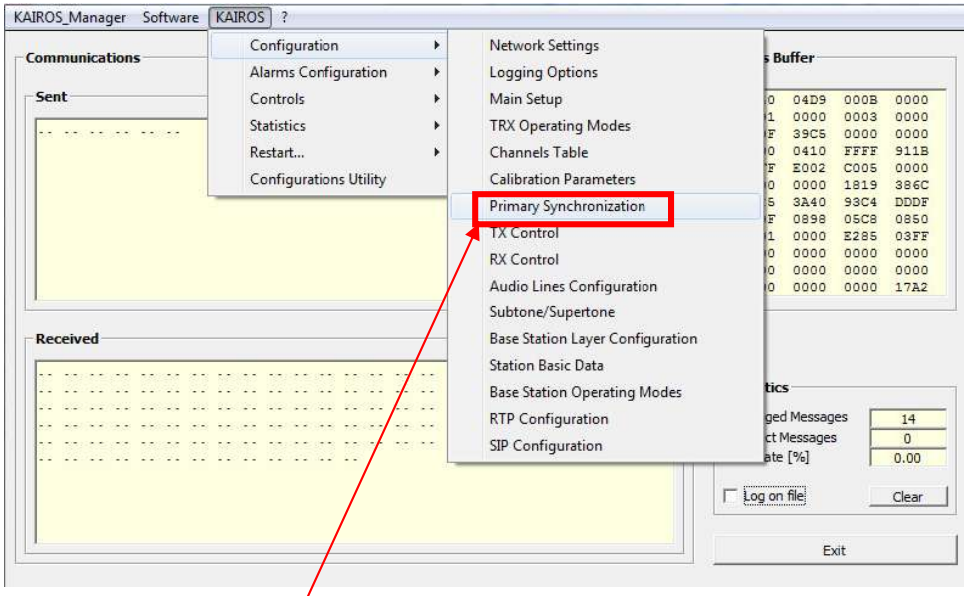
Operation Mode is RF LINK-DOWN NODE.

D. RF Up Link Repeater on Slave Site Setup

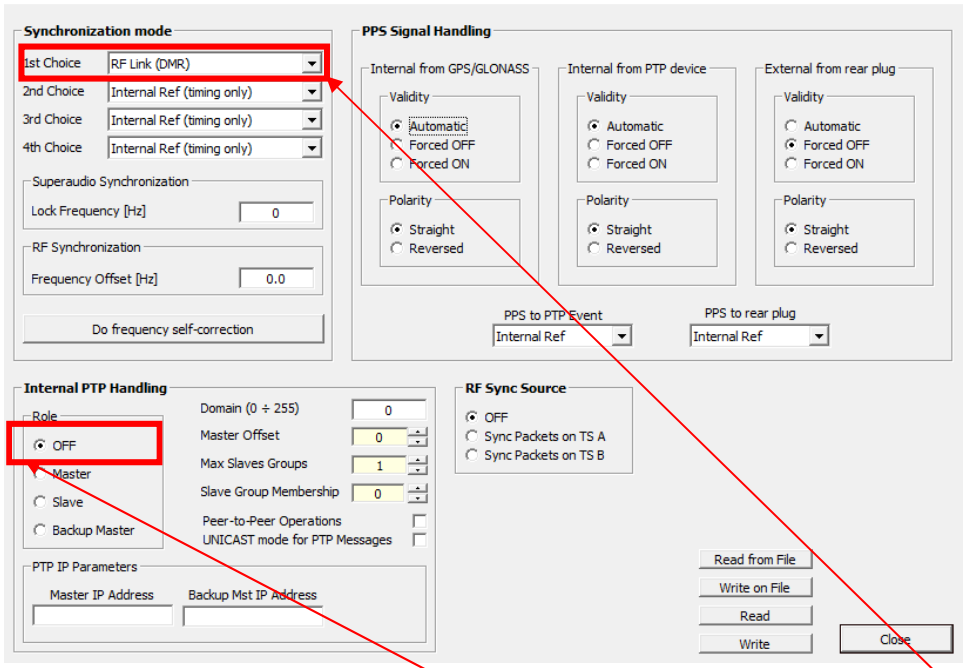
a. Select UPLINK SLV SITE.ka.

b. Modify the same items following common procedure.

c. Select Primary Synchronization

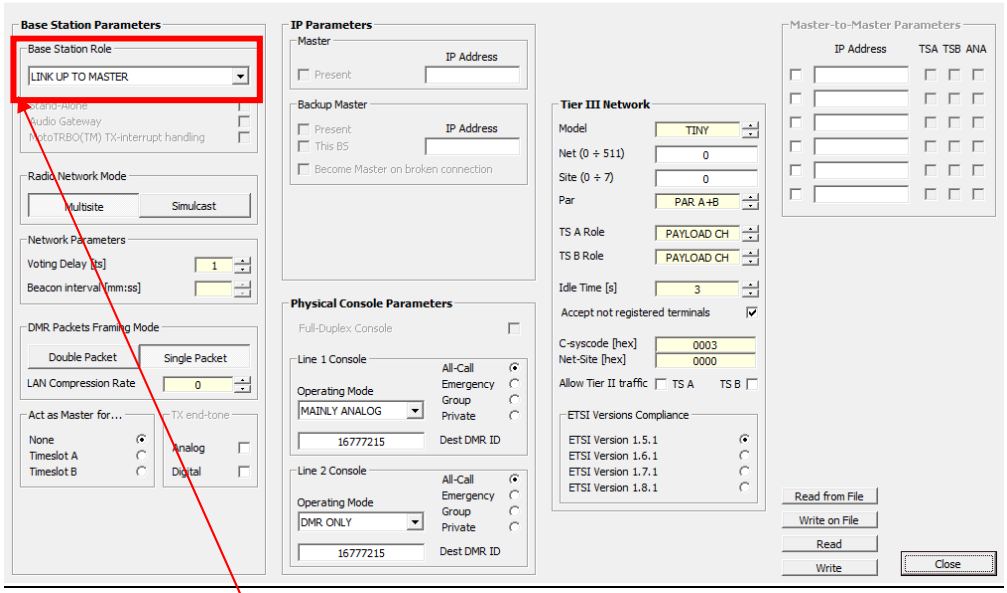


Primary Synchronization



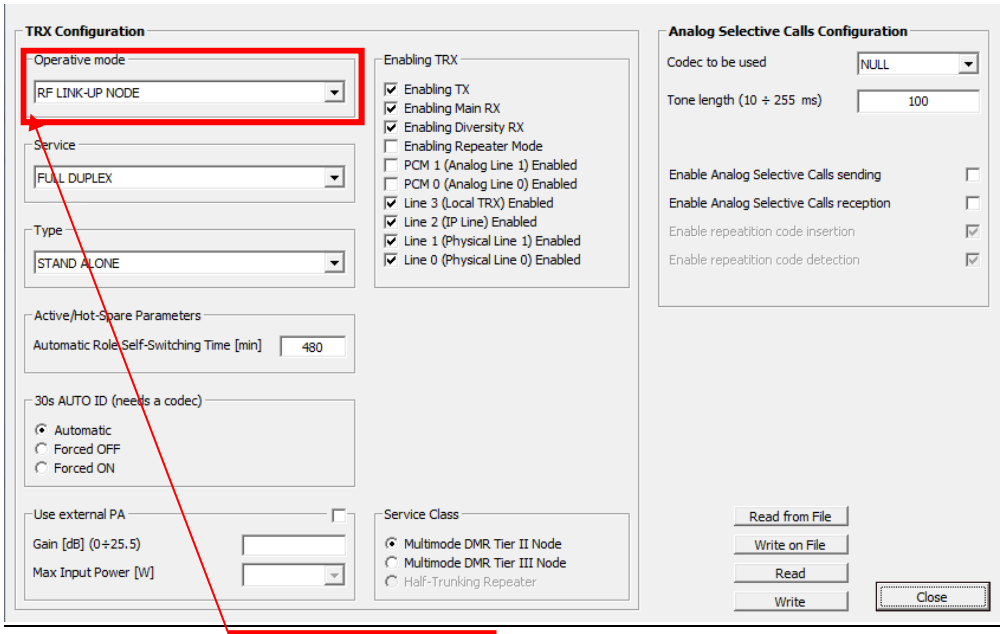
The synchronization sourse is RF Link Down Repeater. So the 1st choice must be RF Link (DMR) and the role of PTP Handling mast be OFF because this repeater will provide PPS signal by a cable backside.

d. Modify Base Station Role



Base Station Role is LINK DOWN TO MASTER.

e. Modify TRX Operation Mode



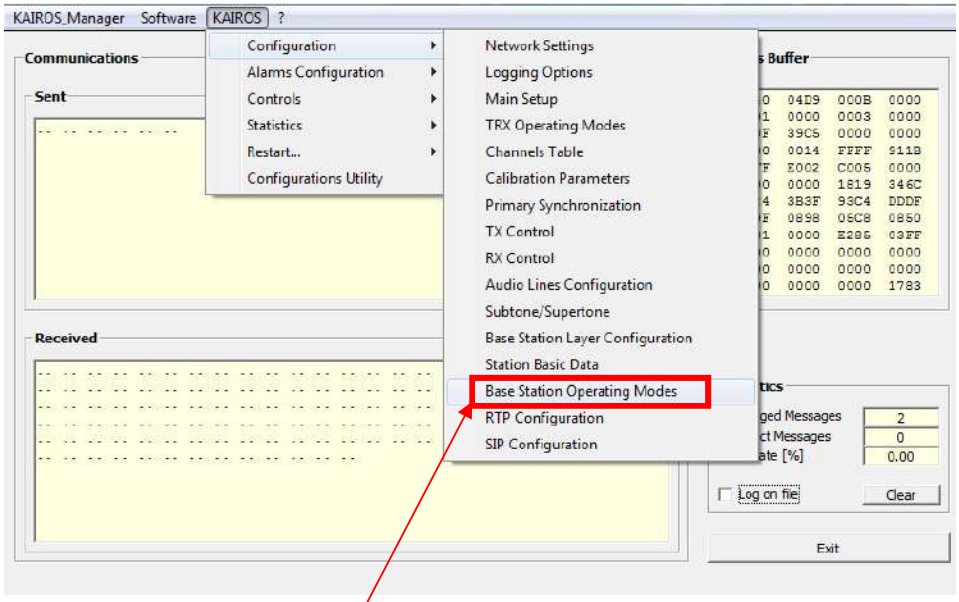
Operation Mode is RF LINK-UP NODE.

E. Broadcaster on Slave Site Setup

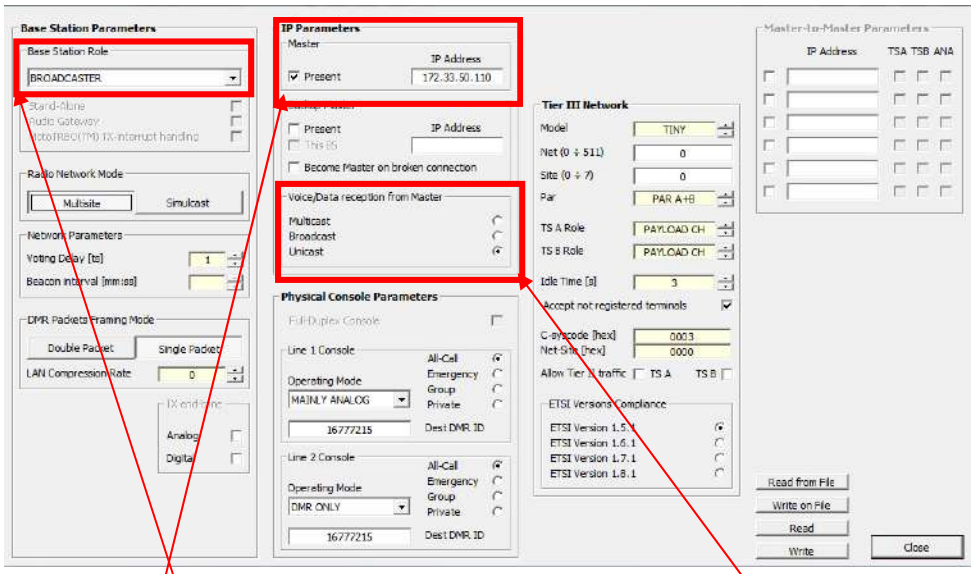
a. Select BDCST SLV SITE.ka.

b. Modify the same items following common procedure.

c. Select Base Station Operation Mode.



Base Station Operation Mode

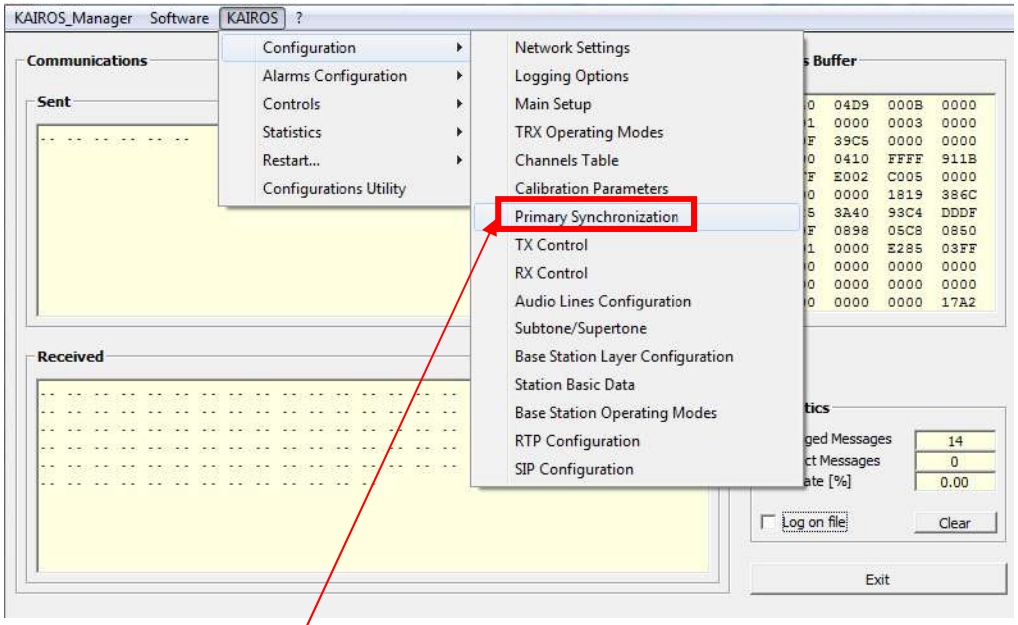


You can edit Master Repeater IP Address in this island site and Data Reception Method following customer requirement. Beacon Interval is Blank because all Slave Repeater follows Master Beacon timing.

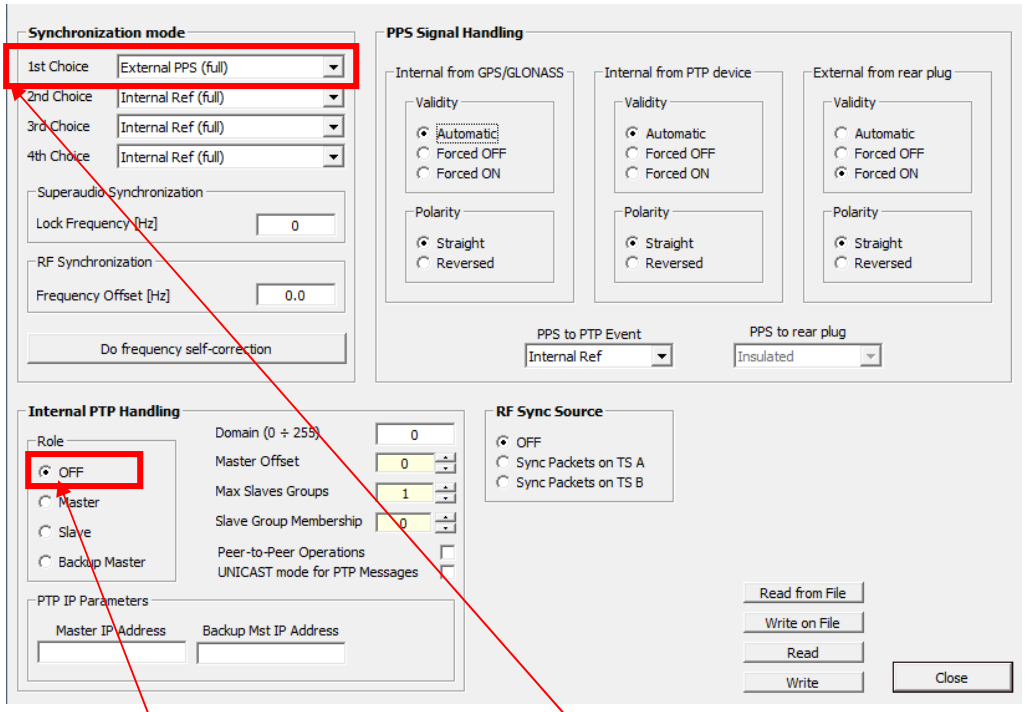
d. Modify Base Station Role

Base Station Role is BROADCASTER

e. Select Primary Synchronization

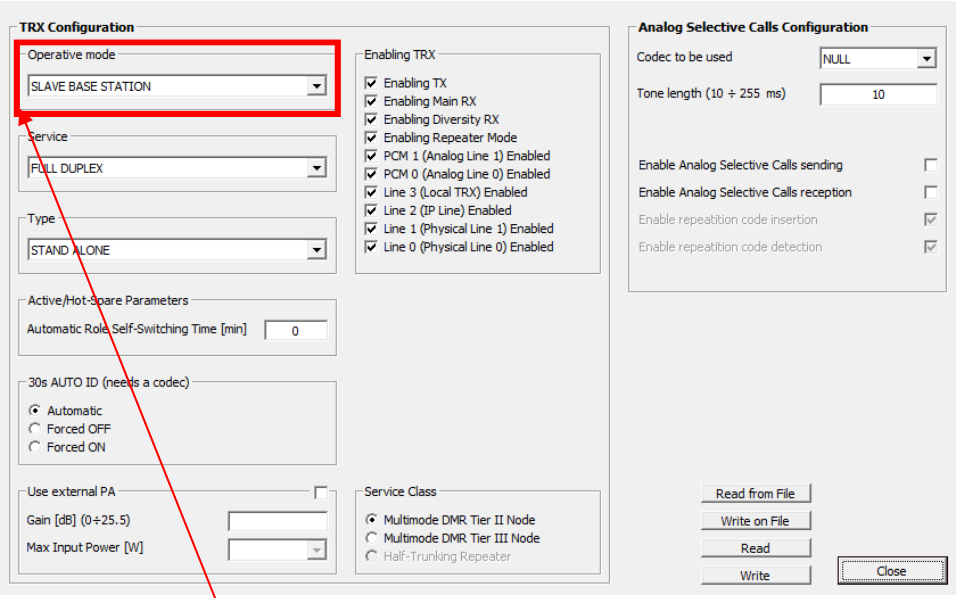


Primary Synchronization



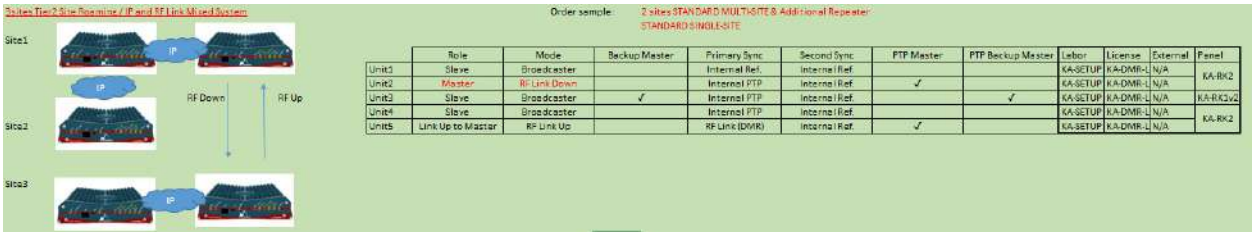
In this case senario, the Master Repeater in this island site will provide PPS signal following the RF Link Synchronization. The 1st choice must be External PPS(full) and the role of PTP Handling mast Off.

f. Modify TRX Operation Mode



Operation Mode is SLAVE BASE STATION

Case2



Order sample: 2 sites STANDARD MULTI-SITE & Additional Repeater
STANDARD SINGLE-SITE

	Role	Mode	Backup Master	Primary Sync	Second Sync	PTP Master	PTP Backup Master	Lebor	License	External	Panel
Unit1	Slave	Broadcaster		Internal Ref.	Internal Ref.			KA-SETUP	KA-DMR-L	N/A	KA-RK2
Unit2	Master	RF Link Down		Internal PTP	Internal Ref.	✓		KA-SETUP	KA-DMR-L	N/A	
Unit3	Slave	Broadcaster	✓	Internal PTP	Internal Ref.		✓	KA-SETUP	KA-DMR-L	N/A	KA-RK2v2
Unit4	Slave	Broadcaster		Internal PTP	Internal Ref.			KA-SETUP	KA-DMR-L	N/A	KA-RK2
Unit5	Link Up to Master	RF Link Up		RF Link (DMR)	Internal Ref.	✓		KA-SETUP	KA-DMR-L	N/A	

Site1

Unit1: Broadcaster on Master Site

Unit2: Master / RF Down Link Repeater on Master Site

Site2

Unit3: Backup Master Repeater

Site3

Unit4: Broadcaster on Slave Site

Unit5: RF Up Link Repeater on Slave Site

- These 2repeaters have to be connected by PPS cable.

A. Broadcaster on Master Site Setup

a. Select BDCST MST SITE.ka.

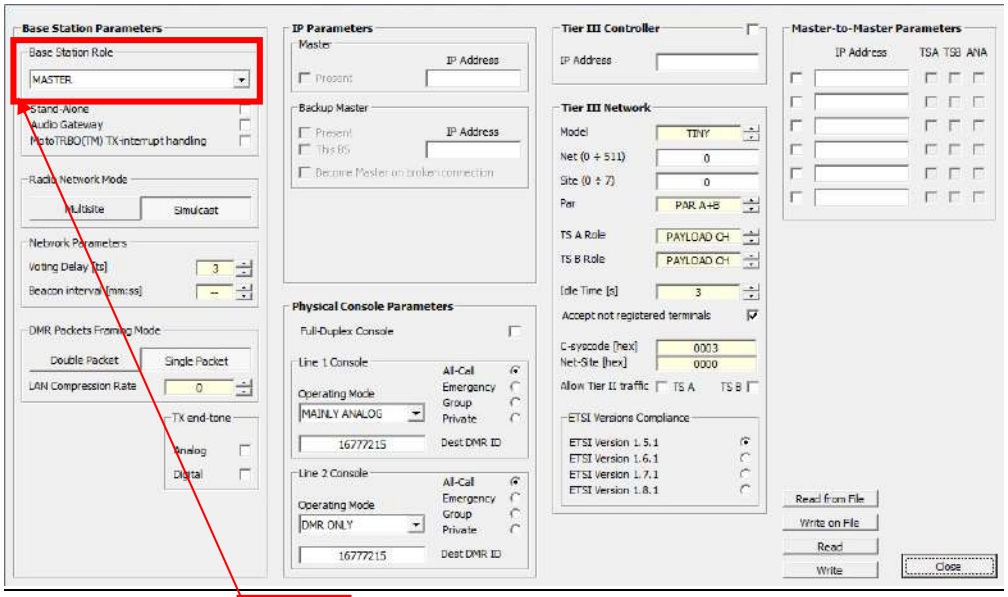
b. Modify the same items following procedure 2.4. (Slave Repeater Setup)

B. Master / RF Down Link Repeater on Master Site Setup

a. Select DOWNLINK MST SITE.ka.

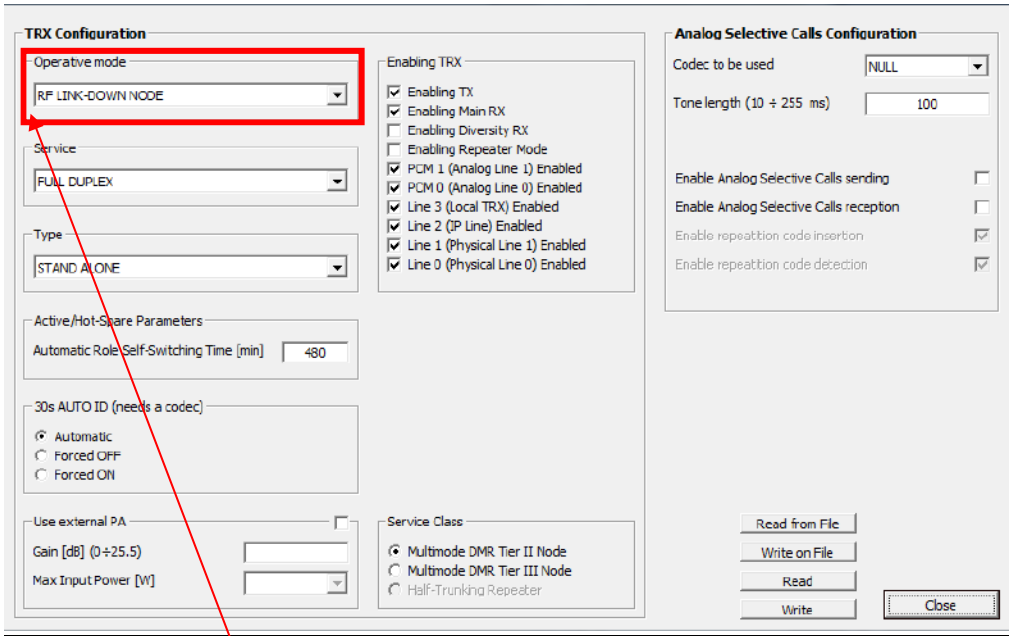
b. Modify the same items following procedure 2.4. (Master Repeater Setup)

c. Modify Base Station Role



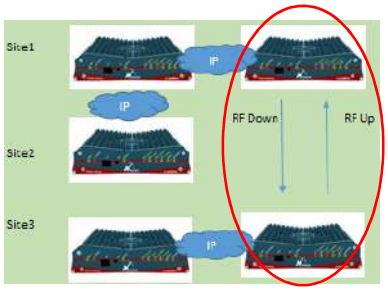
Base Station Role is MASTER.

d. Modify TRX Operation Mode

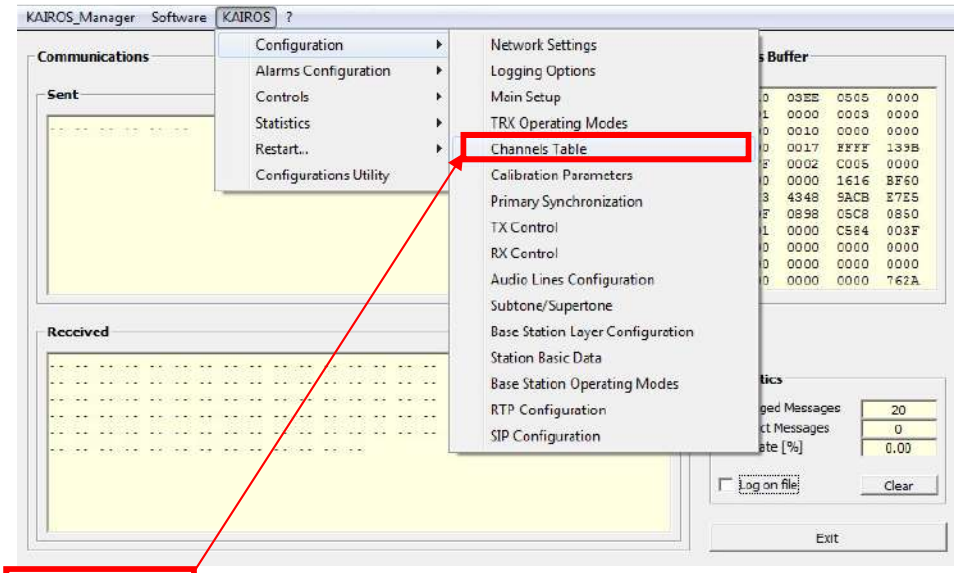


Operation Mode is RF LINK-DOWN NODE.

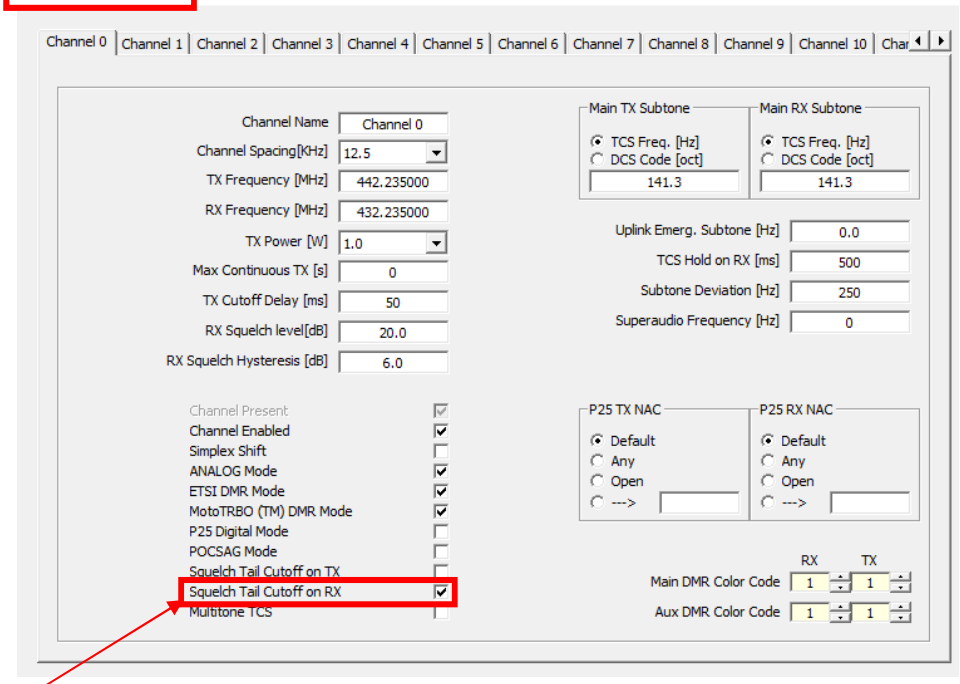
Common Procedure on RF Linked Repeater



a. Select Channel Table

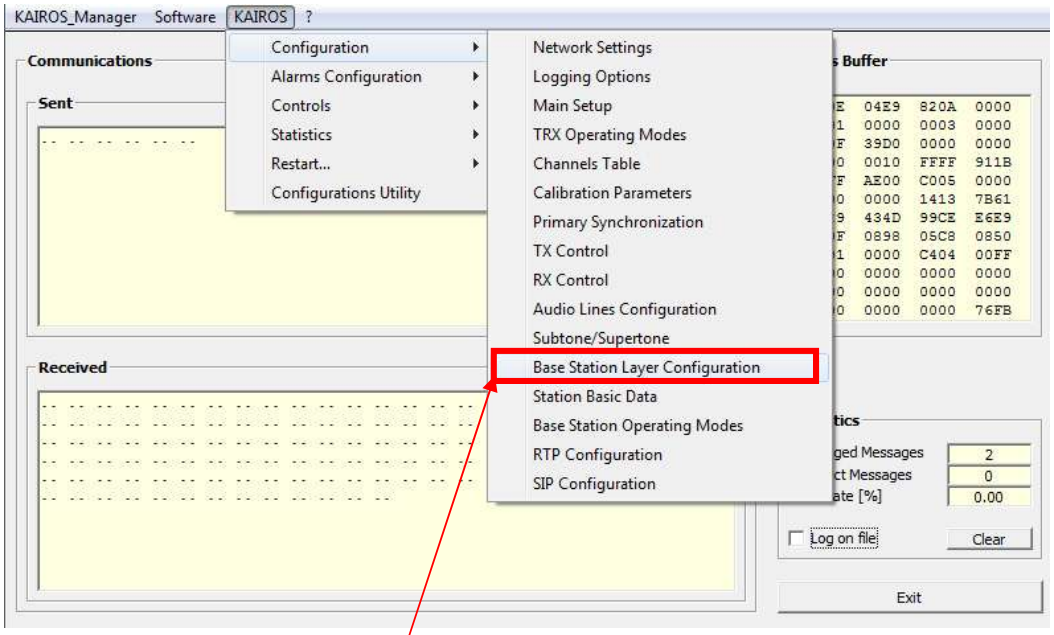


Channel Table

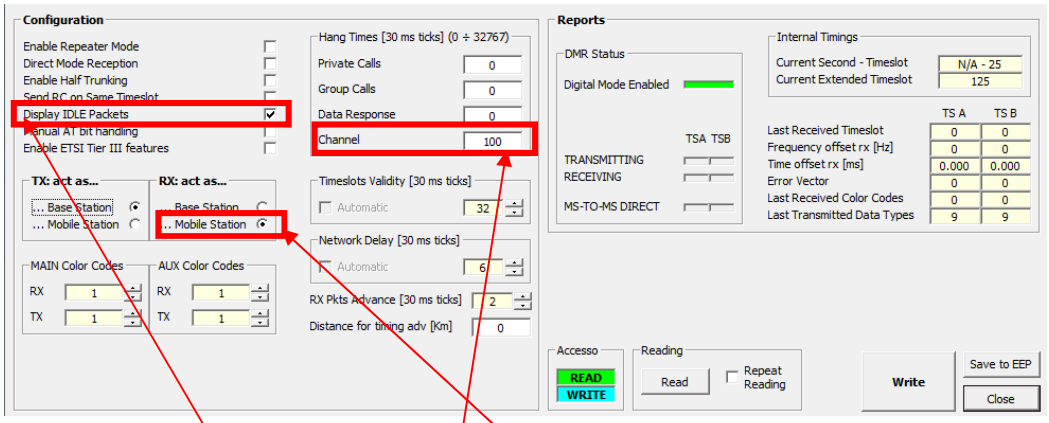


Squelch Tail Cutoff on RX must be checked on RF Linked Kairos.

b. Select Base Station Layer Configuration



Base Station Layer Configuration



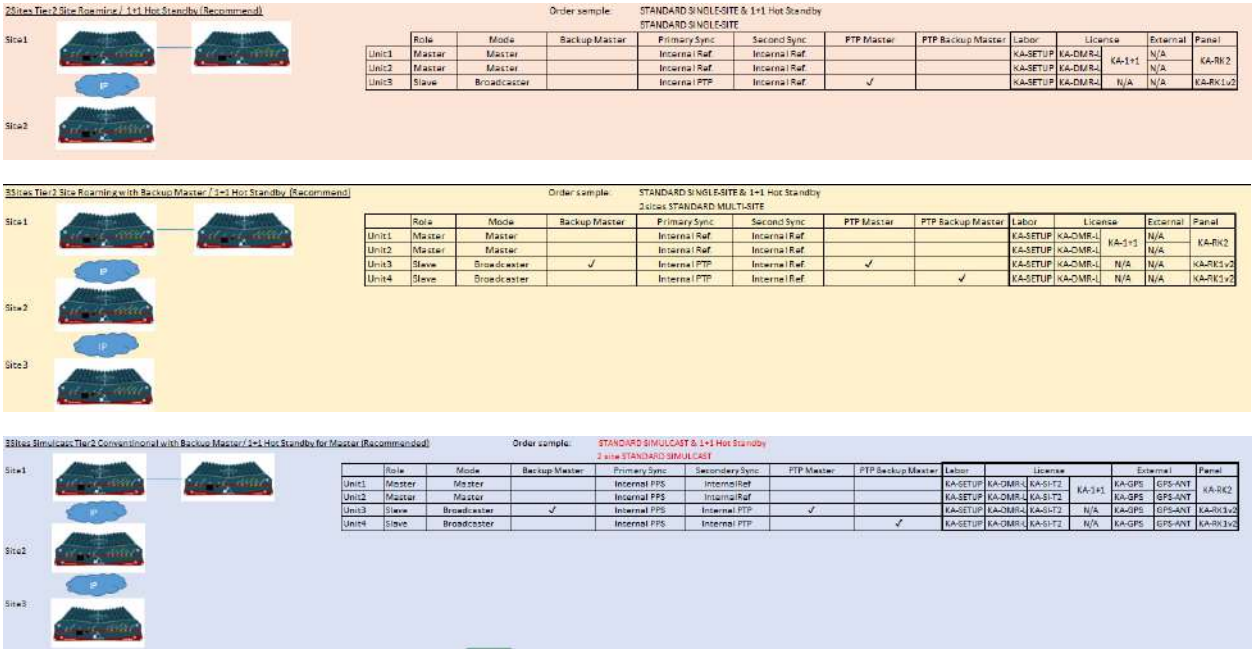
You must enable Display IDLE Packet on RF Linked Kairos.

Basically TX/RX acts are set to Base Station. But Mobile Station must be checked for RX acts on RF Linked Kairos.

Channel Hang Timer must be set to 100 (3000ms) to have enough synchronization.

3. Additional Information

3.1. Add Hot Standby Repeater



When you add Hot Standby Repeater into system, you must consider which repeater can be redundant. Above picture is a recommended structure with hot standby repeater.

Kairos System must have Master Voting Repeater and Master PTP Repeater when you will use PTP sync between sites. Then you can have Backup Repeater for both function. But Hot Standby Repeater is not available to PTP Master function.

Here is the case of lost repeaters.

Lost Repeater	System Behavior
Voting Master Repeater	No Intersite Call in the system.
PTP Master Repeater	No synchronization between sites.

Voting Master is the most important repeater in the system. The system will continue to work without PTP Master Repeater. To having Backup Voting Master Repeater, you must setup PTP Master to a Voting Slave Repeater. And you can add a PTP Backup Repeater into over 3sites system in this case scenario.

You can follow the setup procedure 2.2 when you add Hot Standby Repeater into system. But please consider which repeater will have Voting Master or PTP Master.

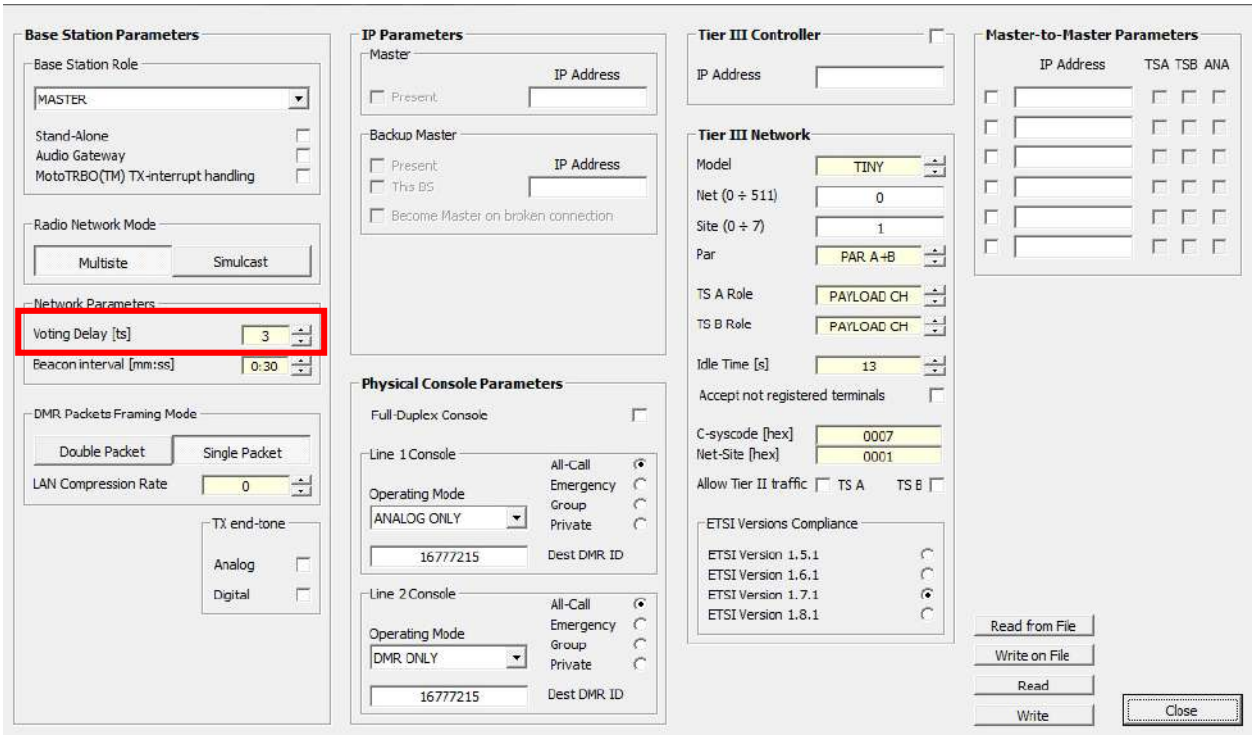
3.2. Appendix A

The reason why we have default data file for some case is the Kairos Manager has too much detailed setup items.

I picked the important setting on each display. You have to take care this portion based on the structure which customer requested but you do not need to take care in case standard structure case which I mentioned on this document.

Base Station Operating Mode

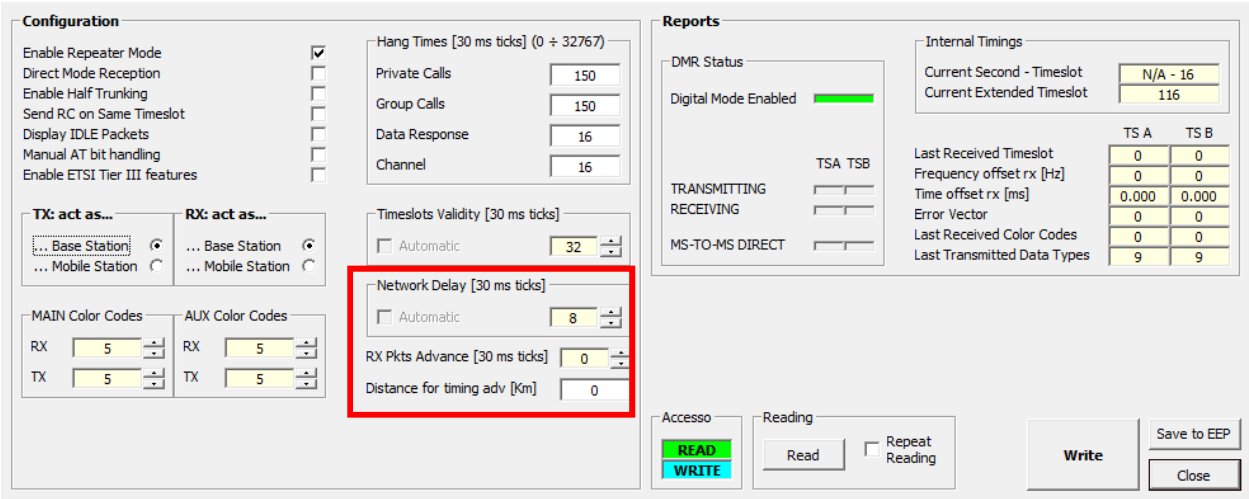
Voting Delay: This is a parameter for Voting Master Repeater when the voter repeat voice/data streaming to Broadcaster Repeaters. Please check Appendix B to see the parameter example.



Base Station Layer Configuration

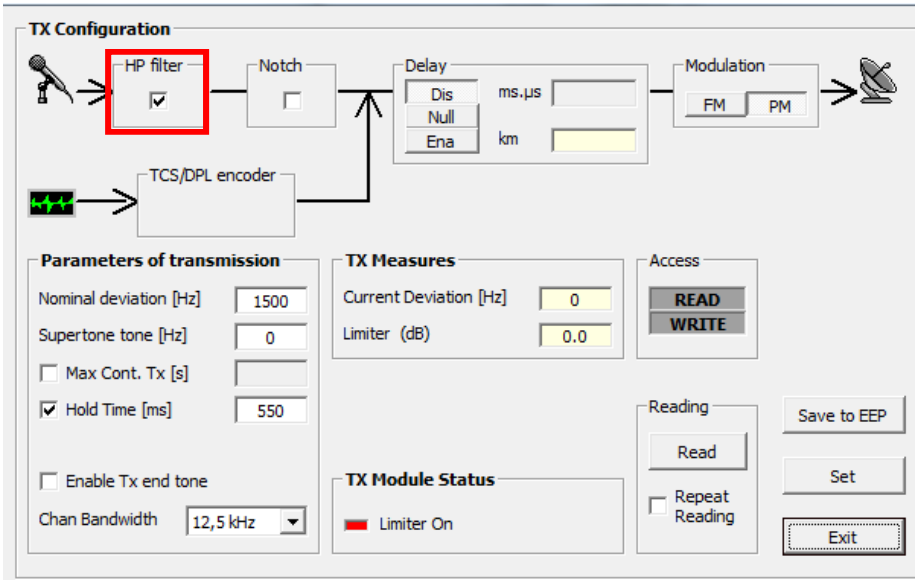
Network Delay/Rx Packets Advance: There are parameters for all repeaters to have synchronized transmit timing. Please check Appendix B to see the parameter example.

Distance for timing adv: You must setup this parameter for RF Linked System even if it is simulcast system to having synchronized transmit timing. Please modified following site location.



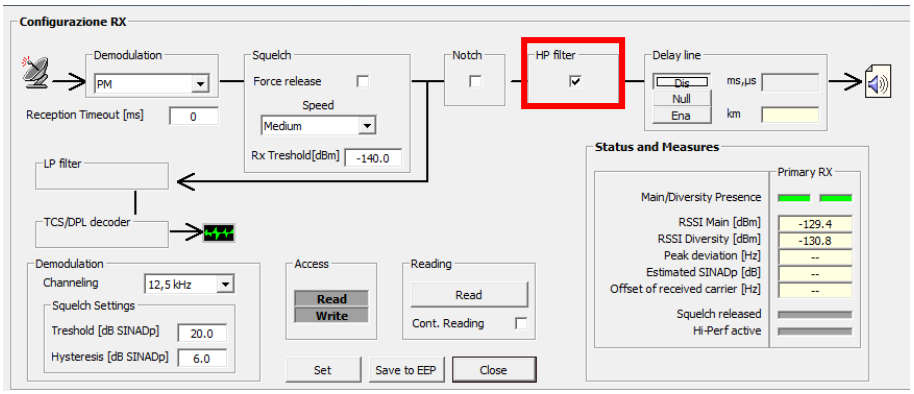
TX Control

HP filter: These parameters are for RF Linked System. Based on Kairos structure, you have to have fixed value for RF Linked system. But you do not need to take care these because the base default date file for RF Link will cover this parameters.



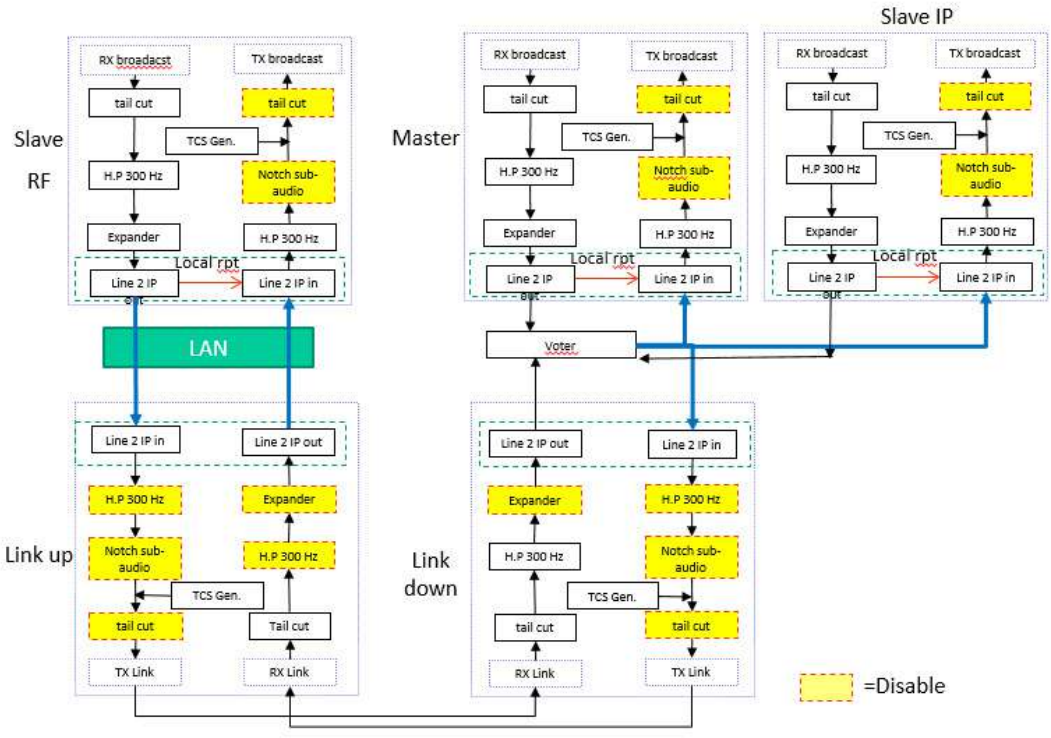
RX Control

HP filter: These parameters are for RF Linked System. Based on Kairos structure, you have to have fixed value for RF Linked system. But you do not need to take care these because the base default date file for RF Link will cover this parameters.



Below Picture is provided by Radio Activity. You must follow this structure.

Percorsi **audio analogici** rete SAT+MST "MIXED" **KAIROS**

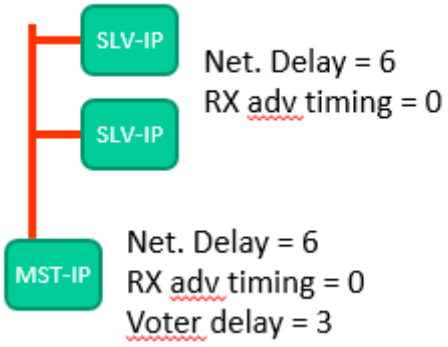


3.3. Appendix B

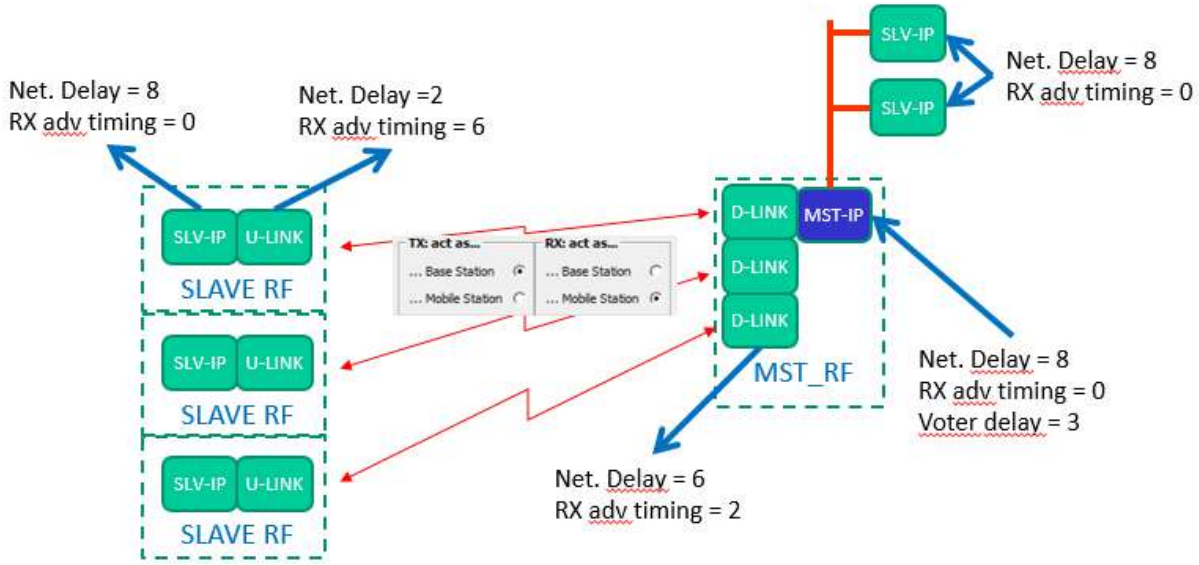
You must modify some parameters from default data file to having the system works correctly based on the system structure if the customer's requirement was out of this document.

Standard Structure which this document covered

- **2level IP Linked System**



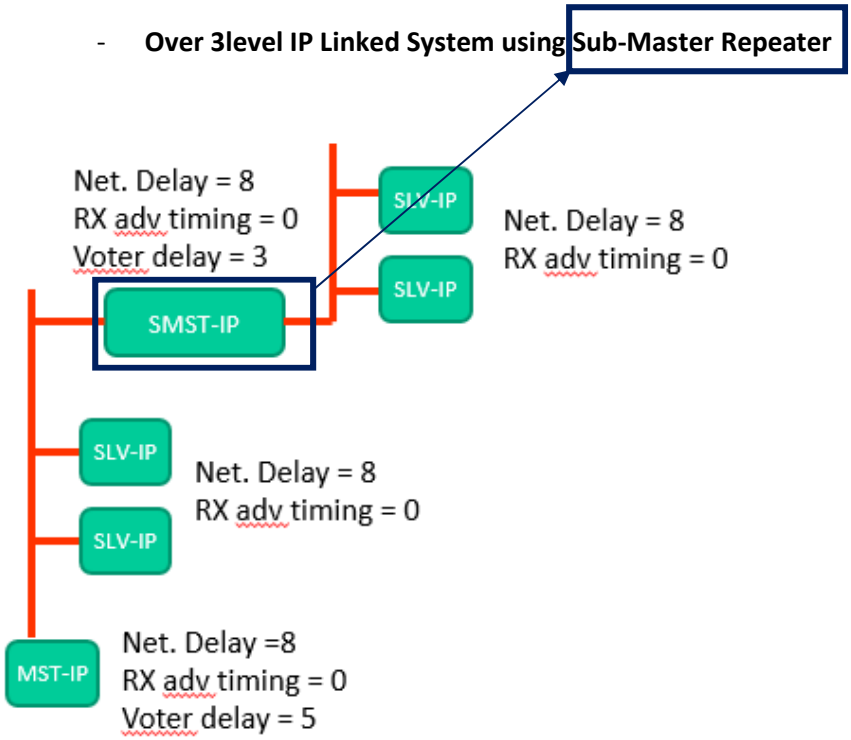
- **2level IP and RF Linked Mixed System**



Optional Structure which this document did not cover

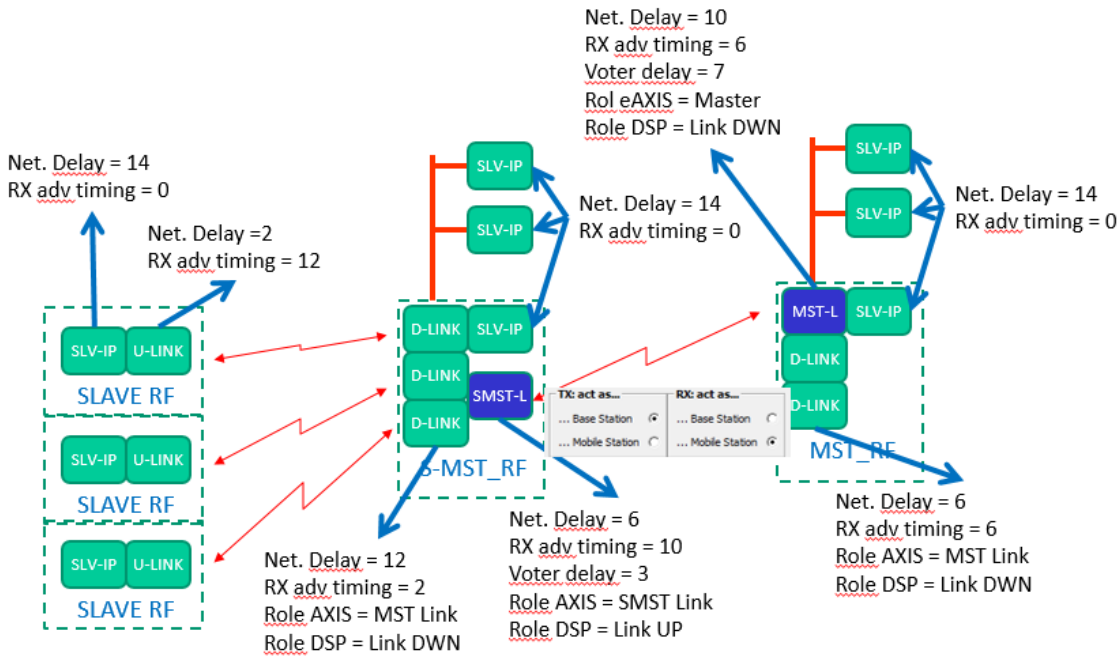
We must consider the system and network design following Radio Activity Team when we sale these optional System Structure.

- **Over 3level IP Linked System using Sub-Master Repeater**



*Sub-Master is one of role on Kairos.

- **Over 3level IP and RF Linked Mixed System using Sub-Master Repeater**



- **Pipeline RF Linked System**