

Kairos Product Series

Long Beach Training

Communications Division

November, 2018

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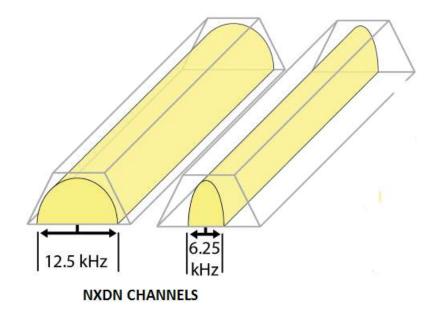
Developed by the European Telecommunications Standards Institute (ETSI)

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 Standards Institute (ETSI)

FM Transmission of digitized information

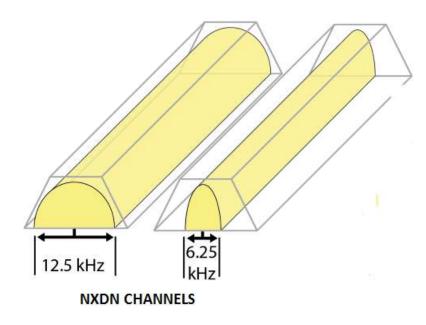
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FM Transmission of digitized information



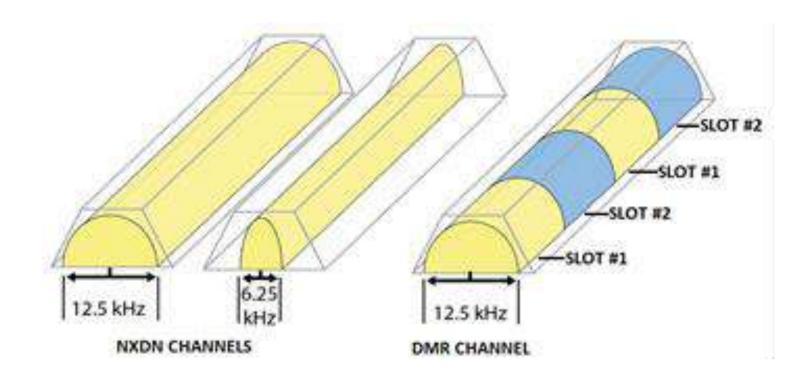
Developed by the European Telecommunications
 Standards Institute (ETSI)

FM Transmission of digitized information TDMA



Developed by the European Telecommunications
 Standards Institute (ETSI)

FM Transmission of digitized information
 TDMA



◆ What is Tier I ?

◆ What is Tier II ?

◆ What is Tier III ?

♦ Tier I

Digital PMR446 (Digital, FDMA, Simplex)

Tier I

Digital PMR446 (Digital, FDMA, Simplex)

Not applicable to our market



Tier II

Tier II

- Conventional Digital TDMA
 - Direct Mode
 - Repeated

Tier II

- Conventional Digital TDMA
 - Direct Mode True 2 Slot
 - Repeated

Tier II

- Direct Mode
- Repeated
 - The standard covers only single site

Tier II

- Direct Mode
- Repeated
 - The standard covers only single site
 - Kenwood supports site roaming

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 - The standard covers only single site
 - Kenwood supports site roaming
 - No form of Trunking is described in Tier II

Tier II

- Direct Mode
- Repeated
 - The standard covers only single site
 - Kenwood supports site roaming
 - No form of Trunking is described in Tier II
 - Kairos supports Multisite
 - Simulcast is a default in Kairos' design



Tier III

Tier III

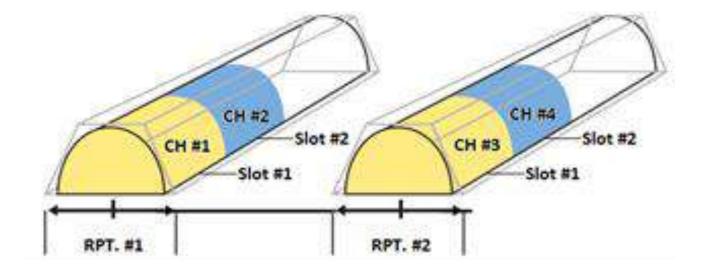
- Centralized Trunking (Dedicated Control Channel)
 - The "control channel" is a particular slot

Tier III

- The "control channel" is a particular slot
- All other slots are "traffic channels"

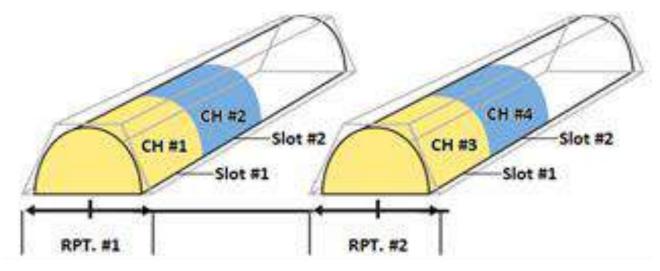
Tier III

- The "control channel" is a particular slot
- All other slots are "traffic channels"



Tier III

- The "control channel" is a particular slot
- All other slots are "traffic channels"
- FB8 required as in Nexedge Type-C



Tier III

Kenwood does not support Tier III at this time

◆ Tier III

Kenwood does not support Tier III at this time

• But Kairos Does !!

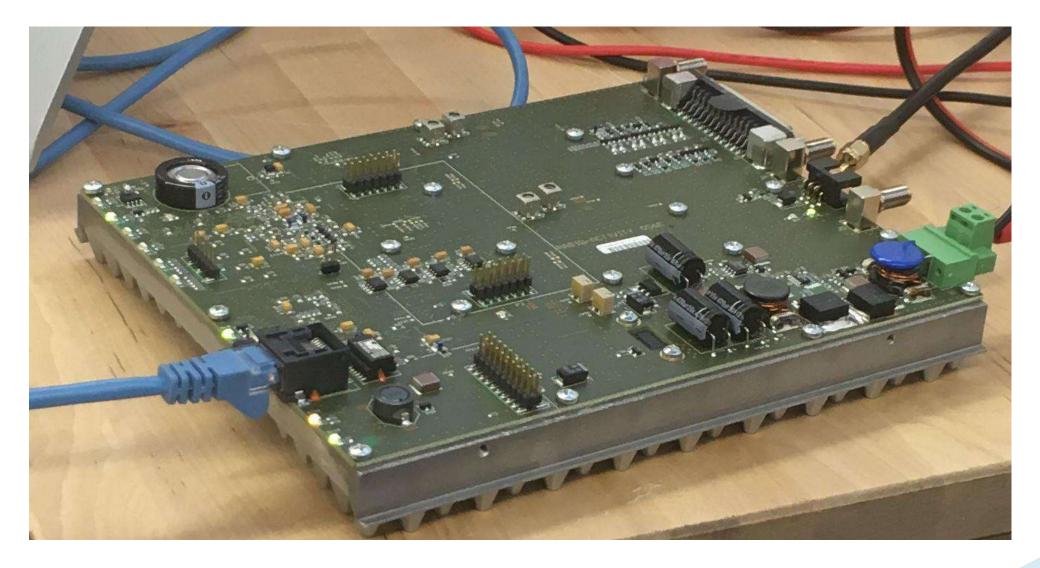
Questions before we proceed?

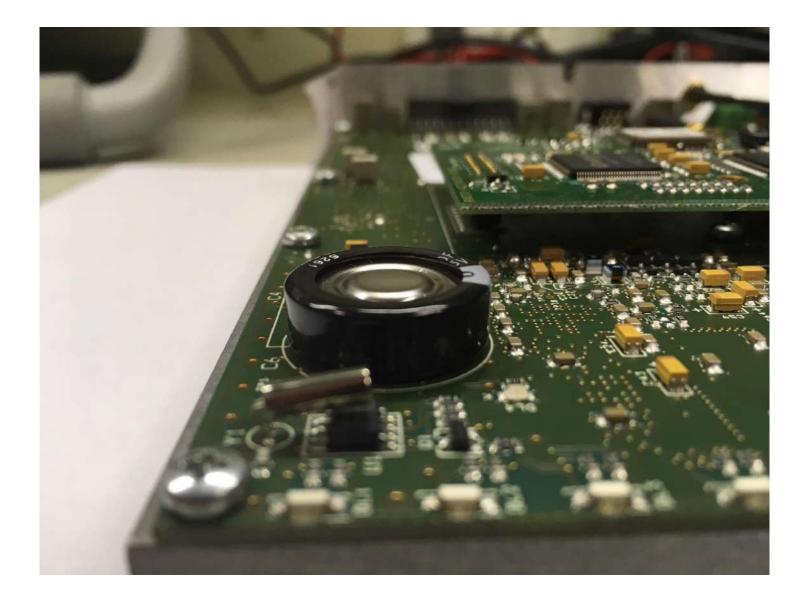
What is Kairos?

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 In classical rhetoric, kairos refers to the opportune time and/or place--that is, the right or appropriate time to say or do the right or appropriate thing.

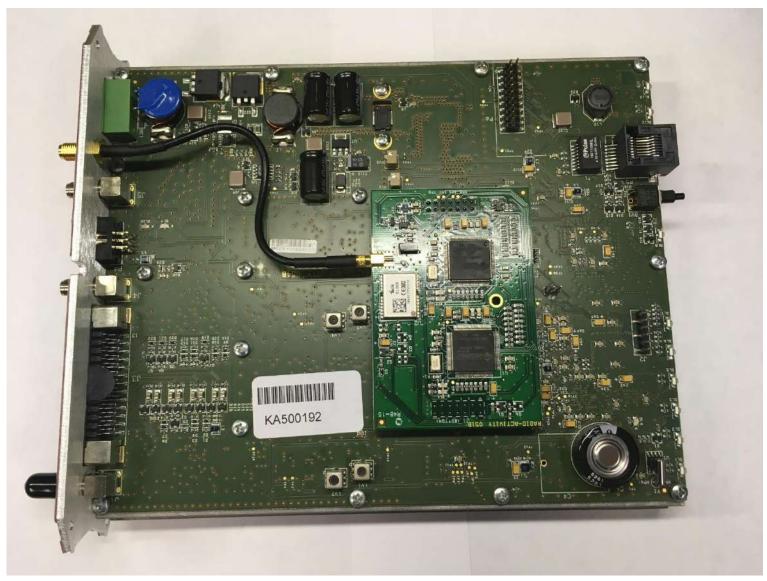
• In Greek mythology, **Kairos**, the youngest child of Zeus, was the god of opportunity.











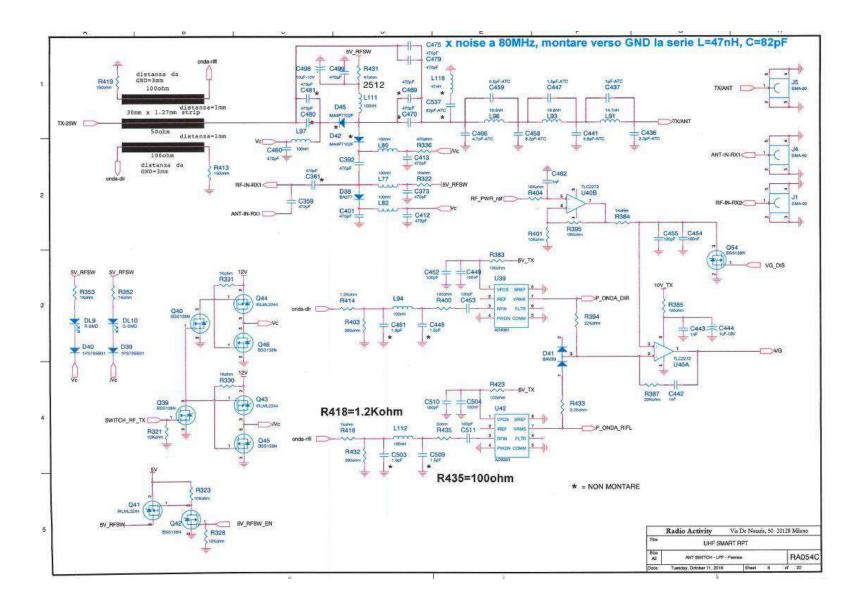
Kairos Models

Available Models	Model	KA-080	KA-160	KA-350	KA-450	KA-500	KA-900
	MHz	66-88	136-174	350-410	400-470	450-527	806-941
Channelization	25/20/12,5/6,25 KHz						
RF output power	1-25 W / 100% duty cycle / selectable per channel						
Synthesis step	50Hz						
Frequency stability	0,5 p.p.m. (without GPS or digital correction)						
Synchronization sources	Internal ref., GPS/GLONASS, Ethernet IEE-1588v2, 2 wire, Digital RX, External						
Operating temperature	-30°C ÷ +60°C						
Power supply (negative	Min.			Тур.		Max.	
ground)		11V	1	13,2V		15V	
Power consumption	TX: 60 W @25W RF / RX: 5 W @Main+Div enabled						
Dimensions & weight	160x200x45mm / 1.4Kg						
Audio lines	2x 4 wires + E&M						
LAN port	Ethernet 10BT/100TX (auto MDI/MDI X) on an RJ45 socket						
IP multisite bandwidth	70 kb/s in analog to/from Master						
	24 kb/s in DMR to/from Master (both DMR timeslots)						
Max tolerable IP delay	960ms (round trip)						
Alarm & control I/O	1xInput + 7xOutput						
Auxiliary I/O	4xInput + 1xOutput + 1xAnalog input						

Kairos Antenna Switch

- Kairos is shipped for full duplex operation
 - □ Transmit antenna port can be used for TX/RX
 - Components must be installed on the main board
 - Two capacitors must be removed from main board

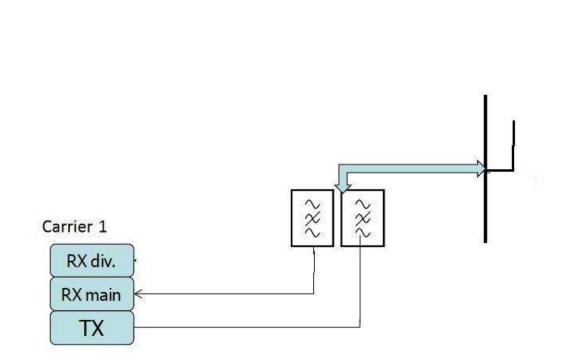
Kairos Antenna Switch

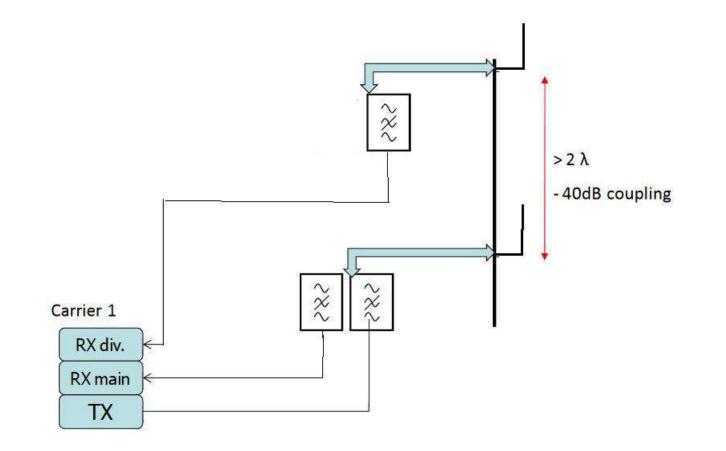


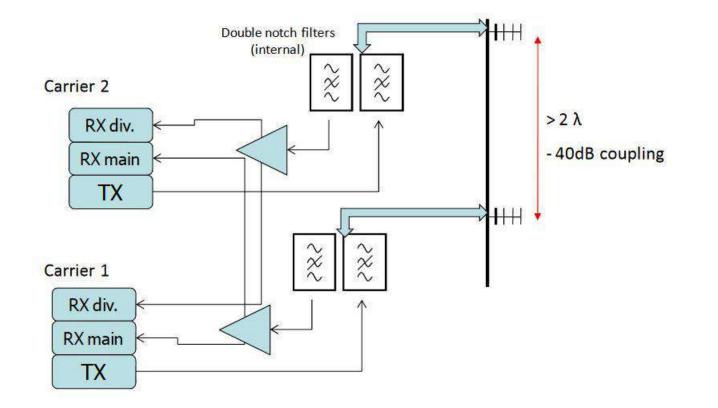
Kairos Models

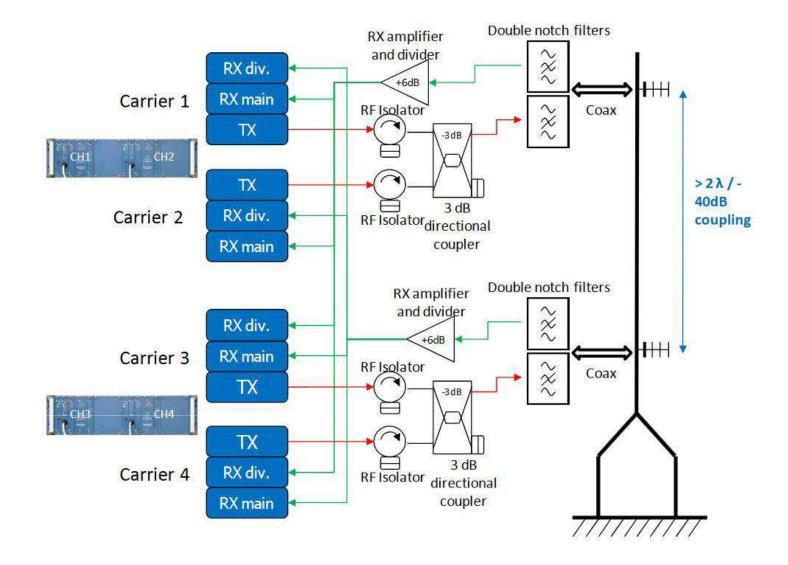
- Diversity Reception
 - Potentially a very important advance in fixed station and repeater design
 - Receive Antenna / Site Filtering design more complicated to leverage the advantage of the diversity receiver
 - Use of the diversity filter in single and multiple repeater sites as opposed to alternative solutions

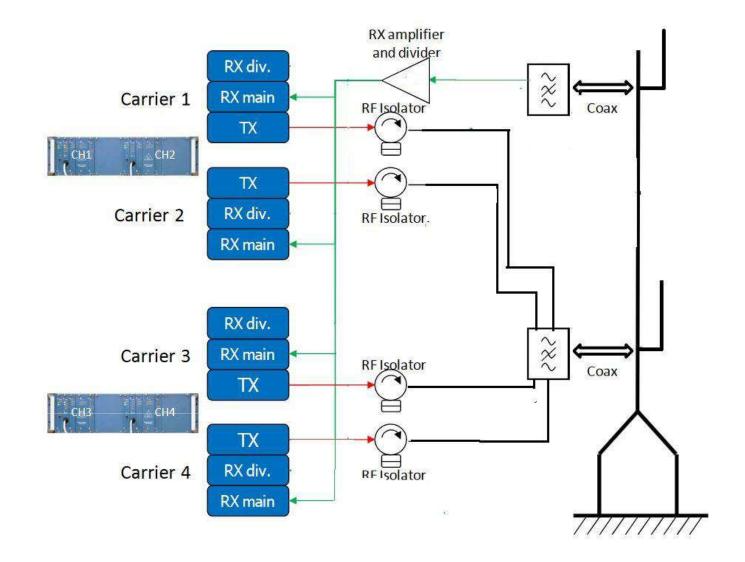


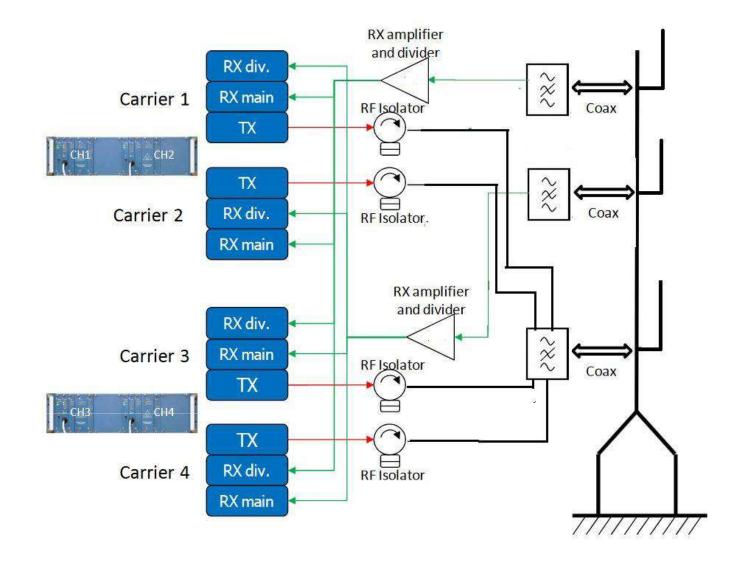












Kairos



Accessing an unknown Kairos

Kairos

Accessing an unknown Kairos
 Default IP

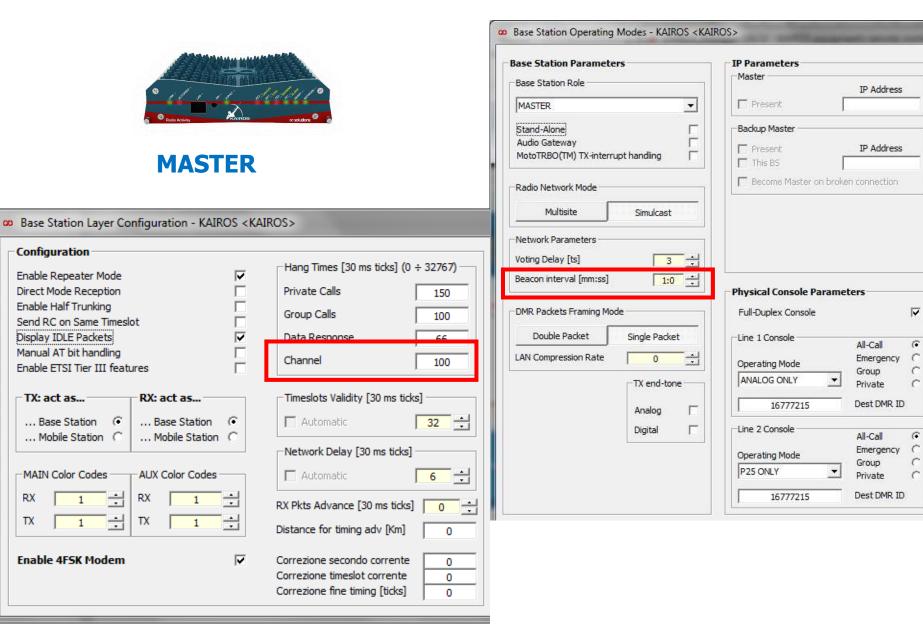
- 172.33.16.140
- Power up, left two LEDS activate, press button once
- Not active unless prompted
- Not always easy to use

Kairos

- Accessing an unknown Kairos
 Default IP
 - 172.33.16.140
 - Power up, left two LEDS activate, press button once
 - Not active unless prompted
 - Not always easy to use
 - Peer to Peer Mode
 - 1.0.0.140
 - Always active
 - Easy to use

Kairos – How to generate beacons

ROAMING SETTING: BEACON



ROAMING SETTING: BEACON



SLAVE

 Base Station Layer Configuration - KAIROS <k< li=""> Configuration </k<>	
Enable Repeater Mode Direct Mode Reception Enable Half Trunking Send RC on Same Timeslot Display IDLE Packets Manual AT bit handling Enable ETSI Tier III features	Hang Times [30 ms ticks] (0 ÷ 32767) Private Calls 150 Group Calls 100 Data Response 66 Channel 100
TX: act as RX: act as Base Station • Mobile Station • MAIN Color Codes AUX Color Codes RX 1 TX 1 TX 1	Timeslots Validity [30 ms ticks] Automatic Network Delay [30 ms ticks] Automatic Automatic RX Pkts Advance [30 ms ticks] Distance for timing adv [Km]
Enable 4FSK Modem	Correzione secondo corrente 0 Correzione timeslot corrente 0 Correzione fine timing [ticks] 0

Base Station Paramet	ers	1	IP Parameters		
Base Station Role			Master		IP Address
BROADCASTER		•	✓ Present	Γ	172.33.17.6
Stand-Alone		Ē	Backup Master		
Audio Gateway MotoTRBO(TM) TX-inter	runt handling	E	F Present	_	IP Address
need need need need need	raperiarianing		This BS		
Radio Network Mode			F Become Master o	on broke	n connection
Multisite	Simulcast		Voice/Data reception	n from M	laster
	0		Multicast		
Network Parameters			Broadcast		
Velley Deley [te]			Unicast		
Beacon interval [mm:ss]					
Beacon interval [mm:ss]		-	Physical Console P	aramet	ters
Beacon interval [mm:ss] DMR Packets Framing M			Physical Console P Full-Duplex Console		ters
		et			
DMR Packets Framing M	ode Single Packe	1000	Full-Duplex Console		All-Call
DMR Packets Framing M	ode Single Packe	- #	Full-Duplex Console		
DMR Packets Framing M	ode Single Packe	- #	Full-Duplex Console		All-Call Emergency
DMR Packets Framing M	ode Single Packe	- #	Full-Duplex Console		All-Call Emergency Group
DMR Packets Framing M	ode Single Packe 0 TX end-tor Analog	- #	Full-Duplex Console		All-Call Emergency Group Private Dest DMR II
DMR Packets Framing M	ode Single Packe	- #	Full-Duplex Console Line 1 Console Operating Mode ANALOG ONLY 16777215		All-Call Emergency Group Private Dest DMR II All-Call
DMR Packets Framing M	ode Single Packe 0 TX end-tor Analog	- #	Full-Duplex Console Line 1 Console Operating Mode ANALOG ONLY 16777215 Line 2 Console Operating Mode		All-Call Emergency Group Private Dest DMR II All-Call Emergency
DMR Packets Framing M	ode Single Packe 0 TX end-tor Analog	- #	Full-Duplex Console Line 1 Console Operating Mode ANALOG ONLY 16777215 Line 2 Console		All-Call Emergency Group Private Dest DMR II All-Call

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Kairos – How to generate beacons

- There is NO front Panel indication that a beacon is going out
- Master and Backup Master will always beacon
- Slaves will beacon on command from a Master or Backup Master

Kairos Registration to Master

 Registration and Synchronization apply only to Kairos used in multi-repeater or mult-isite applications.

Kairos Registration to Master

RX Status	Synchronization St	atus	DSP Measures Clea	r Packets (Counters
DSP Ready TRX Active	PPS Signal from GPS	Present Valid Lock	Last DSP St	artup:	4
Ibr Running Cibr OK	PPS Signal from PTP	Present Valid Lock	2018-10-26 1	7:04:4	1
M. RX Fail D. RX Fail	External PPS Signal	Present Valid Lock	DMR Packets Out of Window		1
Interrupts from PLD	Superaudio Tone	Present Valid Lock	ANA Packets Out of Window	-	0
SQ Analog PTT	Synchronization from F	RF Signal or 4FSK Look	Safety Margin for DMR Packets		2
TCS/DPL Digital PTT	Synchronization from I		Safety Margin for ANA Packets		0
X DMR TS A TX DMR TS A			Timing Error [us]		1,790
X DMR TS B TX DMR TS B RX P25 TX P25	DSP Correc	ctly Synchronized	PPS Position [us]	-	9.886
	- AF Lines Status				
atures Status			RX Measures		
SIMULCAST Features	AF to DMR Codecs	TSA TSB	Peak Deviation [Hz]		4215
DMR Features	DMR Codecs to AF	TSA TSB	Estimated SINADp [dB]		1.9
ANALOG Features ETSI Tier III Features	Output Signalling Input Signalling	Line 1 Line 2 IP Line Line 1 Line 2 IP Line	Offset of received carrier [Hz]		-24
NETCONTROL Access	a par signaling	Line 1 Line 2 IP Line	L		
SMMP Features	Emergency S	ielf-Repeating Mode	Analog Measures		
POCSAG Features	Million And Andrews	ered to Master		- 7 	
MULTITONE TCS Features	Promoted to N	laster for Emergency	Input Supply Voltage [V]		13.2
P25Features		1	TX Temperature [°C]		24
TX Features	Vocoders Status	1	TX Input Current [A]		N/A
SIP Features		North Annual State	Forward Power [W] Reflected Power [W]	_	N/A
Amateur Radio Features	Vocoder 1	Vocoder 2	S W R		N/A
External Raw Access	-		SWR		N/A
Audio from Web	Clocks Status		DMR Status		
mmandsSet	TX PLL Lock	RX PLL Lock	Internal Second/Timeslot	2	90
odk SQ				TS A	TS B
ock TCS/DPL	-1+1 Status	Force to SPARE	Last Received Timeslot	90	0
rt Transmission			Frequency offset rx [Hz]	73	0
able TX	1+1 Node	Link between Nodes	Time offset rx [ms]	0.042	0.000
2 Output Signal	Last role change		Error Vector	166	0
al TRX Test			Last Received Color Codes	1	0
			Last Transmitted Data Types	9	9
			RSSI Main [dBm]	-116.0	-116.2
able Digital Squelch		Close	RSSI Diversity [dBm]	-130.0	-130.0
JHF 450÷520 MHz ITU Regi		ROTOCOL DMR TIER II NODE	SLAVE BASE ST	10000000	

RX Status	Synchronization S	tatus	1	DSP Measures Clea	r Packets (Counter
OSP Ready TRX Active	PPS Signal from GPS	Present Valid	Lock	Last DSP St	artup:	4
Ibr Running Clbr OK	PPS Signal from PTP	Present Valid	Lock	2018-10-26 1	7:04:4	1
M. RX Fail D. RX Fail	External PPS Signal	Present Valid	Lock	DMR Packets Out of Window	_	-
Interrupts from PLD	Superaudio Tone	Present Valid	Lock	ANA Packets Out of Window	_	1
SQ Analog PTT	Synchronization from	DE Cincol ou AECK	- total	Safety Margin for DMR Packets	_	0
TCS/DPL Digital PTT	Synchronization from		Lock	Safety Margin for ANA Packets		2
X DMR TS A TX DMR TS A	Synchronization from	Internal Reference	LOCK	Timing Error [us]		0
X DMR TS B TX DMR TS B	DSP Corre	ectly Synchronized		PPS Position [µs]	-	. 790
RX P25 TX P25				PPS Position [Jas]	4	9.886
atures Status	AF Lines Status			RX Measures		
SIMULCAST Features	AF to DMR Codecs	TSA	TSB			
DMR Features	DMR Codecs to AF	TSA	TSB	Peak Deviation [Hz]	-	1215
ANALOG Features	Output Signalling	Line 1 Line 2	IP Line	Estimated SINADp [dB]		1.9
ETSI Tier III Features	Input Signaling	Line 1 Line 2	IP Line	Offset of received carrier [Hz]		-24
NETCONTROL Access		LINDESC LEXINGER	Contraction of the local data			
SNMP Features		Self-Repeating Mo	de	Analog Measures		
POCSAG Features		ered to Master			_	
MULTITONE TCS Features	Promoted to	Master for Emerge	ncy	Input Supply Voltage [V]		13.2
P25 Features				TX Temperature [°C]		24
TX Features	Vocoders Status			TX Input Current [A]		N/A
SIP Features				Forward Power [W]		N/A
Amateur Radio Features	Vocoder 1	Vocoder	2	Reflected Power [W]	_	N/A
External Raw Access				SWR		N/A
Audio from Web	Clocks Status			DMR Status		
mmands Set	TX PLL Lock	RX PLL LC	xdx.	Internal Second/Timeslot	2	90
	DSP <=>	PLD Communication		and the second inneal of		
odk SQ				Last Received Timeslot	TS A	TS B
ock TCS/DPL	-1+1 Status	Force to SF	ARE	Frequency offset rx [Hz]	90	0
rt Transmission	Total I	Link between	Madee	Time offset rx [ms]	73	0
	1+1 Node	Unk between	Nodes	Error Vector	0.042	0.000
e 2 Output Signal	Last role change			Last Received Color Codes	166	0
di IKA IEST		Č		Last Received Color Codes	1	0
				RSSI Main [dBm]	9	9
able Digital Squelch				RSSI Main [dbm]	-116.0	-116.
able Digital Squeich			Close	Roat Diversity [dbill]	-130.0	-130.
JHF 450÷520 MHz ITU Regio		ROTOCOL DMR TIE		SLAVE BASE STA	e de la companya de l	

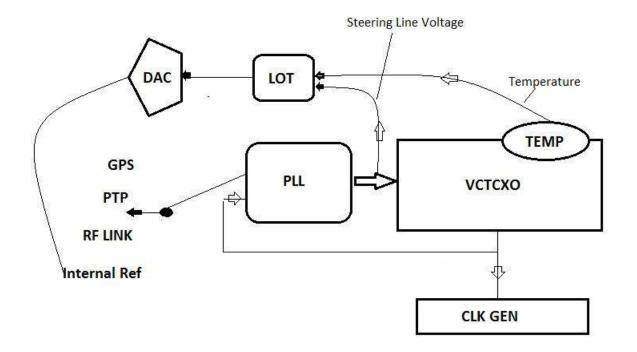
RX Status	Synchronization S	itatus			DSP Measures Clea	r Packets (Counters
DSP Ready TRX Active	PPS Signal from GPS	Present	Valid	Lock	Last DSP St	artup:	
Ibr Running Cibr OK	PPS Signal from PTP	Present	Valid	Lock	2018-10-26 1	7:04:4	1
M. RX Fail D. RX Fail	External PPS Signal	Present	Valid	Lock	DMR Packets Out of Window		
Interrupts from PLD	Superaudio Tone	Present	Valid	Lock	ANA Packets Out of Window		1
SQ Analog PTT	Synchronization from	DE Signal or 4	1ESK	Lock	Safety Margin for DMR Packets	_	5
TCS/DPL Digital PTT		Synchronization from Internal Reference Lock Safety Margin for ANA Packets			0		
X DMR TS A TX DMR TS A		- <u></u>	en prosent		Timing Error [µs]		.000
X DMR TS B TX DMR TS B	DSP Corre	ectly Synchi	ronized		PPS Position [µs]	-	2.468
RX P25 TX P25						9	21 100
atures Status	AF Lines Status			1	- RX Measures		
SIMULCAST Features	AF to DMR Codecs	TS A	_	TS B			
DMR Features	DMR Codecs to AF	TSA	-	TSB	Peak Deviation [Hz]	4	4311
ANALOG Features	Output Signalling	Contractor of Contractor of Contractor	Line 2	IP Line	Estimated SINADp [dB]		1.7
ETSI Tier III Features	Input Signalling		Line 2	IP Line	Offset of received carrier [Hz]		42
NETCONTROL Access		The state of the					
SNMP Features	Emergency			de	Analog Measures		
POCSAG Features		ered to Has					
MULTITONE TCS Features	Promoted to	Master for I	Emerge	ency	Input Supply Voltage [V]		13.3
P25 Features					TX Temperature [°C]		24
TX Features	-Vocoders Status-				TX Input Current [A]		N/A
SIP Features					Forward Power [W]		N/A
Amateur Radio Features	Vocoder 1		Vocoder	2	Reflected Power [W]	-	N/A
External Raw Access					SWR		N/A
Audio from Web	Clocks Status				DMR Status		
	TX PULLock	F	X PLL L	ocik			
mmands Set	DSP <=>	PLD Commun	ication		Internal Second/Timeslot	-	80
ock SQ						TS A	TSB
ock TCS/DPL	- 1+1 Status	En	rce to Si		Last Received Timeslot	68	0
rt Transmission	111318103		rte to si	AKE	Frequency offset rx [Hz]	57	0
able TX	1+1 Node	Linkt	between	Nodes	Time offset rx [ms]	0.042	0.000
e 2 Output Signal	Last role change		1221		Error Vector	89	0
al TRX Test					Last Received Color Codes	1	0
					Last Transmitted Data Types	9	9
-					RSSI Main [dBm]	-117.0	-117.0
able Digital Squelch				Close	RSSI Diversity [dBm]	-130.0	-130.0
JHF 450÷520 MHz ITU Re		PROTOCOL			SLAVE BASE STA		

TRX Status	Synchronization S	Status			DSP Measures Clea	r Packets (Counters
DSP Ready TRX Active Clbr Running Clbr OK	PPS Signal from GPS PPS Signal from PTP	Present Present	Valid Valid	Lock Lock	Last DSP St 2018-10-26 1		
M. RX Fail D. RX Fail	External PPS Signal	100 CT 100 CT	Valid	Lock	DMR Packets Out of Window		1
Interrupts from PLD	Superaudio Tone	Present	Valid	Lock	ANA Packets Out of Window		0
SQ Analog PTT TCS/DPL Digital PTT	Synchronization from	RF Signal or 4	FSK	Lock	Safety Margin for DMR Packets		5
TCS/DPL Digital PTT EX DMR TS A TX DMR TS A	Synchronization from	Internal Refer	ence	Lock	Safety Margin for ANA Packets		0
EX DMR TS B TX DMR TS B	DSP Com	ectly Synchr	horizod		Timing Error [us]	C	.000
RX P25 TX P25	USPCON	ectry synchro	onized		PPS Position [µs]	4	2.468
eatures Status	AF Lines Status			1	RX Measures		
SIMULCAST Features	AF to DMR Codecs	TS A	1	TSB			
DMR Features	DMR Codecs to AF	TS A		TSB	Peak Deviation [Hz]	-	4914
ANALOG Features	Output Signalling	Line 1	Line 2	IP Line	Estimated SINADp [dB] Offset of received carrier [Hz]	-	2.1
ETSI Tier III Features	Input Signalling	Line 1	Line 2	IP Line	Unset of received carrier [Hz]		44
NETCONTROL Access		Colf Description	-				
SNMP Features	the second se	Self-Repeati		die:	Analog Measures		
POCSAG Features	A REAL PROPERTY AND A REAL	tered to Mas			Input Supply Voltage [V]	_	10.0
MULTITONE TCS Features	Promoted to	ridster for t	merge	ncy	TX Temperature [°C]		13.3 23
P25 Features					TX Input Current [A]		
TX Features	-Vocoders Status				Forward Power [W]		N/A N/A
SIP Features	Vocoder 1		/ocoder		Reflected Power [W]		N/A
Amateur Radio Features	WASCONCE - 2		rus wusi	-	SWR		N/A
External Raw Access	1					- Au	infin
Audio from Web	Clocks Status				DMR Status		
ommandsSet	TX PLL Lock	PLD Communi	X PLL Lo	idk:	Internal Second/Timeslot	2	71
nlock SQ		T US Commun	COLUMN			TSA	TS B
nlock TCS/DPL	- 1+1 Status	Ent	ce to SE		Last Received Timeslot	68	0
art Transmission					Frequency offset rx [Hz]	57	0
sable TX	1+1 Node	Link b	etween	Nodes	Time offset rx [ms]	0.042	0.000
ne 2 Output Signal	Last role change				Error Vector	89	0
cal TRX Test					Last Received Color Codes	1	0
					Last Transmitted Data Types	9	9
					RSSI Main [dBm]	-116.3	-116.7
sable Digital Squeich				Close	RSSI Diversity [dBm]	-130.0	-130.0
UHF 450÷520 MHz ITU Regio	n 2 Rand MULTI	PROTOCOL D		B TT NODE	SLAVE BASE ST	ATTON	

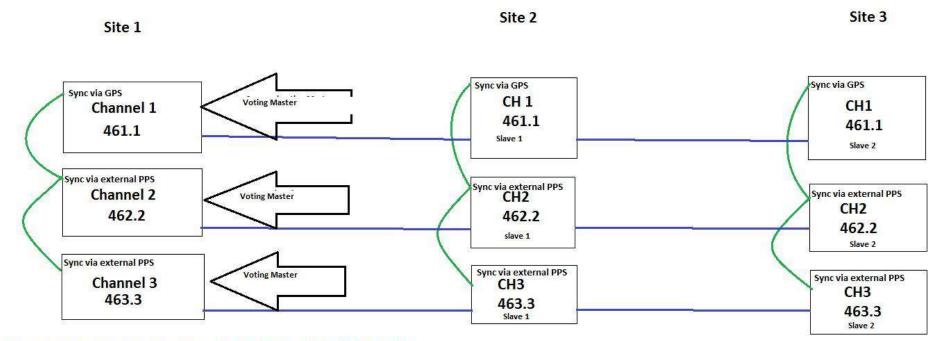
TRX Status		Synchronization	Status			DSP Measures Clea	ar Packets (Counter
DSP Ready	TRX Active	PPS Signal from GPS	Present	Valid	Lock	Last DSP St	artup:	
Cibr Running	Clbr OK	PPS Signal from PTP	Present	Valid	Lock	2018-10-26 1	7:04:4	1
M. RX Fail	D. RX Fail	External PPS Signa	Present	bild	Lock	DMR Packets Out of Window	_	-
Interrupt	s from PLD	Superaudio Tone	Present	Valid	Lock	ANA Packets Out of Window		1
SQ	Analog PTT	Synchronization from	DE Signal o	AECK	Lock	Safety Margin for DMR Packets		2
TCS/DPL	Digital PTT	Synchronization from			Lock	Safety Margin for ANA Packets		0
RX DMR TS A	TX DMR TS A	Synchronizabort ir on	TATION THE INC	reience	LOCK	Timing Error [µs]		2.820
RX DMR TS B	TX DMR TS B	DSP Com	rectly Sync	hronized		PPS Position [µs]		5,966
RX P25	TX P25					The standar [23]	1 3	0.900
Features Sta	tus	AF Lines Status				RX Measures		
SIMULCAS	ST Features	AF to DMR Codecs	TS A	e 11	TS B	Deals Deviation Real	_	
DMR F	eatures	DMR Codecs to AF	TS A	6. The second se	TSB	Peak Deviation [Hz]		1158
ANALOG	Features	Output Signalling	Line 1	Line 2	IP Line	Estimated SINADp [dB] Offset of received carrier [Hz]		2.2
ETSI Tier J	III Features	Input Signalling	Line 1	Line 2	IP Line	Offset of received carrier [Hz]		45
NETCONT	ROL Access	Emergency		ating Ma	da			
SNMP F	Features	1. Construction of the second seco	sen-kepe	THE PLANE AND ADDRESS	ue	Analog Measures		
POCSAG	Features	Promoted to			and the second se	Input Supply Voltage [V]	_	13.3
MULTITONE	TCS Features	Fromoteu (Traster to	rimery	incy	TX Temperature [°C]		24
P25 F6	eatures					TX Input Current [A]		N/A
	atures	Vocoders Status	0			Forward Power [W]		N/A
	eatures	Vocoder 1		Vocoder	2	Reflected Power (W)		N/A
Contraction of the local sector	adio Features	Me Alicebeter I. St.		a distance dat		SWR		N/A
	Raw Access							i dina
Audio fi	tom Web	Clocks Status				DMR Status		
Commands	Set	TX PLL Lock		RX PLL L	ock	Internal Second/Timeslot	4	155
Jnlock SQ		05P <=	> PLD Comm	UNICEED(N			TS A	TSE
Inlock TCS/DPL		4.45	1			Last Received Timeslot	90	0
tart Transmiss	ion 🗌	1+1 Status		Force to S	ARE	Frequency offset rx [Hz]	73	0
Disable TX		1+1 Node	Lini	k between	Nodes	Time offset rx [ms]	0.042	0.00
ine 2 Output S	ignal	Last role change				Error Vector	166	0
ocal TRX Test		Last role orlange				Last Received Color Codes	1	0
						Last Transmitted Data Types	9	9
						RSSI Main [dBm]	-115.8	-115.
Disable Digital S	iquelch				Close	RSSI Diversity [dBm]	-130.0	-130.

1st Choice	Internal PTP		•				
2nd Choice	External PPS (fu	()	*				
3rd Choice	Internal Ref (full)						
4th Choice	Choice Internal Ref (full)						
Lock Freque	o Synchronization - ency [Hz]	3400					
Lock Freque	ency [Hz]	3400					
	ency [Hz] onization	0.0					

Kairos and its internal reference

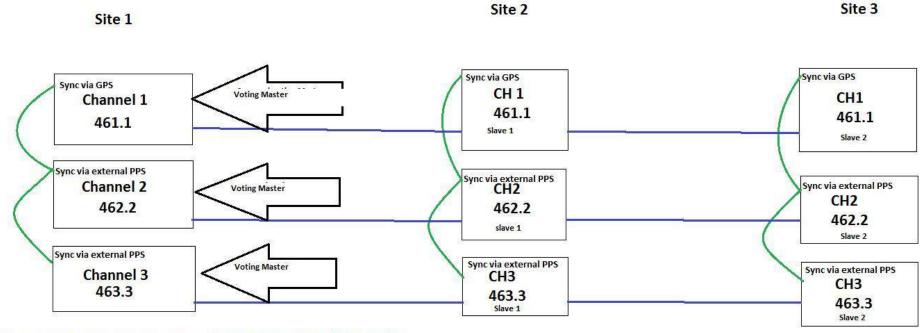


Kairos – Network Delay and Sync

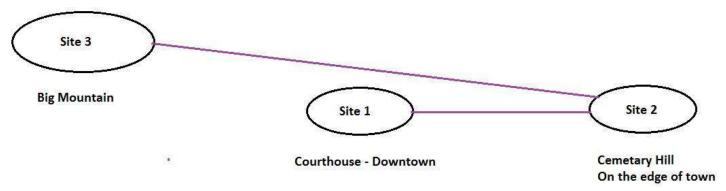


Blue lines are network connections. Green lines are PPS ribbon cables.

Kairos – Network Delay and Sync



Blue lines are network connections. Green lines are PPS ribbon cables.



Kairos – Network Delay and Sync

onfiguration				Reports				
nable Repeater Mode irect Mode Reception	E	Hang Times [30 ms ticks] (0 Private Calls	0	DMR Status		Internal Timings Current Second/Timeslot Current Extended Timeslot		0
end RC on Same Timesl isplay IDLE Packets lanual AT bit handling nable ETSI Tier III feat	▼ □	Group Calls Data Response Channel	0		TSA TSB	Last Received Timeslot Frequency offset rx [Hz]	TS A	TS B 13 8
TX: act as Base Station (Mobile Station (RX: act as	Timeslots Validity [30 ms tick	ks]	TRANSMITTING RECEIVING MS-TO-MS DIRECT		Time offset rx [ms] Error Vector Last Received Color Codes Last Transmitted Data Types	0.000 31 1 0	0.000 51 1 0
MAIN Color Codes	AUX Color Codes RX 1 1 TX 1	Network Delay [30 ms ticks]	2 1					
			Contract of the second s	Accesso Readir				

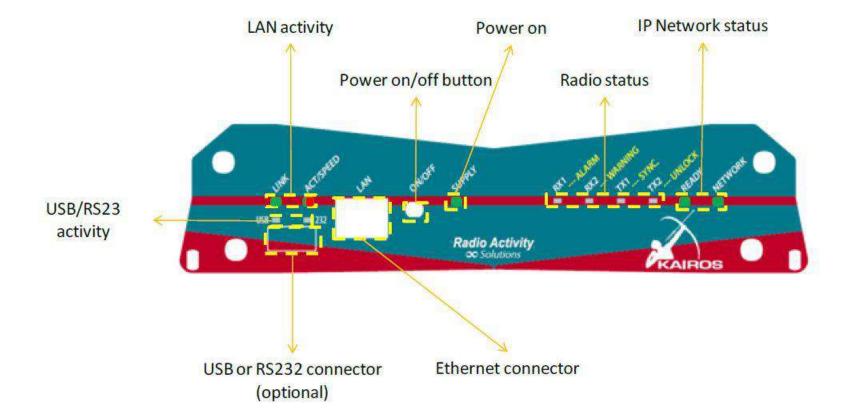
Kairos and GPS

- Most issues are PTP-sync related
 - Use of GPS makes things easy
 - Use of sync cable in multiple repeater installations with one repeater the GPS sync source is very effective
 - □ There are no sync issues with a stand-alone Kairos

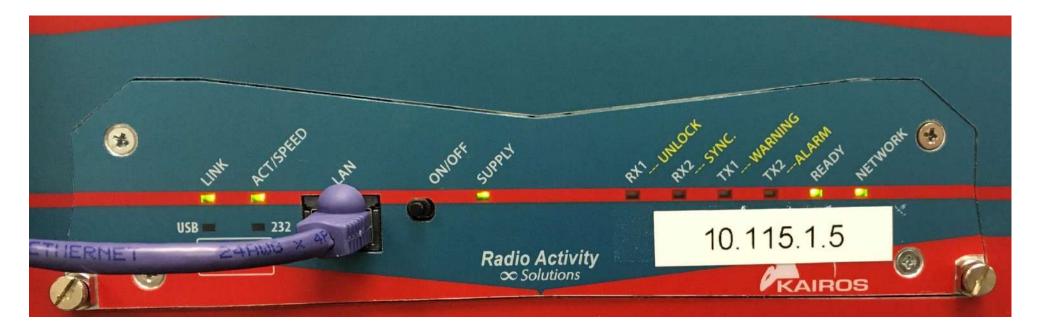
LEDs

□ The LEDs were designed to tell you a lot, and they do

Most issues are PTP-sync related



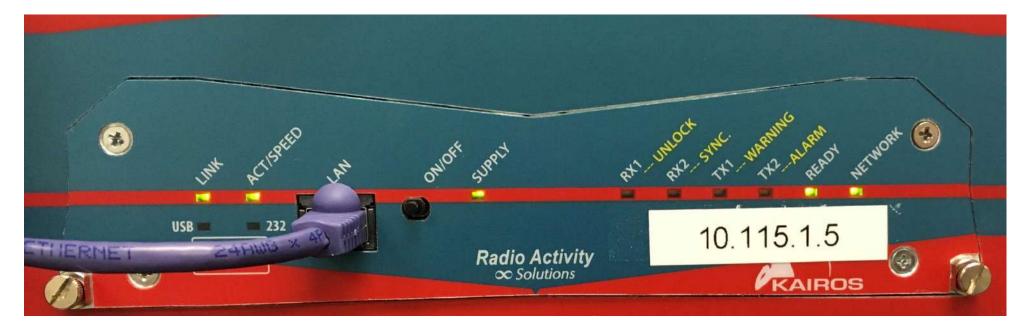
The Link and Act/Speed lights tell you the Layer-1/2 status of the LAN connection.



An RX1 LED that is blinking Green means the internal timing sync is satisfied.

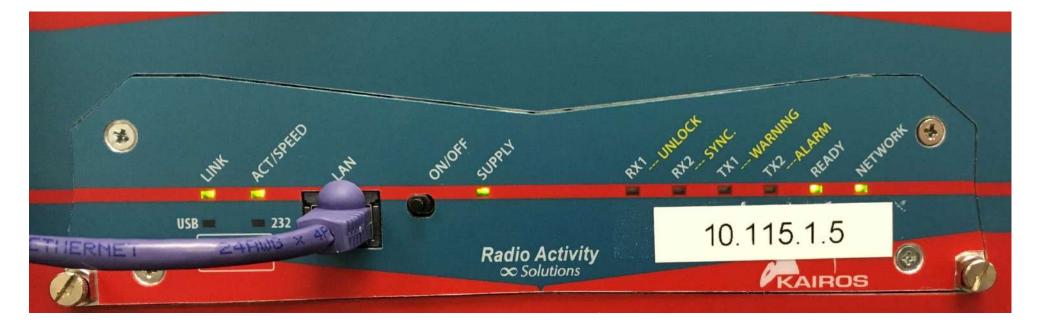
The NETWORK LED tells you about the status of this Kairos' view of the Kairos Network.

Link is always green when connected to the IP network. ACT/SPEED will be blinking with network activity and steady without activity.



If RX1 is blinking Green, Kairos is synced and timing is good.

If NETWORK is blinking Green, Kairos is registered to the Master.



The RX1 lights should blink in sync across the network.

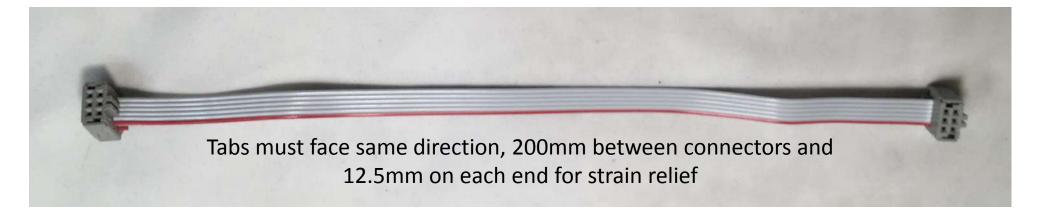
The NETWORK lights may not blink in sync with one another.

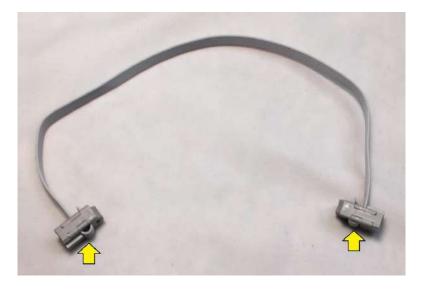
DMR Packets out of window

TRX Status		Synchronization S	status			DSP Measures Clea	r Packets (Counter
DSP Ready	TRX Active	PPS Signal from GPS	Present	Valid Lock		Last DSP St	artup:	
Clbr Running	Clbr OK	PPS Signal from PTP	Present	/alid Lock		2018-10-30 1	2:14:3	15
M. RX Fail	D. RX Fail	External PPS Signal	Present	/alid Lock		DMR Packets Out of Window	_	Contra Contra
Interrupts	from PLD	Superaudio Tone	Present 1	Valid Lock		ANA Packets Out of Window	4	0
SQ	Analog PTT	Synchronization from	DE Signal or de	SK Lock		Safety Margin for DMR Packets		0
TCS/DPL	Digital PTT	Synchronization from				Safety Margin for ANA Packets		2
RX DMR TS A	TX DMR TS A	Synchi onizadon indin	Internal Refere	Ence Look		Timing Error [Ls]		1,660
	TX DMR TS B	DSP Corn	ectly Synchro	nized		PPS Position [µs]	-	1.594
RX P25	TX P25					Pro roston gasj	>	1.094
Features Statu	IS	AF Lines Status	14			RX Measures		
SIMULCAST	Features	AF to DMR Codecs	TS A	TS B		Peak Deviation [Hz]	_	4391
DMR Fea	atures	DMR Codecs to AF	TS A	TS B		Estimated SINADp [dB]	-	4391
ANALOG F	eatures	Output Signalling	Line 1 L	ine 2 IP Lin	e	Offset of received carrier [Hz]	-	63
ETSI Tier III	Features	Input Signalling	Line 1 L	ine 2 IP Lin	e	onservinecence carrier [riz]	-	63
NETCONTRO	OL Access	Emorgoncy	Self-Repeatin	an Mode				
SNMP Fe	a second s	and a second sec	tered to Mast	Contraction of the Contraction o		Analog Measures		
POCSAG F		Promoted to				Input Supply Voltage [V]		13.4
MULTITONET		Tomoteu to	Truster for er	nergency		TX Temperature [°C]		22
P25 Fea	ACCENTED NO.					TX Input Current [A]		N/A
TX Feat	and the second se	Vocoders Status				Forward Power [W]	-	N/A
SIP Fea		Vocoder 1	V	ocodar 2		Reflected Power [W]		N/A
Amateur Rad	Contraction of Contraction Contraction					SWR		N/A
External Ra	CONTRACTOR AND A CONTRACTOR						1	inter .
Audio fro	m Web	Clocks Status				DMR Status		
Commands	Seth	TX PLL Lock		PLLLock		Internal Second/Timeslot	8	278
Unlock SQ		DSP <=>	PLD Communic	ation			TSA	TSI
Unlock TCS/DPL					1.1	Last Received Timeslot	62	0
Start Transmission	n 📛	1+1 Status	Ford	e to SPARE		Frequency offset rx [Hz]	-306	0
Disable TX		1+1 Node	Link be	tween Nodes		Time offset rx [ms]	0.042	0.00
Line 2 Output Sig	nal					Error Vector	173	0.00
Local TRX Test		Last role change		**		Last Received Color Codes	1	0
	Acres 1	-				Last Transmitted Data Types	9	9
						RSSI Main [dBm]	-127.1	-127.
Disable Digital Squ	uelch			Close		RSSI Diversity [dBm]	-131.0	-129.
	1			Liose			1 101.0	
UHF 450÷520	0 MHz ITU Region	a 2 Band MULTI	ROTOCOL DI	IR TIER II N	DDE	SLAVE BASE ST	ATION	
S/N: 500KA56		Base Station Role: BRO				nent ID: 0x08409150		5.1.6

RX Status	Synchronization S	tatus		DSP Measures Clea	r Packets (Counters
OSP Ready TRX Active	PPS Signal from GPS PPS Signal from PTP	Present Valid		Last DSP St 2018-10-30 1		5
M. RX Fail D. RX Fail Interrupts from PLD	External PPS Signal Superaudio Tone	Present Valid Present Valid	and the second s	DMR Packets Out of Window ANA Packets Out of Window	<	0
SQ Analog PTT TCS/DPL Digital PTT	Synchronization from	RF Signal or 4FSK	Lock	Safety Margin for DMR Packets		0
TCS/DPL Digital PTT	Synchronization from	Internal Reference	Lock	Safety Margin for ANA Packets		0
COMPLETE TX DMR TS R	DSP Corre	ctly Synchroniz	ed	Timing Error [µs]	4	.660
RX P25 TX P25		city syncaroniz		PPS Position [µs]	5	1.594
atures Status	AF Lines Status			RX Measures		
SIMULCAST Features	AF to DMR Codecs	TS A	TS B	Peak Deviation [Hz]		
DMR Features	DMR Codecs to AF	TS A	TS B	Estimated SINADp [d8]	-	391 2.8
ANALOG Features	Output Signaling	Line 1 Line	2 IP Line	Offset of received carrier [Hz]		63
ETSI Tier III Features	Input Signaling	Line 1 Line	2 IP Line	Chaecon eceived carrier [riz]		03
NETCONTROL Access	Emergency	Self-Repeating I	lode			
SNMP Features	and the second	ered to Master	Iouc	Analog Measures		
POCSAG Features		Master for Emer	nency	Input Supply Voltage [V]		13.4
MULTITONE TCS Features			32027	TX Temperature [°C]		22
P25 Features				TX Input Current [A]		N/A
TX Features	Vocoders Status			Forward Power [W]		N/A
SIP Features	Vocoder 1	Vocos	lar 2	Reflected Power [W]		N/A
Amateur Radio Features External Raw Access				SWR		N/A
Audio from Web	Clocks Status			DMR Status		
mmandsSet	TX PLL Lock	RX PLL PLD Communication		Internal Second/Timeslot	8	278
odk SQ		A MARKEN IN A MARKEN AND A			TSA	TS B
ock TCS/DPL				Last Received Timeslot	62	0
rt Transmission	1+1 Status	Force to	SPARE	Frequency offset rx [Hz]	-306	0
able TX	1+1 Node	Link betwe	en Nodes	Time offset rx [ms]	0.042	0.000
e 2 Output Signal	Last role change			Error Vector	173	0
al TRX Test	Last role change	-		Last Received Color Codes	1	0
				Last Transmitted Data Types	9	9
				RSSI Main [dBm]	-127.1	-127.4
able Digital Squelch			Close	RSSI Diversity [dBm]	-131.0	-129.4
JHF 450÷520 MHz ITU Reg	ion 2 Band MULTIE	ROTOCOL DMR	TER TI NODE	SLAVE BASE STA	TION	

TRX Status	Synchronization S	tatus			DSP Measures Clea	ar Packets (Counters
DSP Ready TRX Active Cibr Running Cibr OK	PPS Signal from GPS PPS Signal from PTP	Present	A DECKER SHOW	Lock	Last DSP St 2018-10-30 1		
M. RX Fail D. RX Fail	External PPS Signal	Present	Valid	Lock	DMR Packets Out of Window	_	-
Interrupts from PLD	Superaudio Tone	Present	Valid	Lock	ANA Packets Out of Window		0
SQ Analog PTT	Synchronization from	RE Signal or	4ESK	Lock	Safety Margin for DMR Packets		2
TCS/DPL Digital PTT	Synchronization from	A CONTRACTOR OF A CONTRACTOR O		Lock	Safety Margin for ANA Packets		0
RX DMR TS A TX DMR TS A					Timing Error [us]		.840
RX DMR TS B TX DMR TS B RX P25 TX P25	DSP Corre	etty Sync	hronized		PPS Position [µs]	-	4.127
Features Status	AF Lines Status				RX Measures		
SIMU-CAST Features	AF to DMR Codecs	TS A		TSB	and the second designed		
DMR Features	DMR Codecs to AF	TSA		TSB	Peak Deviation [Hz]		1466
ANALOG Features	Output Signalling	Line 1	Line 2	IP Line	Estimated SINADp [dB]		2.9
ETSI Tier III Features	Input Signalling	Line 1	Line 2	IPLine	Offset of received carrier [Hz]		27
NETCONTROL Access	Emergency	Self-Repe	ating Mo	de			
SNMP Features		ered to M			Analog Measures		
POCSAG Features	Promoted to	Master fo	r Emerge	ency	Input Supply Voltage [V] 13.4		
MULTITONE TCS Features P25 Features					TX Temperature [°C]		22
TX Features					TX Input Current [A]		N/A
SIP Features	vocoucis status		_		Forward Power [W]		N/A
Amateur Radio Features	Vocoder 1		Vocode	2	Reflected Power [W]		N/A
External Raw Access					SWR		N/A
Audio from Web	Clocks Status				DMR Status		
Commands Set h	TX PLL Lock		RX PLL L	ock	Internal Second/Timeslot	2	83
Unlock SQ	DSP <=>	PLD Comm	unication			TSA	TSB
Jnlock TCS/DPL					Last Received Timeslot	62	150
Start Transmission	1+1 Status		Force to S	PARE	Frequency offset rx [Hz]	-306	0
Disable TX	1+1 Node	Lin	kbetween	Nodes	Time offset rx [ms]	0.042	0.000
ine 2 Output Signal					Error Vector	173	0
ocal TRX Test	Last role change	I			Last Received Color Codes	1	0
					Last Transmitted Data Types	9	9
					RSSI Main [dBm]	-128.0	-127.8
Disable Digital Squelch			[Close)	RSSI Diversity [dBm]	-131.0	-132.4
UHF 450÷520 MHz ITU Regio	n 2 Rand Mill TH	ροτοςοι		RTINODE	SLAVE BASE ST	ATTON	





Kairos and the DMR Standard

- Groups are not supported
 - While Kairos passes group calls, it does not discern them
 - There is no console interface to support group calling
 - There will be provision for group calling soon

JVCKENWOOD