

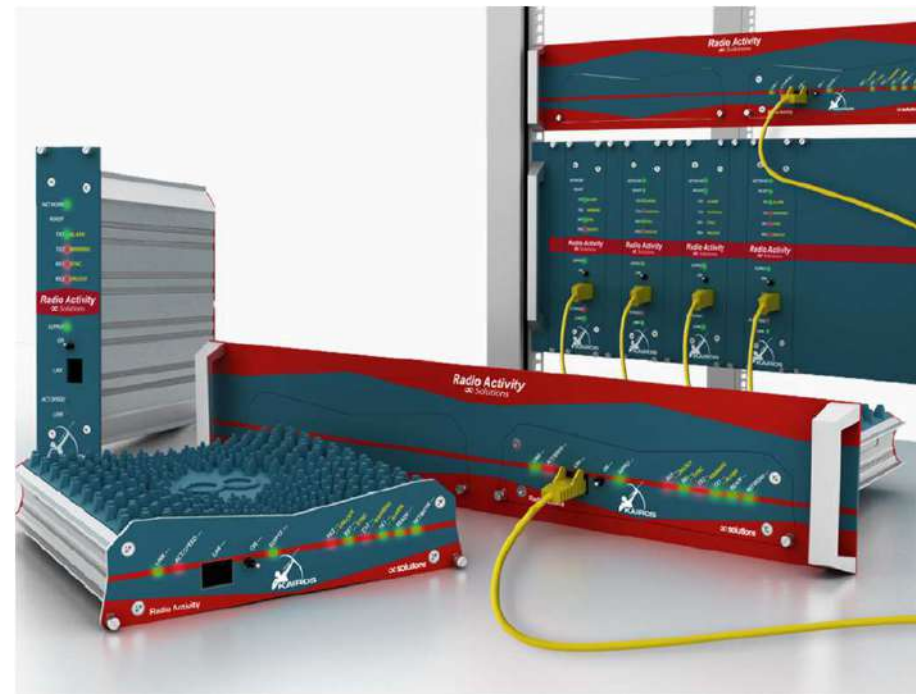
KAIROS Applications

Base station / fixed station / mobile station



Presentation contents

- ∞ **KAIROS - Key Features.** A brief introduction on **KAIROS** benefits as transceiver.
- ∞ **Main network and standalone applications of KAIROS.** Thank to its flexibility, a number of applications are allowed only modifying the setup parameters.
- ∞ **KAIROS – Technical description**
- ∞ **KAIROS – Mechanical accessories**

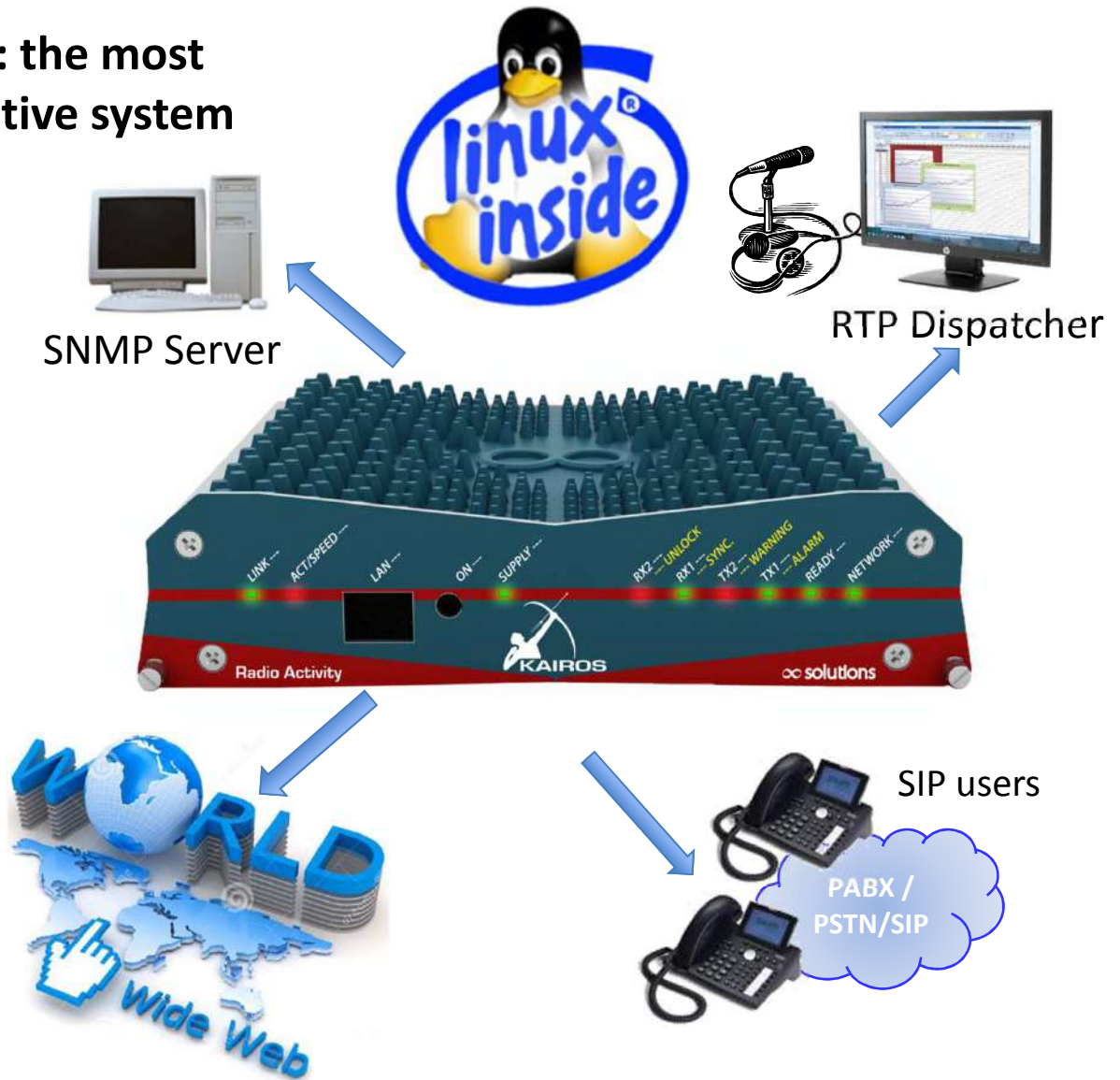


KAIROS - Key Features



POWERFUL LINUX ENGINE: the most diffused license free operative system

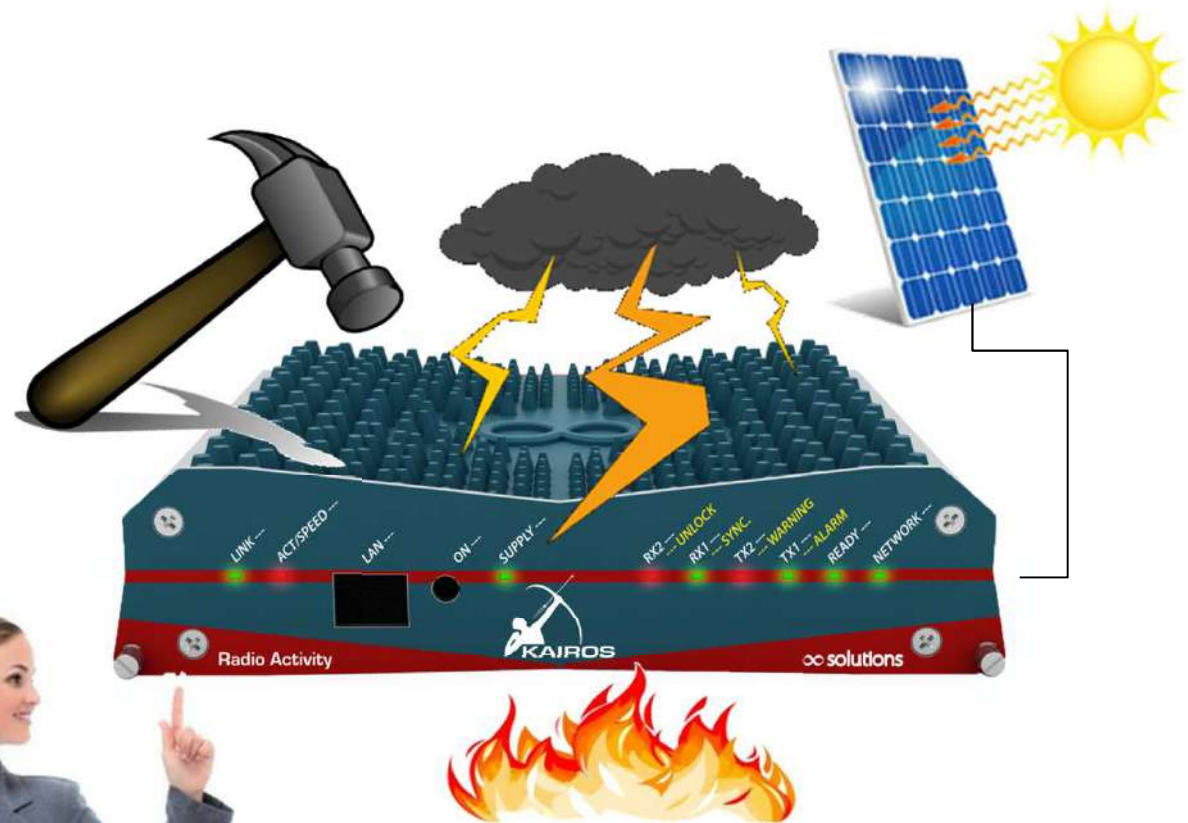
- ∞ Superior software stability
- ∞ Extended file system support
- ∞ Easy and secure SW downloading
- ∞ A number of available applications
- ∞ SIP/RTP-IP VoIP capability
- ∞ Native IP and worldwide proved protocols
- ∞ SNMP alarms report
- ∞ IEE1588 or Precision Time Protocol over IP
- ∞ Audio and data communication over IP
- ∞



LIGHT, RUGGEDIZED AND RELIABLE

All types of on air modulation and protocols are Software only implementation, giving maximum flexibility and upgradability Analog modulation

- ∞ 1.35 Kg weight
- ∞ 160x200x45mm (½ 2xTU 19" rack)
- ∞ <4W standby power consumption
- ∞ Vibration and shock resistant
- ∞ -30°/ +60°C
- ∞ 25W 100% duty cycle
- ∞ 250W (with ext amplifier)
- ∞ Solar panel ready
- ∞



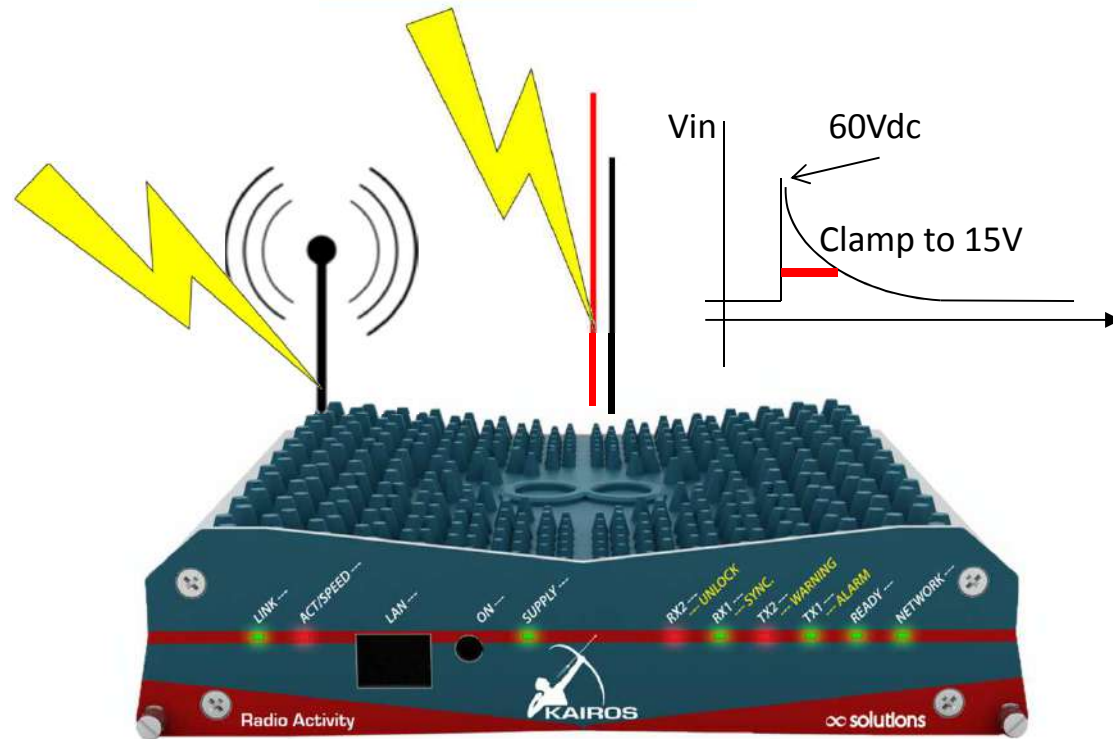
Automatic self protections

Power Supply:

- ∞ Over-current in the Power MOS
- ∞ TX standing wave > 3
- ∞ Over temperature (it reduces progressively the RF power when $T > 85^\circ$)
- ∞ RX power in (up to +20dBm)
- ∞ RX static discharge

RF and environmental:

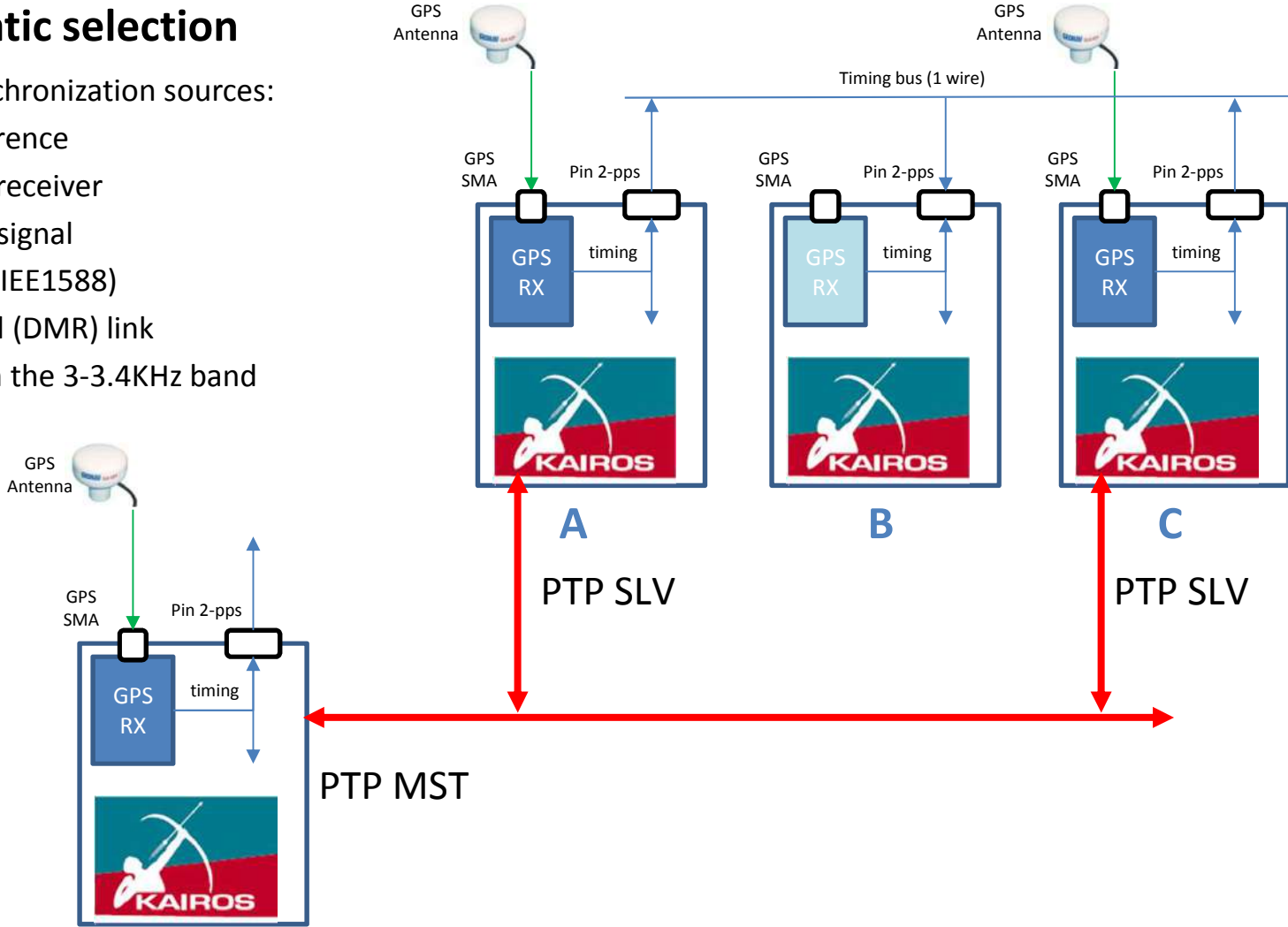
- ∞ Over-current and short-circuit
- ∞ In rush current limited
- ∞ Overvoltage up to 60Vdc
- ∞ Undervoltage to save external Pb battery
- ∞ Polarity inversion
- ∞ High voltage transient (up to 60Vdc)
- ∞ Lightning

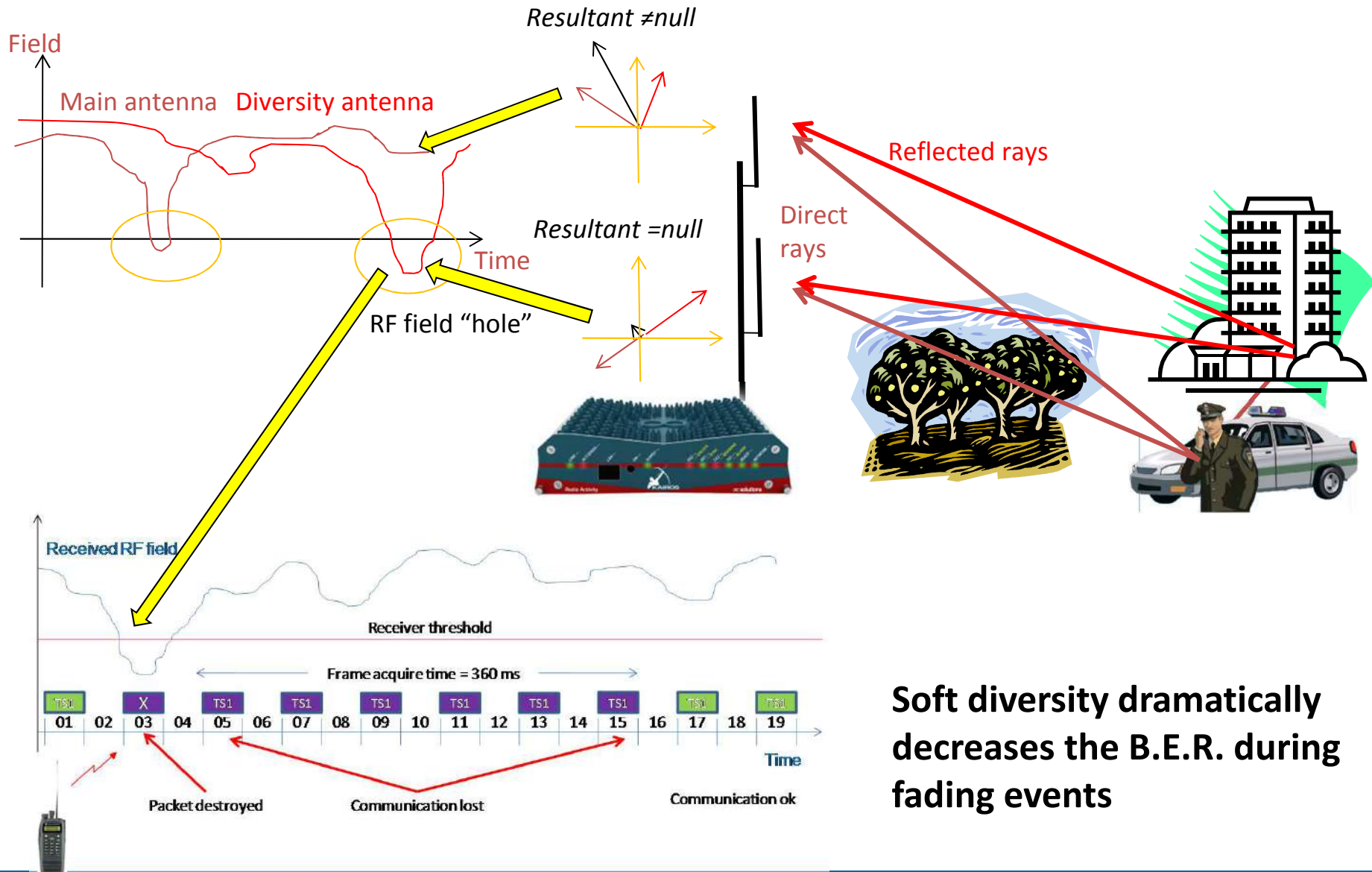


Multiple synch sources with automatic selection

Possible main synchronization sources:

- ∞ Internal Reference
- ∞ Internal GPS receiver
- ∞ External PPS signal
- ∞ P.T.P. over IP (IEE1588)
- ∞ From a digital (DMR) link
- ∞ Audio tone in the 3-3.4KHz band
- ∞





Soft diversity dramatically decreases the B.E.R. during fading events

Remote Control capability

Remote Control **Protocols**:

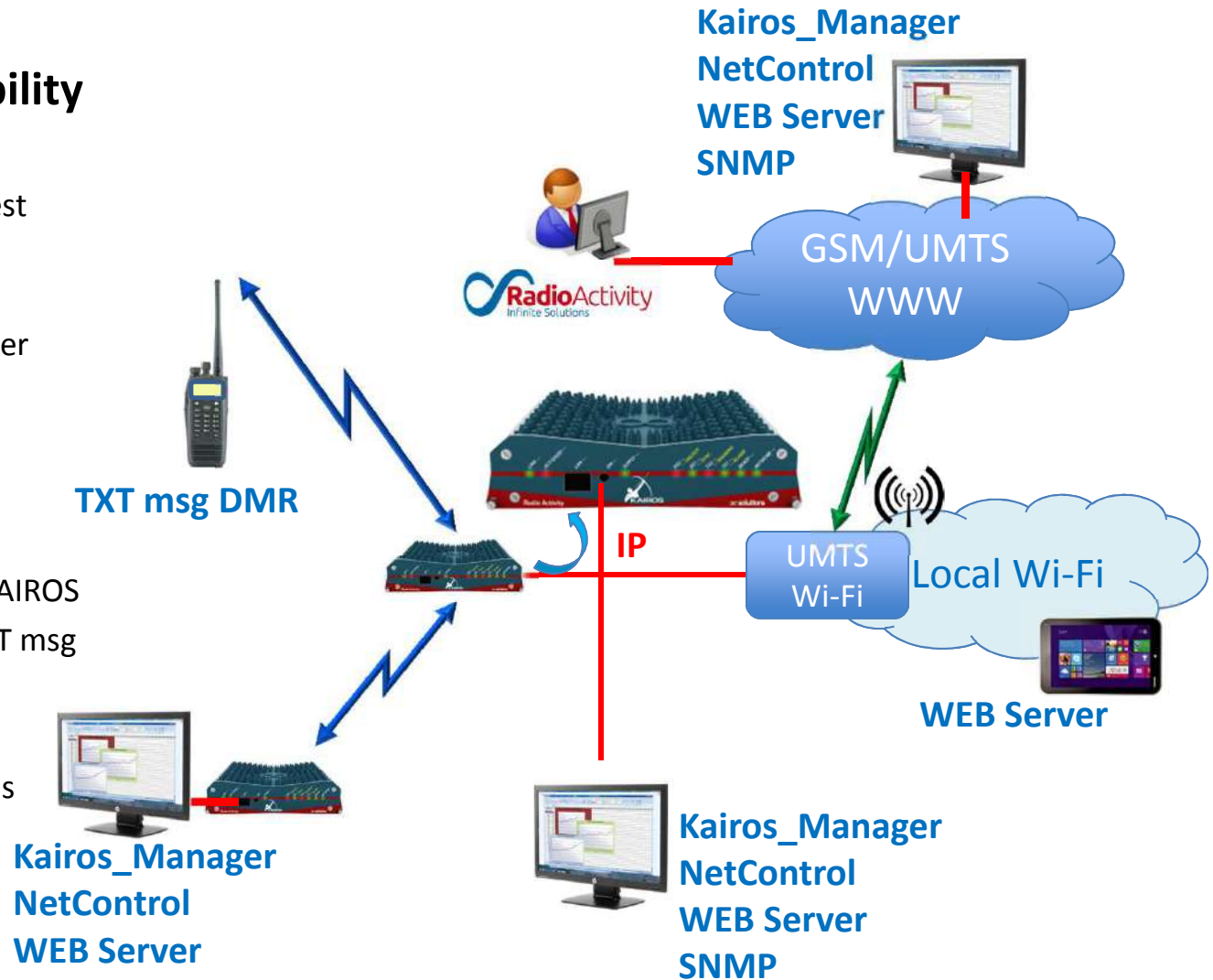
- ∞ Proprietary IP based (highest detail)
- ∞ SNMP
- ∞ HTML to internal WEB server
- ∞ DMR over an RF access

Remote Control **ways**:

- ∞ Direct IP connection
- ∞ 3G/GSM access point
- ∞ Via RF link using another KAIROS
- ∞ From a terminal using a TXT msg

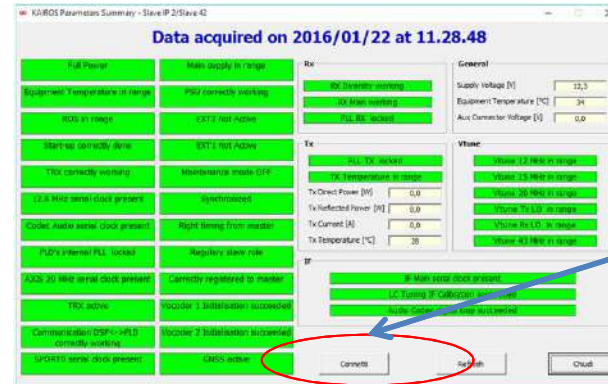
Remote Control **Applications**:

- ∞ NetControl system survey
- ∞ Kairos_Manager setup tools
- ∞ WEB server
- ∞ SNMP Server



DMR_NetControl system survey tools

- ∞ Manages up to 160 base stations
- ∞ Simple overview report
- ∞ IP and/or RF connection
- ∞ Polling mode
- ∞ Proprietary protocol

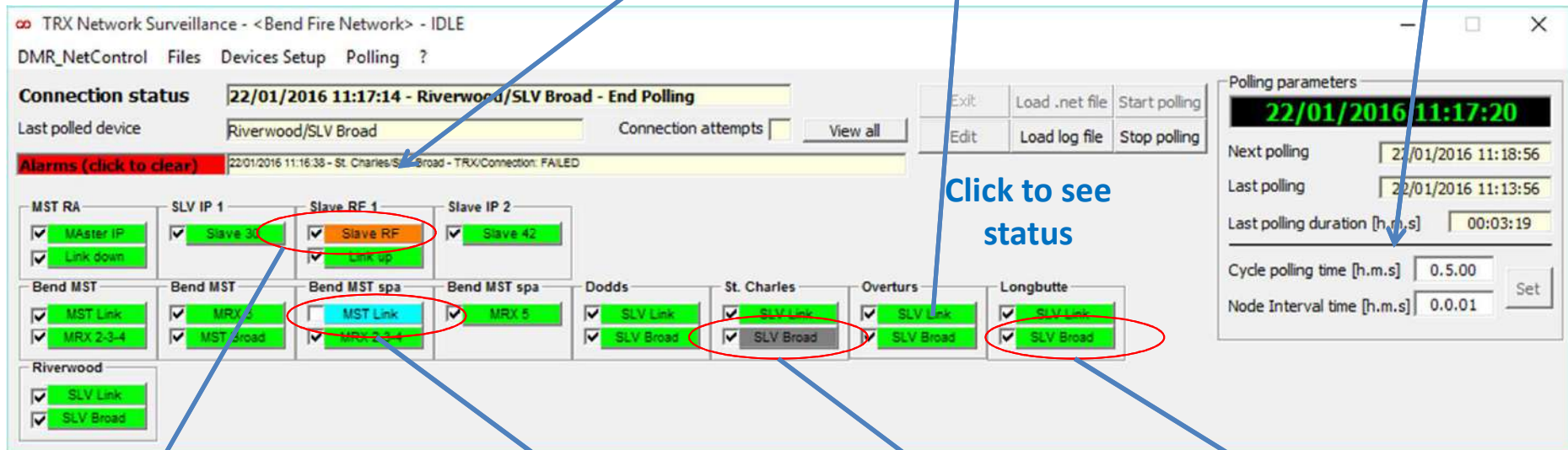


Click to open KAIROS_Manager

Polling Setup

Alarms/warning detail

Click to see status



Warning advise

Excluded from polling

Connection failed

All parameters ok

KAIROS_Manager setup tools

- ∞ Single device access
- ∞ All setup parameters available
- ∞ Direct opening from DMRN_etControl
- ∞ Very detailed operation
- ∞ IP and/or RF connection
- ∞ Proprietary protocol
- ∞ Windows/Linux

KAIROS_Manager

KAIROS equipments remote control
Version 1.6.0
Copyright: © 2014-2015 Radio Activity srl
Radio Activity srl
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The screenshot displays several key components of the KAIROS_Manager interface:

- Front Locks:** A control panel with buttons for RX 1, RX 2, TX 1, TX 2, READY, NETWORK, and LOCK.
- GPS Status:** A window showing satellite status, including a table of satellites in view and a star map of the sky.
- RX Filters:** A graph showing the crystal filter response curve with labels for -2.5 kHz and +2.5 kHz.
- Statistics:** A table displaying performance metrics such as Impulse Rate, Impulse RX, and Interference RX over time.
- Runtime Status:** A comprehensive dashboard showing TX Status, Synchronization Status, AF Lines Status, Analog Measures, and Clocks Status.

WEB Server - Dispatcher setup and survey tools

- ∞ Multiple devices access
- ∞ Main setup parameters available
- ∞ Direct access using a WEB browser
- ∞ Audio interface
- ∞ Standard HTML protocol
- ∞ Tablet view
- ∞ Windows/Linux/Android/IOS/...

Licenses managing

Parameters Setup

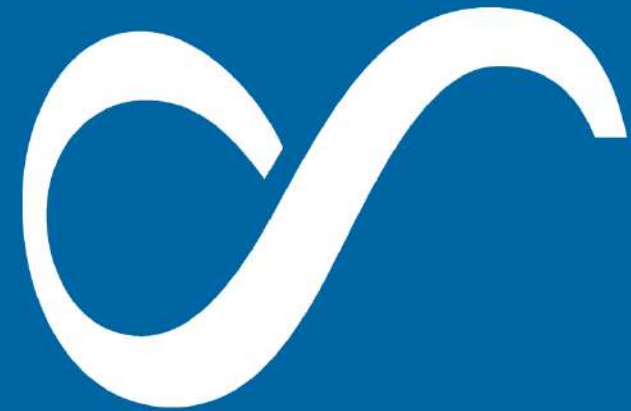
Dispatcher

Network discover

The screenshots show the following sections of the KAIROS web interface:

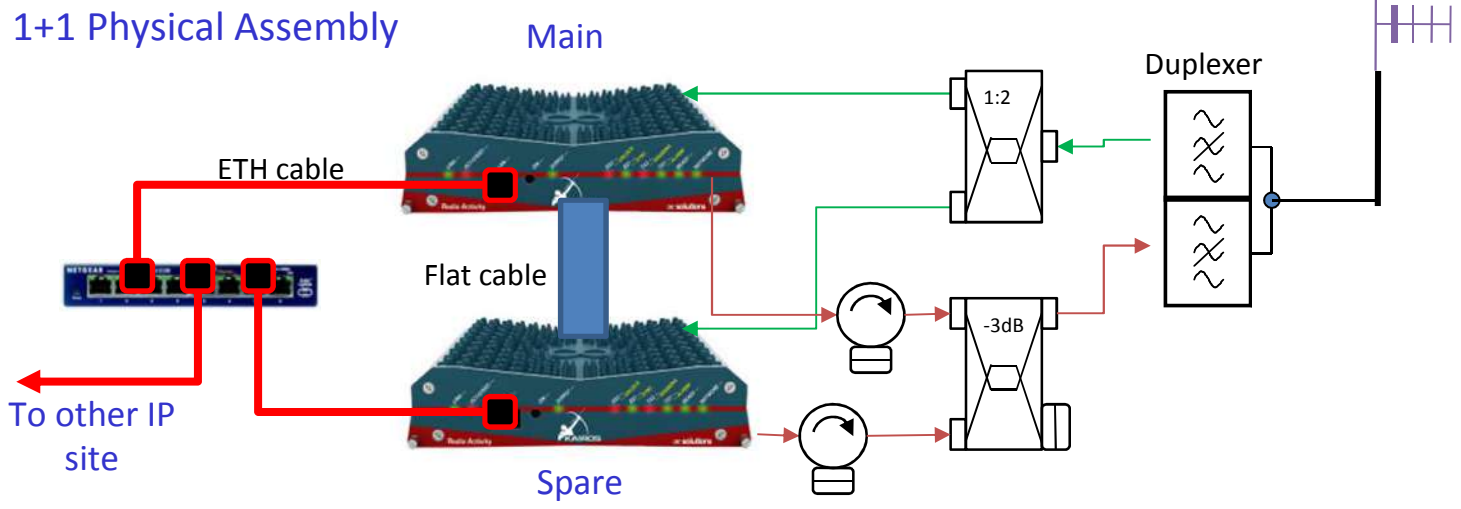
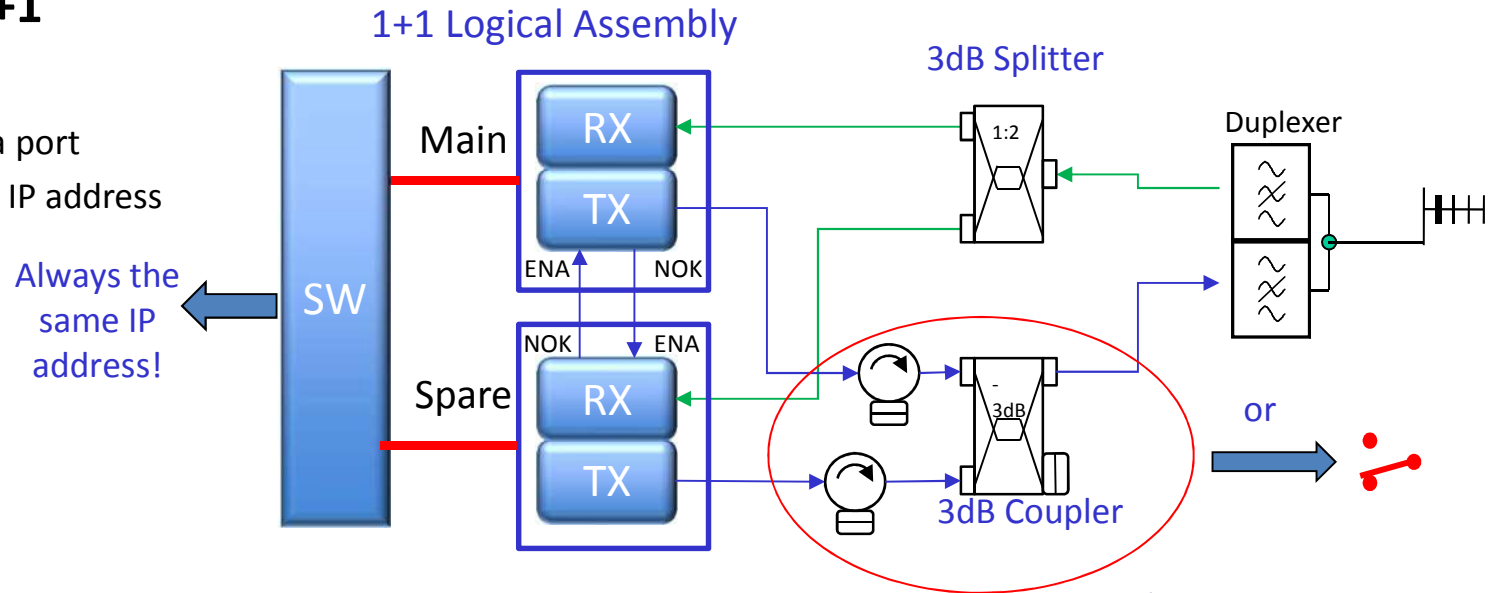
- Licenses managing:** A page titled "Current keys status:" listing various licenses such as DMR, Analog, Tier 3, Net Control, SNMP, POCSAG, MTCS, Simulcast, P25, TX, and SIP, with their activation status (e.g., "LIFETIME" or "EXPIRED").
- Parameters Setup:** A "Software versions" table listing software components like ka_bst, ka_main, ka_snmp, ka_rct1, web_int, ka_ptp, and bst_net_mgr with their respective dates and versions. It also includes "Band Information" for UHF 400+470 MHz.
- Dispatcher:** A page titled "Audio Channels:" showing three channels (172.33.17.40, ANA; 172.33.17.40, Ts A; 172.33.17.40, Ts B) with speaker and microphone icons and volume controls.
- Network discover:** A "Detail of MST LINK DOWN" window showing a table of network events with columns for Description, Attention level, and Value.
- Slave status:** A window showing details for a slave device (SALVE IP 17.42), including IP, MAC address, serial number, and various status indicators.

Network and standalone applications of **KAIROS**



Redundant 1+1 hot/standby

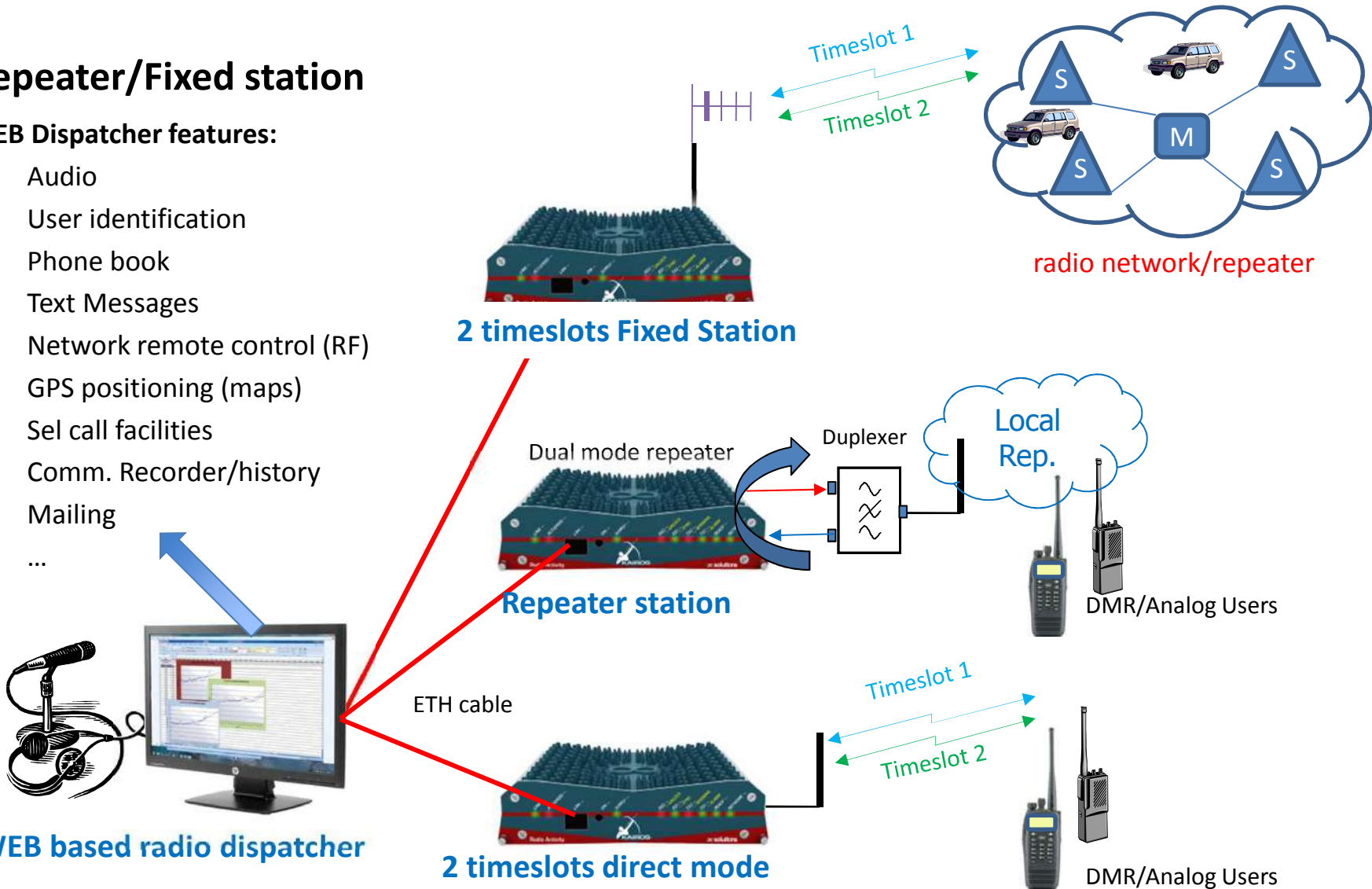
- ∞ Single antenna port
- ∞ Unique "alias" IP address



Repeater/Fixed station

WEB Dispatcher features:

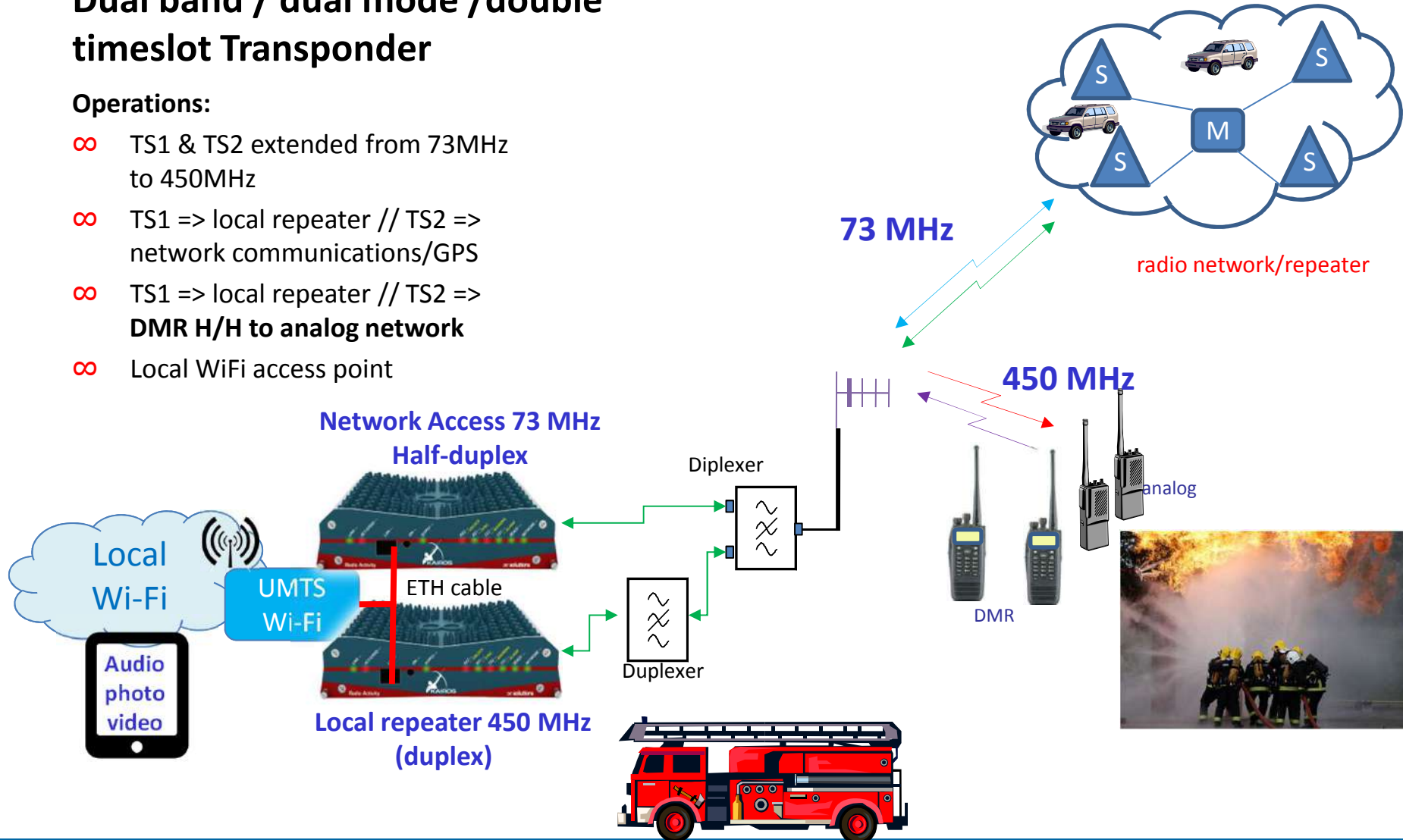
- ∞ Audio
- ∞ User identification
- ∞ Phone book
- ∞ Text Messages
- ∞ Network remote control (RF)
- ∞ GPS positioning (maps)
- ∞ Sel call facilities
- ∞ Comm. Recorder/history
- ∞ Mailing
- ∞ ...



Dual band / dual mode /double timeslot Transponder

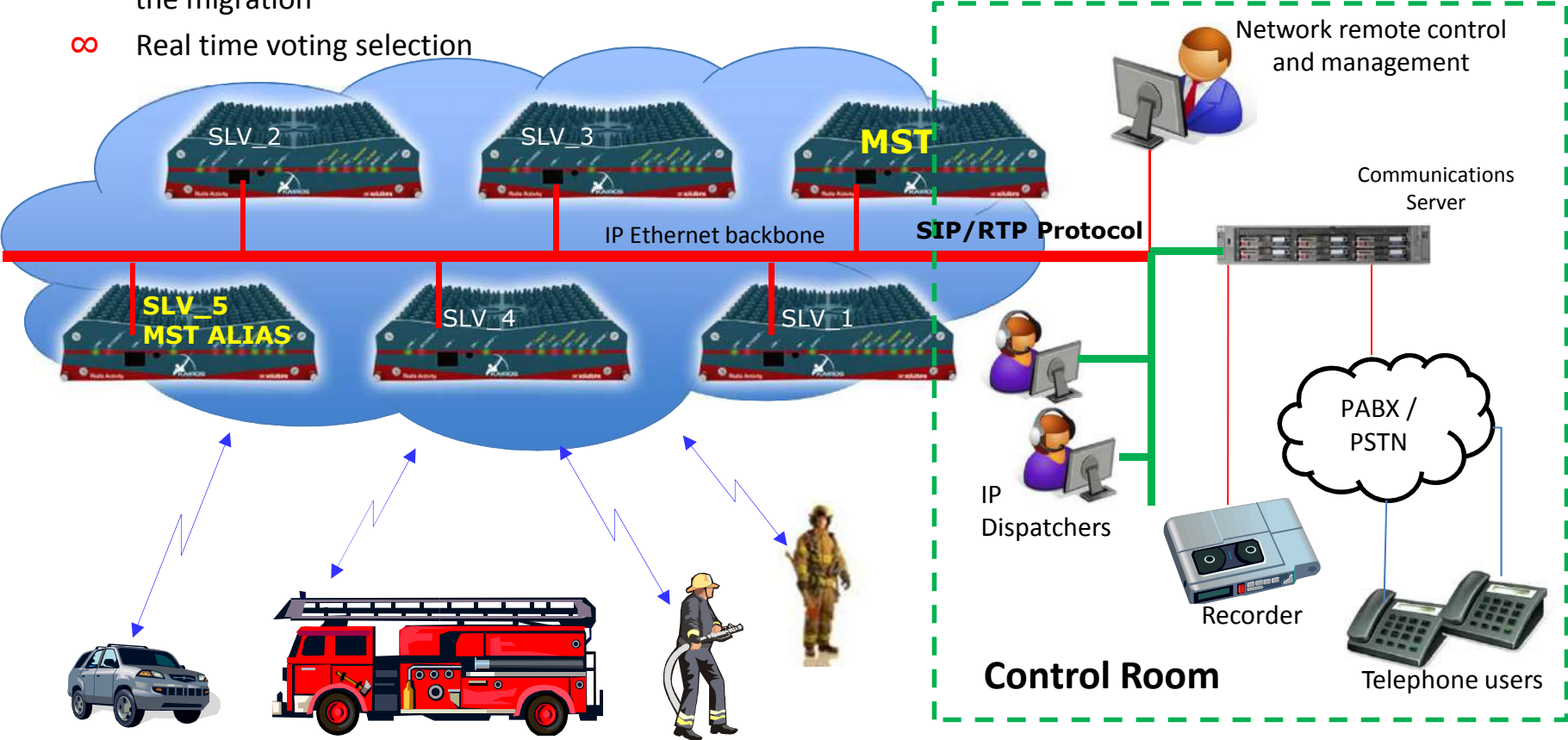
Operations:

- ∞ TS1 & TS2 extended from 73MHz to 450MHz
- ∞ TS1 => local repeater // TS2 => network communications/GPS
- ∞ TS1 => local repeater // TS2 => **DMR H/H to analog network**
- ∞ Local WiFi access point



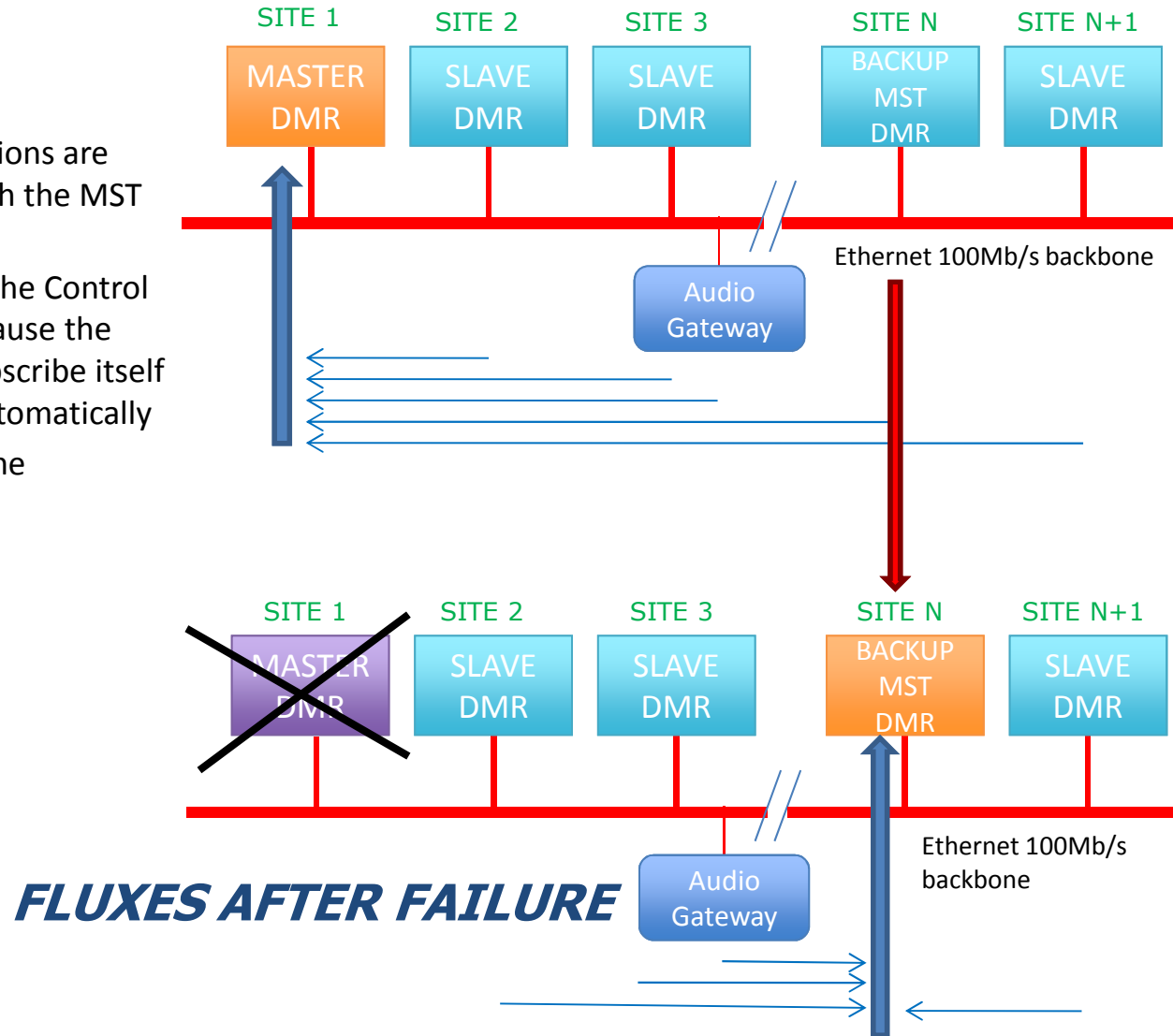
Dual mode IP site Connect

- ∞ Automatic switch between **Analog and Digital** services eases the migration
- ∞ Real time voting selection



Backup Master

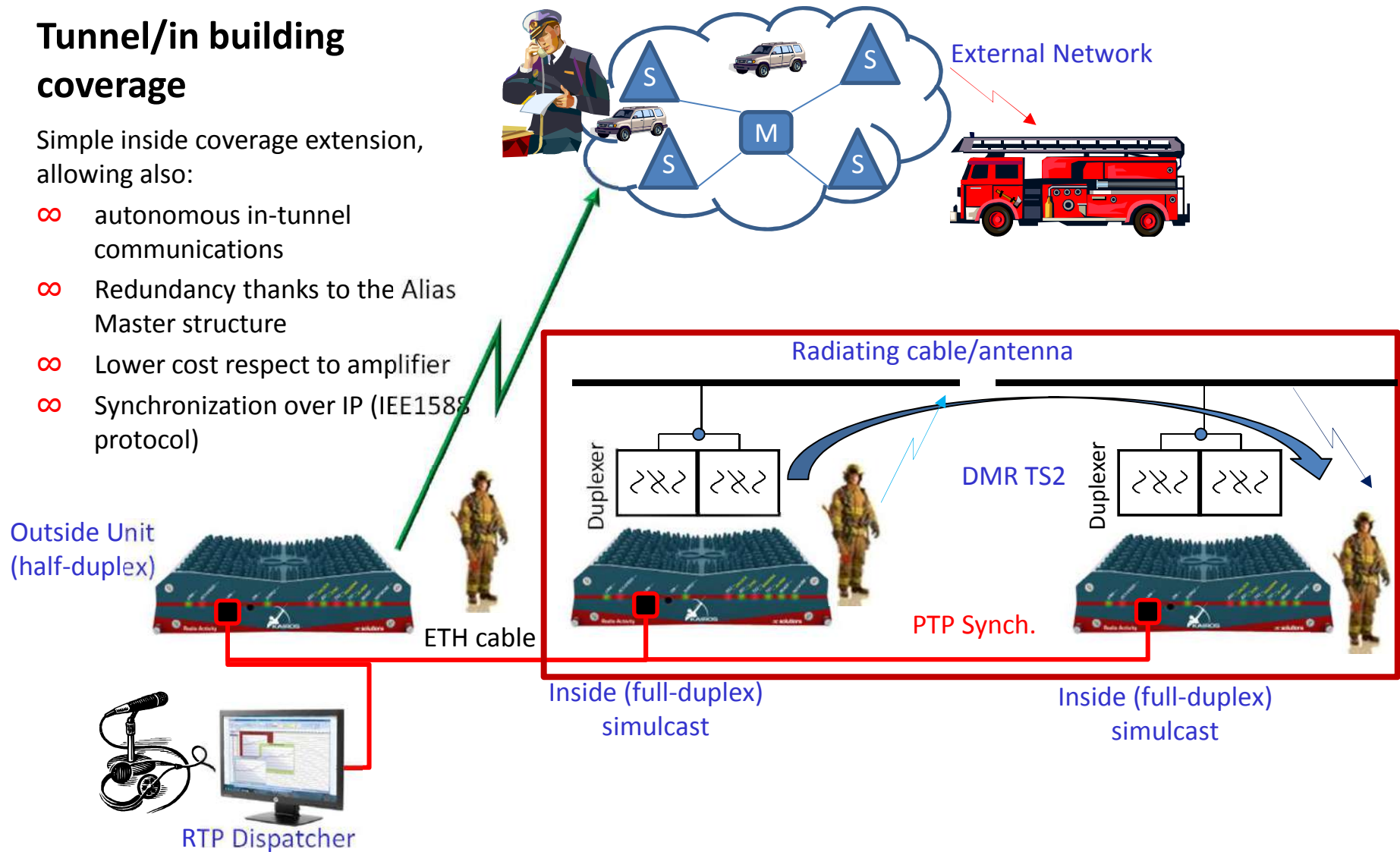
- ∞ Network communications are allowed regularly (with the MST site exception)
- ∞ The connection with the Control Centre is assured because the Audio Gateway re-subscribe itself to the new Master automatically
- ∞ Same procedure for the synchronization



Tunnel/in building coverage

Simple inside coverage extension, allowing also:

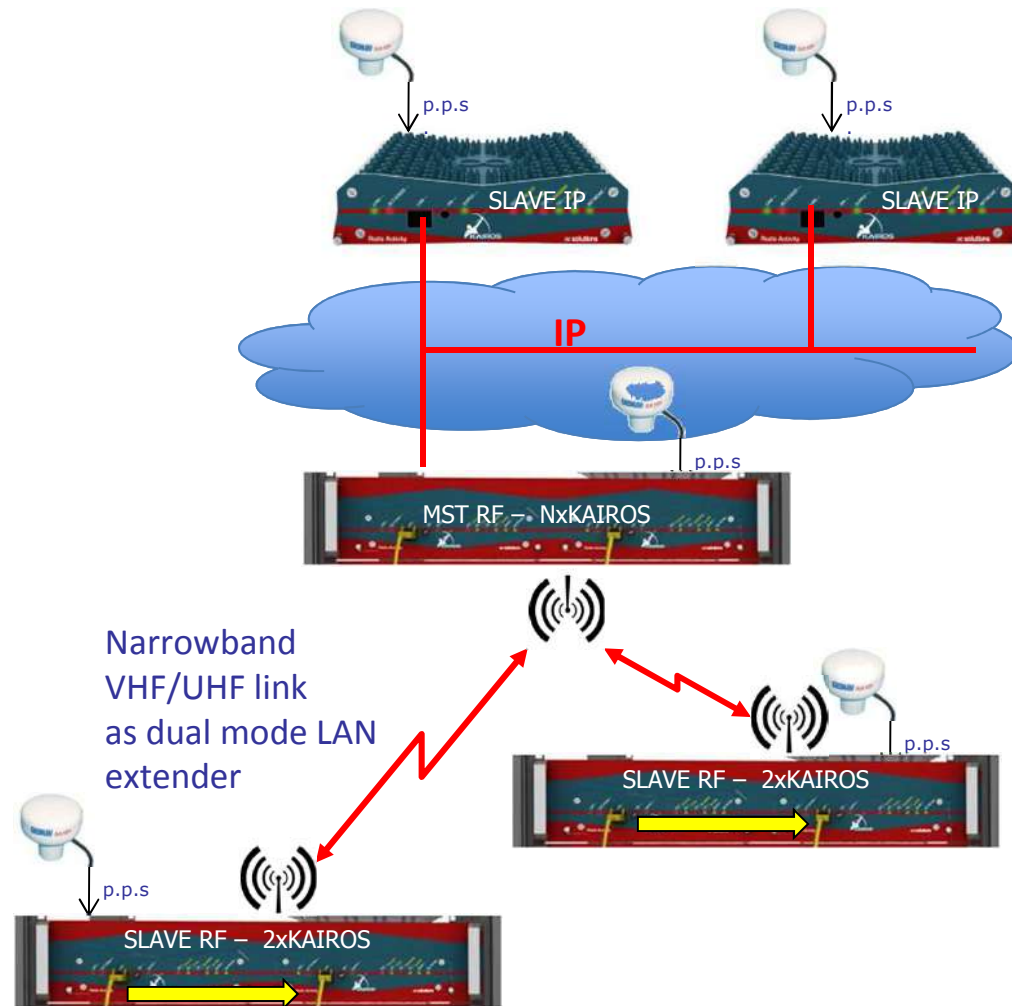
- ∞ autonomous in-tunnel communications
- ∞ Redundancy thanks to the Alias Master structure
- ∞ Lower cost respect to amplifier
- ∞ Synchronization over IP (IEEE1588 protocol)



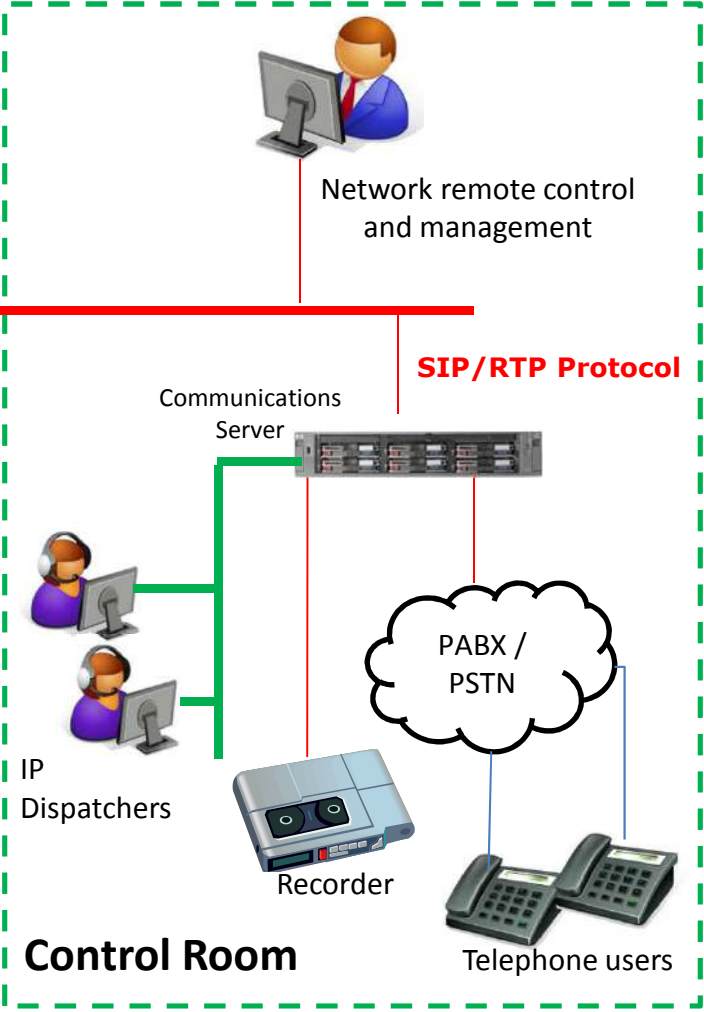
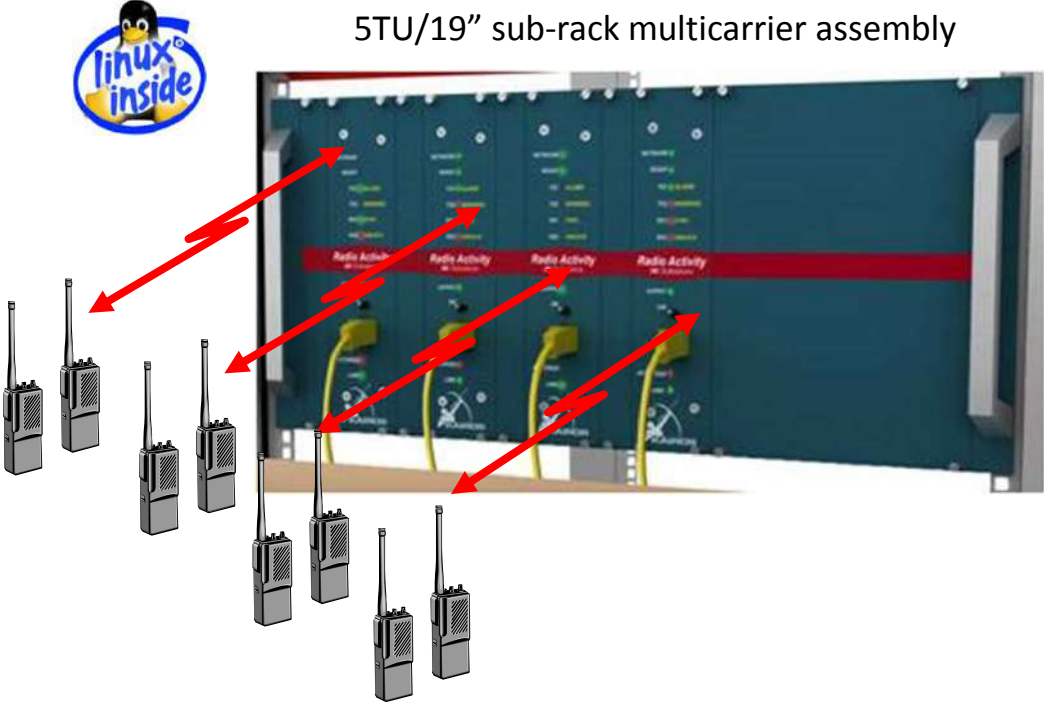
RF-linked repeaters

Dual Mode (DMR/Analog) mixed IP/RF linked. Advantages respect to microwave links:

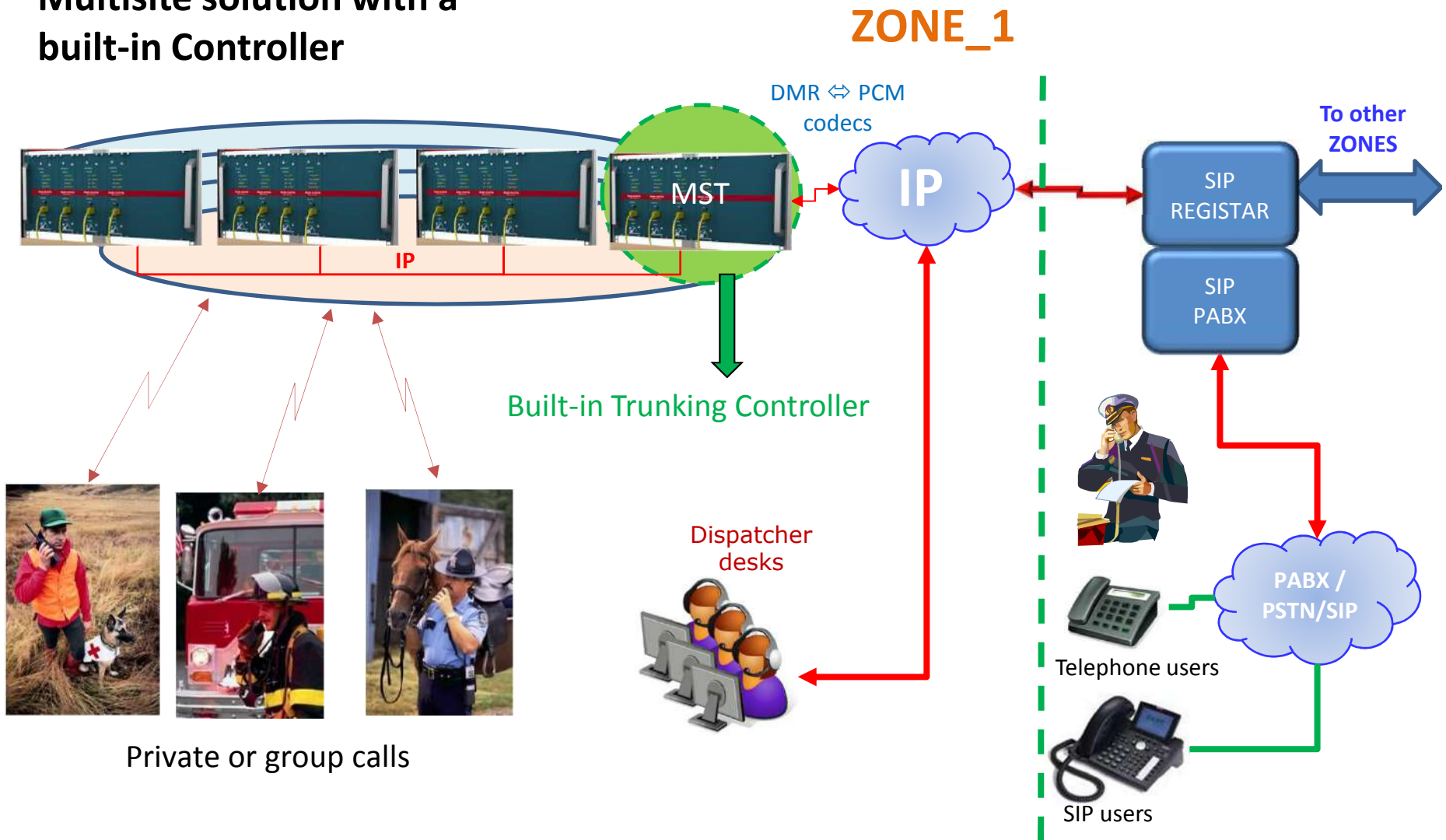
- ∞ Lower licenses cost
- ∞ Low power consumption (no constant link needed)
- ∞ “line of sight” not mandatory
- ∞ Synchronization via GPS with digital RF back-up
- ∞ Same devices (**KAIROS**) for broadcast and for link purpose



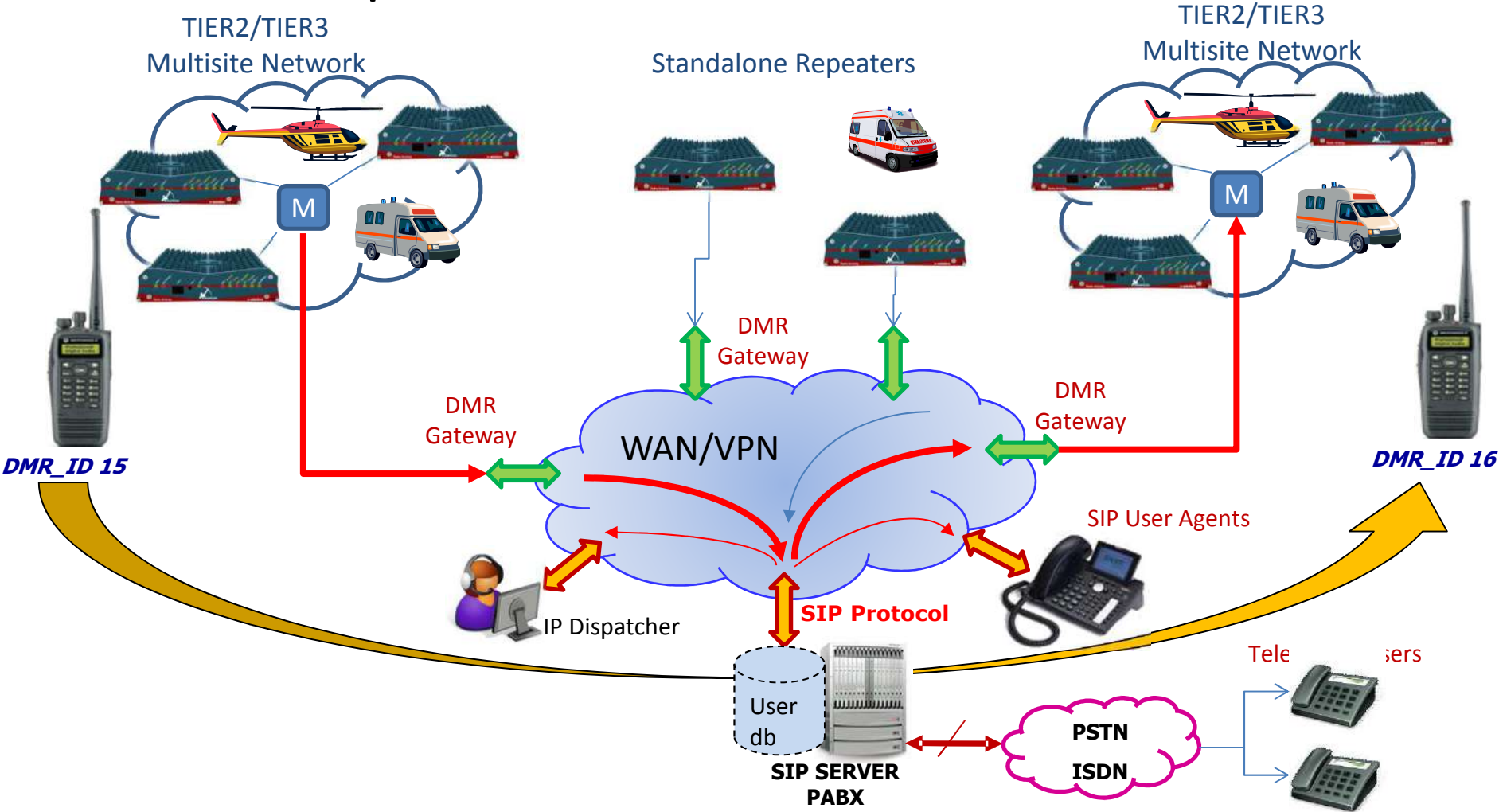
Single site TIER3 Trunking



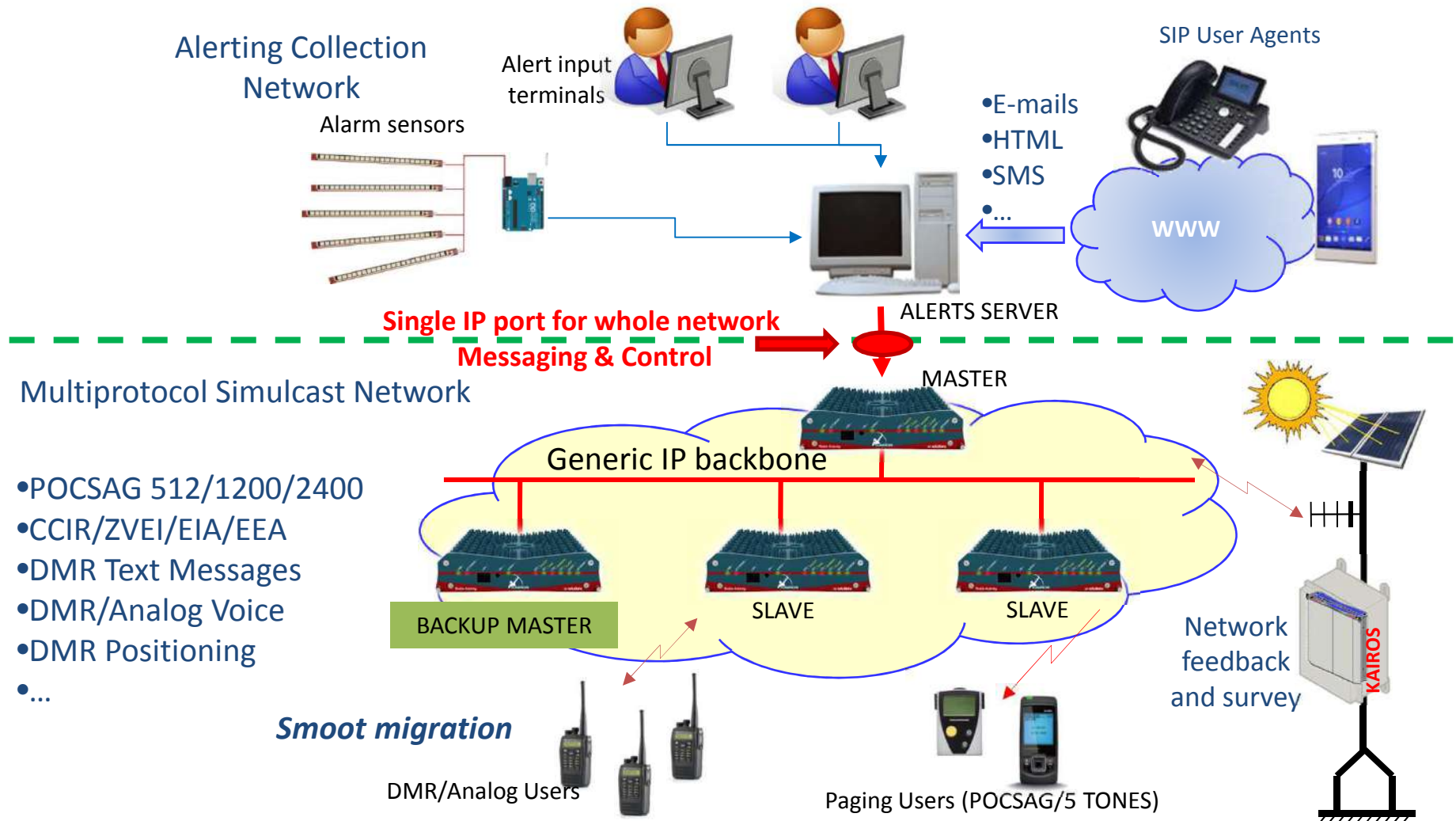
Multisite solution with a built-in Controller



Mobility and SIP services: Simple wide area roaming based on the standard SIP protocol



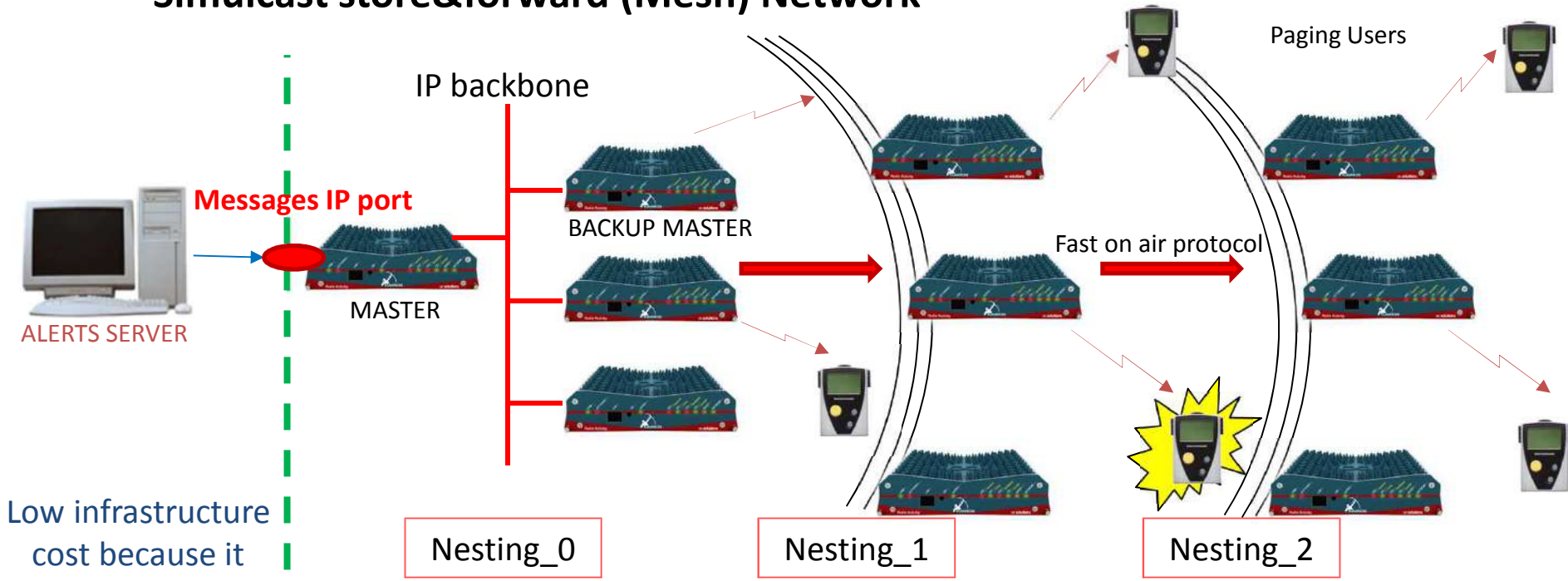
A single infrastructure for both audio and paging communications



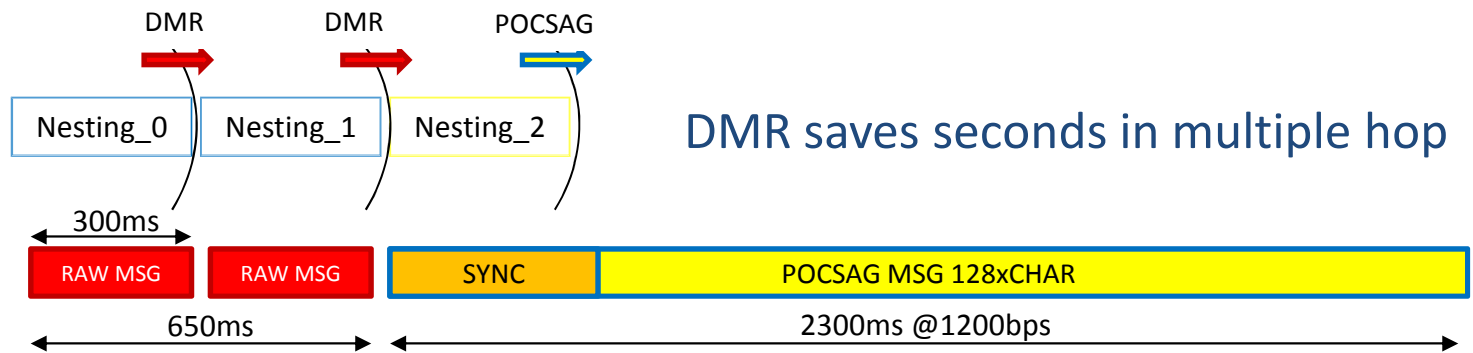
- POCSAG 512/1200/2400
- CCIR/ZVEI/EIA/EEA
- DMR Text Messages
- DMR/Analog Voice
- DMR Positioning
- ...

Smooth migration

Simulcast store&forward (Mesh) Network

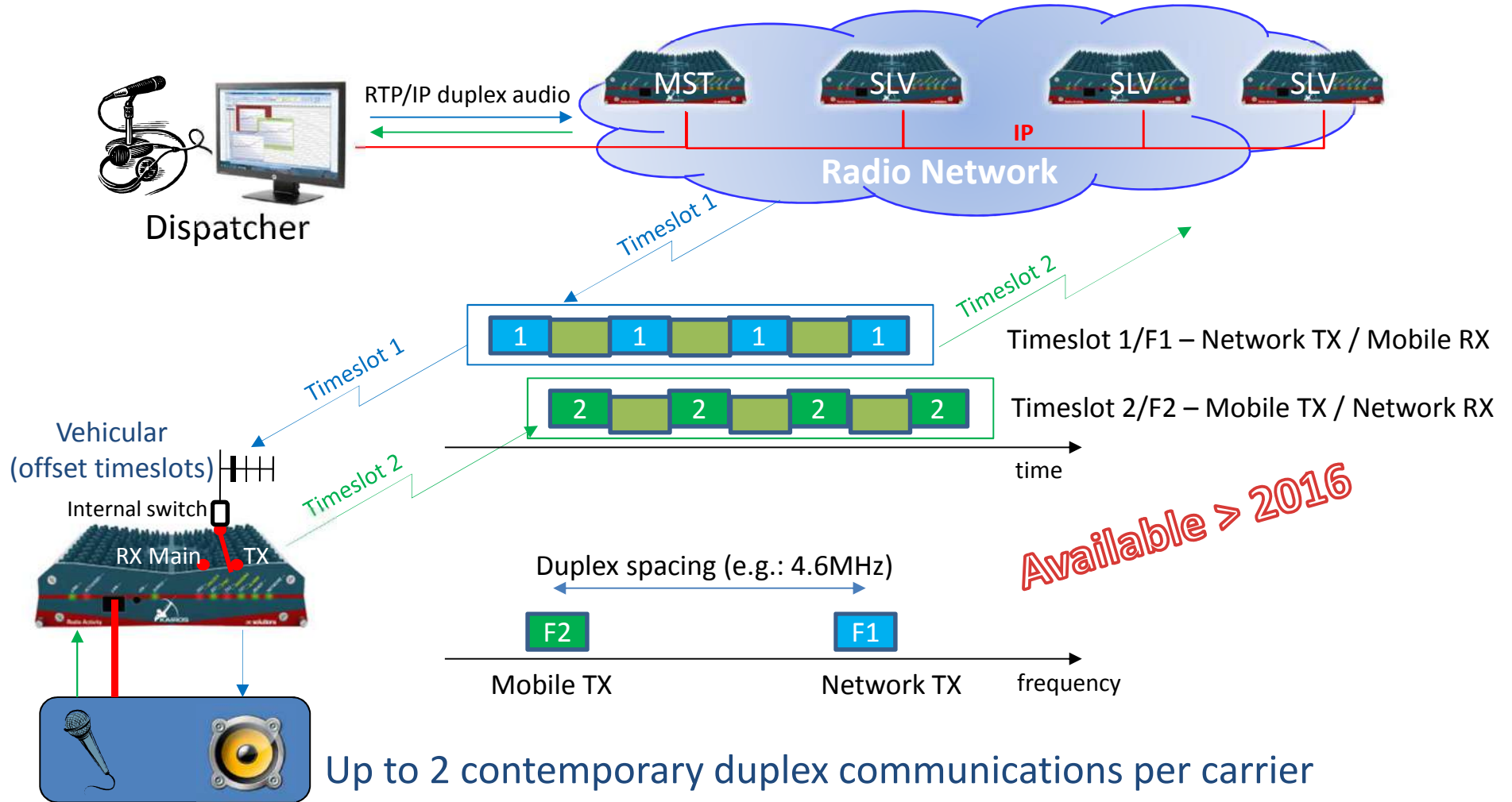


Low infrastructure cost because it doesn't need an IP backbone



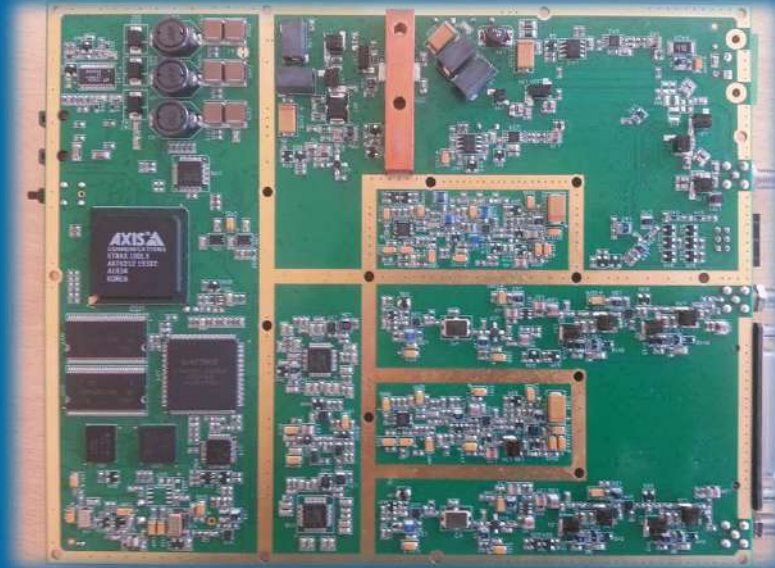
DMR saves seconds in multiple hop

TDMA Duplex (CAB Radio)



Up to 2 contemporary duplex communications per carrier

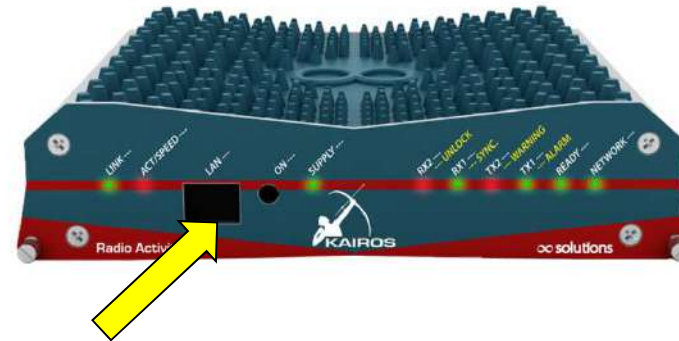
KAIROS – Tech. description



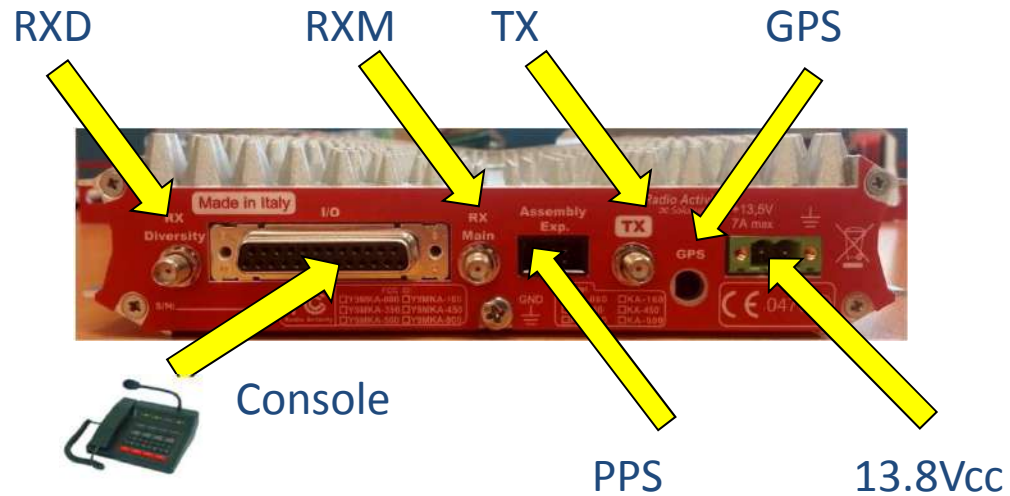
Communication ports (physical)

Main Ports:

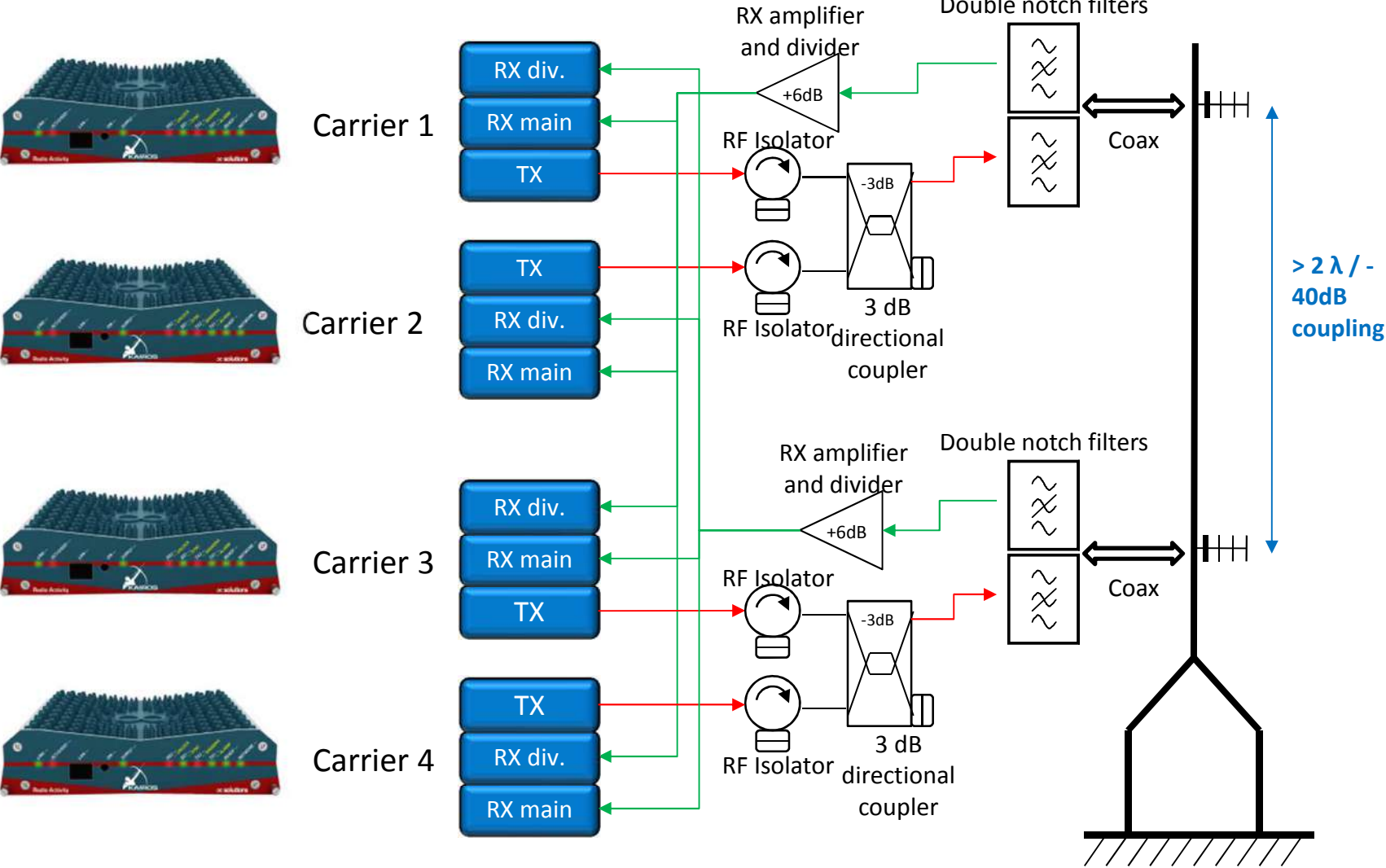
- ∞ Ethernet 10BT/100TX (auto MDI/MDI-X) on an RJ45 socket; it carries the DMR and the Analog communications, the network management protocols, the remote control messages, the interfacing with the external applications, SIP/RTP interfacing
- ∞ 2/4 wires + E&M for synchronization or Analog interfacing for Console
- ∞ PPS port for synchronization between local BS
- ∞ Power Supply 13.8Vcc



LAN ETH



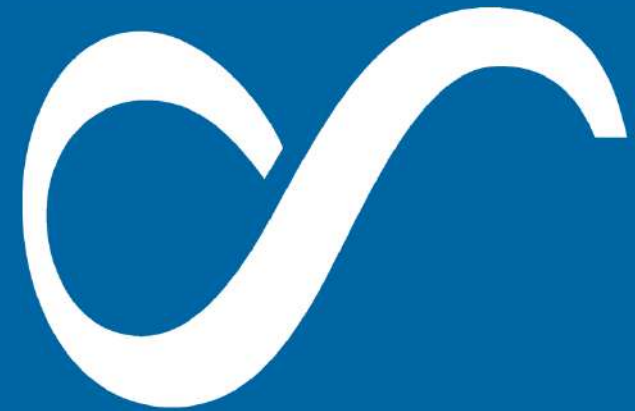
Multicarrier Diversity example



Engineering specifications

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 PPS						
Operating temperature	-30°C ÷ +60°C						
Power supply (negative ground)	Min.	Typ.			Max.		
	11V	13,2V			15V		
Power consumption	TX: 60 W @25W RF / RX: 5 W @Main+ Diversity enabled						
Dimensions & weight	160x200x45mm / 1.35Kg						
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	1140ms (round trip)						
Alarm & control I/O	1xInput + 7xOutput						
Auxiliary I/O	4xInput + 1xOutput + 1xAnalog input						

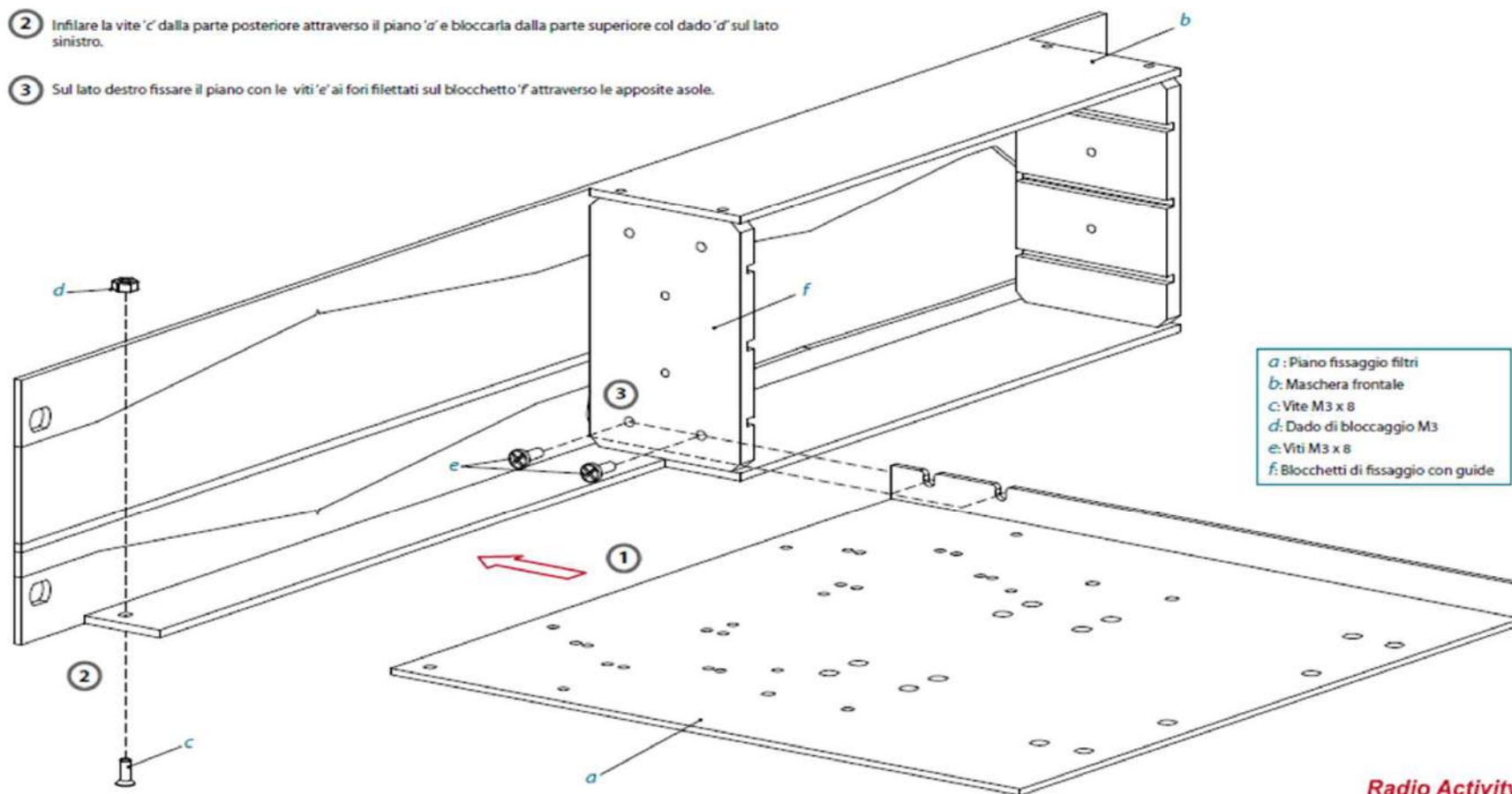
KAIROS – Mechanical accessories



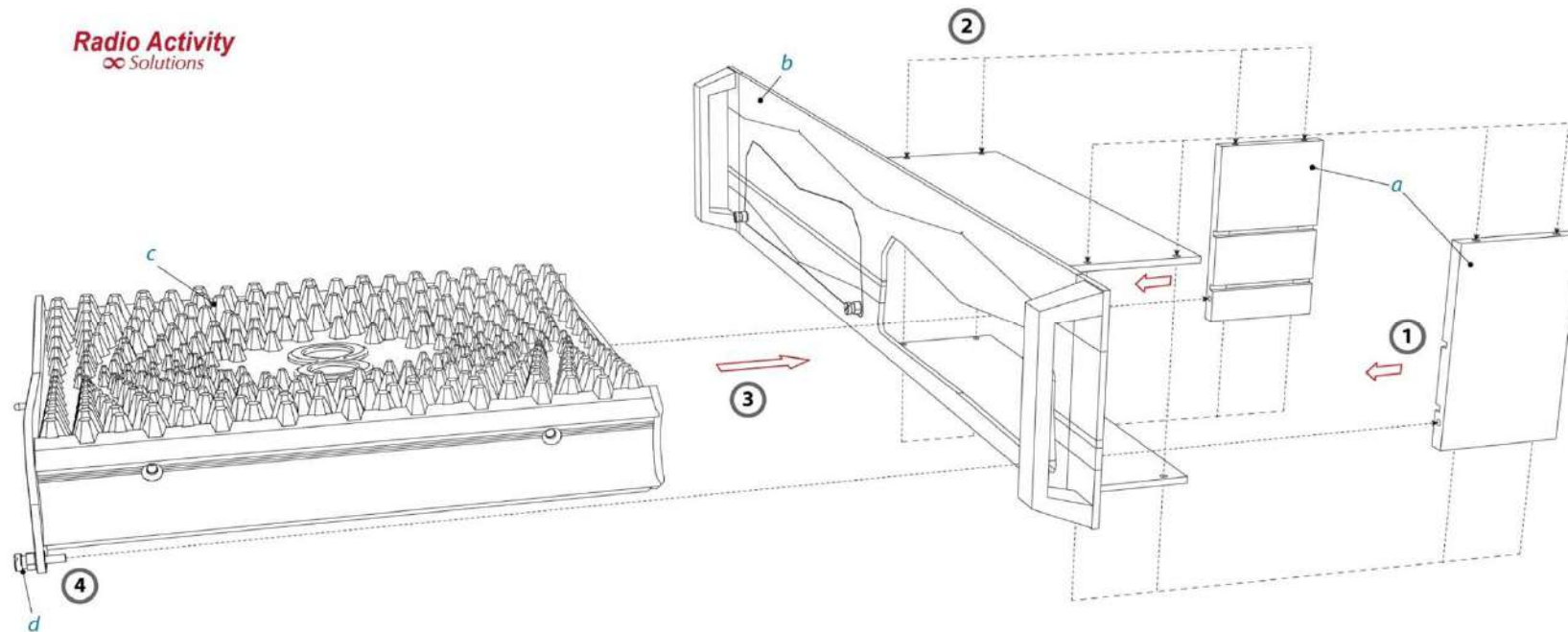
Single assembly 19" rack

KAIROS family: **MONTAGGIO VASSOIO FILTRI**

- ① Appoggiare il piano di fissaggio filtri 'a' alla piega della maschera frontale 'b'.
- ② Infilare la vite 'c' dalla parte posteriore attraverso il piano 'a' e bloccarla dalla parte superiore col dado 'd' sul lato sinistro.
- ③ Sul lato destro fissare il piano con le viti 'e' ai fori filettati sul blocchetto 'f' attraverso le apposite asole.



Dual assembly 19" rack



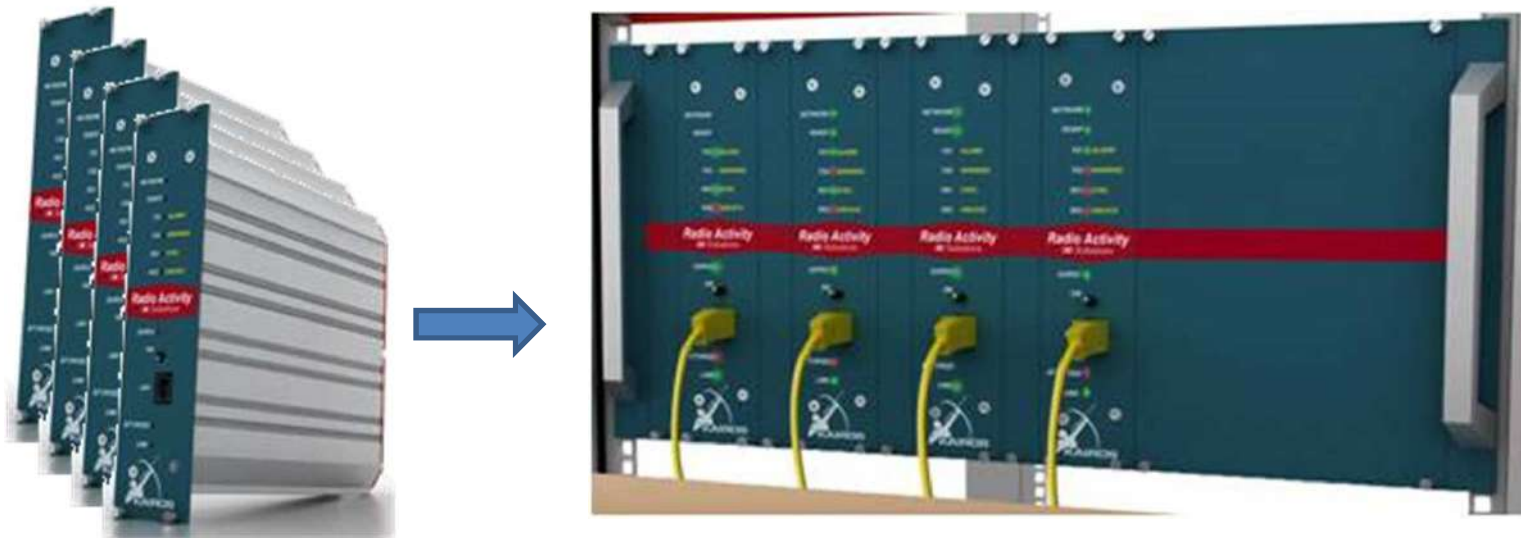
Radio Activity
∞ Solutions

KAIROS family: MONTAGGIO RACK

- a: Blocchetti guida
- b: Frontale da rack 19", altezza 2UT
- c: Kairos - base station/repeater
- d: Viti autobloccanti M2,5

- ① Portare i blocchetti 'a' in battuta con la maschera 'b', inserendoli nello spazio formato dalle due pieghe orizzontali.
- ② Fissare i blocchetti alle pieghe del frontale 'b' con delle viti m2,5, come mostrato dalle frecce tratteggiate.
- ③ Inserire Kairos 'c' nello spazio aperto del complesso 'b'+ 'a', utilizzando le guide dei blocchetti come riferimento. Fare scorrere 'c' fino a fine corsa.
- ④ Infine fissarlo con le viti autobloccanti 'd' che sporgono agli appositi fori su 'a'.

Multiple assembly 19" rack

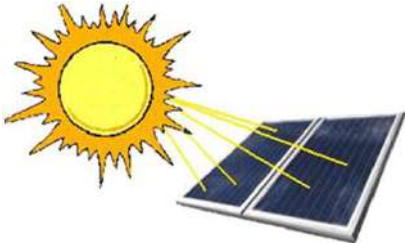


5TU/19" sub-rack multicarrier assembly (up to 6 **KAIROS**)

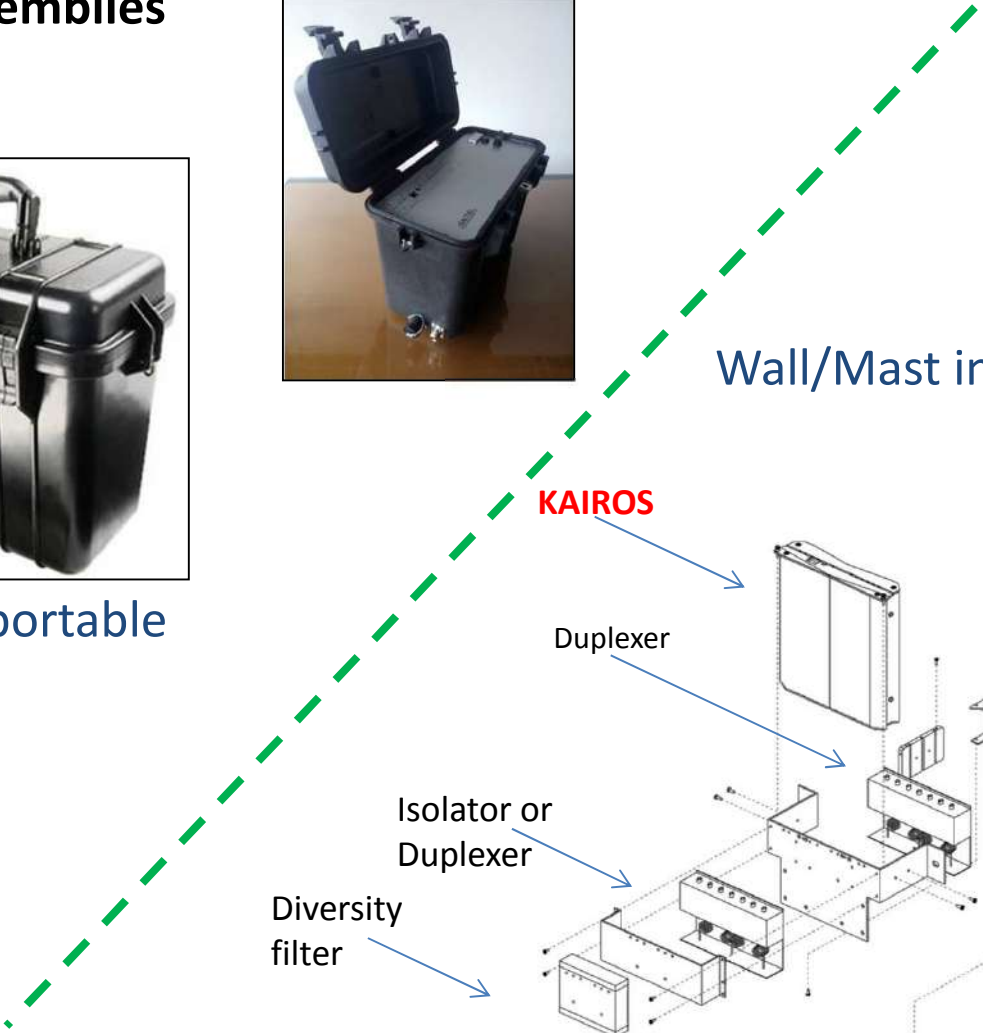
Compact assemblies



Transportable



Wall/Mast installation



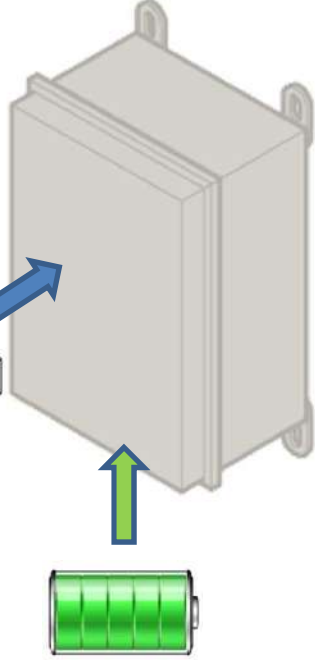
KAIROS

Duplexer

Isolator or Duplexer

Diversity filter

Wall mounting accesories



Thank you for your attention



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