

# PAGA / MBS

## PUBLIC ADDRESS AND GENERAL ALARM / MAIN BROADCAST SYSTEM



DS-308 Issue 01



Thank you for your interest in Ziztel - we are a UK based manufacturer of PAGA / MBS and Intercom products. Our systems are mainly designed for use in the Marine, Hazardous Oil, Gas and Petrochemical industries.

The ZEST PAGA Main broadcast system is designed specifically for safety critical applications. The system is unique in the use of Class G amplification, a static operating system (we do not use software in the critical paths), addressable field devices. Efficiency exceeds 85% resulting in much reduced power supply requirements, HVAC, weight and rack real estate foot print area. The system is in daily use in all parts of the globe both on and offshore. The system can provide service in safe areas or can be delivered to operate entirely in a potentially explosive atmosphere including the central equipment racks. The equipment can be configured to serve a range of architectures depending on application criticality including N + 1, A + B, A + B N + 2 and distributed / network solutions.

*High efficiency Class G amplification* – eliminates Class D technology and associated RF emission and line matching risk

*SIL level 2 compliant* - suitable for high integrity broadcast requirements

*IEC 60945 and IEC 60068 certified* – Designed for service in severe operational conditions

The ZEST Public Address & General Alarm System (PAGA) / MBS (Main Broadcast System) has been designed specifically for high criticality applications including the Marine, Oil / Gas industry and the Military; use in less demanding markets is therefore readily accepted. The major components of the ZEST package are:-

### **ZX100 control management processor**



### **350A series Class G power amplifier and 350A SR sub rack**



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The system is controlled from a range of input sources / interfaces, typical examples include:-

### AP100-01 industrial Master access unit

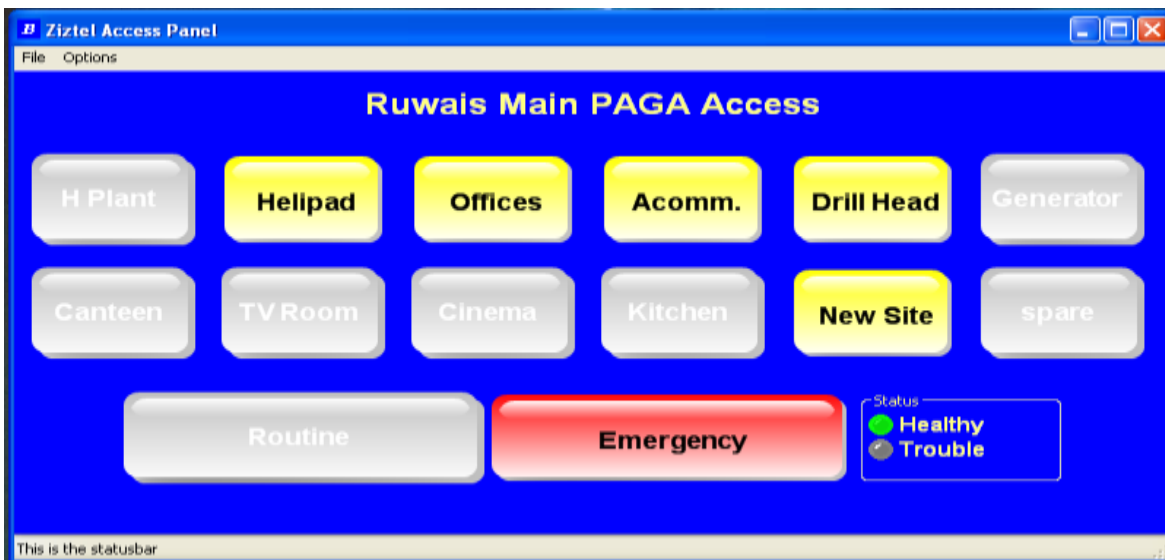


### ZAP10-02 External IP66 IECEx and ATEX certified access unit for potentially explosive atmospheres



Note that access units are delivered with duplicated resources including the microphone transducers when used in N + 1 / A + B applications.

### PC based PCAP12 allows a touch screen microphone access unit option:



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The package also allows interface to other site systems including Fire and Gas detection, PBX, ICSS and Supervisory. The interface port is implemented by the ZID08 series.



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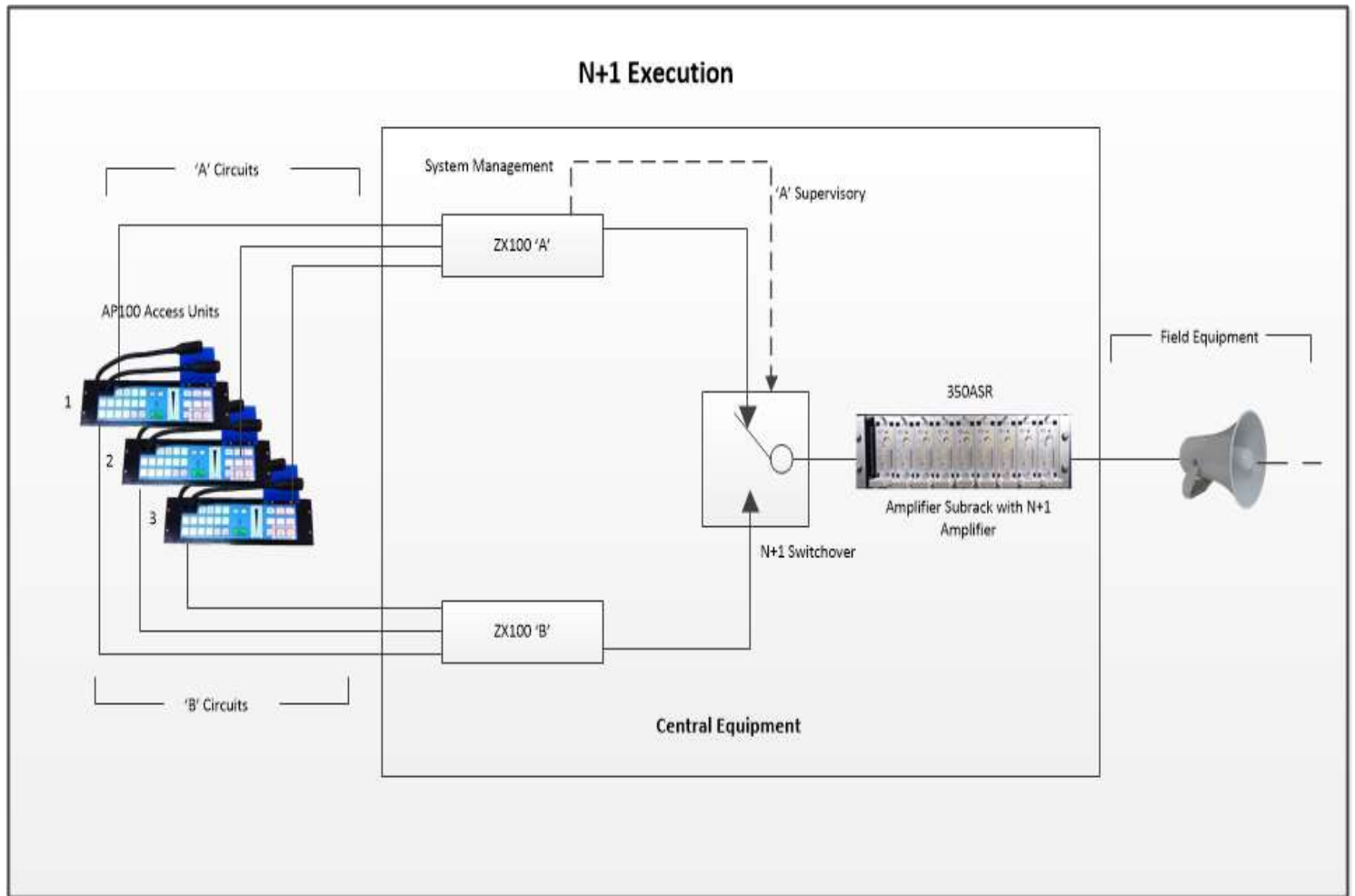
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As with any life safety system the purpose is to deliver a product that is efficient, robust and resilient. Our systems extend from simple non duplicated single path architectures to complex networked fully duplicated redundant A+B N + 2 solutions with addressable field devices. A ZEST PAGA package can be supplied in a number of system architectures depending on site criticality:

- A + B Fully Duplicated/Redundant A/B system
- N+1, where key components are duplicated and configured on Hot-standby
- N+2 where the entire central equipment hardware is fully duplicated on an on line / hot standby basis
- A + B N + 2 a combination of A+B and hot standby for ultimate system security

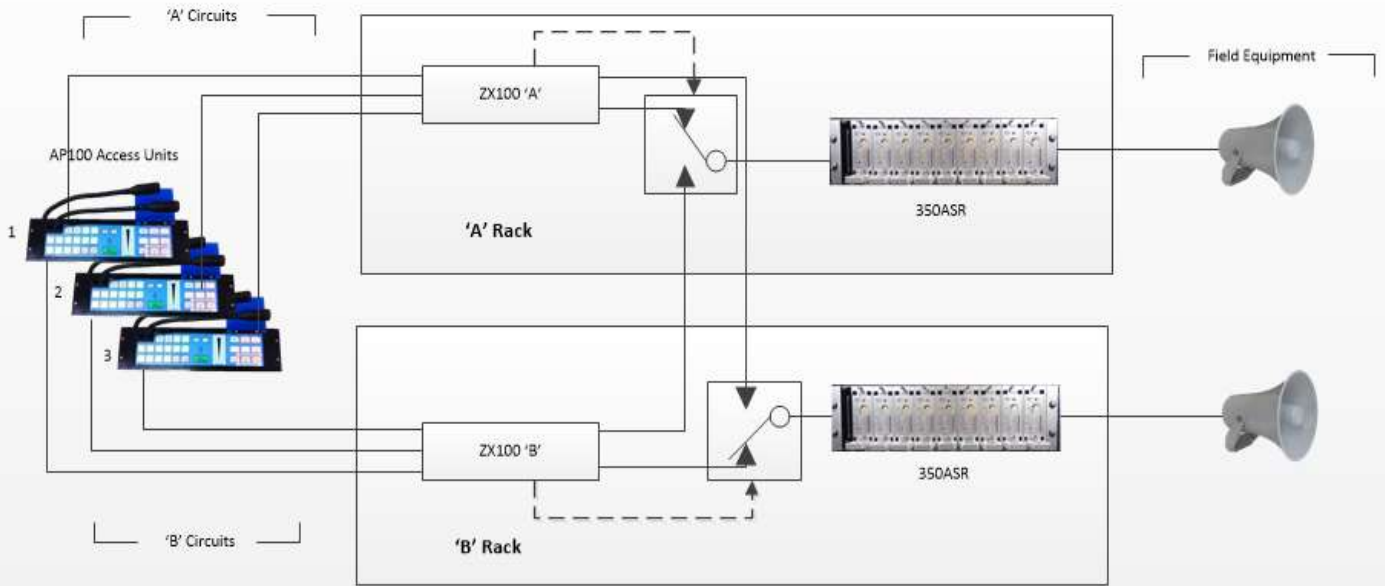


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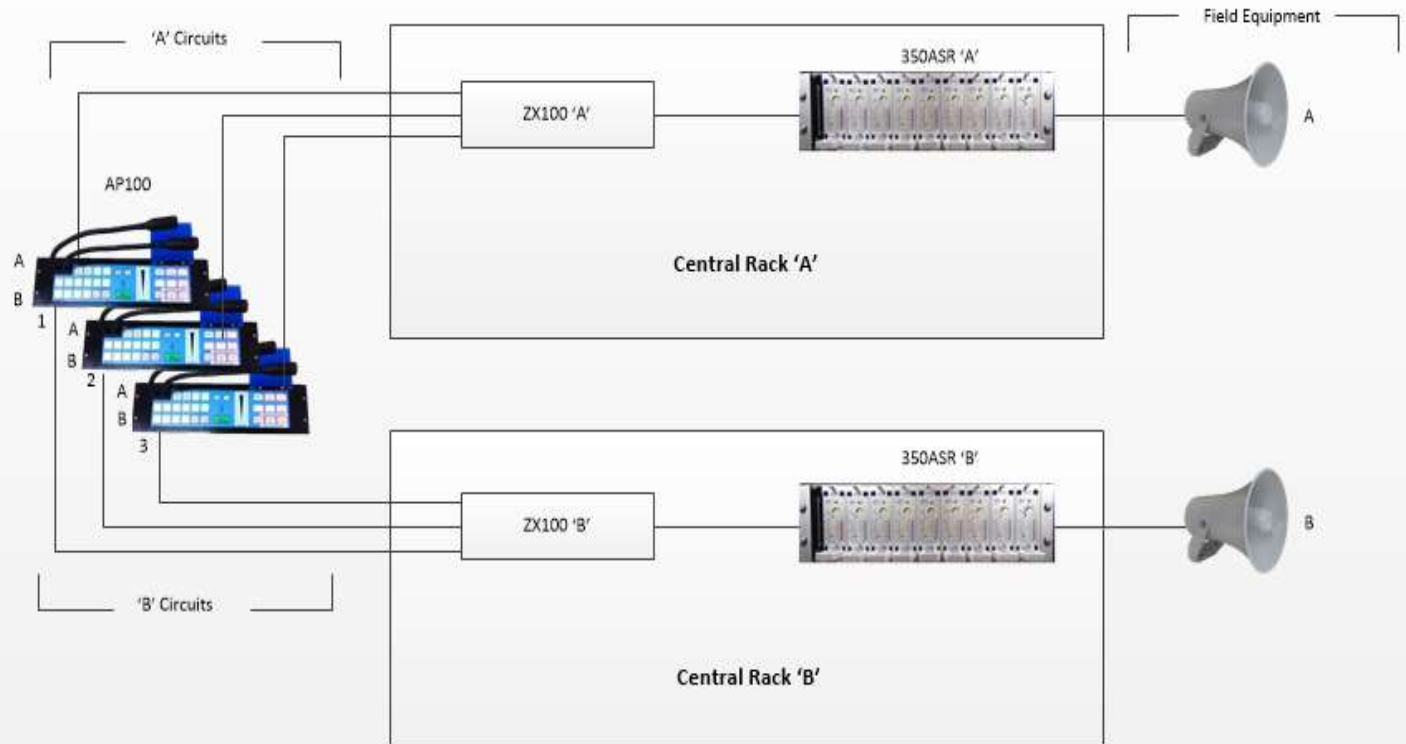
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## A+B N+1



## A+B



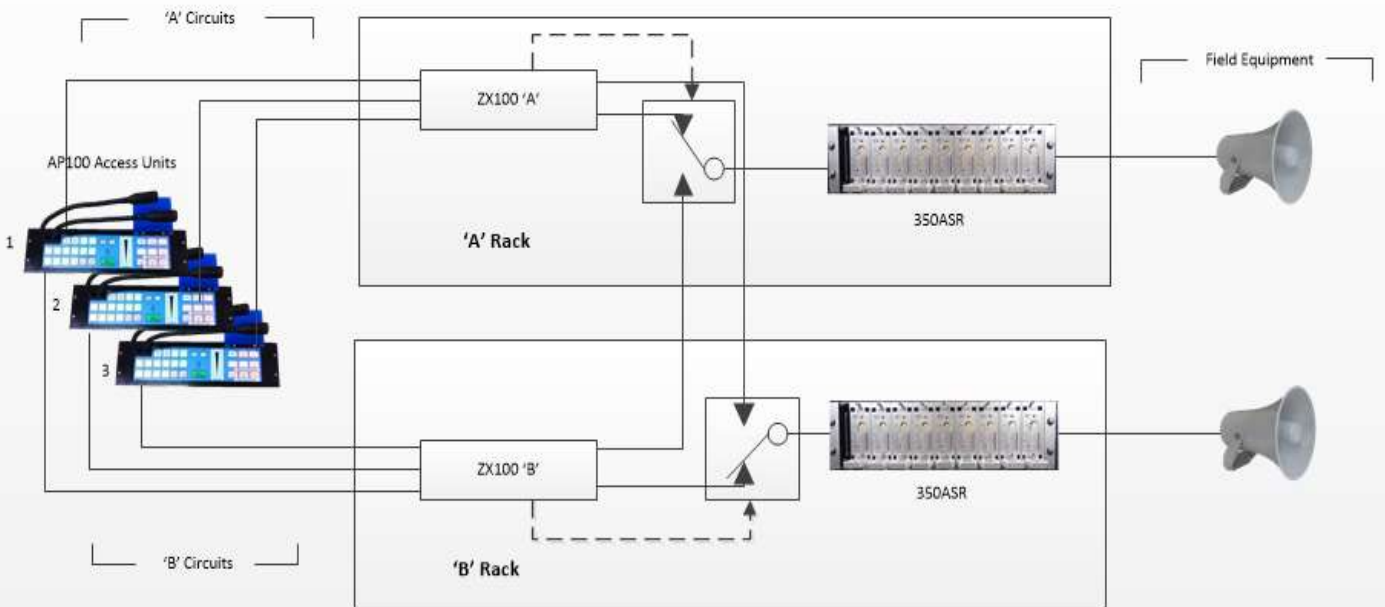
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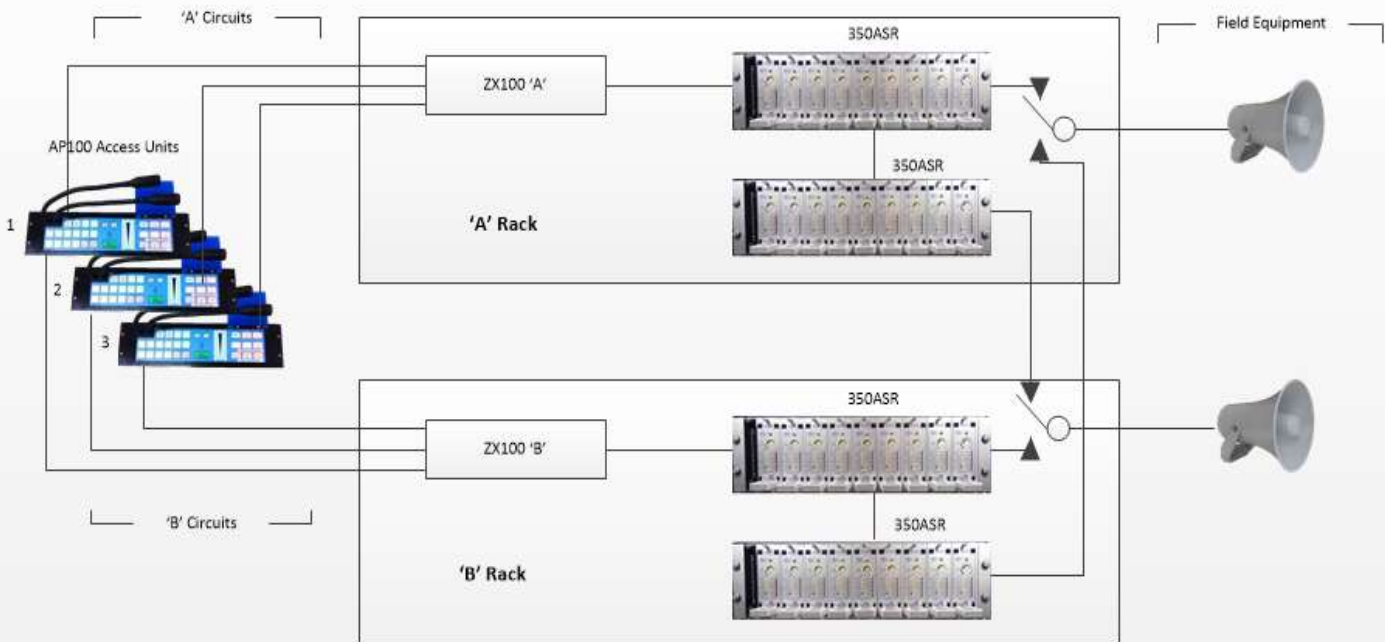
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### A+B N+1



### A+B N+2



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**Primary features of the ZEST PAGA / MBS system include:**

- Energy Efficiency – greater than 85% is made possible by use of Class G 350A amplification
- Space Saving miniature 3 unit high power 350 A amplifier ‘cassette / blade’ type amplifier modules which allow a significantly reduced 19 inch rack foot print and much lower weight.
- Class G power amplification – 350A and 350-500A 350 Watt and 500 watt intelligent power amplifiers are live pluggable – enables rapid service and no EMC or network matching risks associated with Class D technology.
- PC configurable high security ZX100 operating platform – mission critical life dependent applications – no chip exchanges required.
- Touch screen ZMIS management Zitel GUI enabling rapid fault finding and remote supervision worldwide.
- Intelligent Addressable Speaker – IAS ZADS – supervision and sound pressure level control of *individual* loudspeakers and monitoring of flashing beacons. This system eliminates the high frequency carrier which is the reason for unreliable performance on legacy systems.
- Pressurised Exp ATEX certified fully explosion proof central rack solutions. This enables the delivery of a PAGA / MBS system that can safely operate exclusively in a potentially explosive atmosphere.
- Removal of software from the core critical paths. Eliminates latent software bugs, re boots and possible software corruption.
- Certified to IEC60945 and IEC60068. Operates in hostile climatic extremes and under severe shock / vibration.
- Compliance with IEC61508 SIL Safety Integrity Level 2.
- Radial / Star / Loop wired field device architectures.
- Fully monitored from microphone to loudspeaker / flashing beacon end of line.
- Explosion proof ATEX / IECEx microphone access units, loudspeakers and flashing beacons.

***Image shows single 19 inch rack housing 21 x 500 Watt 350-500A amplifiers***

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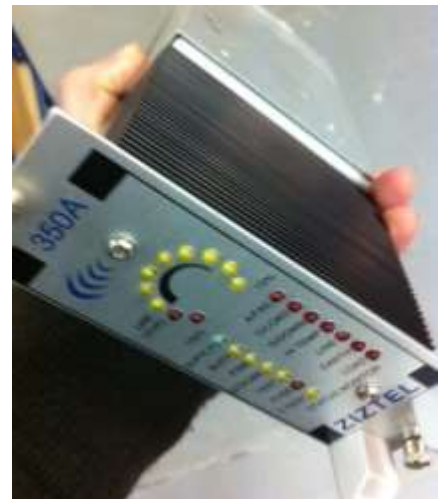
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The core of the PAGA / MBS rack is the 350A Class G power amplifier which features integrated supervisory and configurable operating sub system.



A single 350A SR sub rack can hold up to nine 350A Class G power amplifier modules enabling a single fully populated 19 inch rack to deliver over 15,000 Watts of audio power.



The central rack can be energized from 24 VDC, 48 VDC, 90 to 254 V AC 50 / 60Hz. Power factor is closely managed to ensure that the system achieves highest efficiency and switch on surge is controlled by correct AC to DC power conversion design.



*Image left shows ZAPSU-02 Power supply module*

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The amplification drives loudspeaker networks which comprise of safe area, weatherproof and explosion proof devices. A range of PAGA / MBS loudspeaker options are available from special MASS EVACUATION line source arrays to simple accommodation area flush fit ceiling loudspeakers with fire domes. Flashing beacons enable signaling in high noise areas.



Ziztel manufacture a range of explosion proof and weatherproof safe area flashing beacons, variants are available which incorporate multiple colours in a single housing. ZX100 PAGA / MBS management control enables a wide range of visual alert cause and effect to be implemented.



The ZEST central equipment extends either loop based, radial or star wired field circuits to field located loudspeakers, flashing beacons and microphone access units where applicable. When loop wired cable architectures are specified the package automatically provisions automatic self-healing capability to ensure uninterrupted service in event of field cable conductor discontinuities as well as automatically providing an early warning of any system deterioration to the operator.

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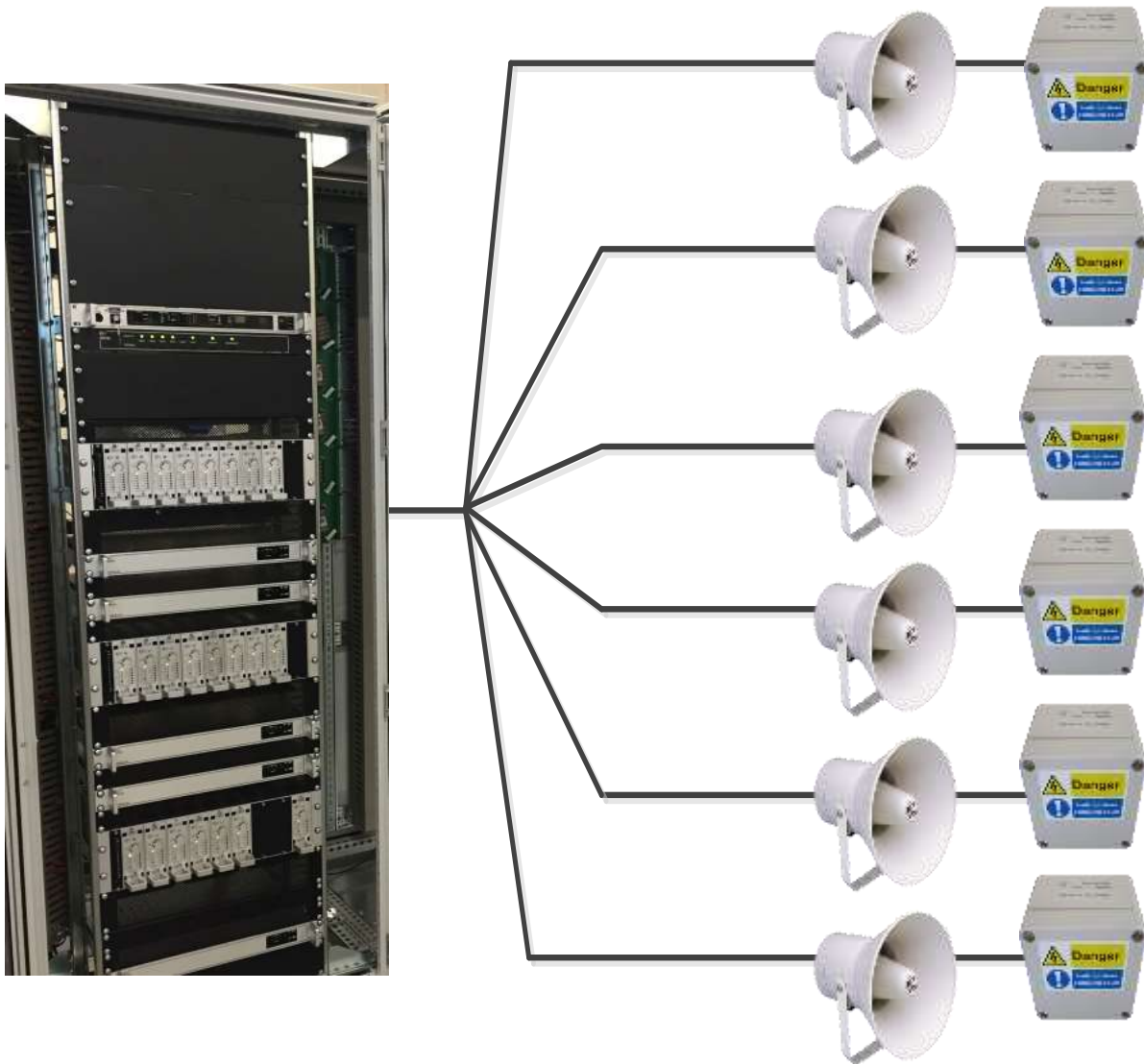
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End of line devices Ziztel type LTD010 (safe area) or LTD010 Ex (hazardous area) monitor the critical path from central rack to loudspeaker end of line. Up to six end of line devices can be prescribed per amplifier output.

### Loudspeaker Circuit in Star wired connection topology



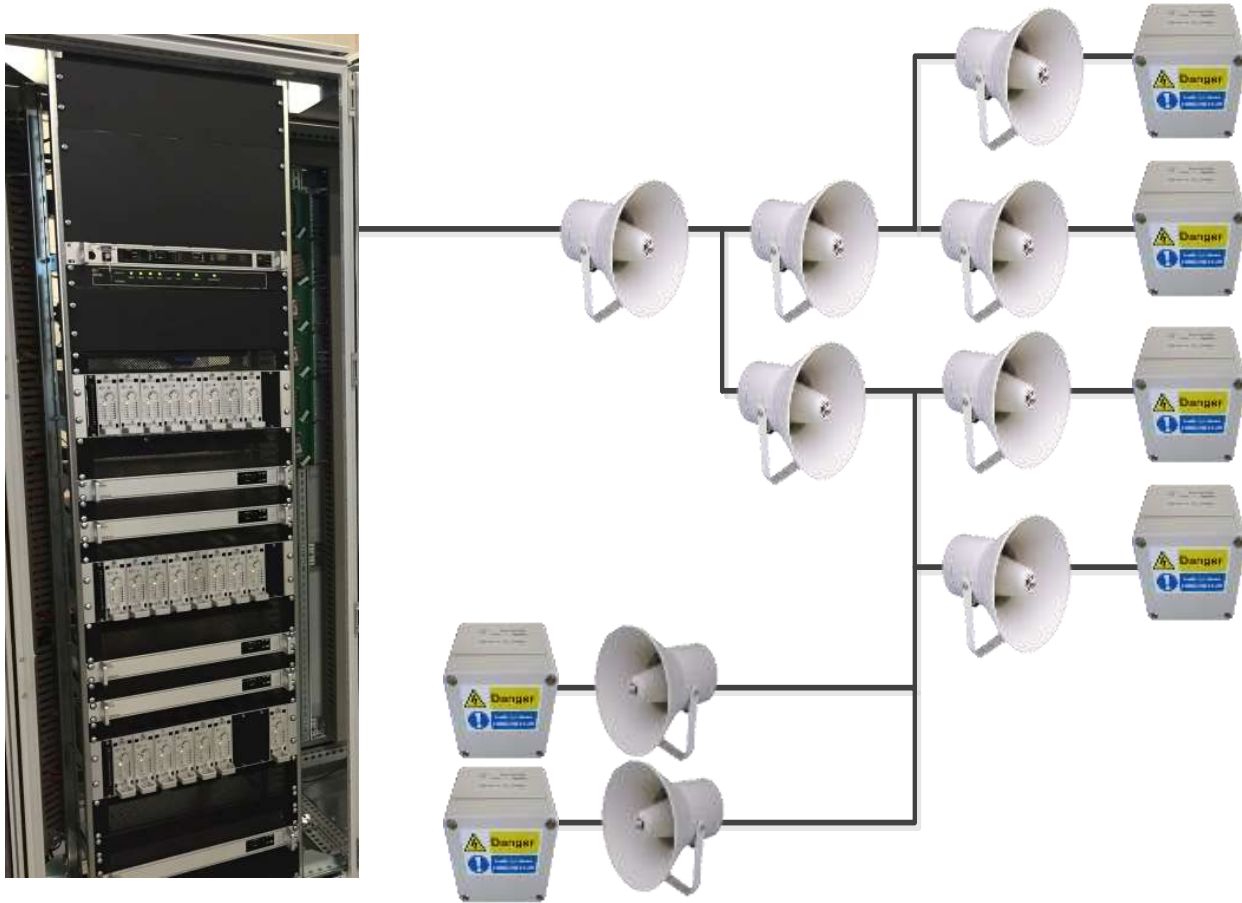
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“Tree and Branch” Loudspeaker circuit connection topology



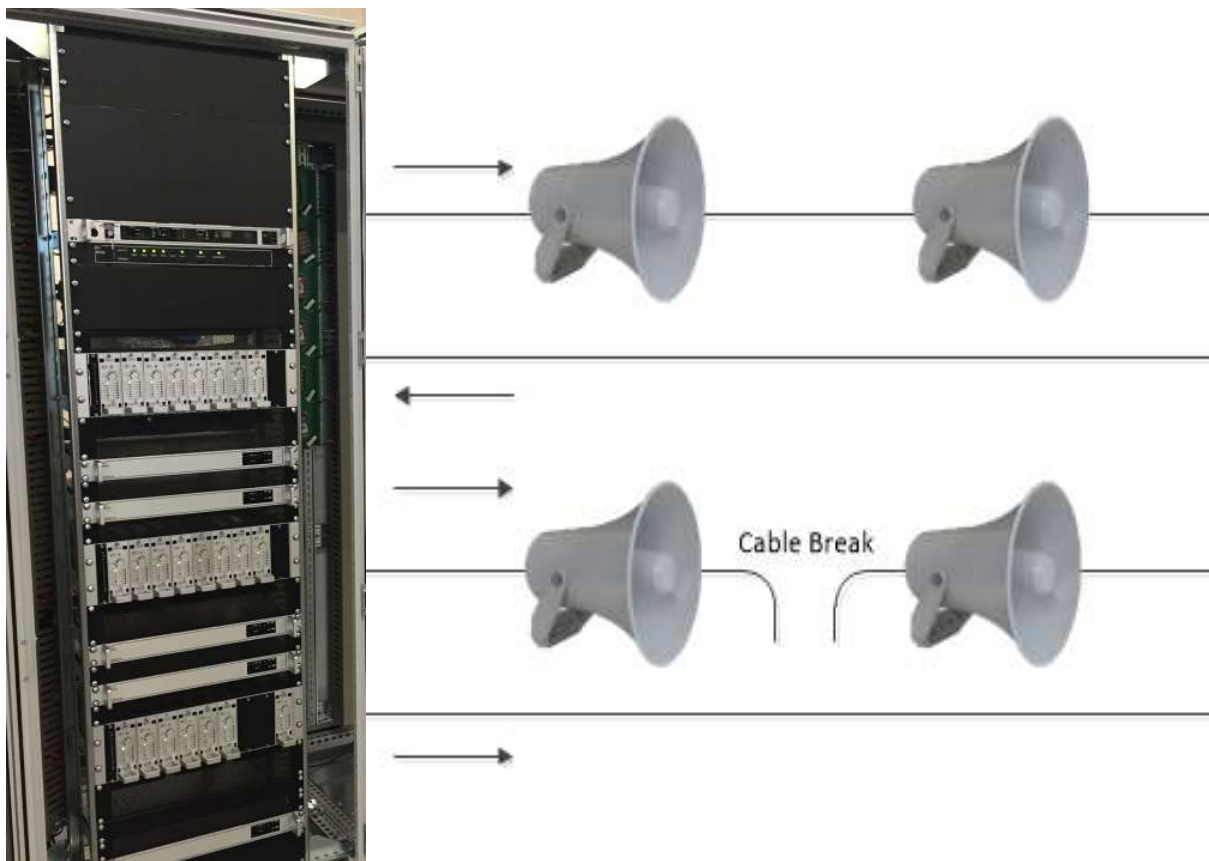
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## Loop Loudspeaker Circuit Connection Topology



Loop based loudspeaker architecture using Zitel LTD003 loudspeaker 'Line Termination Device' ensures continued PAGA / MBS broadcast capability from all speakers in the event of a single cable discontinuity.

The LTD003 is located in the central rack MDF and can serve up to eight self-healing loudspeaker loops. Lightning protection is fitted on all outgoing LTD circuits as standard.

***LTD003 Line Termination Device shown right***



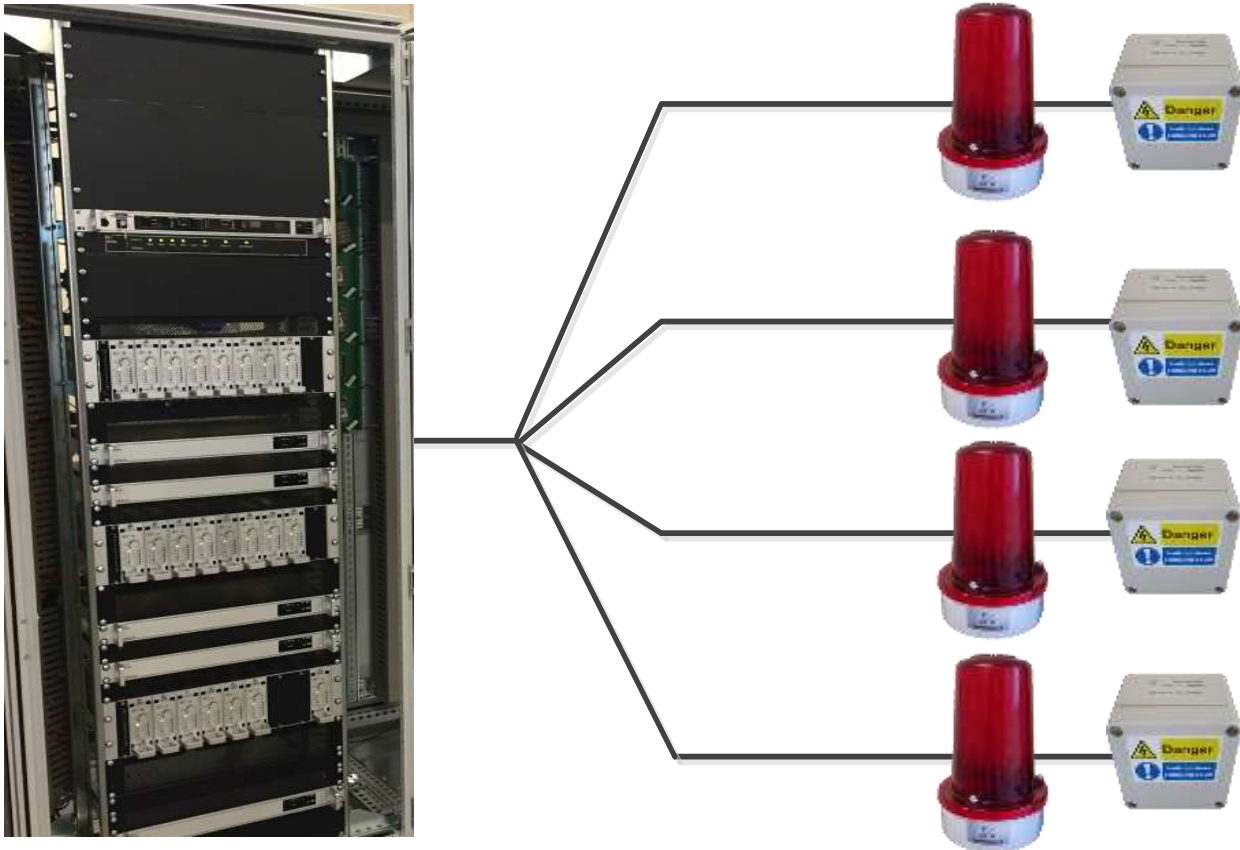
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In areas of high ambient noise acoustic broadcasts are supplemented with visual alerts, Zitel manufacture a range of flashing beacons including safe area weather proof, explosion proof, multi colour / multiple light source variants. Flashing beacons can be again star, radial or loop wired according to specification. Zitel LTD011 and LTD011 Ex End of line devices are fitted to non-loop wired systems and each LTD002 allows up to three self-healing loop wired flashing beacon circuits.

Flashing Beacon Circuits in star wired connection topology

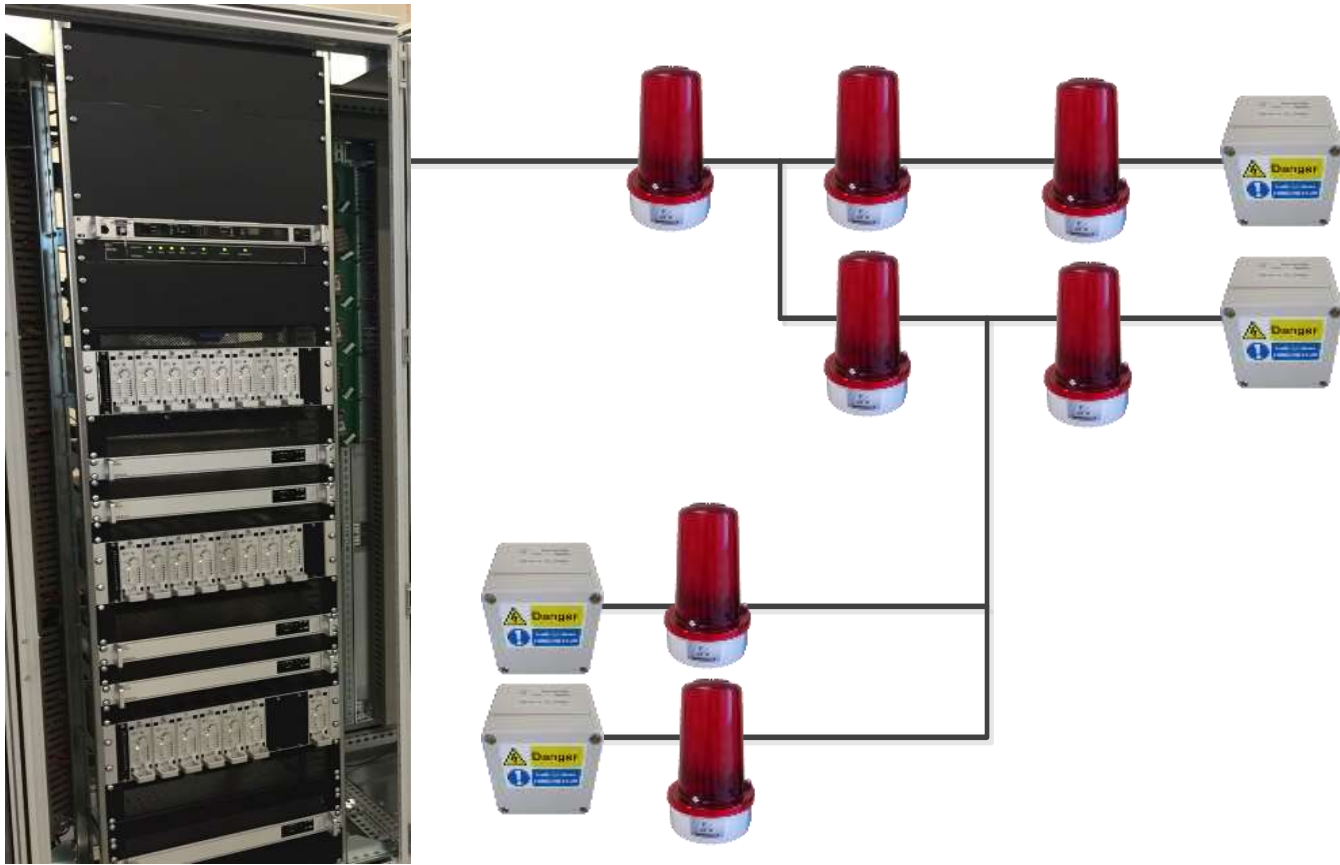


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“Tree and Branch” Flashing Beacon circuit connection topology



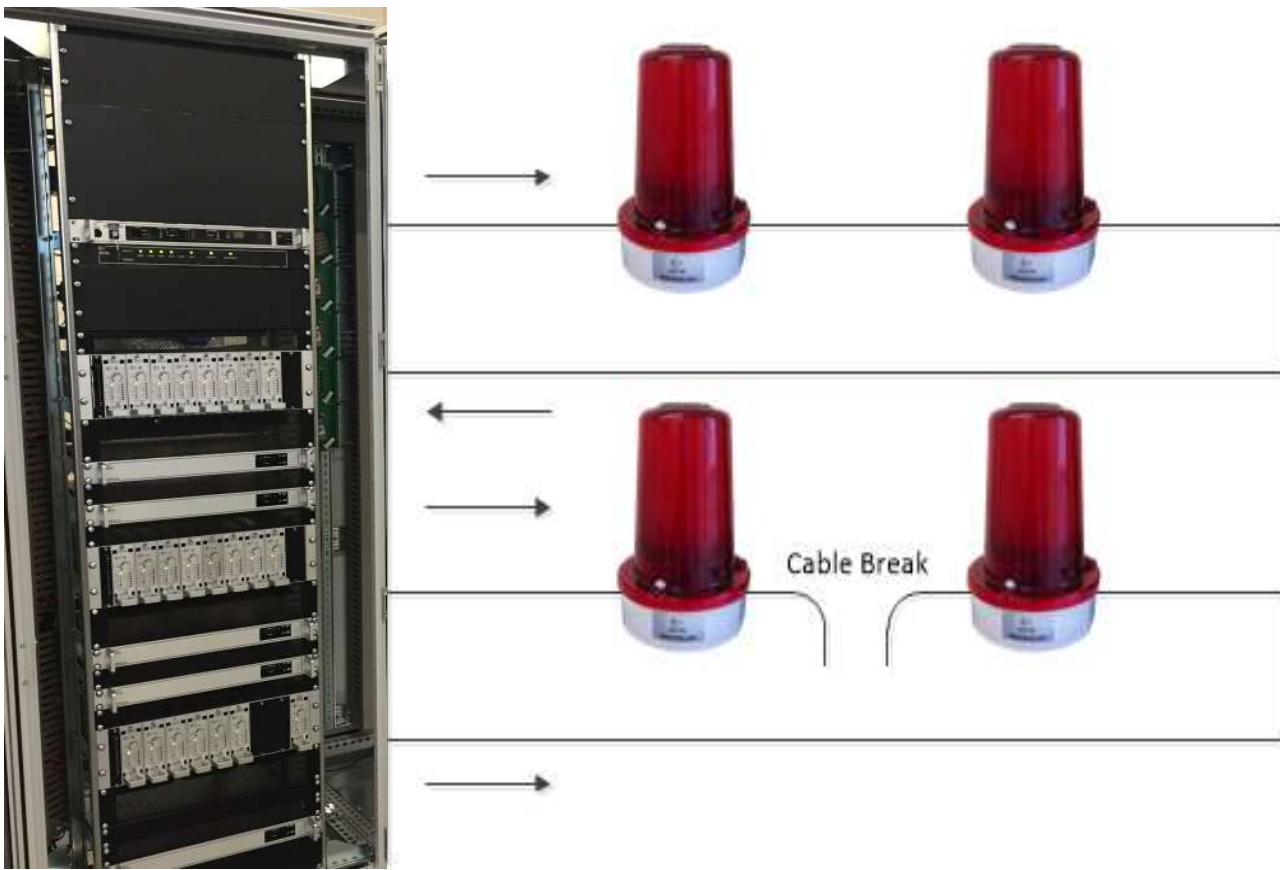
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## Loop Flashing Beacon Circuit Connection Topology



Loop based loudspeaker architecture using Zitel LTD002 flashing beacon 'Line Termination Device' ensures continued PAGA / MBS visual alert capability from all beacons in the event of a single cable discontinuity.

The LTD002 is located in the central rack MDF and can serve up to three self-healing flashing beacon loops. Further LTD002 can be cascaded enabling in excess of 1080 flashing beacons to be serviced from a single central rack.

*LTD002 Line Termination Device shown right*



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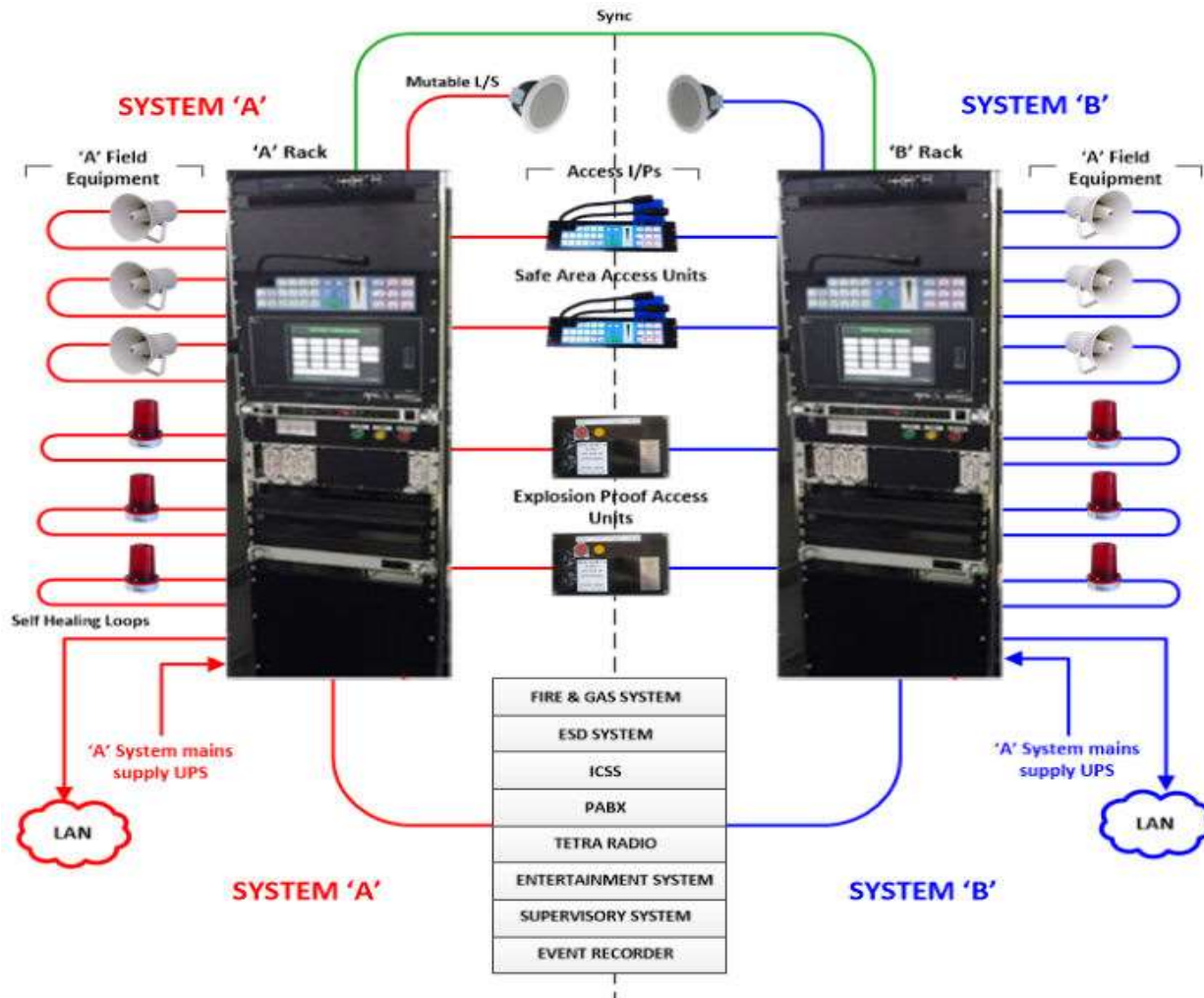
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The ZEST PAGA / MBS complies with IMO SOLAS and meets the strictest conditions specified by classification societies, for example Bureau Veritas, ABS, RMRS and DNV.



*Zitel access unit undergoing independent ingress protection testing to IEC 60529*

Typical Zitel high integrity PAGA / MBS system A + B configuration – note that in this example the entire critical path is fully duplicated including microphones, controls, indications, management, amplification and field equipment. There are no common mode failure points.



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ZMIS can also include the possibility to interrogate *each* loudspeaker (and flashing beacon) connected to the system either locally or remotely. **Intelligent Addressable Speaker – ZADS IAS** is a secure non-invasive automatic testing sub system which eliminates routine maintenance patrols enables simple adjustment of sound pressure levels delivering greatly enhanced levels of integrity and major cost savings.

**NO LOCAL ALARMS ACTIVE**

LOOP 1 TST CAL FLT MNR FLT TIP BUSY

LOOP 2 TST CAL FLT

LOOP 3 TST CAL FLT

LOOP 4 TST CAL FLT

LOOP 5 TST CAL FLT

LOOP 6 TST CAL FLT

LOOP 7 TST CAL FLT

LOOP 8 TST CAL FLT

ZADS-C V0.3 MENU EVENTS CANCEL TEST

WED 13:06:05 2014/01/08 EVENTS: 18719

**NO LOCAL ALARMS ACTIVE**

LOOP: 1, SPEAKERS: 10

TST CAL FLT

TIP  OVER CURRENT PSU INPUT : 48.90V  
 BUSY  OVER VOLTAGE LOOP (V) : 1.70V  
 MNR FLT  ADJUST FAULT LOOP (I) : 0.000A

CONFIGURE LOOP CALIBRATE SPEAKERS

**NO LOCAL ALARMS ACTIVE**

LOOP: 1, SPEAKERS: 10

0 0 1 0 0 0 0 0 0 1  
 1 2 3 4 5 6 7 8 9 10

NUMBER OF SPEAKERS SPEAKER SETUP COMMIT EXIT

TYPE 1 RL1 RESET RL2 SET RL3 SET ALL SPKRS

WED 13:36:21 2014/01/08 EVENTS: 18723 ZMIS

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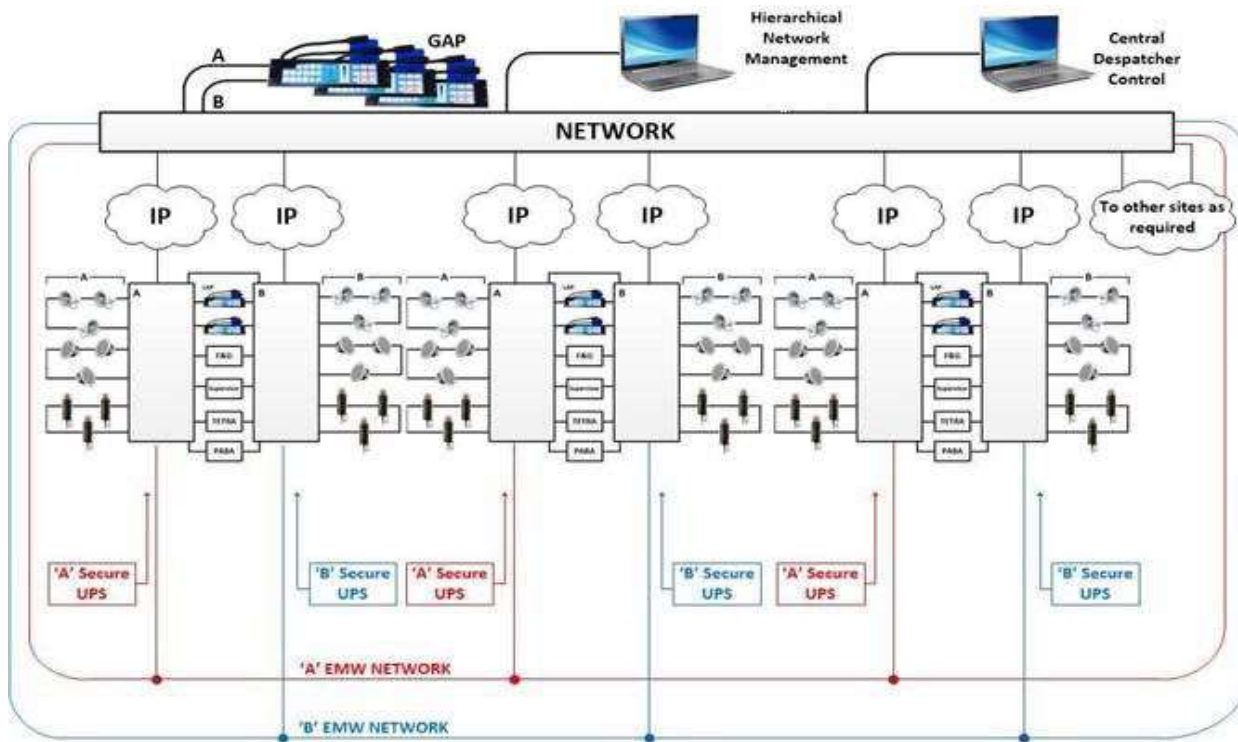
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The ZEST PAGA / MBS package can be arranged in a distributed architecture enabling efficient coverage of large sites. In this execution multiple panels are networked either directly by dark fibre optic cable or indirectly by IP / Ethernet connectivity.



*Networked multi sector PAGA system pictured during in house testing – a distributed approach is specified for large sites to improve efficiency and integrity.*

Mission critical hierarchical PAGA system for a land based application providing remote centralized asset management



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