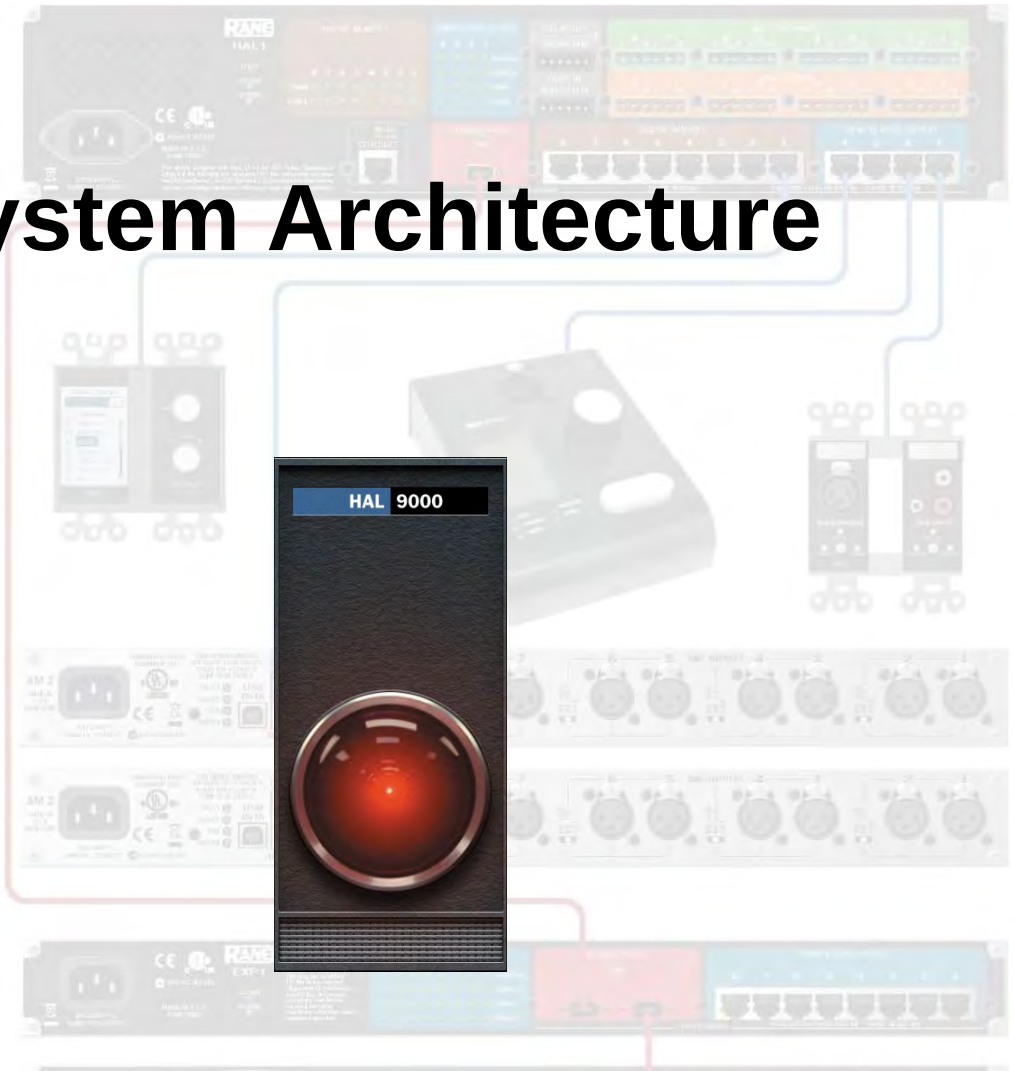
HAL System Architecture



RANE

HALOGEN

Outline

- Target Applications
- HAL System Architecture Review
  - Intro to HAL System hardware
    - 4 HAL models
      - 6 DR: Digital Remotes
      - 22 RADs: Remote Audio Device
      - 5 EXP: Expanders for HAL1x
    - What's New (shipping in November)
      - DR6 touch screen control remote
      - EXP2x Dante Expander for HAL1
  - Halogen software highlights

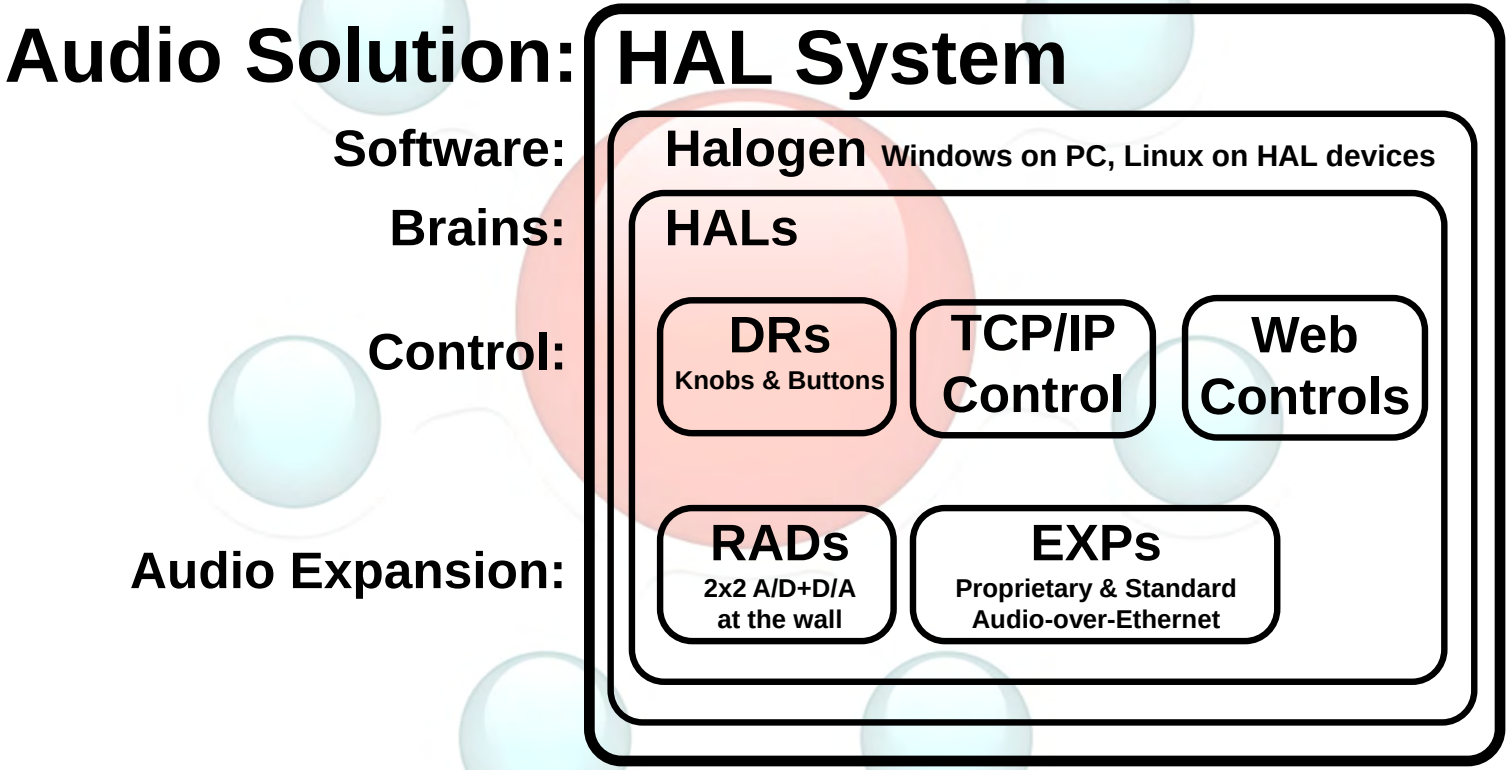
HAL Target Applications

- **Music & paging systems - retail/restaurant**
- **Auditorium, church, theater**
- **Meeting rooms, convention spaces, conference rooms**
- **Room combining, overflow or prefunction room**

Some HAL Installs

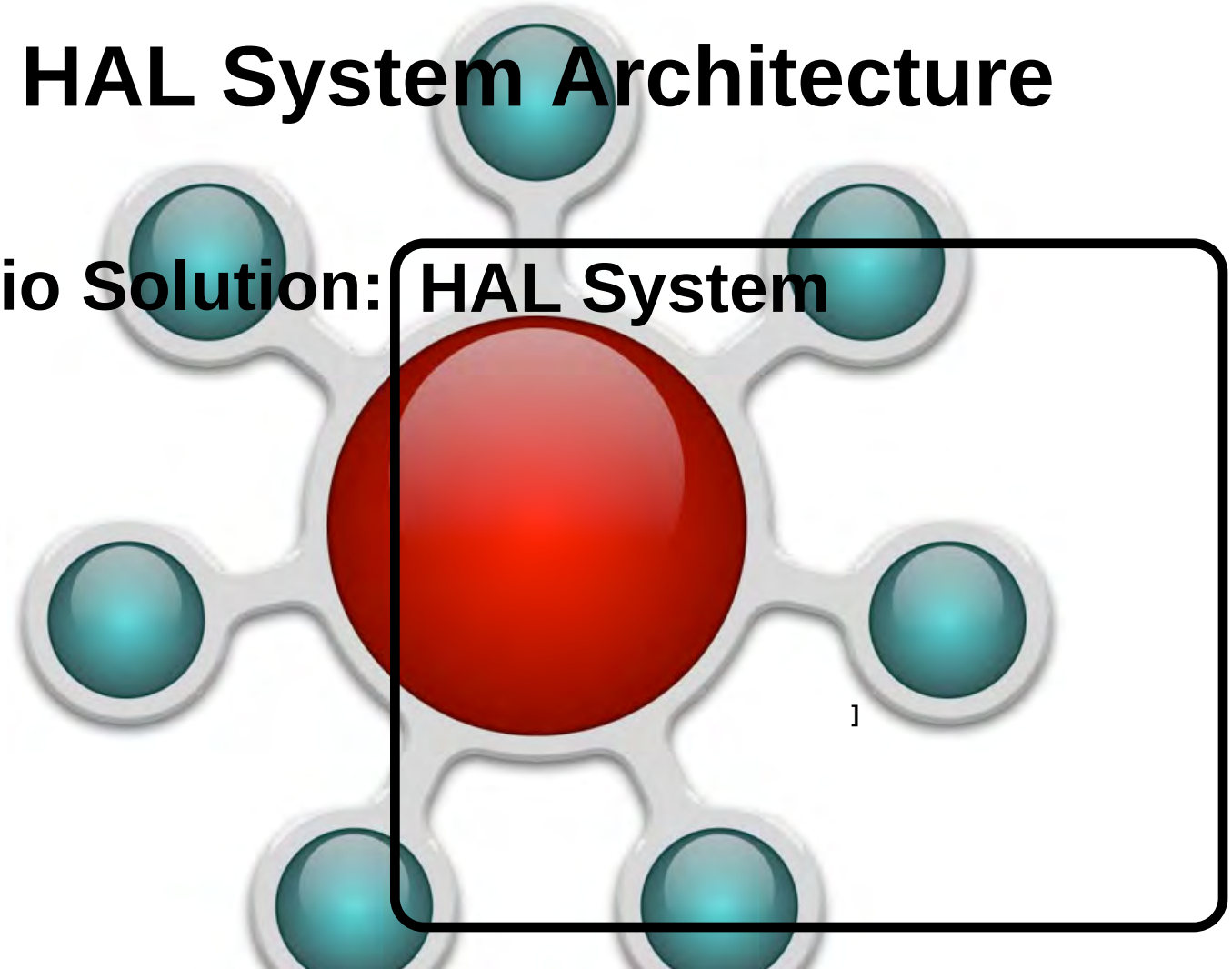
- AC Davis High School Gym, Yakima, WA
- Air Guard Facility, Fargo, ND
- Aritzia (retail), NY NY
- Arsenal Technical High School - Career Tech Center, Indianapolis, IN
- Atlantis water park, Herzogenaurach, Germany
- Avera St. Luke's Hospital multifunction space with room combine, Aberdeen, SD
- Barbagallo Raceway, Neerabup, WA, Australia
- Baths Hall (performance theatre), Scunthorpe, UK
- BJ's Brewhouse, somewhere? USA
- Brown Deer Fieldhouse, Brown Deer, WI
- Cafeteria, Southeastern Regional Vocational Technical High School, South Easton, MA
- Canada Bay Club, Five Dock, NSW, Australia
- Carrabbas on Kirby, Houston, TX
- Caterpillar (office), Australia
- CCH multi-room meeting & banquet facility, Kuala Lumpur, Malaysia
- Clwyd Theatr Cymru, Flintshire, UK
- Collège Boréal, Ontario, Canada
- Conference Center Room Combine, Boeing Company, Chantilly, VA
- Craigleith Ski Club (lodge), Collingwood, Ontario, Canada
- Crystal Pool and Fitness Centre, Victoria. BC
- Dali Art Museum, St. Petersburg, FL thedali.org
- Duquesne University, Chapel of the Holy Spirit, Pittsburgh, PA
- El Molino High School, Forestville, CA
- Gaylord Texas Resort, Grapevine, TX
- Hartville Hardware (330,000 sq feet), Hartville, OH
- Hilton Garden Inn, Las Vegas, NV
- HMS Santa Regina cruise ship, New Zealand
- Holiday Inn, North Vancouver, BC, Canada
- Homewood Flossmoor HS, Flossmoor, IL
- Hope Inn Hotel, Hindmarsh, Adelaide, Australia
- Hyatt Regency Grand Cypress, Orlando,FL& Louisville, KY
- Kissimmee Utility Authority boardroom, FL
- Kuakini Hospital, Honolulu, HI
- Main Event Entertainment, Katy, San Antonio & Shenandoah, TX
- Malibu Presbyterian Church, Malibu, CA
- Marriott Courtyards, Indianapolis,IN&Mankato MN
- Medical Office with room combine, Duncan, OK
- Miramar Cultural Center, Miramar FL
- Morinville Cultural Centre, Morinville, Alberta
- Nobu Sushi House, Malibu, CA
- Oak Bay Beach Hotel, Victoria BC, Canada
- Operatorium (remote operating room for education), undisclosed location (military)
- Orchestra Hall, Minneapolis, MN
- PNW Univ 300 student combinable classroom, Yakima, WA
- Perkins Park Club, Stuttgart, Germany
- Port Colborne Centre, Port Colborne, Ontario, Canada
- Public Safety Academy, Enfield, CT
- Radisson Blu Hotel, Bloomington, MN
- Ramada, Leipzig, Germany

HAL System Architecture

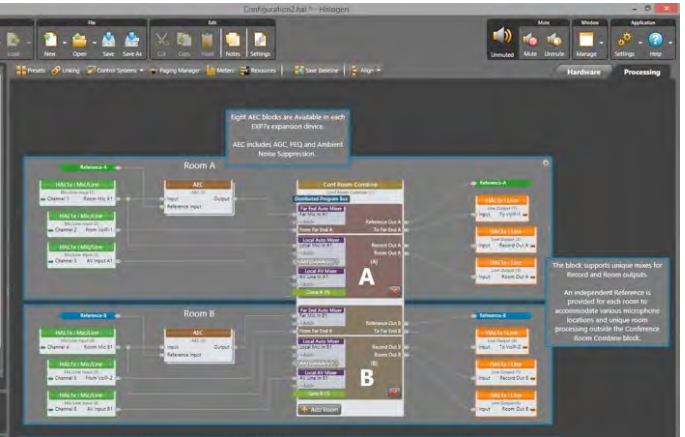


HAL System Architecture

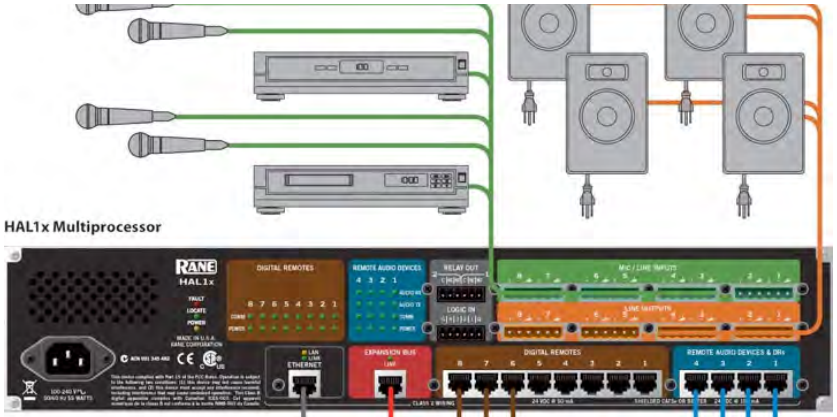
Audio Solution: HAL System



HAL System

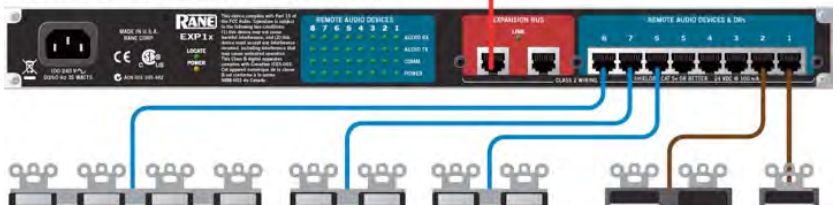


HAL1x Multiprocessor

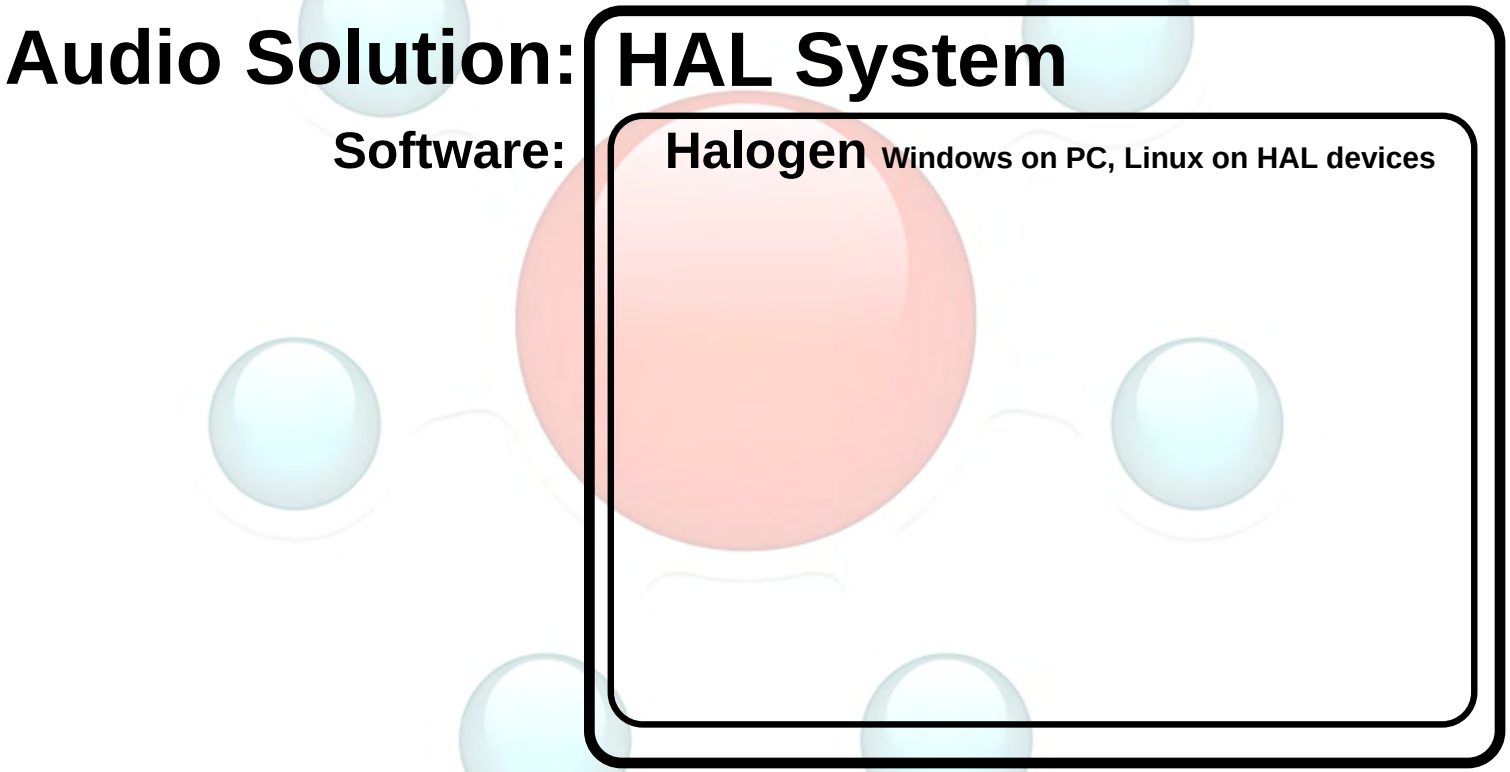


Halogen Software for System Setup

EXP1x Remote Audio Expansion (up to 32 to a HAL1x)



HAL System Architecture



Halogen Software

In Windows

Solution for:

- **Preliminary & final design**
  - **Generate system requirements & labels**
- **Fast & accurate equipment selection & bid assistance**
- **Configure final system**
  - **I/O, processing & control**
- **COMPLETELY configure, tweak & test behavior & control**
- **KNOW IT WORKS AS DESIGNED BEFORE SELECTING, BIDDING**

Setup / Control a Live HAL System

Solution for:

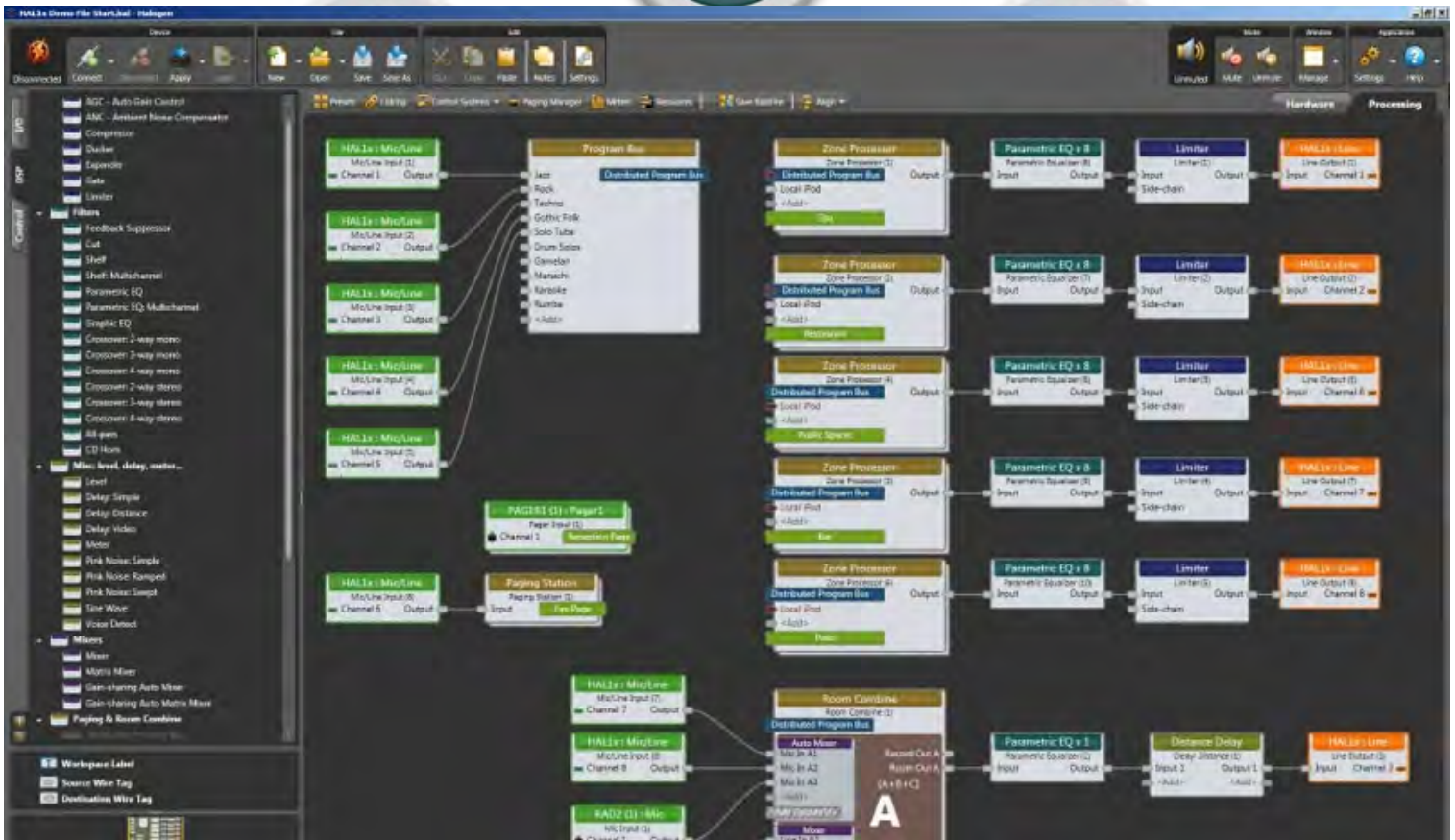
- **Automatic verification of signal & infrastructure**
- **Troubleshooting indication in hardware & software**
- **Finalize I/O, processing & controlFinalize on site configuration, tweak & verify control**
- **Same Software on PC & HAL: HARDWARE BEHAVIORS ALWAYS MATCH SOFTWARE BEHAVIORS**

Linux in Live HAL

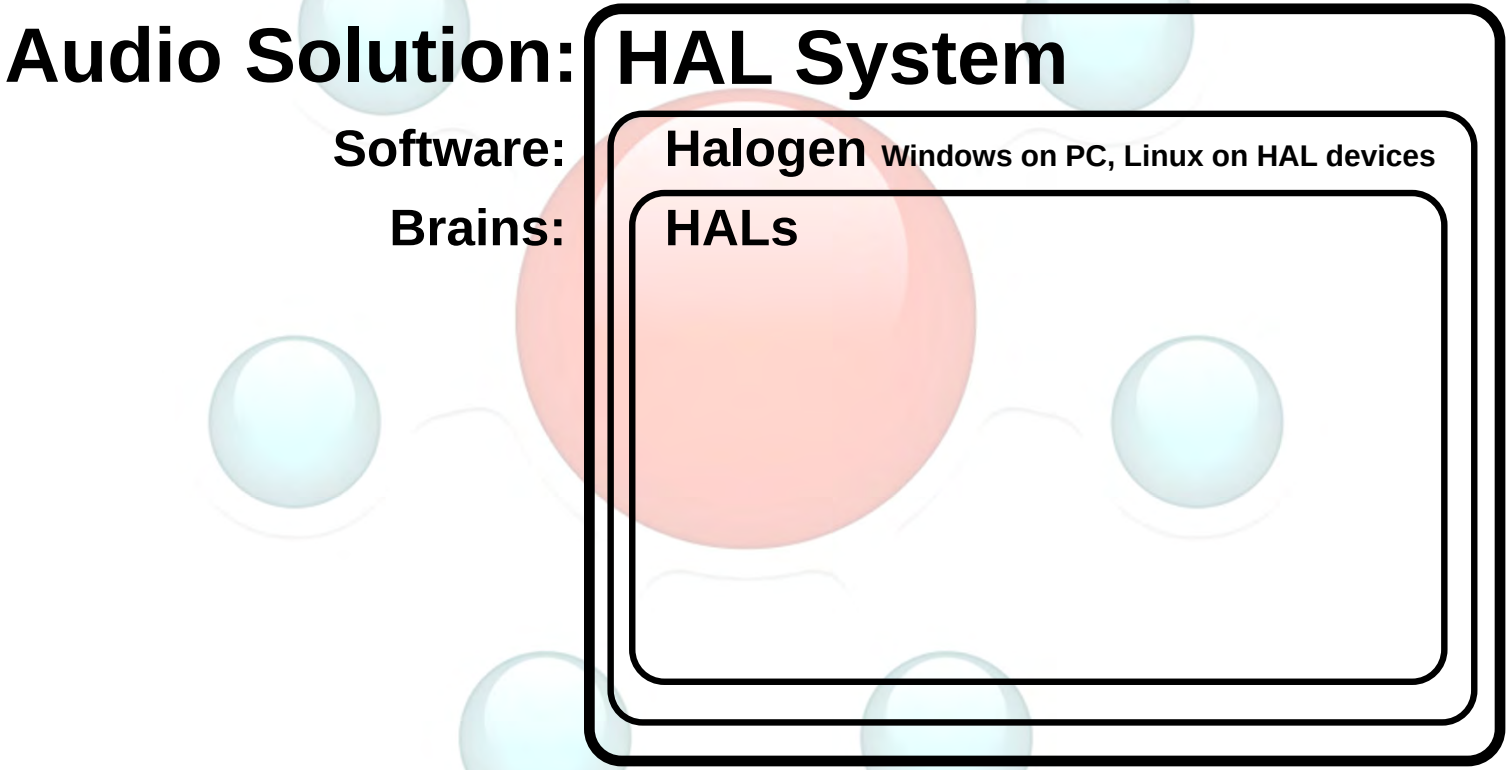
Solution for:

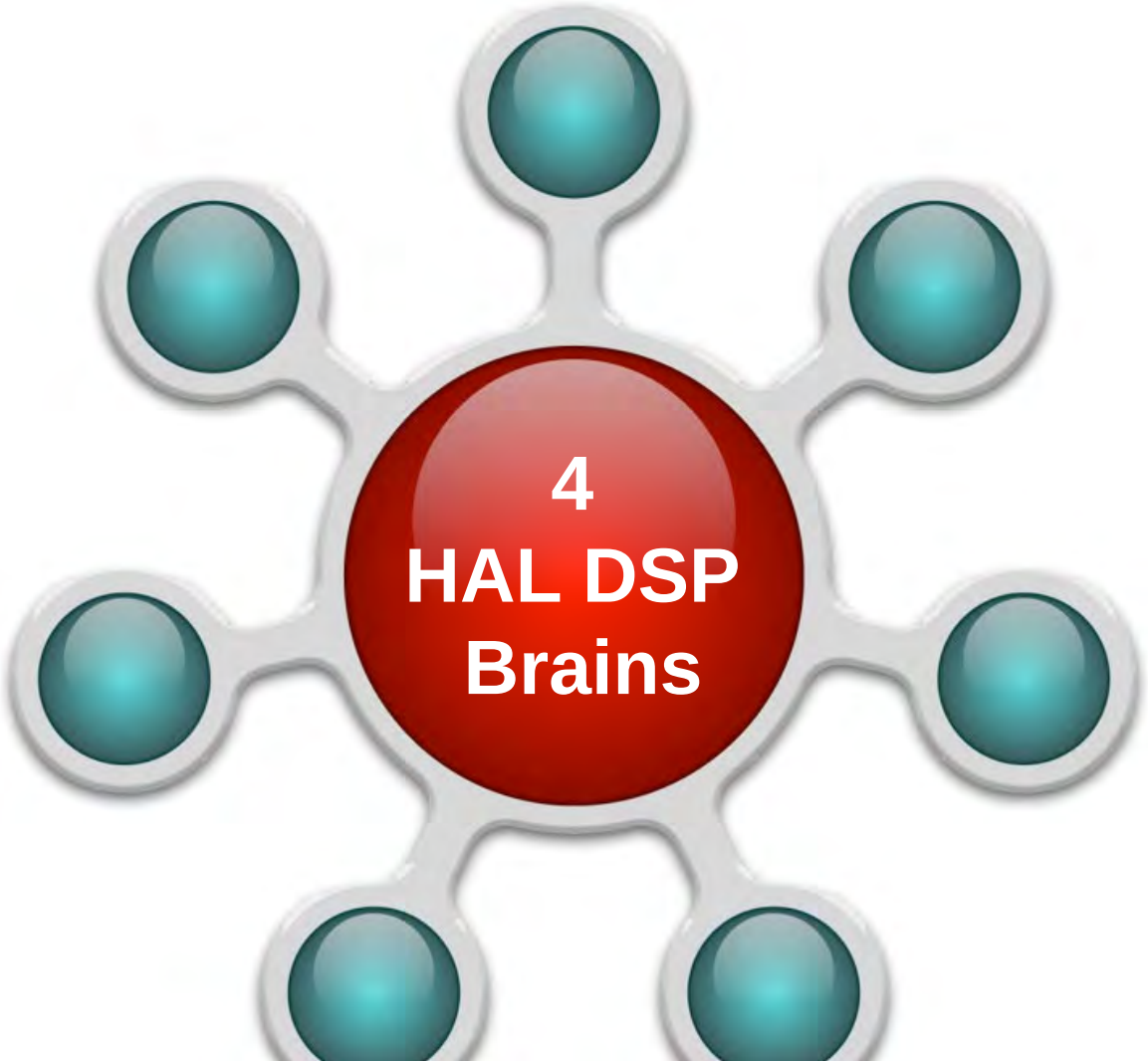
- **24/7 control & monitoring**
  - **HAL Web Server**
  - **TCP/IP 3rd-Party**
- **Internet monitorIndicators on ALL HAL System devices for confidence & troubleshootingUse DRs, RADs in portable carts & padded racks**
  - **Swap any DR, RAD or EXP anywhere, any vintage**

Look at Halogen Software



HAL System Architecture




4
HAL DSP
Brains

HAL1x

528x528

4

HAL DSP

Brains

18x18

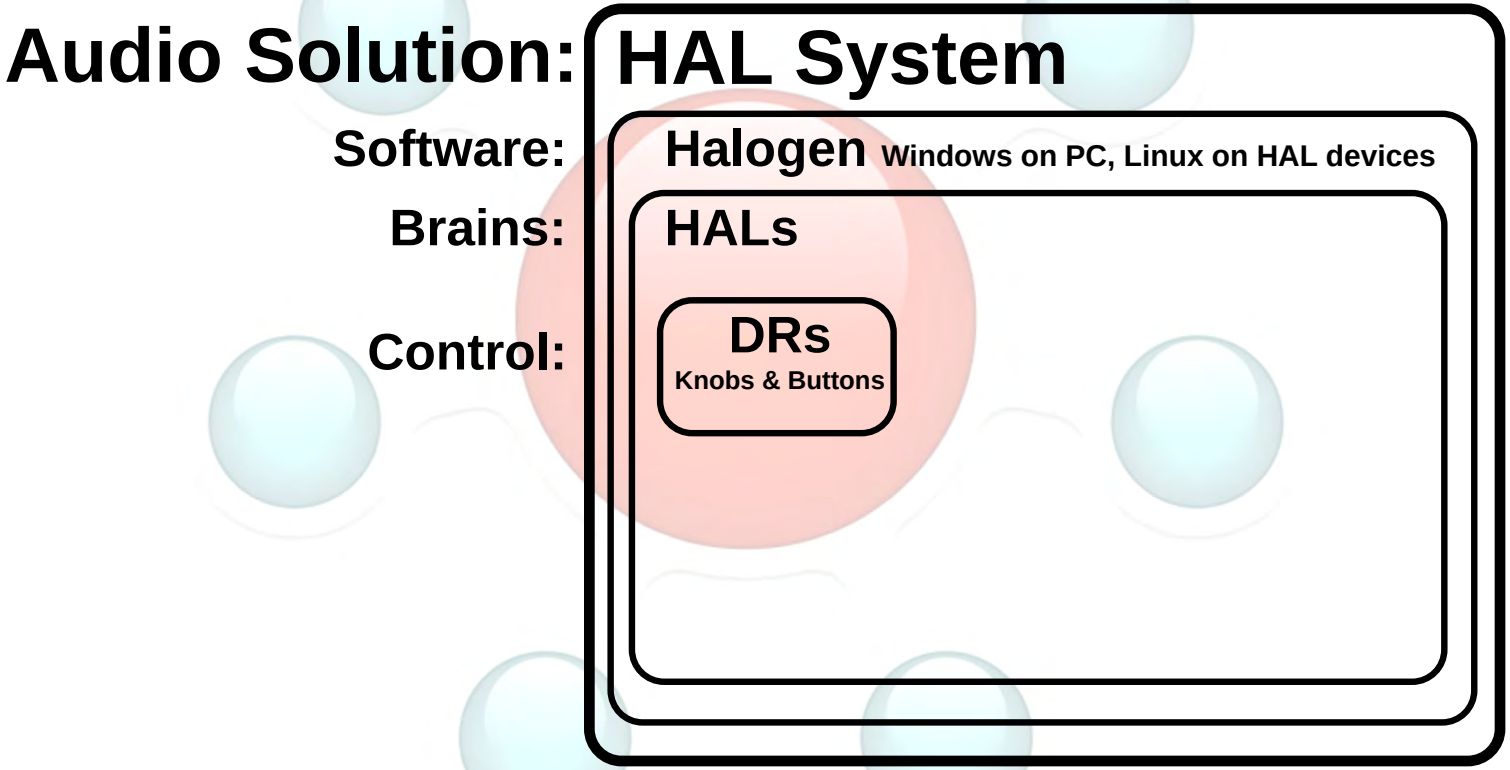
HAL4

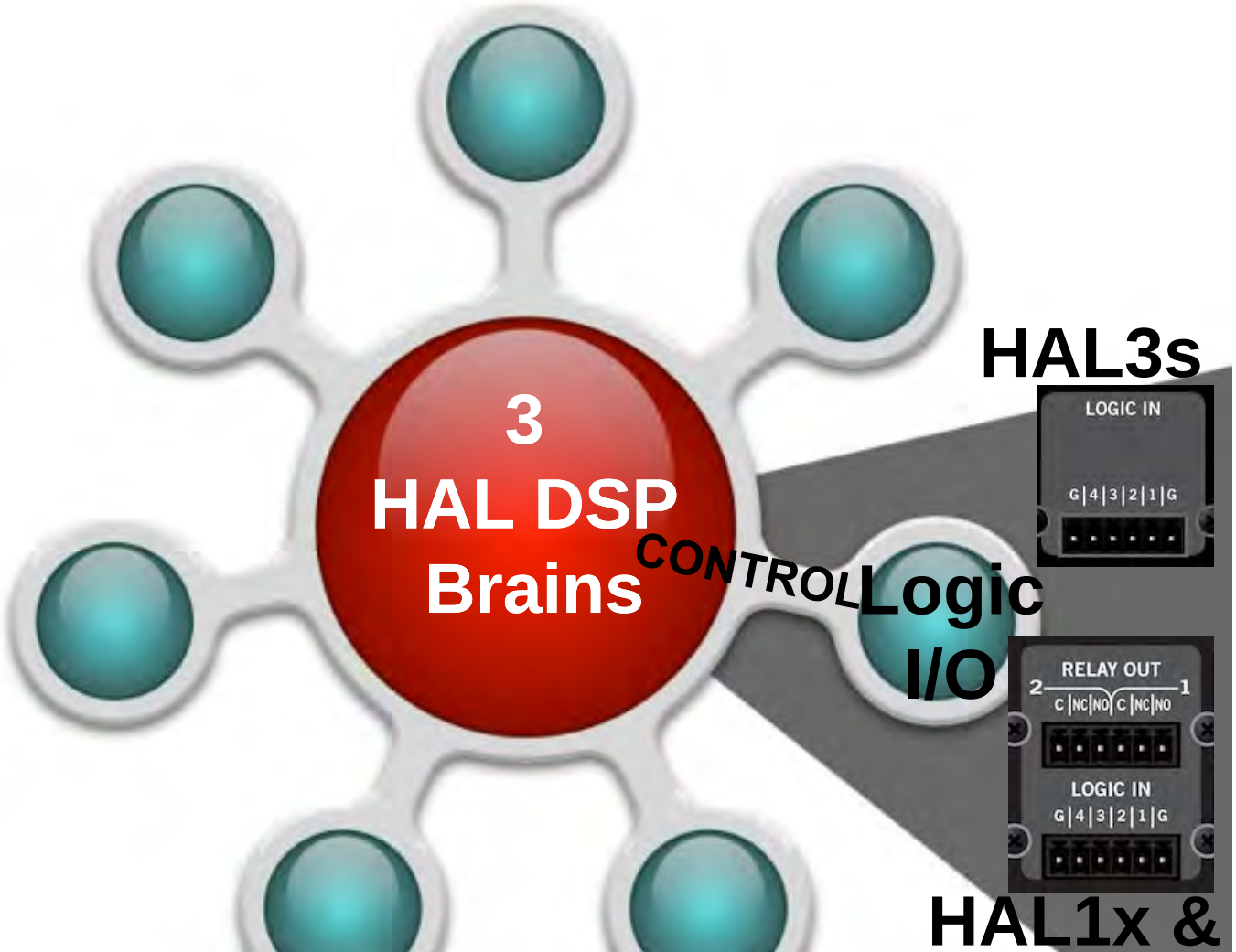
2x2

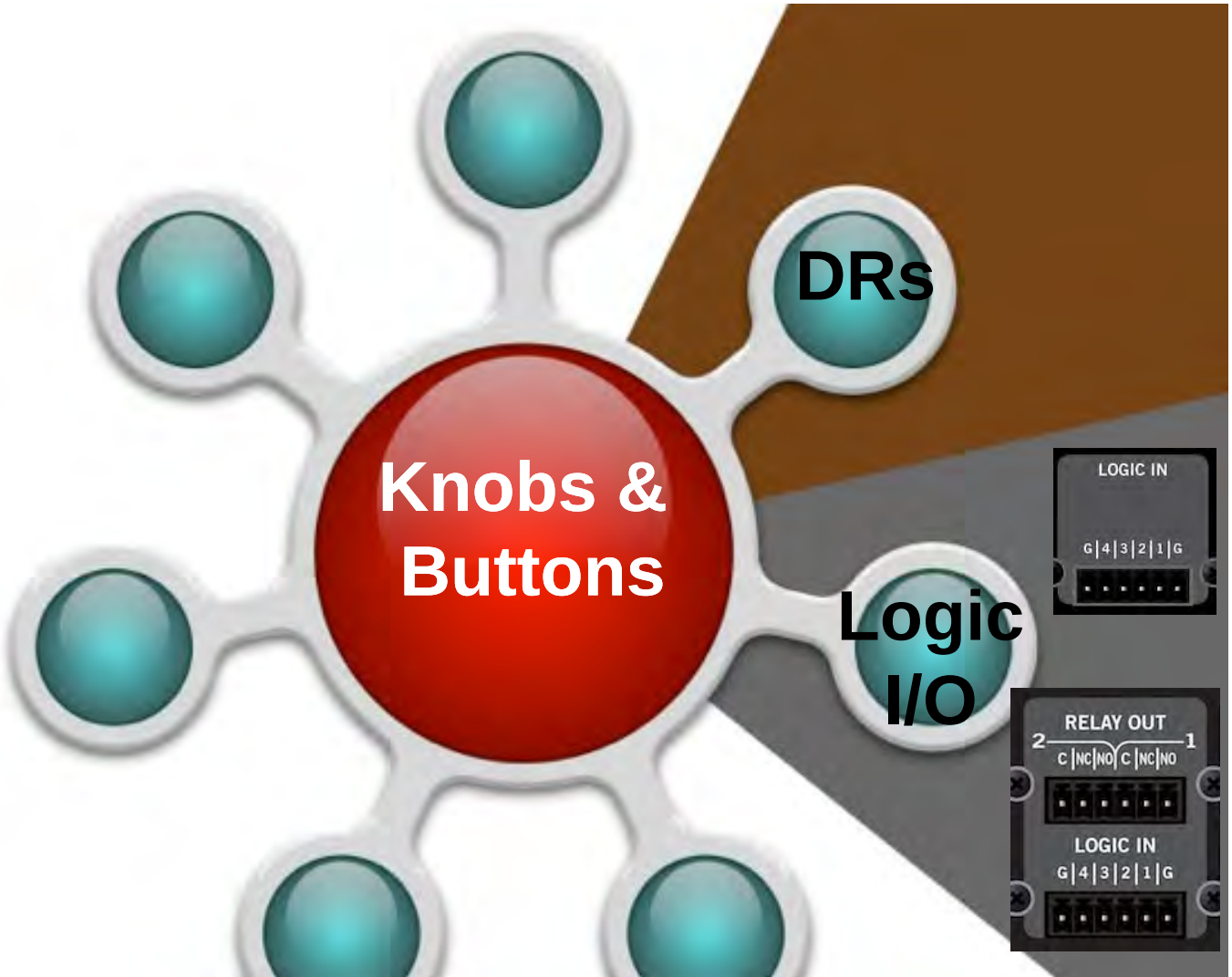
Note the color coding

6x10

HAL System Architecture



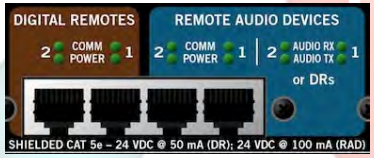

3
HAL DSP
Brains
CONTROL
HAL3s
LOGIC IN
G|4|3|2|1|G
Logic
I/O
RELAY OUT
2
1
C|NC|NO C|NC|NO
LOGIC IN
G|4|3|2|1|G
HAL1x &


DRs
Knobs &
Buttons
Logic
I/O
LOGIC IN
G|4|3|2|1|G
RELAY OUT
2
1
C|NC|NO|C|NC|NO
LOGIC IN
G|4|3|2|1|G

HAL1x

HAL2

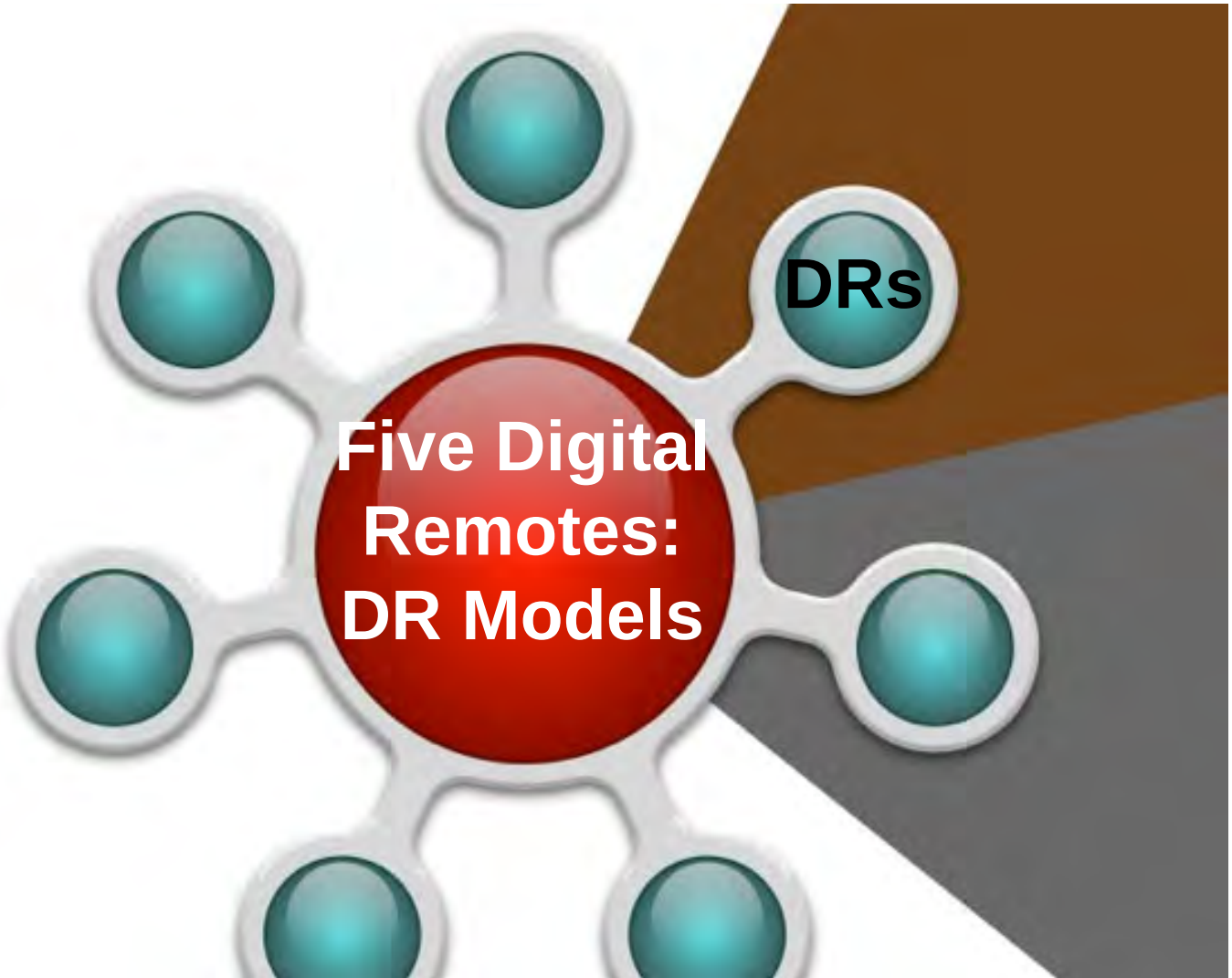
HAL3s



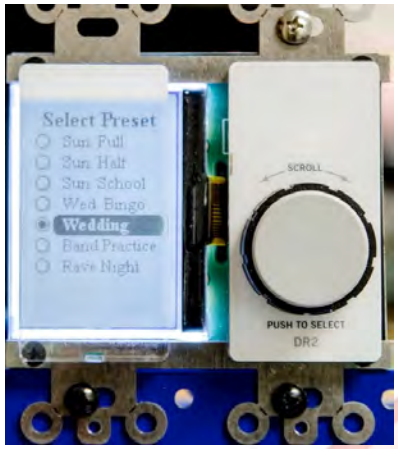
HAL4

DRs

4 HAL DSP Brains

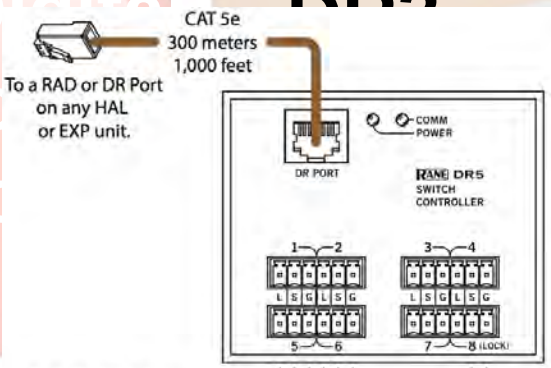

DRs
Five Digital Remotes: DR Models

DR1



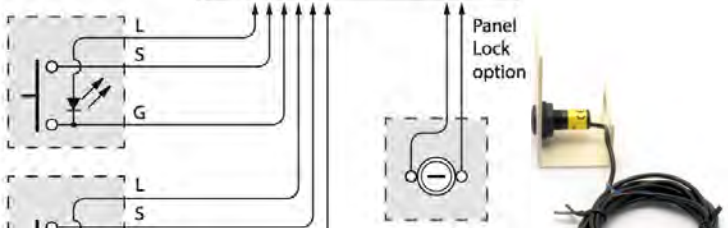
DR2

DR5



IR2

DR



DRs - Digital Remotes

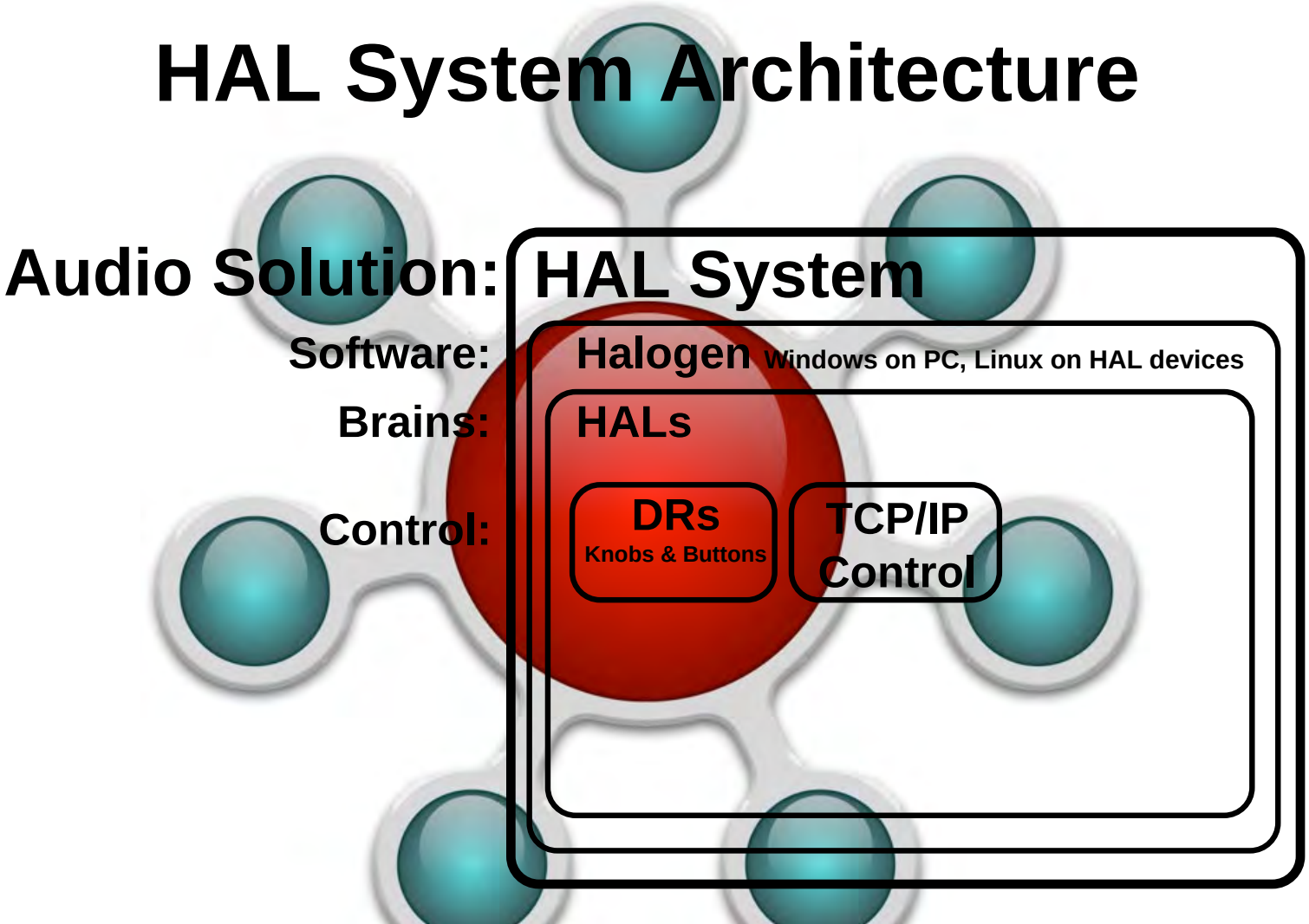
Control any HAL using knobs & buttons

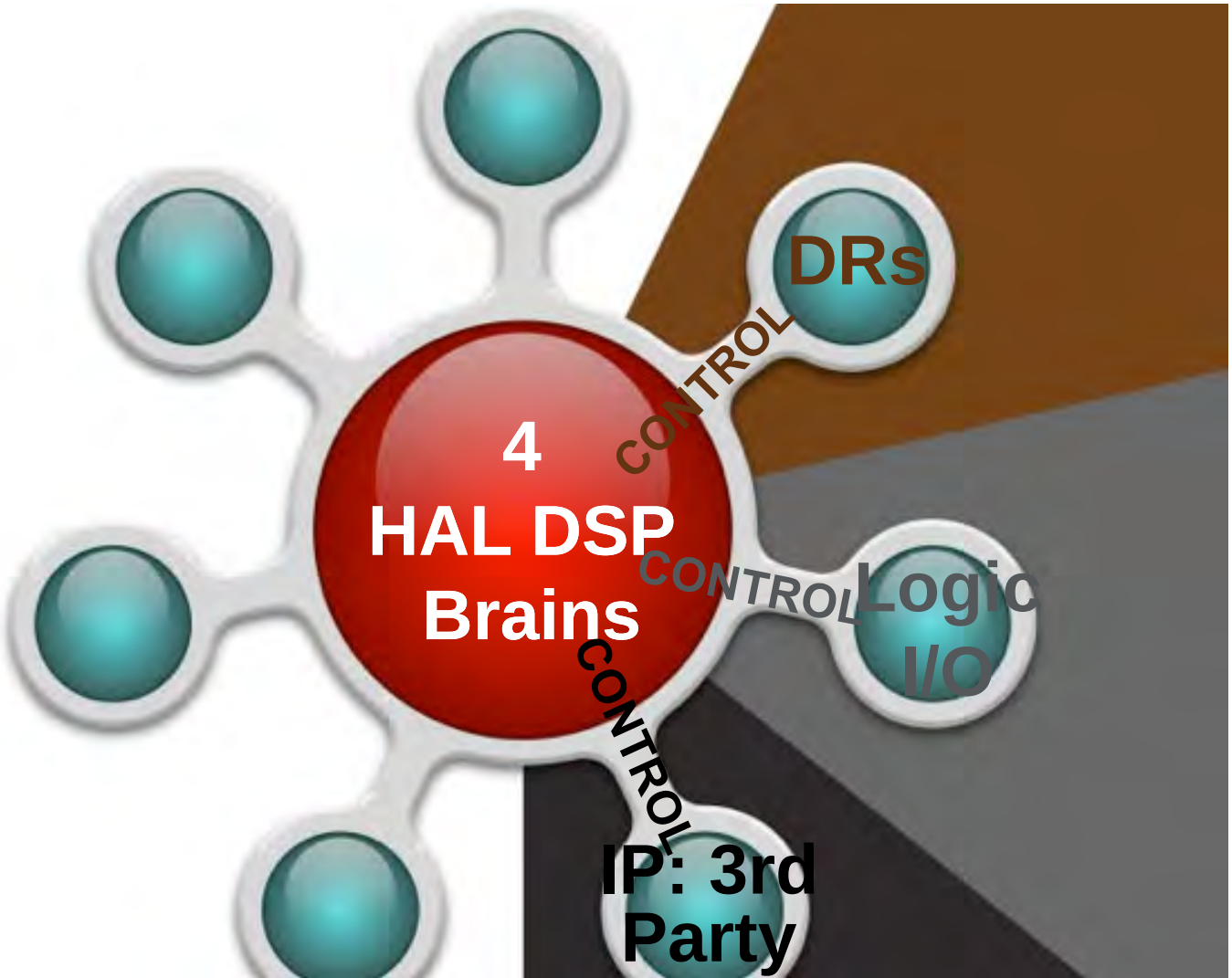
Key features:

- Auto firmware & settings sent from any HAL
- Hot swap, hot crimp, portability
- Customizable, location-aware LCD labeling
- Shielded CAT 5e or better homeruns
  - Automatic physical addressing
- 300 m (1,000 feet) maximum from HAL
- Device location & RJ-45 crimps are tested:

Troubleshooting indication in SW & HW (both

HAL System Architecture




4
HAL DSP
Brains
CONTROL
DRs
CONTROL
Logic
I/O
CONTROL
IP: 3rd
Party

ASCII Text over TCP/IP

Key Feature:

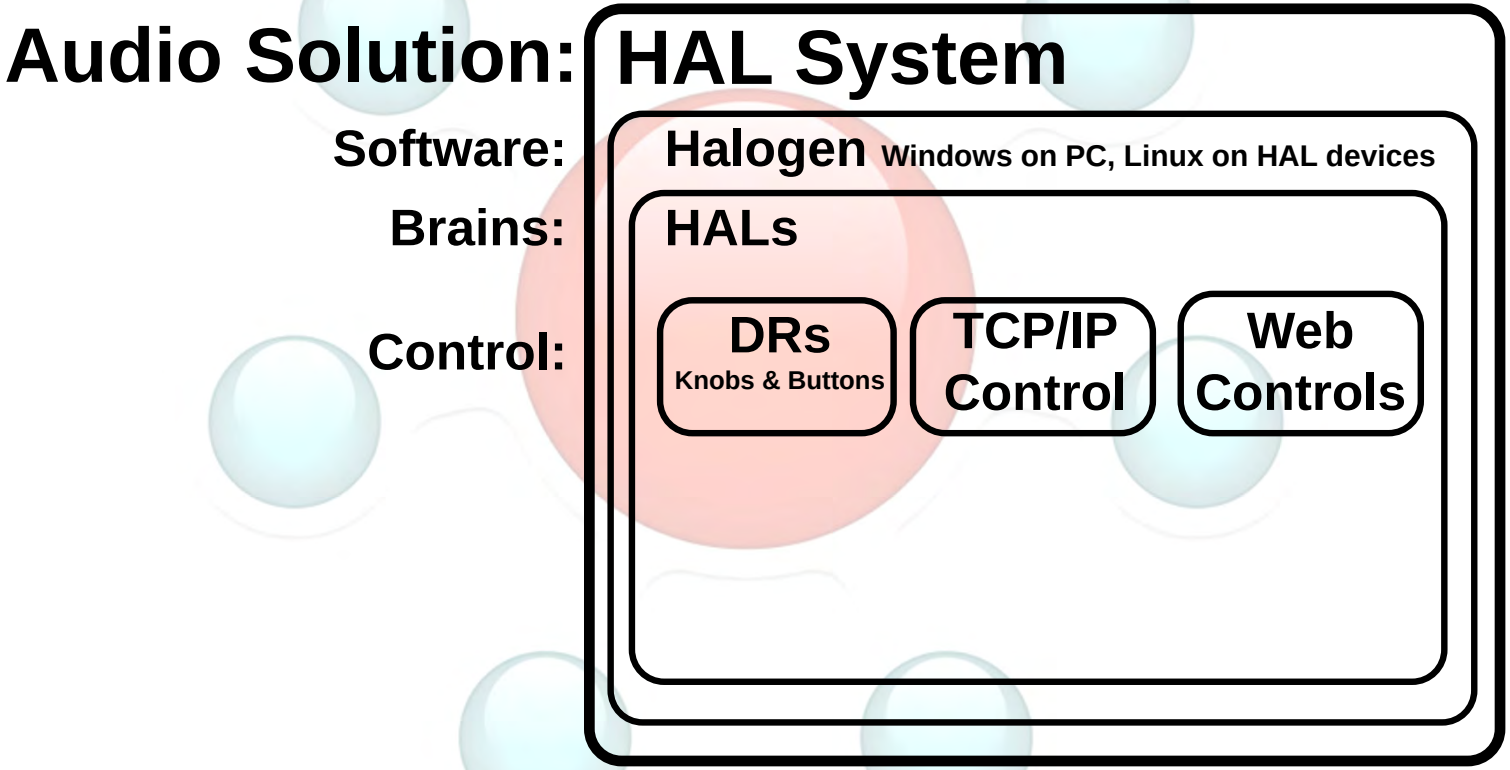
- **100% Test all control behaviors without HAL Hardware**

4
HAL DSP
Brains

CONTROL

IP: 3rd Party

HAL System Architecture



Web Controls

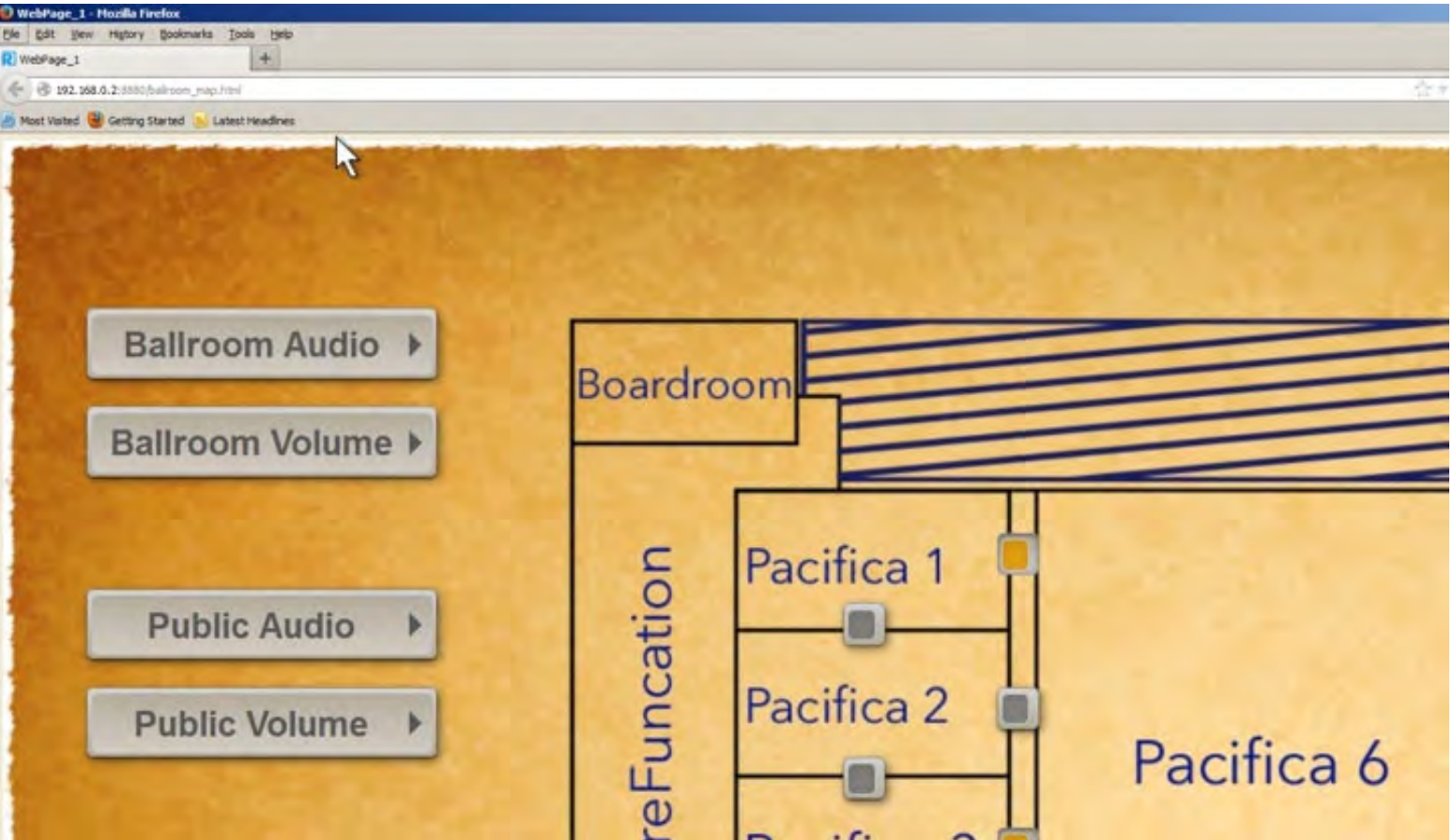
Key Features:

- Customizable Browser-based control
- Web pages run on any device browser
  - Any PC: Windows or Apple
  - Any Tablet: iPad, Surface, Samsung...
  - Any Smart Phone: iPhone, Android, Windows
- 100% Test all control behaviors without HAI Hardware

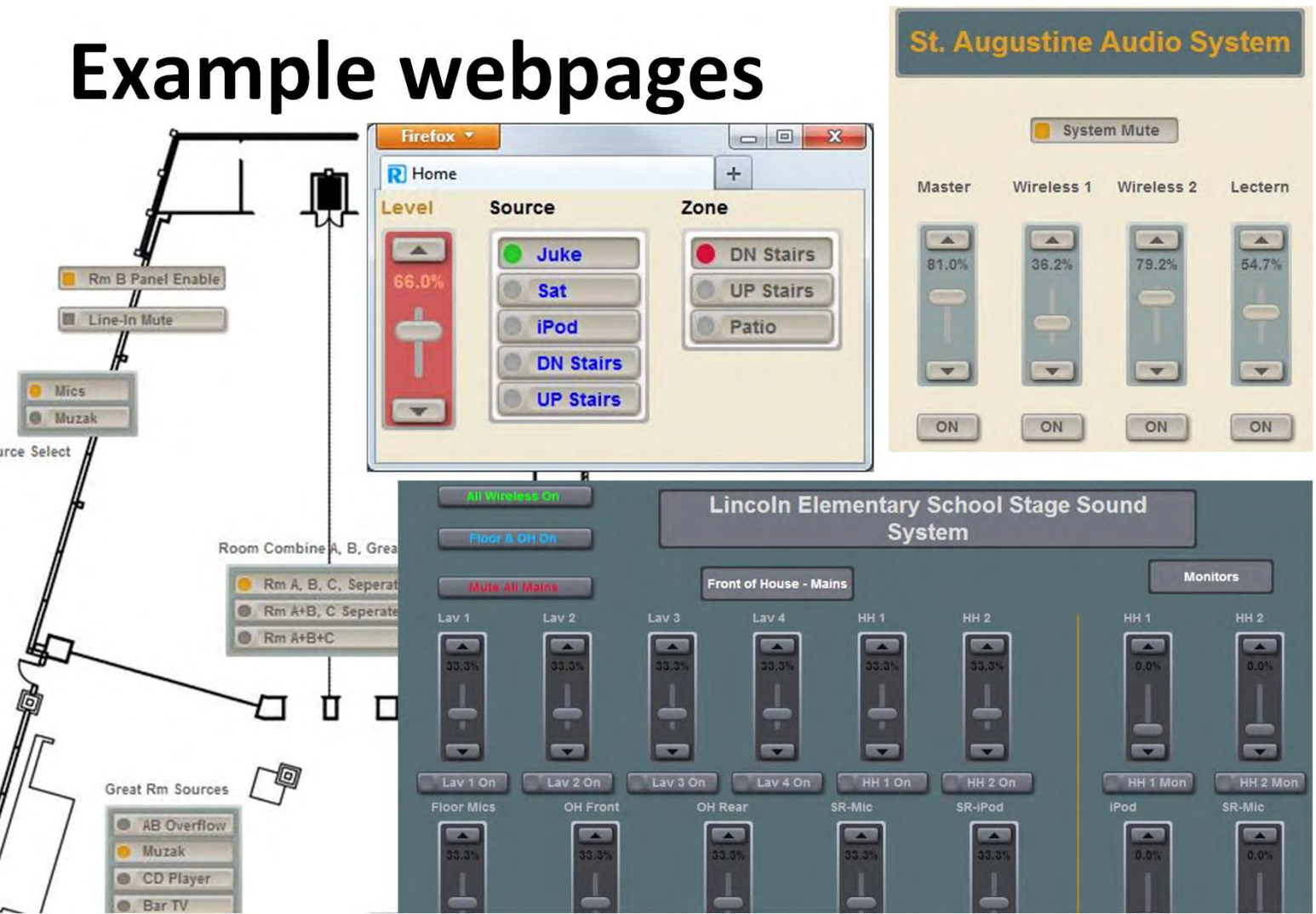
CONTROL

IP: Web Control

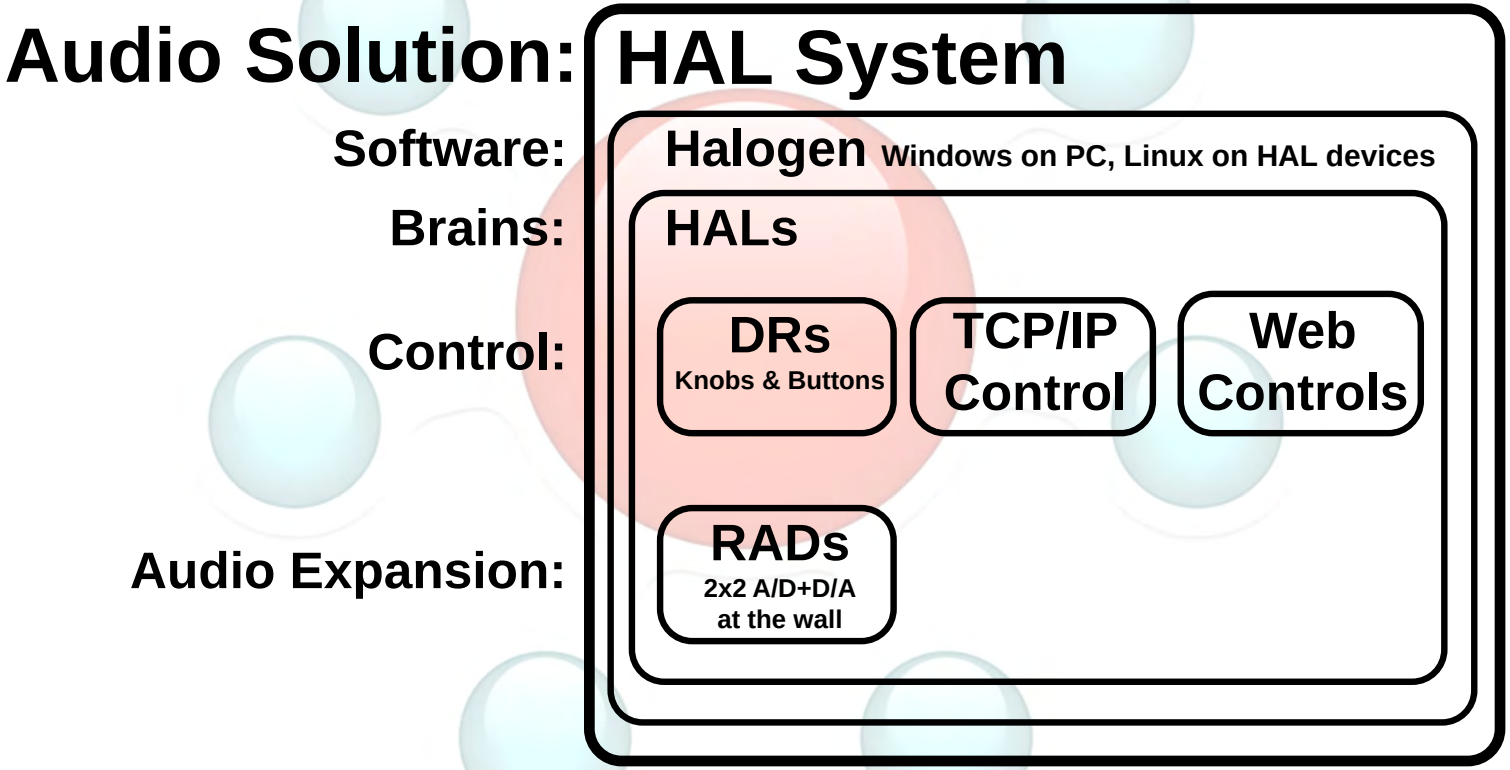
Example Hotel Room Combine

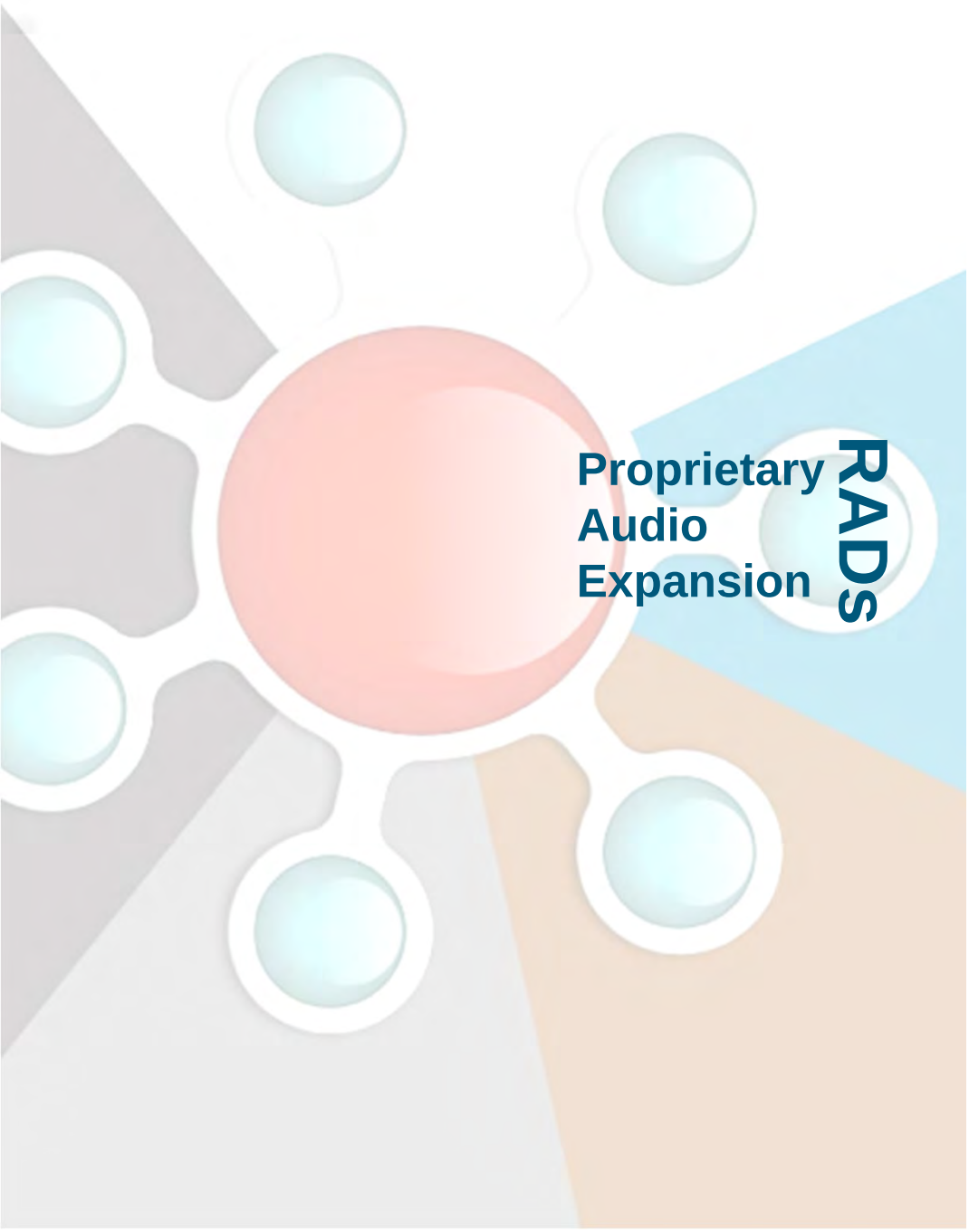


Example webpages



HAL System Architecture




Proprietary
Audio
Expansion
RADS

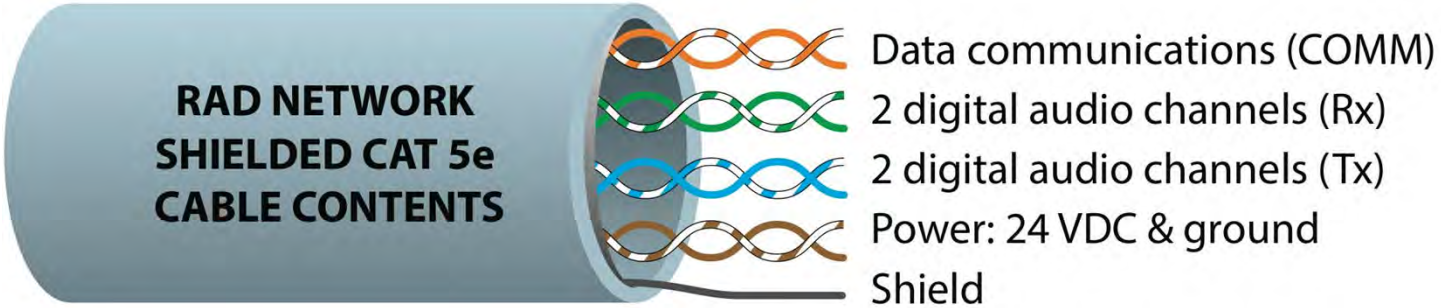
RADs

RADs - Remote Audio Devices

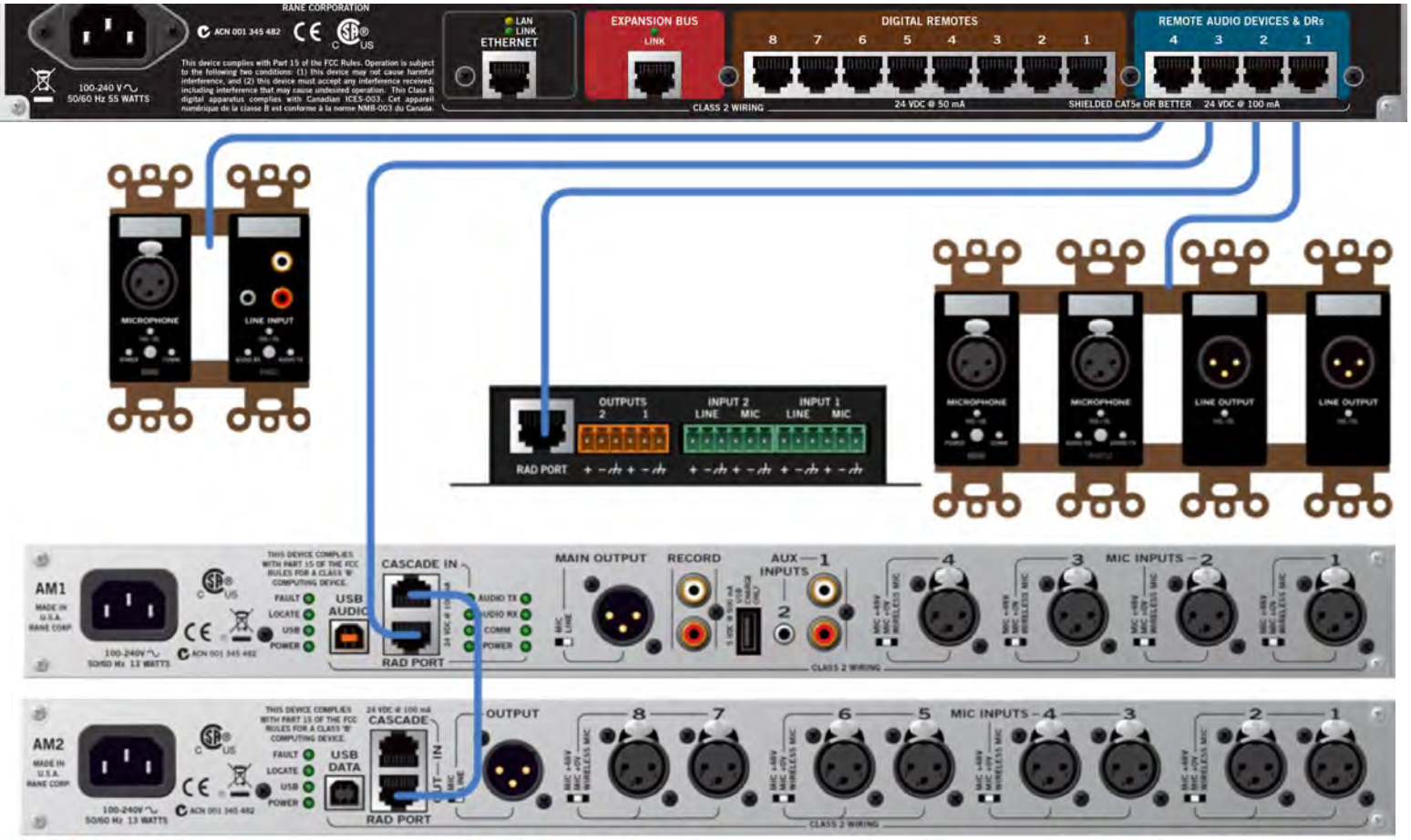
Incremental (2x2) expand audio for any HAL
A/D & D/A at the wall, podium, desk...

- **Auto firmware & settings sent from any HAL**
- **Hot swap, hot crimp, portability**
- **Location-aware**
- **Shielded CAT 5e or better homeruns**
  - **Automatic physical addressing**
- **150 m (500 feet) maximum from HAL**
- ***Audio*, device location & crimps testing**
  - **Troubleshooting indication in SW & HW (both**

What’s in the RAD cable?



- **Communications RS-485**
- **AES3 Receive, 24-bit, 48 kHz; 2 audio Channels**
- **AES3 Transmit 24-bit, 48 kHz; 2 audio Channels**
- **Power & ground**
- **Shielded CAT 5e (or better) cable required**



4 RAD Ports: from 2x2 I/O to 64 inputs. Audio where it's needed.

Homerun connection: auto-checks CAT5 crimp & verifies audio.

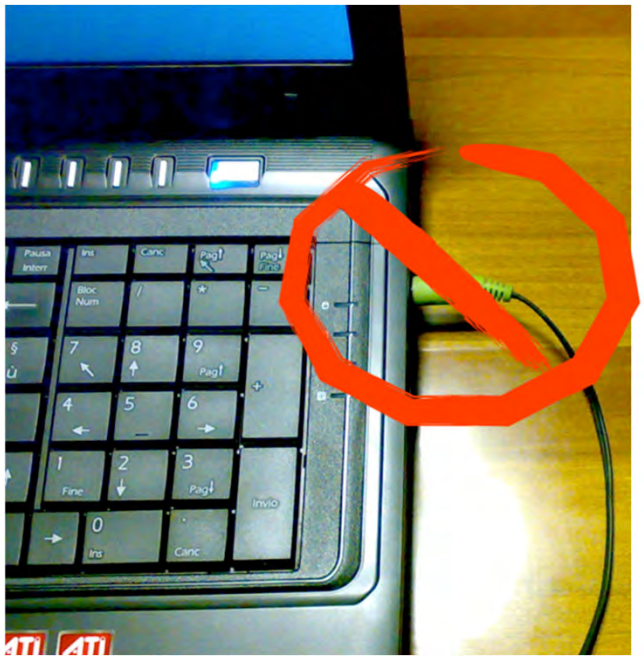
20 models: RADs, PAGER1, AM1 & AM2 Automixers & 3 DRs

AM1 & AM2 Gain-Sharing Automixer (also RADs)

RAD27 USB Audio Sound Card

- **USB Audio I/O**
- **16-bit, 48 kHz**
- **Simultaneously Playback & Record from one PC**
- **Any vintage Mac or PC**
  - **No driver to install**
- **Auto-senses OS authorization:**
  - **Projector on,screen/lights down, switch vid**

RAD27 USB Audio Sound Card



- Presentation Podiums
- Meeting Rooms, Education
- City Council, PTA meetings, School Dances, Nightclubs, Concerts, Sports events...
- PCs with prerecorded announcements,

PAGER1 Desktop Paging Station

- **Mic stage RAD**
  - **SW adjust**
- ***Scenario* (group of zones) LCD list**
- **Select knob, push-to-talk**
- **Status indicators**
- **32 supported**

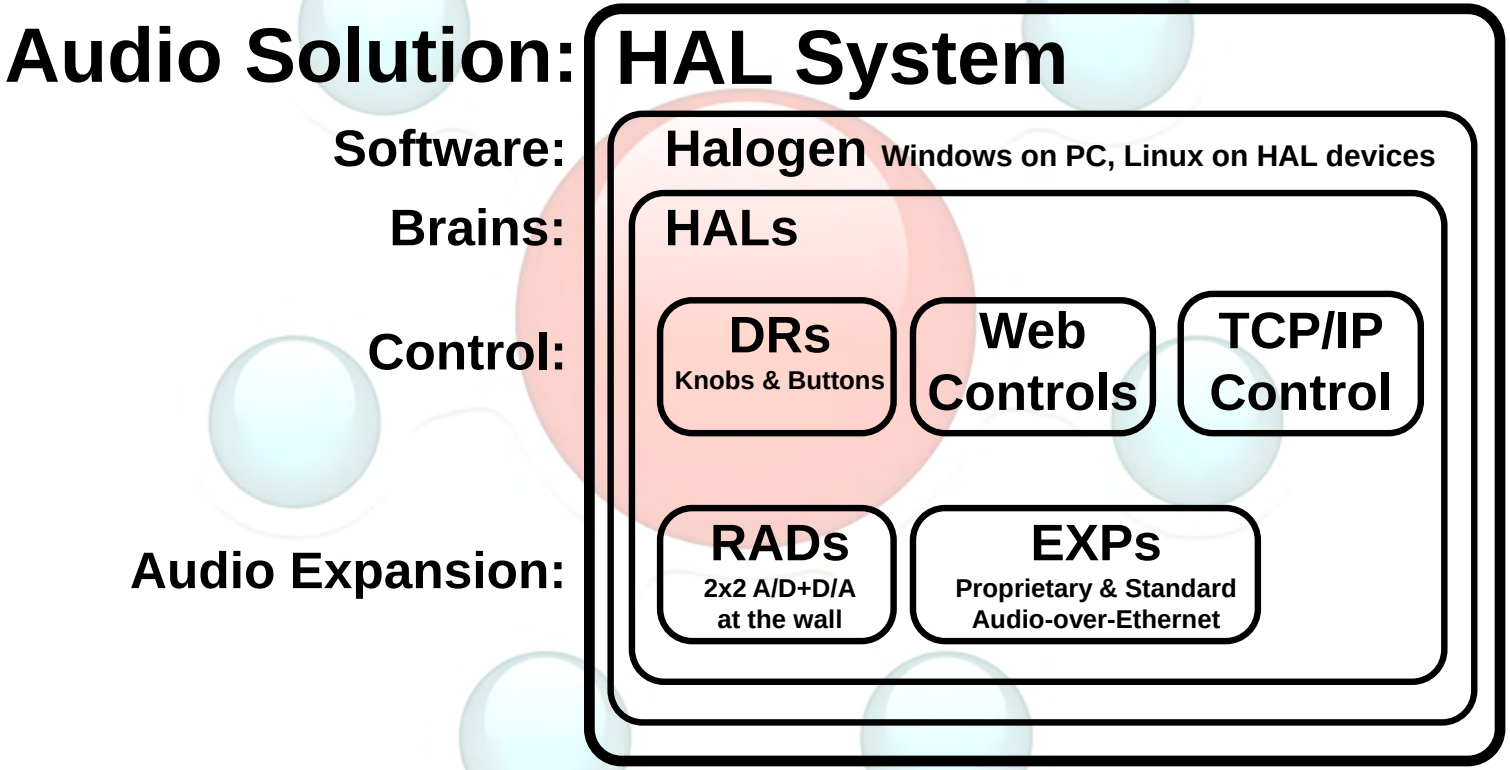
RAD17

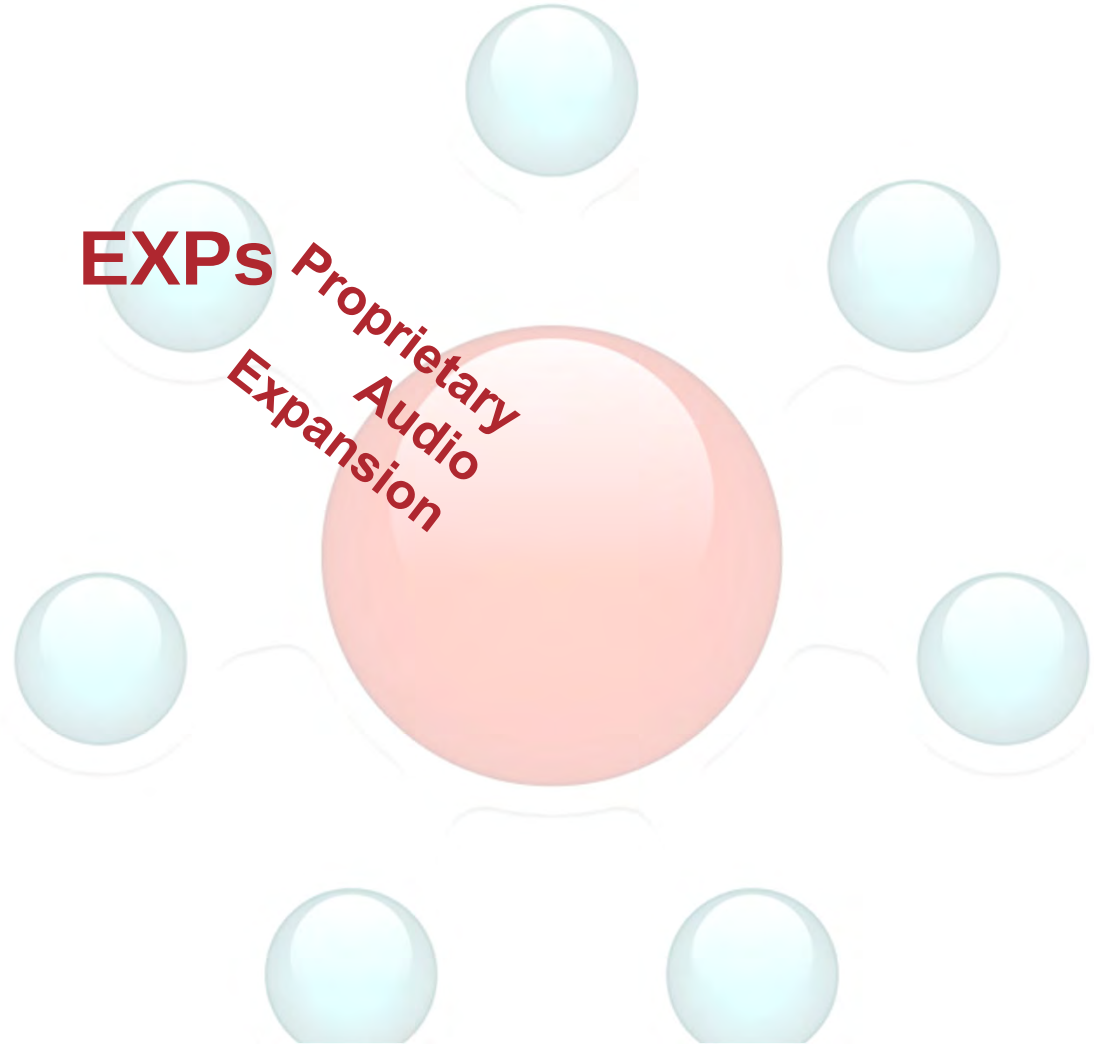
- **Boundary Layer Mic RAD**
  - **aka PZM Pressure Zone Mic**
- **Weather resistant ...mylar**
  - **Omni electret element**
- **Ambient noise sensing, surveillance, interrogation, detention center, security, industrial, train stations...**
- **Use with *Ambient Noise Compensation* DSP block**
- **Spray paint any color to please Interior decorators**

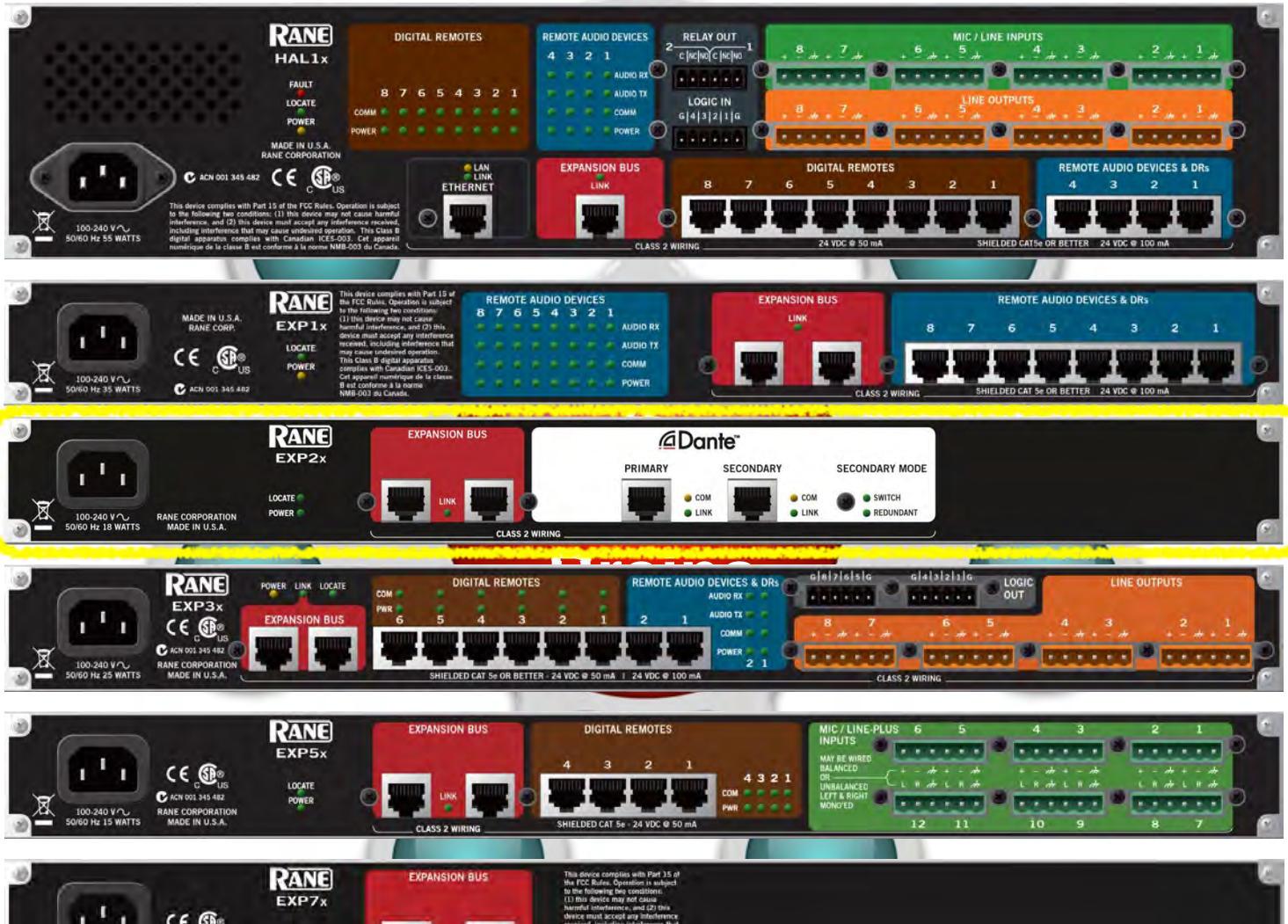
RAD24 amp

- One watt into 8 ohms, one channel
- For office, bath
- Plenum rated UL 2043

HAL System Architecture




EXPs
Proprietary
Audio
Expansion


RANE
HAL1x
FAULT
LOCATE
POWER
MADE IN U.S.A.
RANE CORPORATION
ACN 001 345 482
100-240 V~
50/60 Hz 55 WATTS
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.
DIGITAL REMOTES
8 7 6 5 4 3 2 1
COMM
POWER
REMOTE AUDIO DEVICES
4 3 2 1
AUDIO RX
AUDIO TX
COMM
POWER
RELAY OUT
2 C NC NO C NC NO 1
LOGIC IN
G 4 3 2 1 G
MIC / LINE INPUTS
8 7 6 5 4 3 2 1
LINE OUTPUTS
8 7 6 5 4 3 2 1
LAN
LINK
ETHERNET
EXPANSION BUS
LINK
DIGITAL REMOTES
8 7 6 5 4 3 2 1
REMOTE AUDIO DEVICES & DRs
4 3 2 1
CLASS 2 WIRING
24 VDC @ 50 mA
SHIELDED CAT5e OR BETTER
24 VDC @ 100 mA

RANE
EXP1x
MADE IN U.S.A.
RANE CORP.
100-240 V~
50/60 Hz 35 WATTS
ACN 001 345 482
LOCATE
POWER
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.
REMOTE AUDIO DEVICES
8 7 6 5 4 3 2 1
AUDIO RX
AUDIO TX
COMM
POWER
EXPANSION BUS
LINK
REMOTE AUDIO DEVICES & DRs
8 7 6 5 4 3 2 1
CLASS 2 WIRING
SHIELDED CAT 5e OR BETTER
24 VDC @ 100 mA

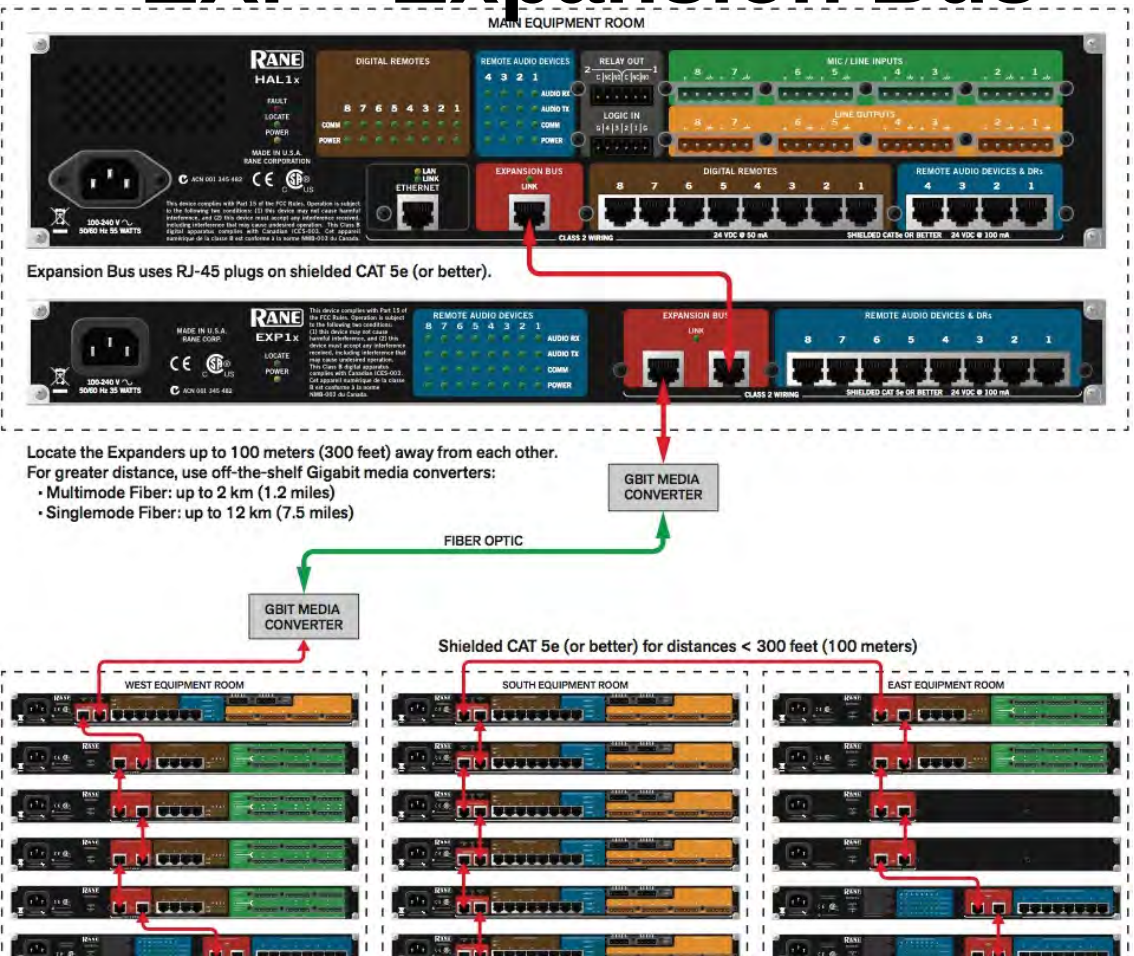
RANE
EXP2x
100-240 V~
50/60 Hz 18 WATTS
RANE CORPORATION
MADE IN U.S.A.
LOCATE
POWER
EXPANSION BUS
LINK
CLASS 2 WIRING
Dante
PRIMARY
SECONDARY
SECONDARY MODE
COM
LINK
SWITCH
REDUNDANT

RANE
EXP3x
POWER
LINK
LOCATE
ACN 001 345 482
100-240 V~
50/60 Hz 25 WATTS
RANE CORPORATION
MADE IN U.S.A.
EXPANSION BUS
DIGITAL REMOTES
COM
PWR
6 5 4 3 2 1
REMOTE AUDIO DEVICES & DRs
AUDIO RX
AUDIO TX
COMM
POWER
2 1
G 6 5 4 3 2 1 G
G 4 3 2 1 G
LOGIC OUT
LINE OUTPUTS
8 7 6 5 4 3 2 1
SHIELDED CAT 5e OR BETTER - 24 VDC @ 50 mA | 24 VDC @ 100 mA
CLASS 2 WIRING

RANE
EXP5x
100-240 V~
50/60 Hz 15 WATTS
ACN 001 345 482
RANE CORPORATION
MADE IN U.S.A.
LOCATE
POWER
EXPANSION BUS
LINK
CLASS 2 WIRING
DIGITAL REMOTES
4 3 2 1
4 3 2 1
COM
PWR
SHIELDED CAT 5e - 24 VDC @ 50 mA
MIC / LINE-PLUS INPUTS
6 5 4 3 2 1
MAY BE WIRED
BALANCED
OR
UNBALANCED
LEFT & RIGHT
MONO'ED
L R L R L R
12 11 10 9 8 7

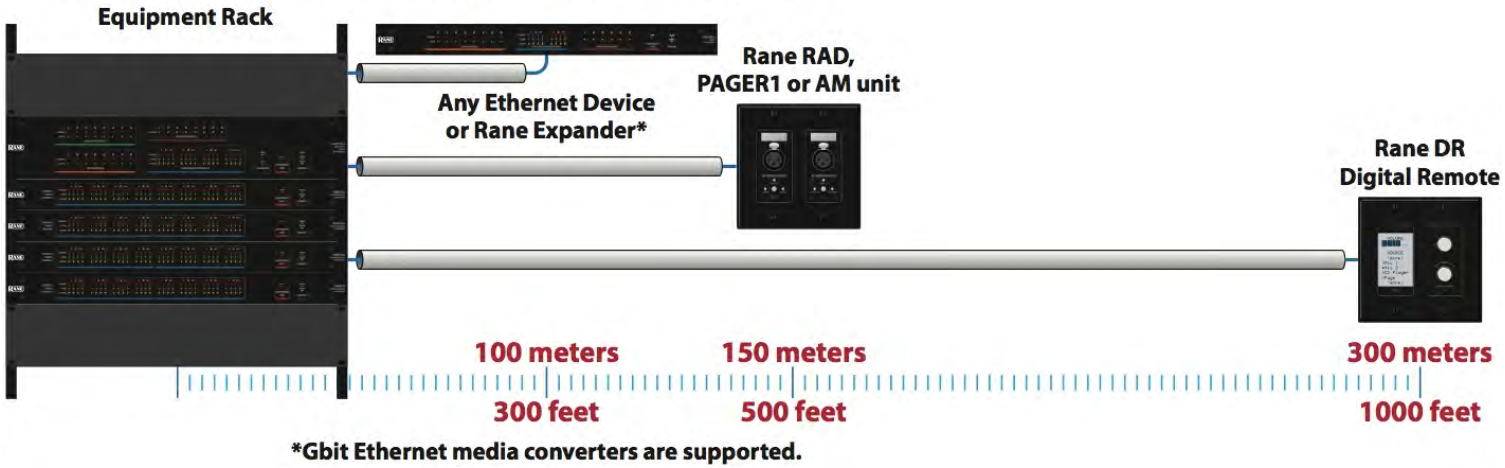
RANE
EXP7x
EXPANSION BUS

“EXP” Expansion Bus



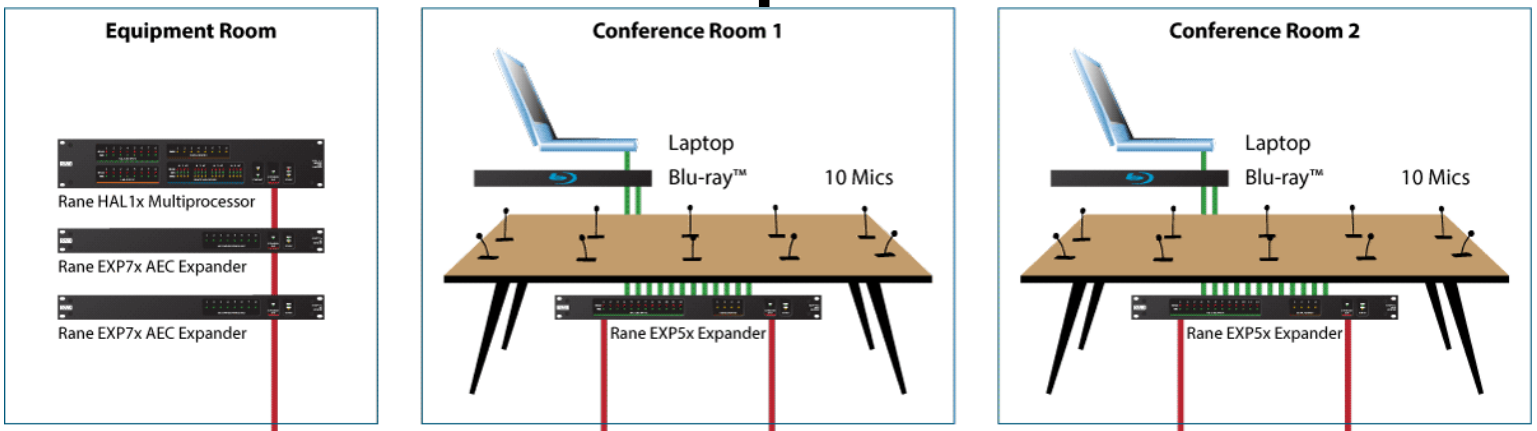
- **EXP1x, *EXP2x*, EXP3x, EXP5x & EXP7x**
- Conference CentersClassroomsCampusHotelsMallsArenas, Sports & Water ParksMultiple Equipment Rooms

Ethernet, RAD and DR Cable Lengths



*Gbit Ethernet media converters are supported.

Useful HAL1x Expansion Bus Idea



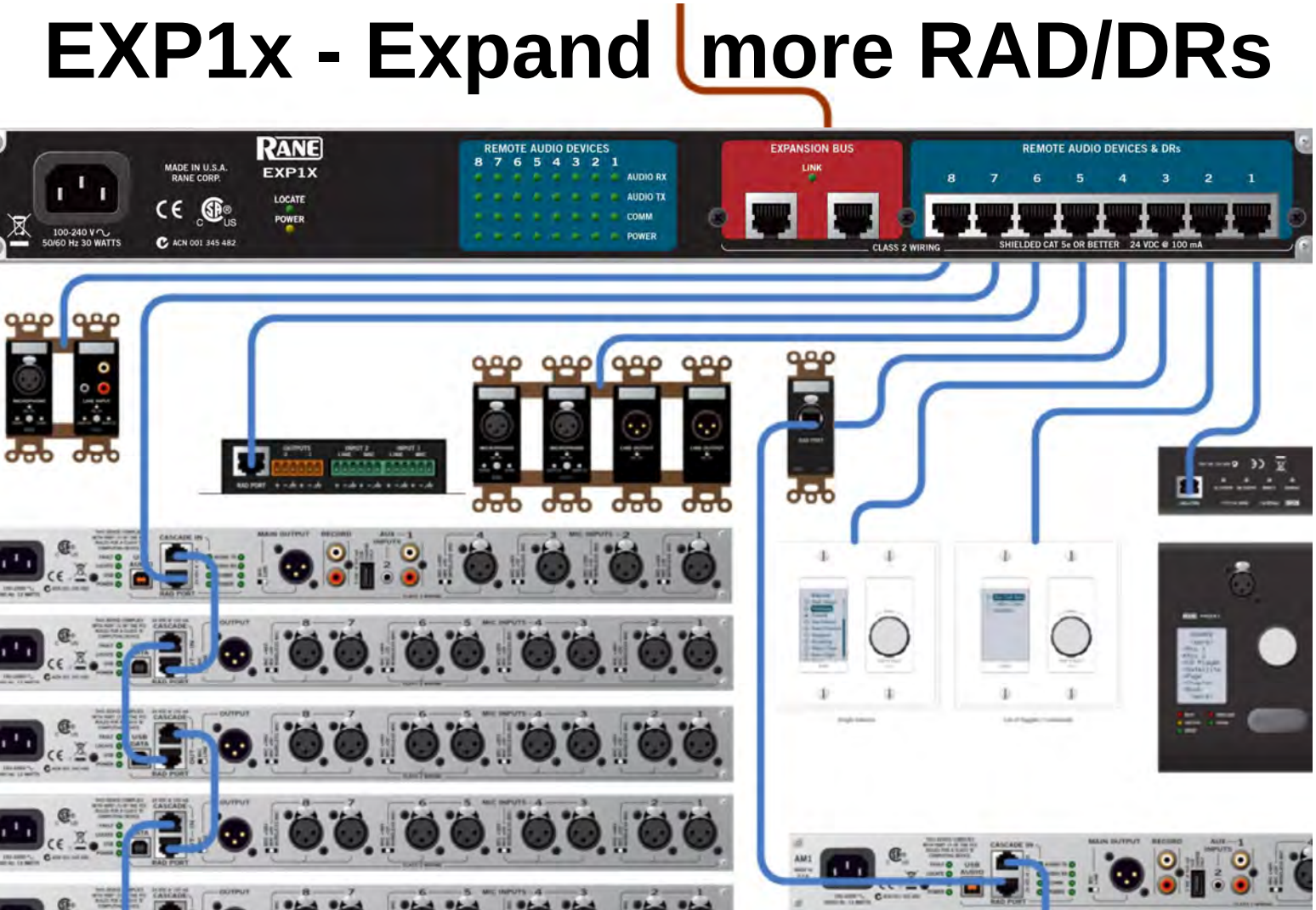
EXPs - Expanding *HAL1x*

in racks and rooms

512x512 audio Expansion Bus for HAL1x

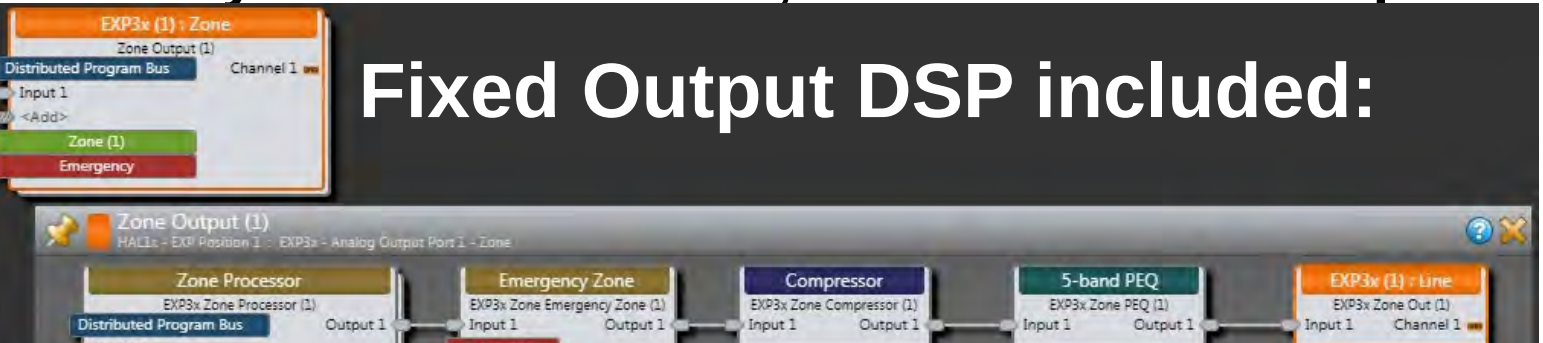
- Auto firmware & settings sent from HAL1x
- Hot swap, hot crimp, auto SW wiring
- Daisychain any combo up to 32 EXPs
- Shielded CAT 5e or better or unmanaged fiber optic gigabit media converters
- Ethernet layer 1 (*not* layer 2)
- 100 m (325 feet) between devices
- Link indication in SW & HW: both cable ends

EXP1x - Expand more RAD/DRs



EXP3x Output & DSP Expander

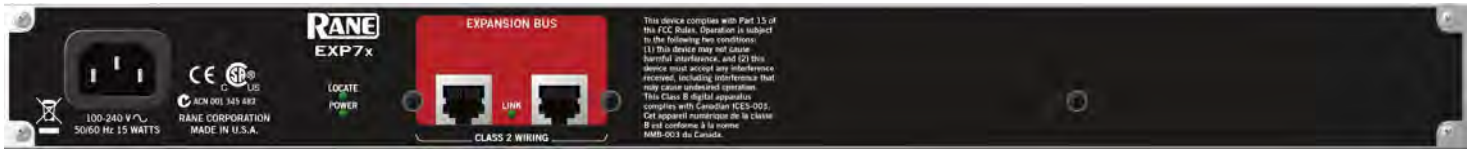
- ***4 inputs 12 outputs***
- **8 Logic Outputs - for 70 V relay paging apps**
- **Daisychain 32 = 256 out; +64 RADs = 384 outputs**



EXP5x Input & DSP Expander

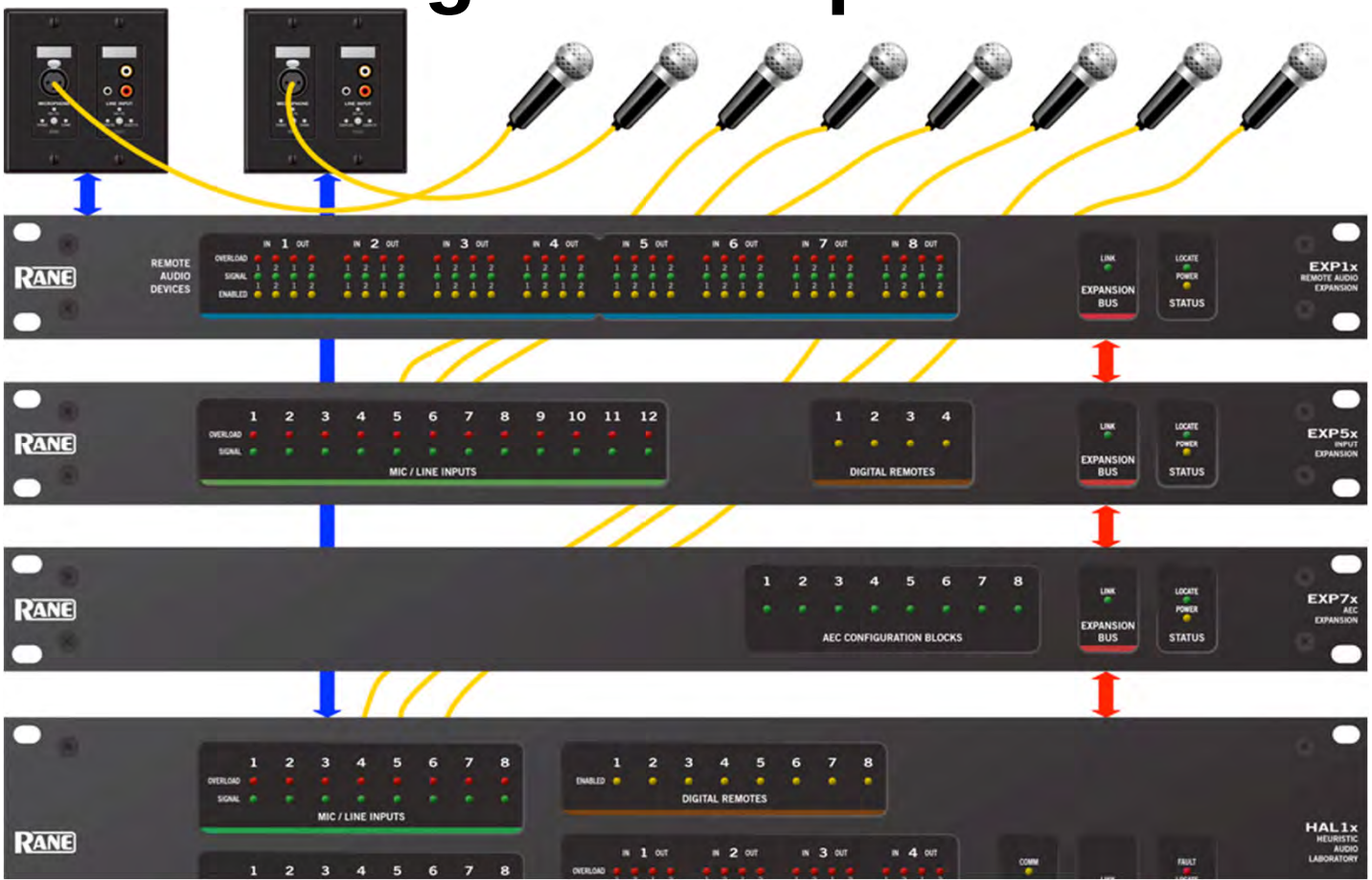
- **12 Mic/Line/Line-Plus - handles any audio input**
  - **Line-Plus: Monos unbalanced RCA L&R inputs**

EXP7x: Acoustic Echo Cancelling

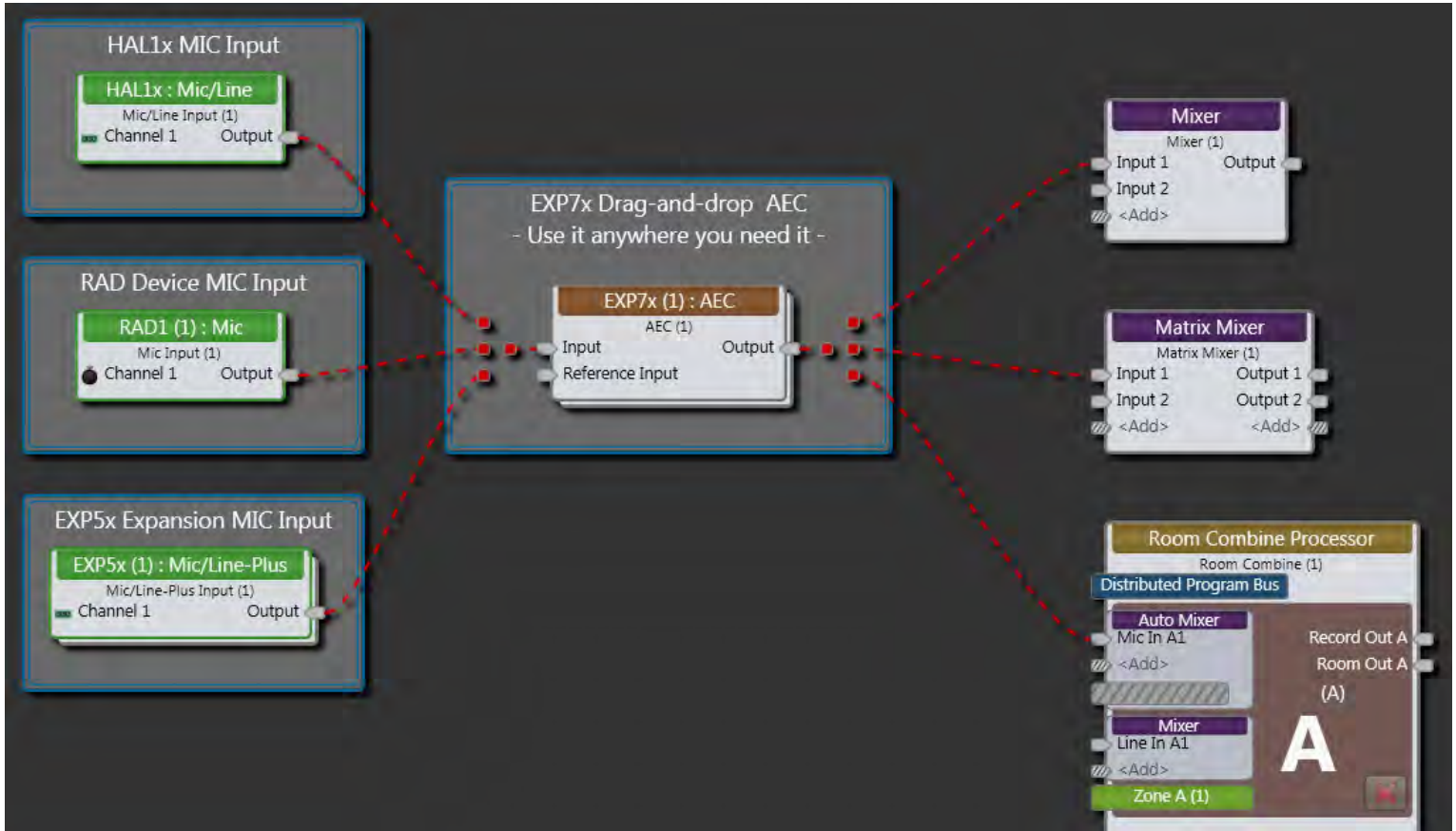


- 8 channels of drag and drop AEC
  - Use the AEC block with any HAL1x input anywhere in the system
    - e.g., Analog, RAD, EXP, AES3, USB Audio, Dante

Drag and Drop AEC

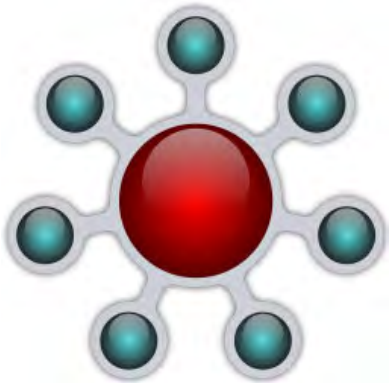


Drag and Drop AEC



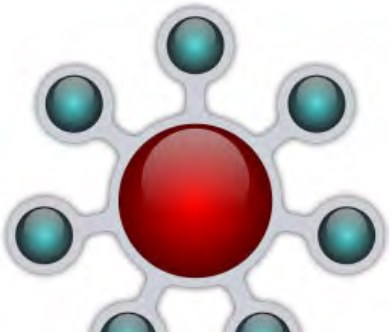
What's New in Halogen 5.0

Ships: November, 2014



New HAL System Products

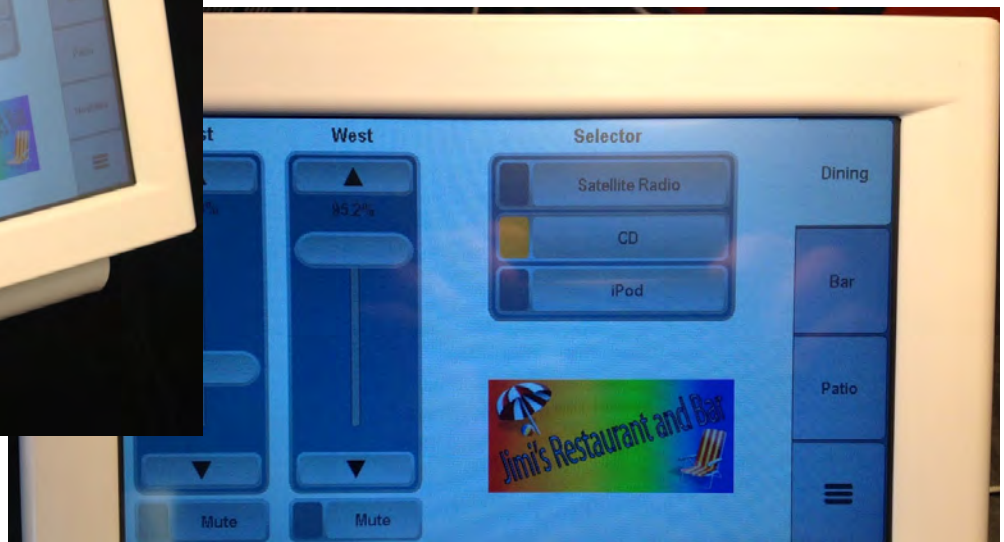
- **Coming for November, 2014 in Halogen 5.0**
  1. **FIR filter import DSP block**
  2. **DR6 Remote: 7” customizable touch screen**
  3. **EXP2x: Dante 32 x 32 Expander for HAL1x**



Dante™
SPOKEN HERE

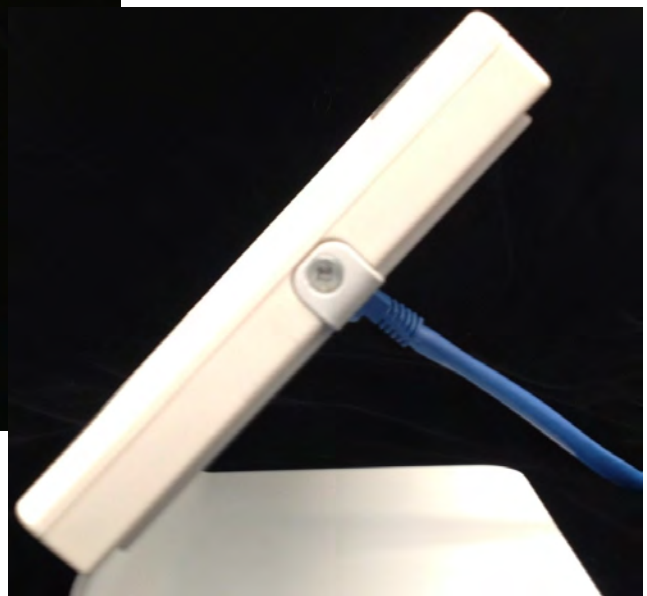
Rane DR6 Remote

- **7” color LCD touch screen**
  - **Custom screen program a la Web Controls**
    - **Wall mount bracket & accessory desktop stand are white**



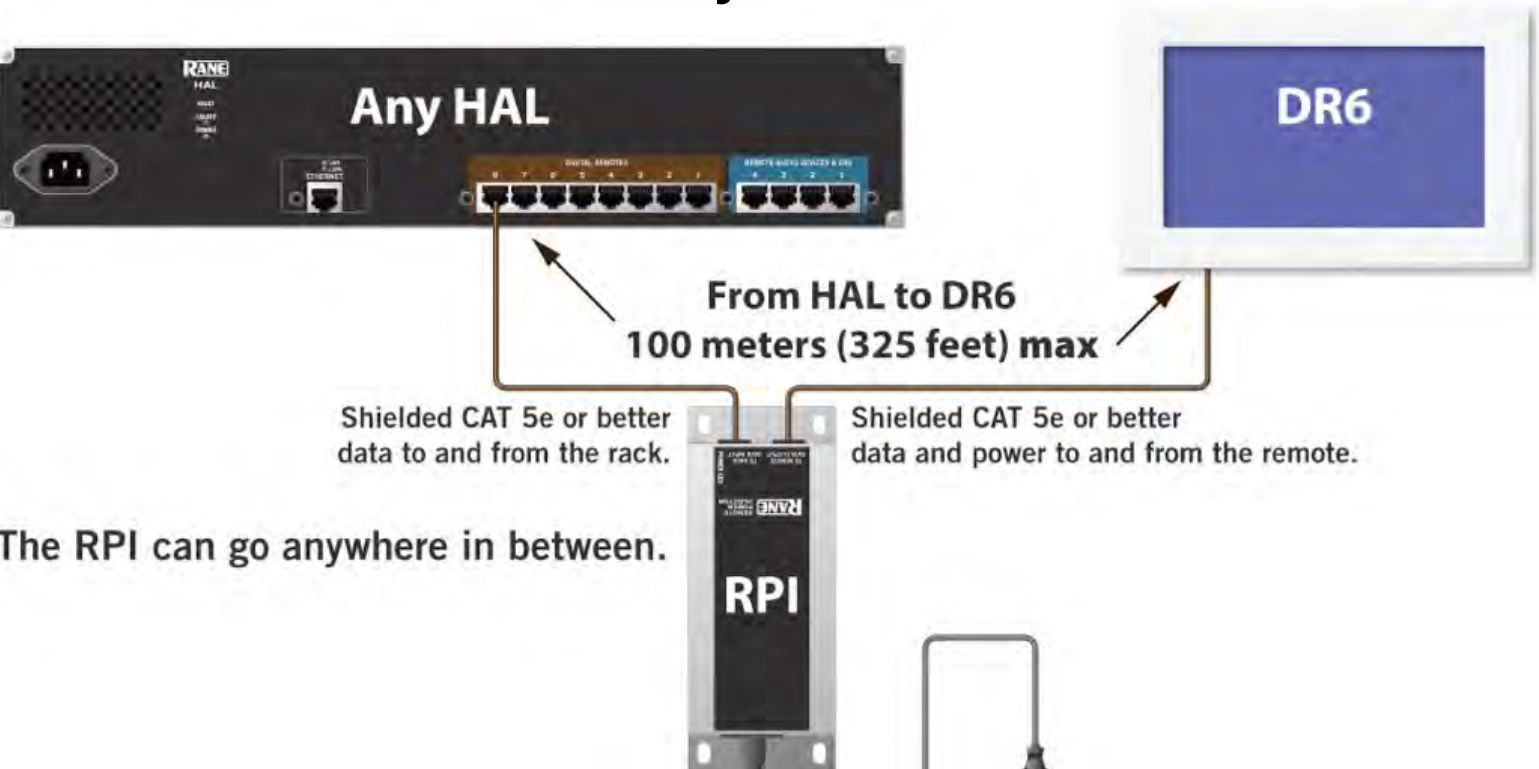
Rane DR6 Remote

- **Accessory tabletop stand sold separately**

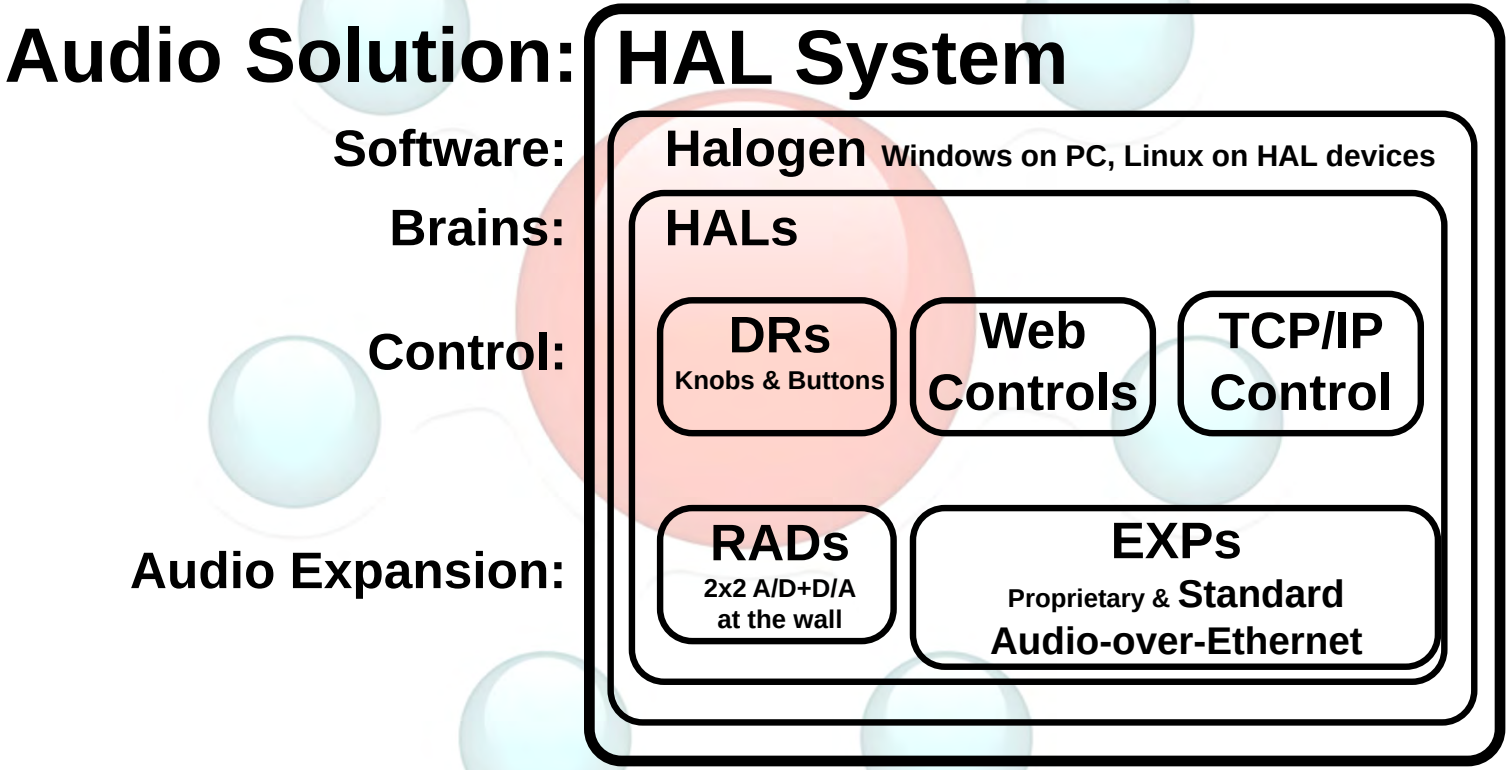


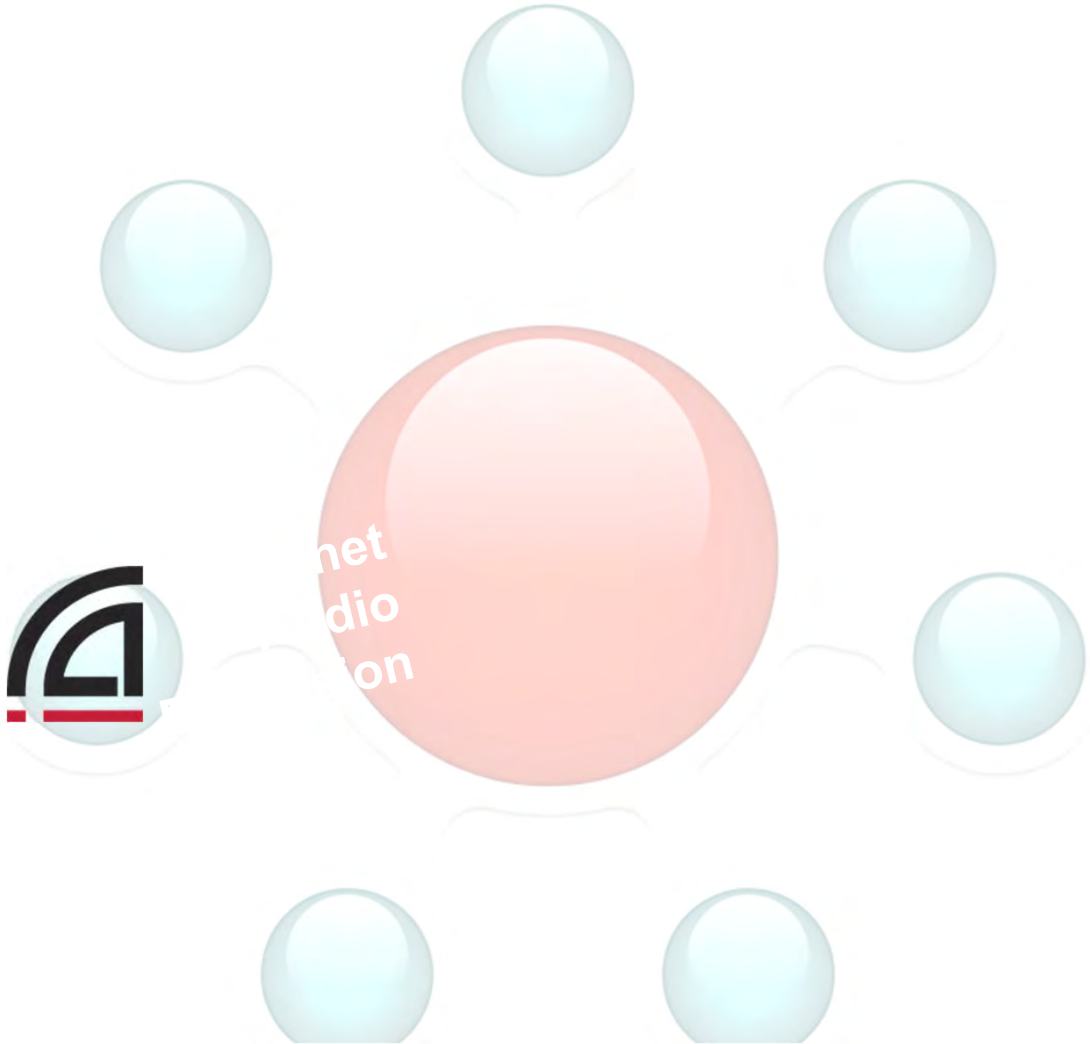
Rane DR6 Remote

- **Includes RPI: Remote Power Injector**
  - **Place RPI between any HAL RAD/DR Port & the DR6**



HAL System Architecture

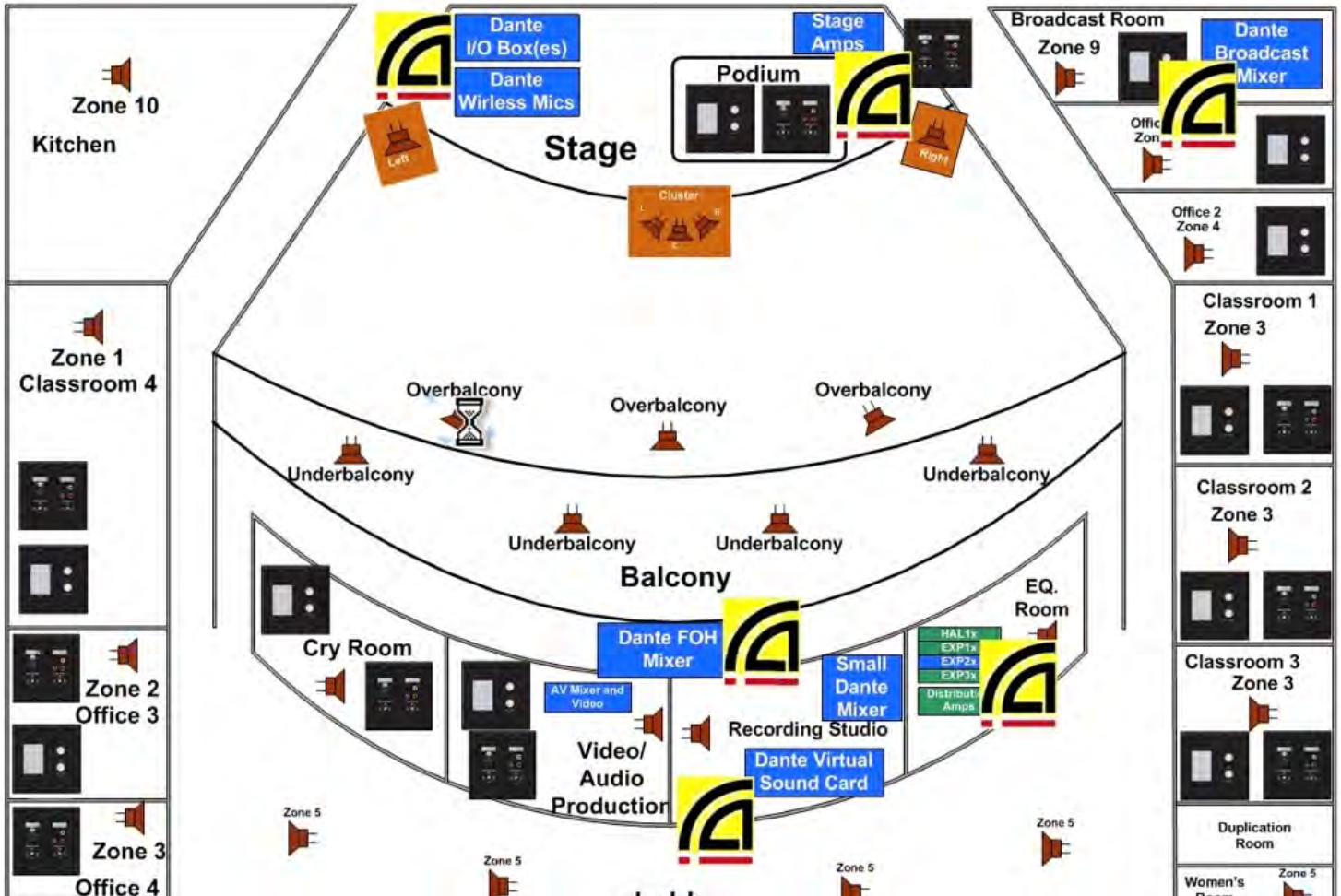



net
dio
ion

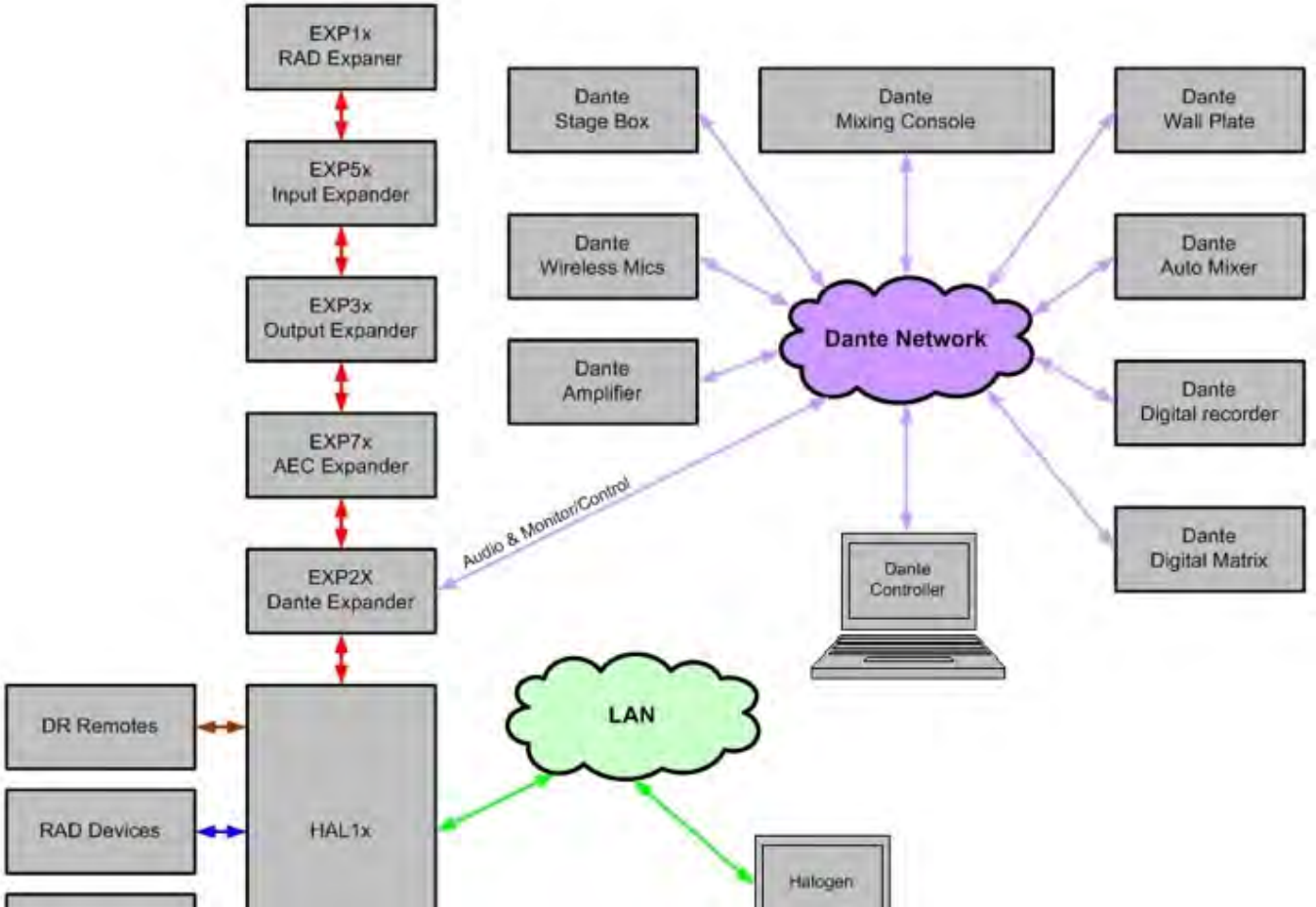
New EXP2x Dante Expander

- **Network facilities or multiple independent HAL1x Systems together**
- **32 x 32 Dante channels @ 48 kHz or 96 kHz**
- **Daisychain up to 16 EXP2x to a single HAL1x: 512 x 512 channels, maximum**
- **Secondary Dante port supports Redundant or Switch modes**

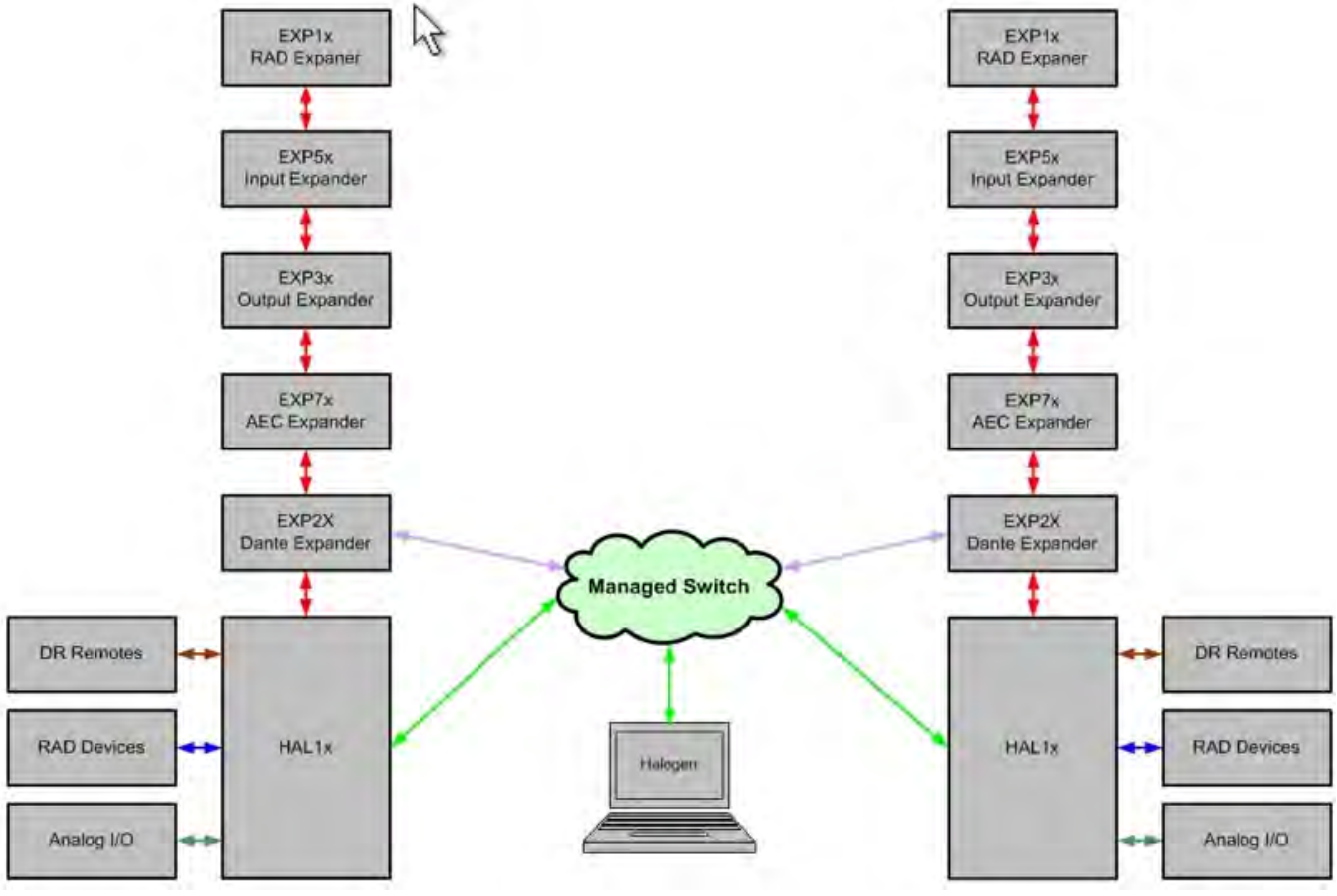
EXP2x Performance Theatre



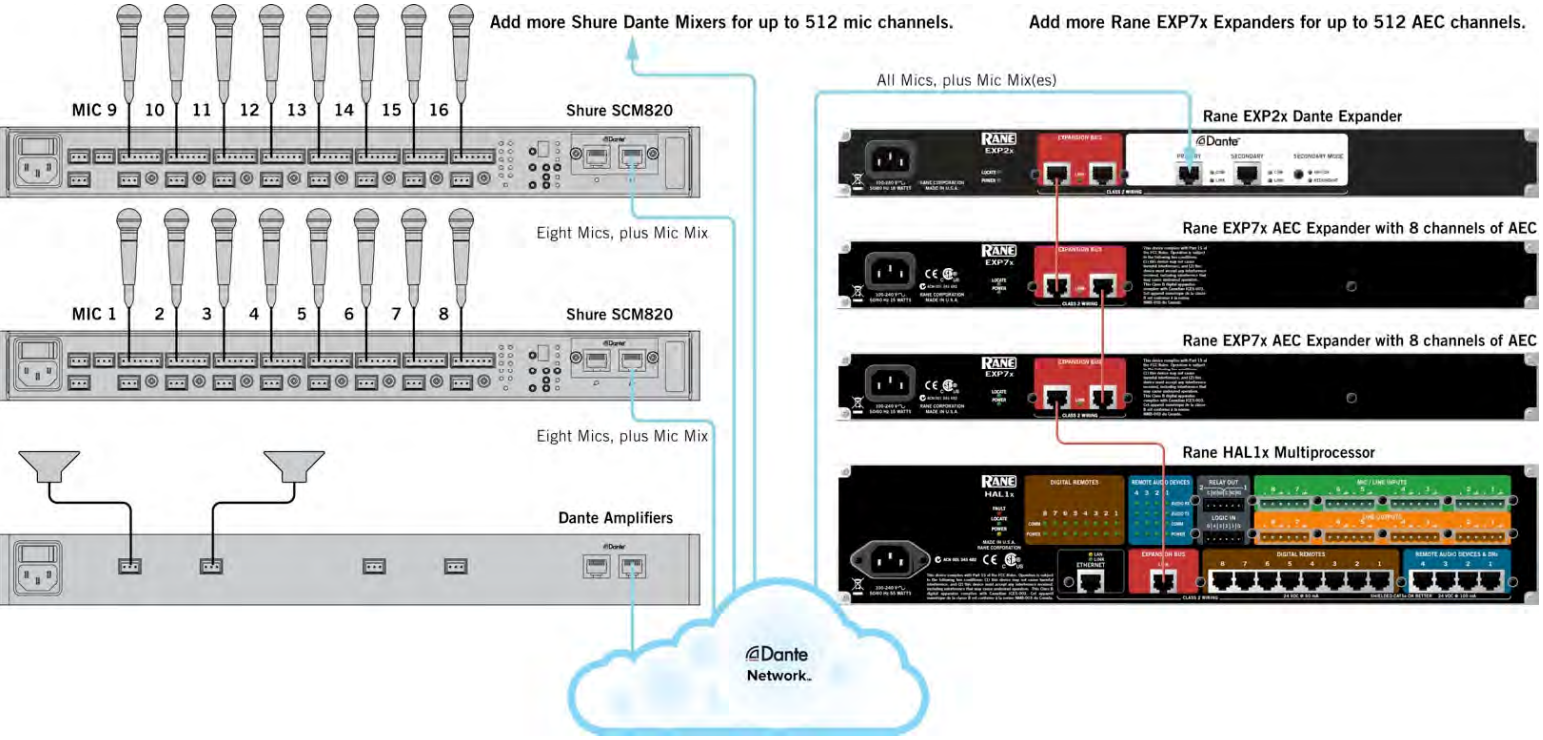
New EXP2x Dante Expander



New EXP2x Dante Expander



Add AEC to Shure’s SCM820 Dante mixer(s)



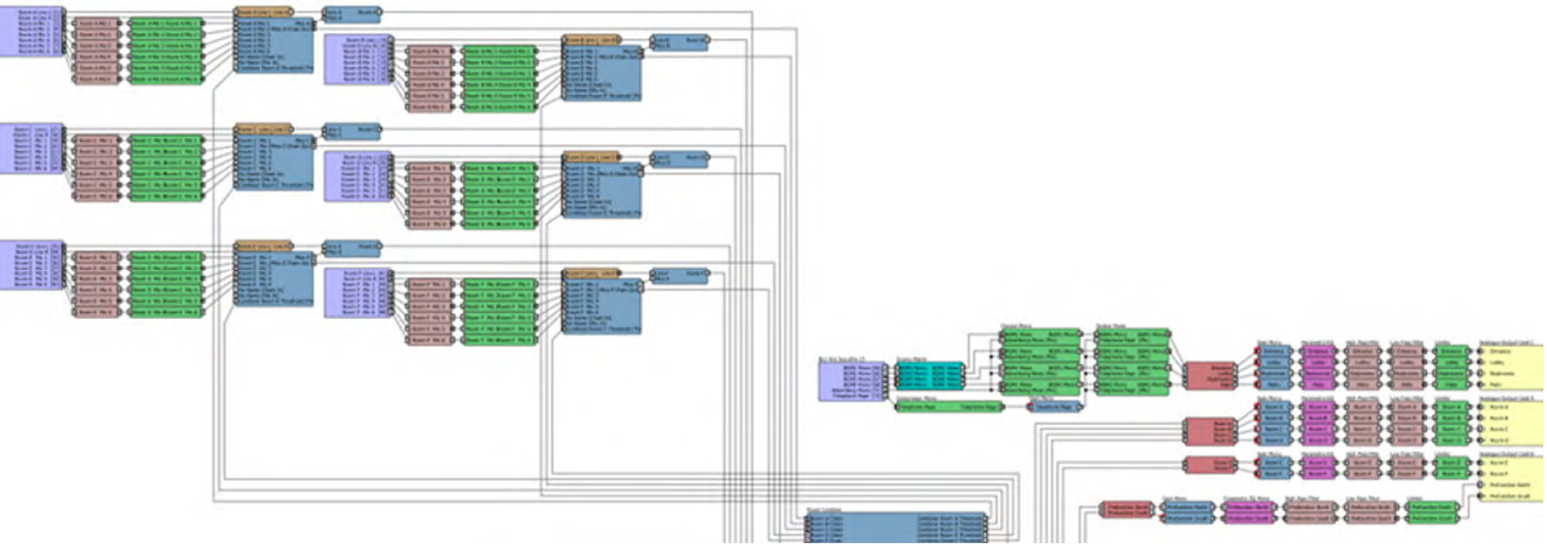
Halogen Highlights

- **Paging Manager**
- **Web Controls - drag & drop**

- **Hardware Workspace**
- **Zone Processor & Distributed Program Bus**
- **Linking to DRs, 3rd-party & web pages**
- **Room Combine blocks**

6 Room Combine Comparison

- **BSS: 183 blocks, 271 wires.**
- **No paging into room combine rooms**



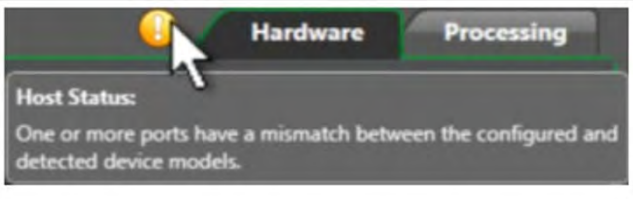
6 Room Combine Comparison

- **Rane Halogen: 171 blocks, 162 wires**
- **Adds paging into any room with no “logic” programming**

Consultant Benefits

- **Get on the Plane Indicator**

Green means "Get on the Plane"



Know HAL #1: HAL's "Get on the Plane" Indicator

Does your formerly favorite audio DSP tell you all 7 of the following things with a single, live device software indicator?

All hardware devices in your original Halogen design file are:

(1) physically present in the building and connected,

(2) in the proper location in the building,

(3) all cables were pulled through the building without mistakes or mislabeled cables,

(4) all cable crimps on all RJ-45 cables are correct,

(5) control communications and all audio I/O are already working,

(6) the settings for all DR and RADs are intact and working,

Contractor / Installer Benefits

- **Labor savings: HAL System shows you install errors & offers real troubleshooting help**
  - **With & without software; on- or off-site**
  - **In software: “Get on the Plane” Indication**
  - **In hardware: Indicators at both ends of cables**
- **Highly integrated DSP blocks**
  - **Application-level blocks, not building blocks**
- **Intuitive Linking that’s verifiable**
- **Ease of programming custom Web Controls**
- **Installers can run any and all versions of the Halogen software on the same laptop**

Client / End User benefits

- Ease of use for DRs & Web Controls
  - DRs - custom labeling, location-aware/portable
  - Web Controls - use the phone in their pocket...
    - No “app” or OS updates to get in the way
    - Often used solely as a monitor for admin/managers
- Ease of PC audio integration - USB Audio
  - AM1 & RAD27 audio sound cards - no drivers
- Rane architecture: HAL stores everything
  - Easy replacement/inventory, backup, swap...
  - System indicators for unsophisticated debug
    - Most DSPs lack such a simple feature

Final Unique Points

- **Do large complex jobs fast with fewer wires, presets and intuitive control linking**
- **Converters at the wall (RADs)**
- **Paging system eases pager-to-zone map**
- **Verify control linking behaviors offline**
- **Auto-verify CAT5 & audio signal integrity**
- **Auto firmware: plug it in, it works**
- **Gain-share mix between wall mic jacks, portable mics and rack-connected mics**

Thank you

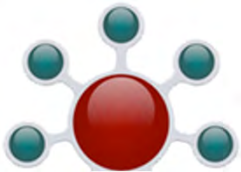
Since 1981, engineered, designed, built, tested & supported in Mukilteo, Washington, USA

www.rane.com/hal/new.html

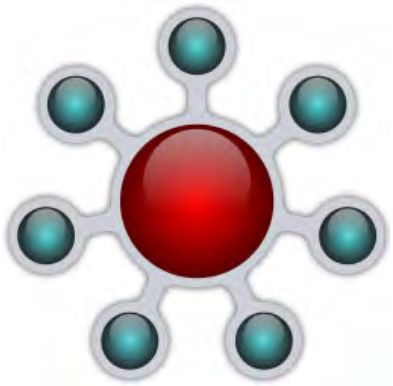
425 355-6000

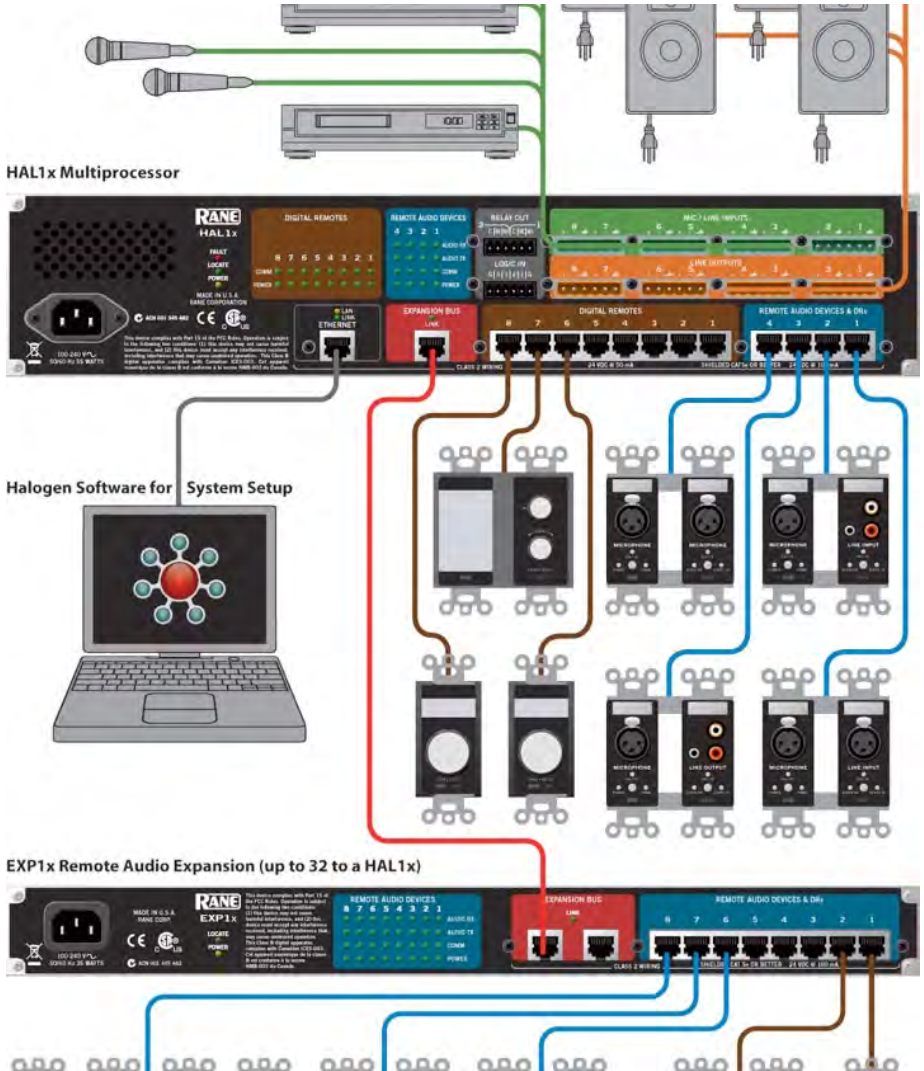
Pacific time zone: Monday - Friday 8 am to 5 pm

Still privately owned by the gal who started Rane in her garage



Thank You!




HAL1x Multiprocessor
Halogen Software for System Setup
EXP1x Remote Audio Expansion (up to 32 to a HAL1x)