E-SQUARE
AUDIO-OVER-IP

Audio Networking—Simply Evolved
Creating a network to link audio and control of many different sources in many different locations — studios, control rooms, production suites, newsrooms, TOC, automation, streaming, STL penthouse — is a daunting task. Doing it on a budget is even tougher. Prior to E-SQUARE, doing it without a graduate degree in IT was pretty much impossible.

E-SQUARE is THE rock-solid, ultra-fast solution for bringing your traditional broadcast engineering functions into an IT-based network. Setup is easy, intuitive, and takes only a few minutes until you’re on the air.

The front panel setup wizard in each SQUARE gets you up and running in moments. Extensive front panel metering and status indicators provide quick confirmation that all is well.

Wheatstone’s E2 NAVIGATOR Administration and Control Software and web interface let you further customize and control your system, locally or remotely.

Each SQUARE carries a complete map of the entire connected network in its onboard CPU flash RAM — this allows SQUAREs to be quickly and easily replaced in a network. Assign an ID # to a SQUARE and connect it to the network — it will query the other connected SQUAREs and import all the necessary configuration settings. No external PC required!

**FEATURES**

- E-SQUARE is comprised of four hardware SQUAREs — three handle I/O in various configurations and one is a digital mix engine
- All SQUAREs are linkable units that communicate with each other via a single CAT 5E/6 over Gigabit/1000BASE-T protocol using standard layer 2 or 3 Ethernet switches
- All SQUAREs are designed to interface seamlessly with Wheatstone’s existing Evolution series Console Control Surfaces, the Wheatstone GLASS-E Virtual Console, Wheatstone console control panels, most of the popular automation systems, and streaming audio
- With Wheatstone’s WHEAT-IP driver installed in your automation system computers, you can eliminate the expensive sound card and tons of wiring with a single CAT 5E/6 cable to your E-SQUARE network for two-way audio, console control, and routing
- Start with a single SQUARE as a 16x16 router, add a studio control surface with two or three SQUAREs and a Gigabit Ethernet switch, then expand your E-SQUARE network to thousands of channels
The 1U SQUARE is a stand-alone 16x16 router, a 16x16 audio I/O plus logic access point on an E-SQUARE network, or a mix engine for a Wheatstone console control surface.

**AUDIO-OVER-IP**

**E² NAVIGATOR**  
**ADMINISTRATION AND CONTROL SOFTWARE**

E² Navigator is optional software that is installed on a PC running Windows® XP. It can be connected directly on the E-SQUARE network or remotely over VPN.

While much of the basic configuration of E-SQUARE can be done easily from a SQUARE’s front panel, E² NAVIGATOR offers a more convenient way to do comprehensive system configuration, to enter source and destination names, perform other system setup functions, program salvos and macros, and control audio paths (crosspoints). You can also control and monitor real-time levels.

When connected, E² NAVIGATOR continuously queries the network so that it’s always showing the current configuration and status. You can even run up to four copies of E² NAVIGATOR at the same time to monitor and control the system from multiple locations simultaneously.

Every hardware SQUARE also includes a built-in web server, so you can use a standard web browser to perform many of the functions of E² NAVIGATOR.
Hardware SQUAREs

**FEATURES**

- Two 8x2 stereo virtual Utility Mixers that can be used for a wide range of applications; for example, using Wheatstone’s ACI Automation Control Interface, your automation system can control the mix for satellite or local insertion switching.
- Built-in web server, so you can configure and control locally or remotely without having to run dedicated software.
- 16 front panel bar graph meters switchable to display source input level or destination output level after gain trim.
- Front panel routing control — any system source to any destination on that SQUARE.
- Front panel headphone jack with source select and level control — monitor any system source.
- Silent — no fans — can safely be located in a studio with live mics.
- Flexible GPI logic — 12 universal logic ports, programmable as inputs or outputs, routable throughout the entire system.
- SNMP messaging for alerts.
- Silence detection on each output that can trigger alarms or make a routing change.
- DB25 and StudioHub®-compatible RJ45 interconnect.

**88e DIGITAL ENGINE**

Every nerve center needs a brain. The 88e is it, handling all of the mixes from Wheatstone Evolution series Console Control Surfaces and the Wheatstone GLASS-E Virtual Console.

The 88e SQUARE houses all DSP power for an individual control surface and distributes the four stereo PGM, four stereo AUX SEND, per-channel MIX-MINUS, monitor outputs and other bus signals to the network. Once on the network, they are available as sources and destinations anywhere. This creates an extremely flexible system, where program outputs from one surface can be a source on any other surface; for example a news mixer’s program bus as a source on the air studio surface. While the 88e doesn’t house audio I/O, it does include 12 universal logic (GPIO) ports.

**Software SQUARE**

**WHEAT-IP PC SQUARE**

Software that installs on any Windows® 2000 or XP computer to interface eight stereo channels of audio in each direction plus control. WHEAT-IP connects to the E-SQUARE network with a standard NIC card and a single CAT5E/6 cable.

Install WHEAT-IP on automation PCs to allow them to play audio to the entire E-SQUARE network without using a sound card, and control console functions such as channel on/off without the need for separate control wiring. There is a huge savings in hardware cost (no need for an expensive sound card!) and wiring time and complexity.

There are many more uses for WHEAT-IP: Install it on news reporters computers to allow them to record and edit any audio in the system. Install it on program directors and managers computers to allow them to listen to system sources directly on their computer, limiting their selection list to only those sources you authorize.
Hardware I/O SQUARES

88a — 88d — 88ad

AUDIO and LOGIC INPUT/OUTPUT SQUAREs

The I/O SQUAREs are access points on the E-SQUARE network, converting each hardware physical input — audio or logic — to a data stream on the network, and converting data streams to hardware physical outputs.

Each 88 I/O SQUARE provides connectivity for 16 input channels, 16 output channels, and 12 universal logic (GPIO) ports that are programmable as inputs or outputs, routable throughout the system. Greatly reduce wiring time and complexity by installing a SQUARE in each equipment rack, in each studio, and in the control room furniture.

88a ANALOG I/O SQUARE

16 analog input channels and 16 analog output channels (8 stereo, 16 mono, or any combination totaling 16 channels); 12 universal logic (GPIO) ports

88d AES DIGITAL I/O SQUARE

8 AES two-channel inputs and 8 AES two-channel outputs; 12 universal logic (GPIO) ports; the AES channels can be routed in the network as stereo or two independent mono channels (for example, a two-channel digital phone hybrid or mic preamp)

88ad ANALOG and AES DIGITAL I/O SQUARE

Half analog/half digital — 8 analog input channels/8 analog output channels and 4 AES inputs/4 AES outputs; 12 universal logic (GPIO) ports
STAND-ALONE ROUTER
SINGLE SQUARE, 16x16 CHANNELS
Ideal as a TOC general-purpose router
Audio I/O can be all analog (88a), all digital (88d), or half analog, half digital (88ad)

- 8 stereo inputs or 16 mono inputs or any combination totaling 16 channels
- Headphone output to monitor any system source
- PC for programming not required for operation
- 8 stereo outputs or 16 mono outputs or any combination totaling 16 channels
- 12 Logic (GPIO) ports programmable as input (opto) or output (relay)
- Two 8x2 stereo Utility Mixers
- Silence Detect on each output can change audio routing and trigger a logic out

SMALL FACILITY
ONE or TWO STUDIOS and TOC
One Ethernet Switch—up to 24 Ethernet Ports
One 88e Mix Engine per console, 88a/88d/88ad I/O SQUAREs as needed

- Automation Servers equipped with WHEAT-IP Audio and Control over IP
- 24 Port Gigabit Ethernet Switch
- TOC Equipment
- Control Panels

DIGITAL SNAKE
BI-DIRECTIONAL 16 AUDIO CHANNELS
Source channels 1-16 of SQUARE A appear as destination channels 1-16 on SQUARE B
Source channels 1-16 of SQUARE B appear as destination channels 1-16 on SQUARE A
Audio I/O can be all analog (88a), all digital (88d), or half analog, half digital (88ad)

- 8 stereo inputs or 16 mono inputs or any combination totaling 16 channels
- 8 stereo outputs or 16 mono outputs or any combination totaling 16 channels
- Headphone output to monitor any system source
- CAT5e/6 or fiber using Ethernet-to-fiber transceivers
- 6 Logic (GPIO/opto) inputs, 6 Logic (GPIO/relay) outputs
- 6 Logic (GPIO/opto) inputs, 6 Logic (GPIO/relay) outputs
LARGE SYSTEM
MAJOR MULTI-STATION FACILITY or NETWORK
Each studio complex equipped with a dedicated Gigabit Edge Switch, permitting it to stand alone
Central Ethernet Switch to network all studio complexes and TOC

TOC Audio Equipment Racks
Equipment connects to SQUARES™ in each rack.
SQUARES™ connect to one or more Gigabit Edge Switches

Gigabit Central Ethernet Switch
Backup PGM A from each studio complex
(AES or analog)

to Main/Primary Studio-to-Transmitter Links (AES or analog)

to Backup/Secondary Studio-to-Transmitter Links (AES or analog)

Air Chain Distribution Rack
Backup PGM A from each studio complex offers a redundant path of on-air audio to the STL in the event of failure of the Central Switch

PC for programming
not required for operation

Automation Audio Servers and other audio PCs
connected via WeaT-IP to one or more Gigabit Edge switches
SPECIFICATIONS FOR E-SQUARE

ANALOG SQUARE I/O

Inputs
Electronic differential, >10KΩ (bridging)
Optimum source impedance <1KΩ
<10Ω, 20Hz-20kHz

Outputs
Optimum load impedance >600Ω
<10Ω, 20Hz-20kHz

Connectors
D-sub-25 Female, requires D-sub-25 male cable
end connectors
RJ45, requires straight-wired RJ45 plugs

Frequency response
±0.5dB, 20Hz-20kHz, ref +4dBu

THD+n
0.02%, 20Hz-20kHz, ref +4dBu

Noise
-85dBu

Gain range
±18dB, inputs and outputs

Maximum input
+24dBu

Maximum output
+24dBu

A/D converter
ADC enhanced dual bit

D/A converter
DAC 24bit Advanced ΣΔ

DIGITAL SQUARE I/O

Inputs
Balanced 110Ω AES-3, S/PDIF compatible

Outputs
Balanced 110Ω AES-3 only

Connectors
D-sub-25 Female, requires D-sub-25 male cable
end connectors
RJ45, requires straight-wired RJ45 plugs

Frequency response
Flat, 20Hz-20kHz, ref -20dBFS, +4dBu

THD+n
0.0009%, 20Hz-20kHz, ref -20dBFS, +4dBu

Noise
-141dBFS, ref max level out

Gain range
±18dB, inputs and outputs

Maximum input
0dBFS

Maximum output
0dBFS

Sample rate converters
32-96kHz, 16-24bit, on all inputs

AES channel status
Standard implementation

LOGIC I/O

Connector
RJ45

Voltage
+5VDC to GND

Current
+5VDC and GND provided

ETHERNET

Connectors
RJ45

Cable
CAT-5e or CAT-6

Audio transport
Gigabit Ethernet

Utility interface
100BASE-TX for future use

SYSTEM

Sample rate
44.1 or 48kHz, user selectable in software

Sync
Internal or external

Reference level
0dBFS=+4dBu (+4dBu=1.23VRMS)

Latency
0.5mS, SQUARE to switch to SQUARE

PHYSICAL

Dimensions
1RU
19"/48.3cm wide, 1-3/4"/4.5cm high 13-1/4"/33.7cm deep
15-1/4"/38.7cm deep with connectors

Shipping weight
14lbs/6.4kg
88a: 40VA, 30W
88d: 23VA, 12W
88ad: 39VA, 19W
88e: 18VA, 10W

Specifications and features subject to change without notice.