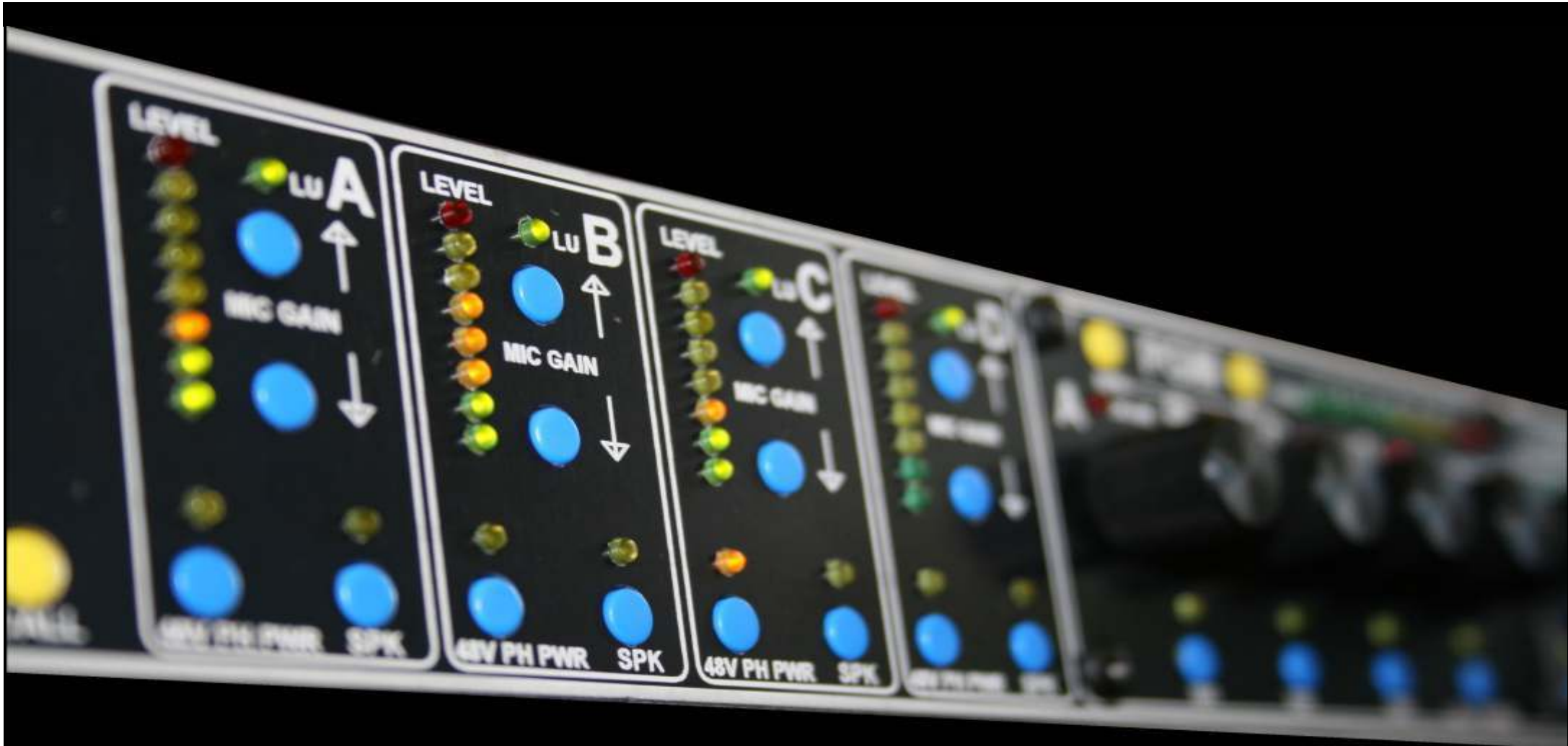




# GDC-6432

## Glen sound Digital Commentary

issue 2

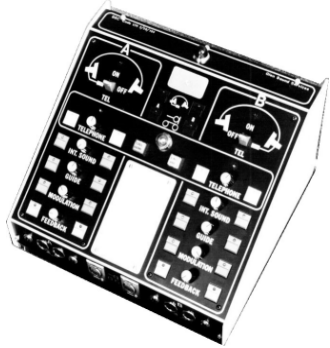


Glen sound Electronics Ltd

# HISTORY

GlenSound Electronics Ltd have been specializing in the design and manufacture of commentary systems since 1977. There are more GlenSound commentators boxes in the whole World than all other manufacturers combined!

The new fully digital system has been designed based on our engineers combined experience of designing commentators equipment. Between them they have over 100 years experience in commentary equipment design. For the last 10 years we have been requested by customers to provide a fully digital solution, however it was only 2 years ago when new high tech chipsets became available that it was possible to begin to design the robust link technology required to make a digital commentary system capable of lasting the next 20 years.



1977  
Multiwire link (still in occasional use today!)



1984  
Coaxial link introduced



1990  
Excellent performance multiwire



1994  
Updated Coaxial Equipment



1998  
Cat5 System



2002  
Coaxial eqpt. for very large events



2004  
Stand alone system



2006  
Single comms box

GDC 6432 GlenSound Digital Commentary



GlenSound Electronics Ltd

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# dCCU to dCU3 DIGITAL LINK TECHNOLOGY

The most important part of any 2 part commentary system is the physical link between the Commentary Control Unit (dCCU) and the Commentators Unit (dCU3).

The technology used in the link has to be robust and versatile enough to meet the demanding requirements of regular outside broadcast use and meet the changing needs of different venues and events.

## Link Solutions

There are 2 ways of connecting the dCCU to the dCU3 and you can choose the one that best suits your requirements for a particular broadcast.

**Coaxial Cable** One option is 75 Ohm coaxial cable.....one single cable provides bi-directional digital audio, data and power between the dCCU and the dCU3.

**Ethernet** is the second option. Using our proprietary protocol a private Ethernet network can be reliably used for interconnection of dCCU and dCU3. Ethernet connections are available as either copper (CAT5) or fiber (multi mode or single mode)



## Digital Link

The all new fully digital link technology provides a reliable interconnection between dCCU and dCU3. This high speed bi-directional digital link carries 8 channels of 48kHz 24 bit digital audio from dCU3 to dCCU while simultaneously carrying 8 channels of 48kHz 24 bit digital audio from dCCU to dCU3. The link also carries digital data between both the dCCU and dCU3.

## Powering the dCU3 from the Link

To make the set up of the commentary position as simple as possible the dCU3 is powered via the link when using either coaxial cable or copper Ethernet. Using the coaxial cable the dCU3 is powered directly from the dCCU however when using copper Ethernet the dCU3 is powered by the power over Ethernet standard.

## Cable Distance

Using Coaxial cable the maximum cable distance between dCCU and dCU3 is 400 meters.

The great thing with having a fiber option is that it means that however far away the dCCU is from the dCU3 you will still have a working commentary position.

Copper Ethernet running at 100 BASE-T only provides connection distances of a 100 meters, however equipment can of course be joined together using Ethernet switches with gigabit fiber thus extending the range.

## Multiple dCCU & dCU3

The Ethernet connectivity enables multiple dCU3 and dCCU to be connected together at larger events using just two fiber cables saving on cable costs and installation time.

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# dCCU to dCU3 DIGITAL LINK TECHNOLOGY

## Our Ethernet Link

The Ethernet link is provided to give you maximum flexibility for interconnectivity. The dCCU and dCU3 can be connected directly together by fiber or copper without a switch. Alternatively our proprietary protocol is designed to run on a private network controlled by industry standard managed switches. The managed switch needs to be capable of setting up Virtual Local Area Networks (VLAN).

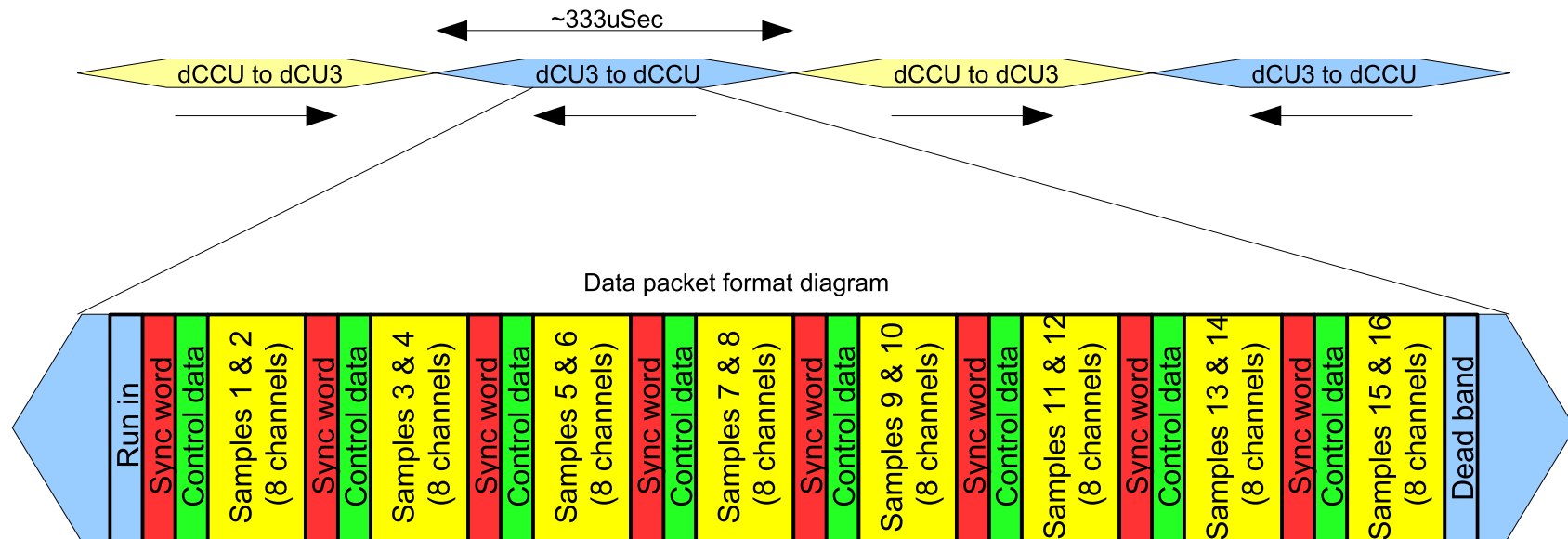
The physical connectivity to the network is either copper on RJ45 or Fiber. One or the other of these are fitted in our factory during manufacture. 'SFP' modules are used for the fiber connection thus allowing multi mode or single mode fibers to be easily interchanged.

*Note: When using a fiber connection the dCU3 must be powered locally.*

## VLAN

VLANs are simple to set up and are used to overcome the addressing problems that networks cause outside broadcast engineers. Basically a VLAN sets up a data route between a port on one switch and a port on another. This means that when you set up a system you know which dCCU is connected to which dCU3 just by the port number on the switch!....this is so much easier than setting up individual addresses on individual pieces of equipment and keeping track of them.

## GDC 6432 - dCCU to dCU3 Line Data Overview



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# dCU3 COMMENTATORS UNIT

To create as perfect a system as possible microphone and analogue inputs are converted using studio grade 24 bit A to D converters with a dynamic range in excess of 105dB.

Commentary units need to be both simple to use and highly flexible. The GDC-6432 dCU3 achieves this in two ways. Firstly continuing with the traditional look of rows of headphone volume control pots for each commentator, a large mic on air switch and smaller different colored talk back

keys provides a human interface that commentators will immediately recognize and feel happy using. Secondly the completely digital architecture of the system allows for complete customization of the facilities provided by the human interface to match the way that you want to work.

## Commentators' facilities

Each dCU3 is set out for 3 commentators and a line level input for pre-recorded material.

Each commentator has their own stereo headphone amplifier with 8 separate level controls, these level controls adjust the volume of a source in the commentators ears, during initial set up each source can be assigned from a mix of 64 inputs (this is normally

a 1 off initial factory setup but software can be provided to allow customers to customize their own systems). Commentators can route each source to left / right or both ears of their headphones to allow split ear working. Each of the 3 commentators mic inputs and the line level input can be routed to on air or to 4 different talk back circuits.

## Powering

A really useful feature is the fact that no local power is required for the dCU3 when connected by coaxial cable or copper Ethernet as it is powered remotely from the dCCU or power over Ethernet switch.



## Additional audio circuits

For complete flexibility and to help with interconnection to other equipment the dCU3 also provides bi-directional audio links for both line level analogue and AES3 digital audio.

There is an AES3 output along with a stereo analogue output (suitable for connection to both domestic & professional kit). Both the analogue and digital outputs are derived from the same source which can be a mix of any

of the available 64 audio sources within the dCCU.

Additionally there is an AES3 digital input & a stereo analogue input (both domestic & professional levels), these 2 circuits are separate and are both sent to the dCCU where they become 4 sources of the dCCUs internal 64 channel mixer.

GDC-6432 Glensound Digital Commentary



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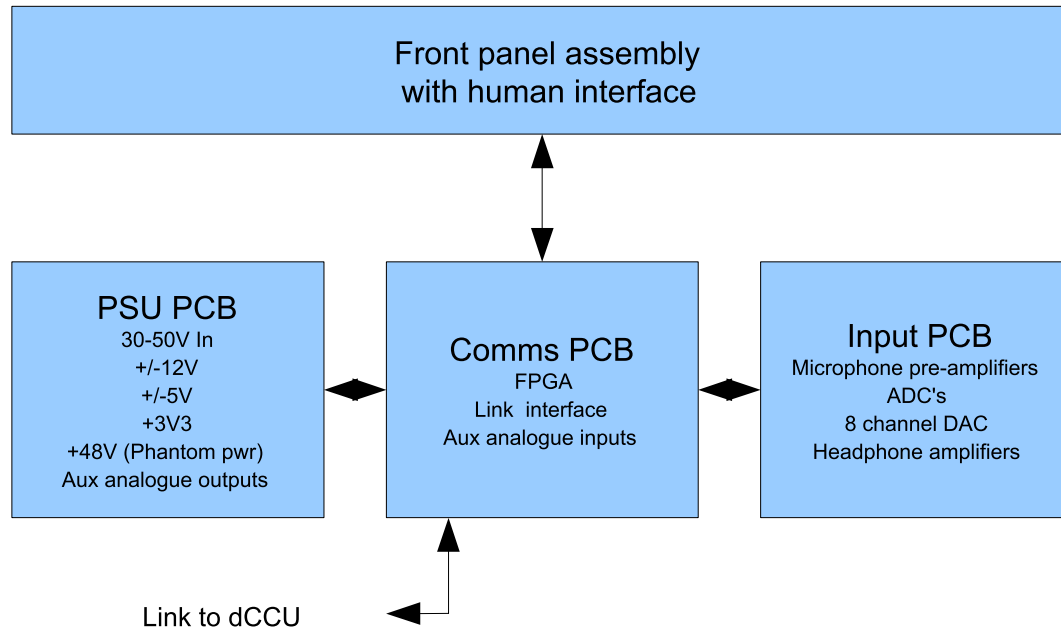
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# dCU3 COMMENTATORS UNIT

## GDC-6432 dCU3 Hardware Overview



Based on Glensound's extensive experience of commentary equipment robust, reliable and versatile digital electronics have been developed to form the heart of the dCU3.

### Internally

At the heart of the dCU3 lies the ultra reliable Altera cyclone III FPGA with nearly 10,000 gates. This device seamlessly handles the digital audio both from the audio inputs and to the outputs while simultaneously communicating with Atmel microprocessors providing detailed

information of pot and switch positions.

The ultra modern highly efficient power supply converts the power supplied by the dCCU to the numerous voltage rails required to power both the digital and analogue circuits within the dCU3.

### Fundamental basic features

For modern commentary positions a dCU3 must be able to provide several basic but often overlooked functions. It must be able to produce high level headphone outputs into high

impedance headphones (otherwise the commentators cannot hear in noisy environments). It must provide 48 volt phantom power for the power hungry microphones used today and the user interface, talk back buttons, headphone mixes and on air switches must be capable of being set to operate to match how you and your commentators want to work.



The fully digital architecture of dCU3 allows a previously unimaginable audio quality from a 2 part commentary system.

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# dCCU COMMENTATORS CONTROL UNIT

Easy and instinctive to operate the dCCU provides all the facilities that an engineer needs to produce a high quality fully digital program.

## The dCCUs job

The purpose of the dCCU is to provide an interface for the audio circuits from and to the dCU3. Naturally these audio interfaces are high quality 24 bit digital AES3 (48kHz sampling). Each dCU3 requires one dCCU to control it and it provide its' external audio connectivity. The incoming and outgoing audio

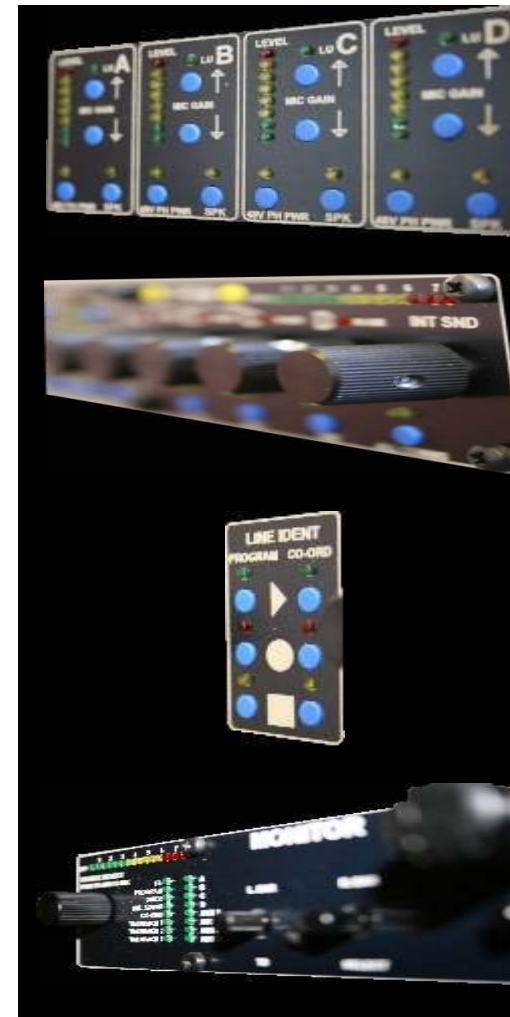
circuits can all be monitored, front end gains set, program mixes adjusted, talk back initiated, idents recorded and played in fact all the requirements of an engineer to produce a program are met by the facilities provided on the dCCUs front panel.

## Remote or front panel controls

Where do you want to control the system from? The versatility of the dCCU means that as well as providing a logical and easy to use to front panel interface for system control an Ethernet interface can serve up java web pages which allow full control of the system just by pointing your PC's browser at it! Not only can you control the system but you can also monitor audio remotely.

This means that you can easily control the commentary facilities at an event in one Country from your master control room in another Country and if your IP link has enough bandwidth this can even include monitoring audio. Never before has commentary equipment been so sophisticated and so easy to use.

The front panel is divided into 4 sections



The gains section allows for adjustment of the input gains on the dCU3. It also provides a permanent visual indication of the inputs audio level. Phantom power on / off switching and speak to the commentator switch are located below each ppm for ease of use.

The mixer section houses a 5 channel mixer for producing program output. Digital shaft encoders are used and allow soloing of channels to the PPM which also provides intelligent indication of the shaft encoders position.

A 2 channel internal fully digital line identification unit is provided. Simple easy to use controls allow idents to be recorded, played & stopped.

The monitoring section provides an intuitive human interface for setting up monitoring mixes and temporarily monitoring individual sources.



# dCCU COMMENTATORS CONTROL UNIT

At the heart of the dCCU lies a sophisticated 64 input digital mixer with 32 outputs.

This provides 100% flexibility for setting up the system to match your operating style.

Any audio source can be mixed with any other or others to produce an output, which in turn can be used as a source.

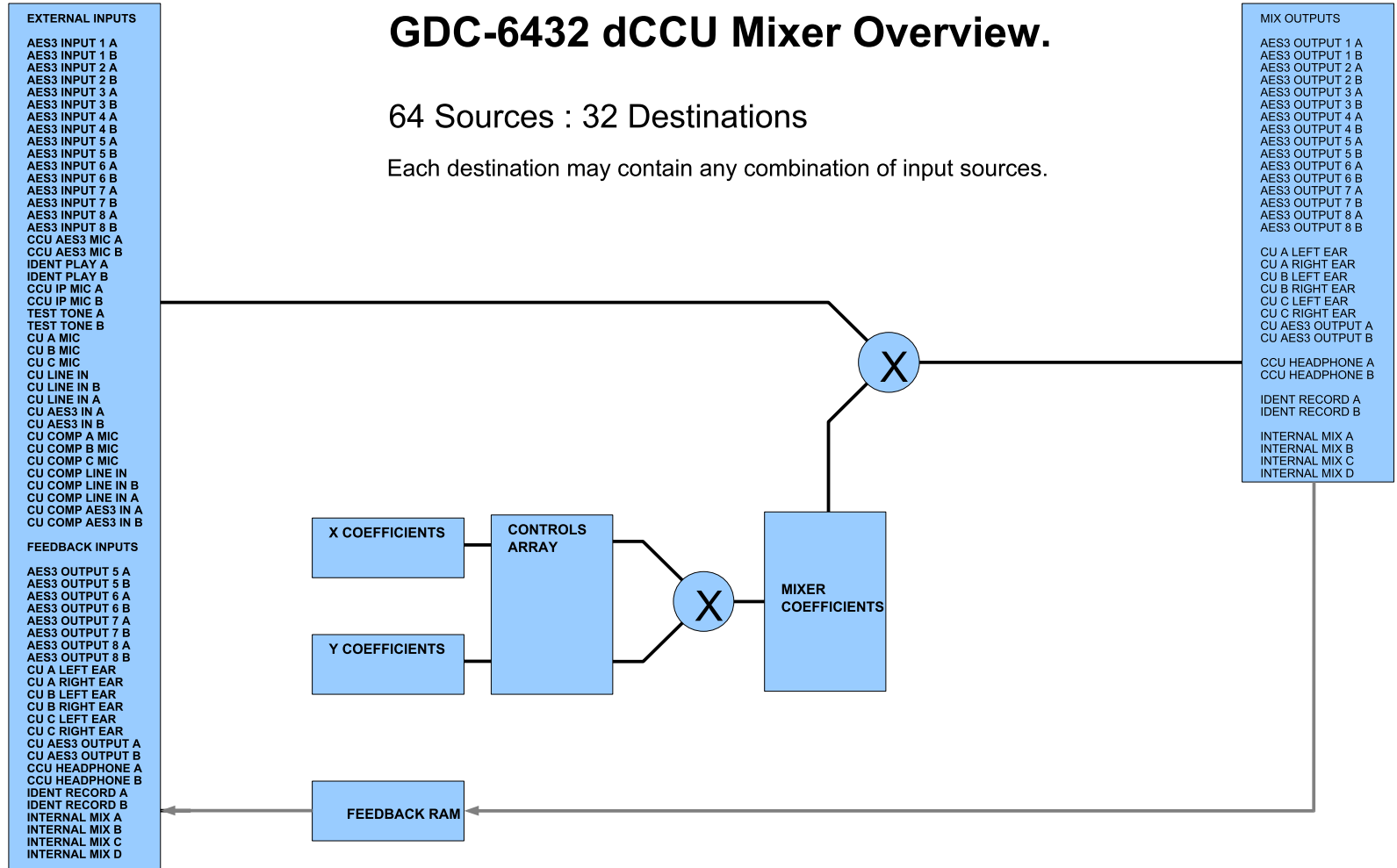
This means that the digital infrastructure can handle any conceivable scenario.

The mixer configuration is an initial setup either done at our factory or by your engineer prior to an event.

## GDC-6432 dCCU Mixer Overview.

64 Sources : 32 Destinations

Each destination may contain any combination of input sources.



### Digital or analogue audio inputs & outputs

There are 16 audio input and 16 audio output circuits to/ from the dCCU. These can be provided as either digital (48k AES3) or analogue. Being a fully digital system we would recommend the digital solution but high performance analogue to digital and digital analogue converters are used to provide the best possible quality from the analogue circuits.

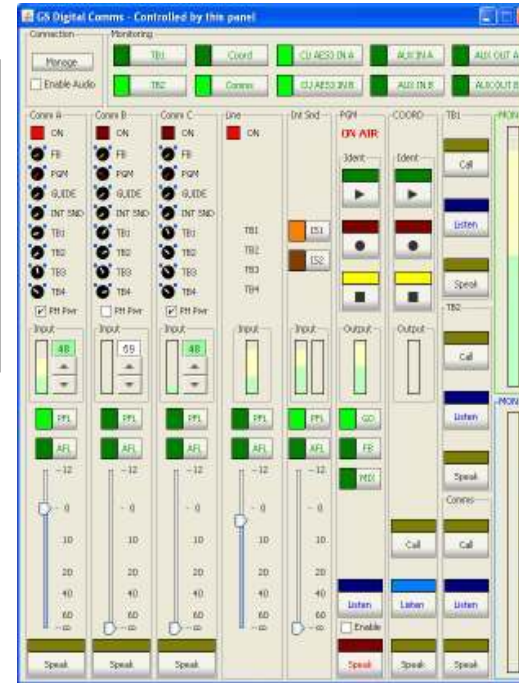
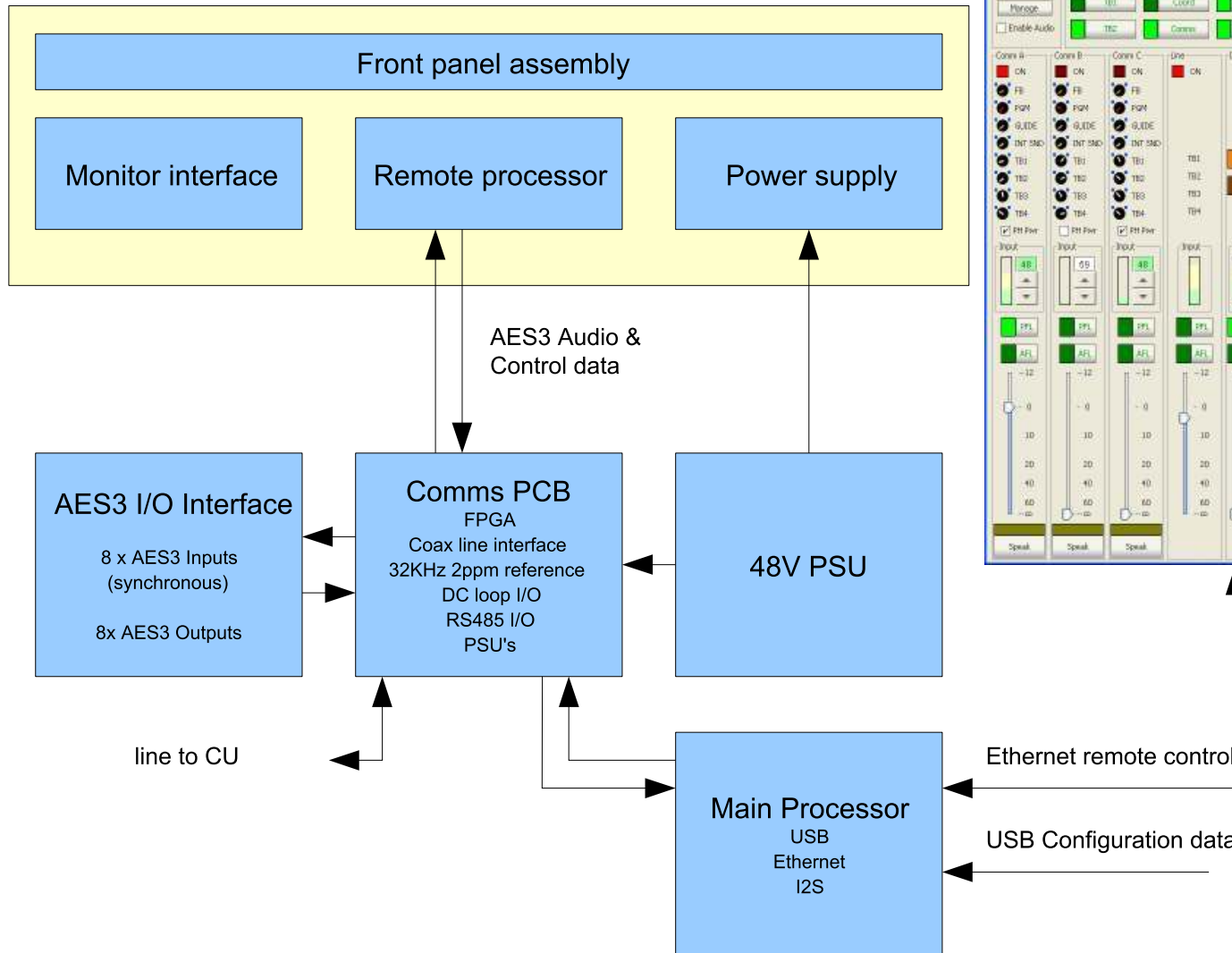






# dCCU COMMENTATORS CONTROL UNIT

## GDC-6432 dCCU HARDWARE OVERVIEW



### Versatility & quality

Central to the internal completely digital infrastructure of the dCCU is a high capacity ultra reliable Altera cyclone III FPGA. This provides a fully flexible core that interfaces efficiently with the other high tech components to make a reliable system.

Internally the front panel user interface can be considered separate from the other core electronics. Importantly the front panel connects internally to the FPGA by just an AES3 audio link. This means that future versions of the dCCU will be available where the front panel user interface can be remotely connected via an AES3 link and positioned in a location that suits a customers individual setup.

A USB interface is provided for loading and configuring initial setup structures and software to allow the system to be tailored to your exact requirements.





# dCCU IP INTERFACE

The dCCU IP interface allows full operational control of the system by simply pointing your pc's browser at the IP address of the dCCU.

Java web pages are served up by the dCCU that provide graphical representations of the human interfaces of both the dCU3 and dCCU.

Using your browser and mouse it is then possible to control all the functions on the dCCU and most of the functions on the dCU3.

## Monitoring & Talkback

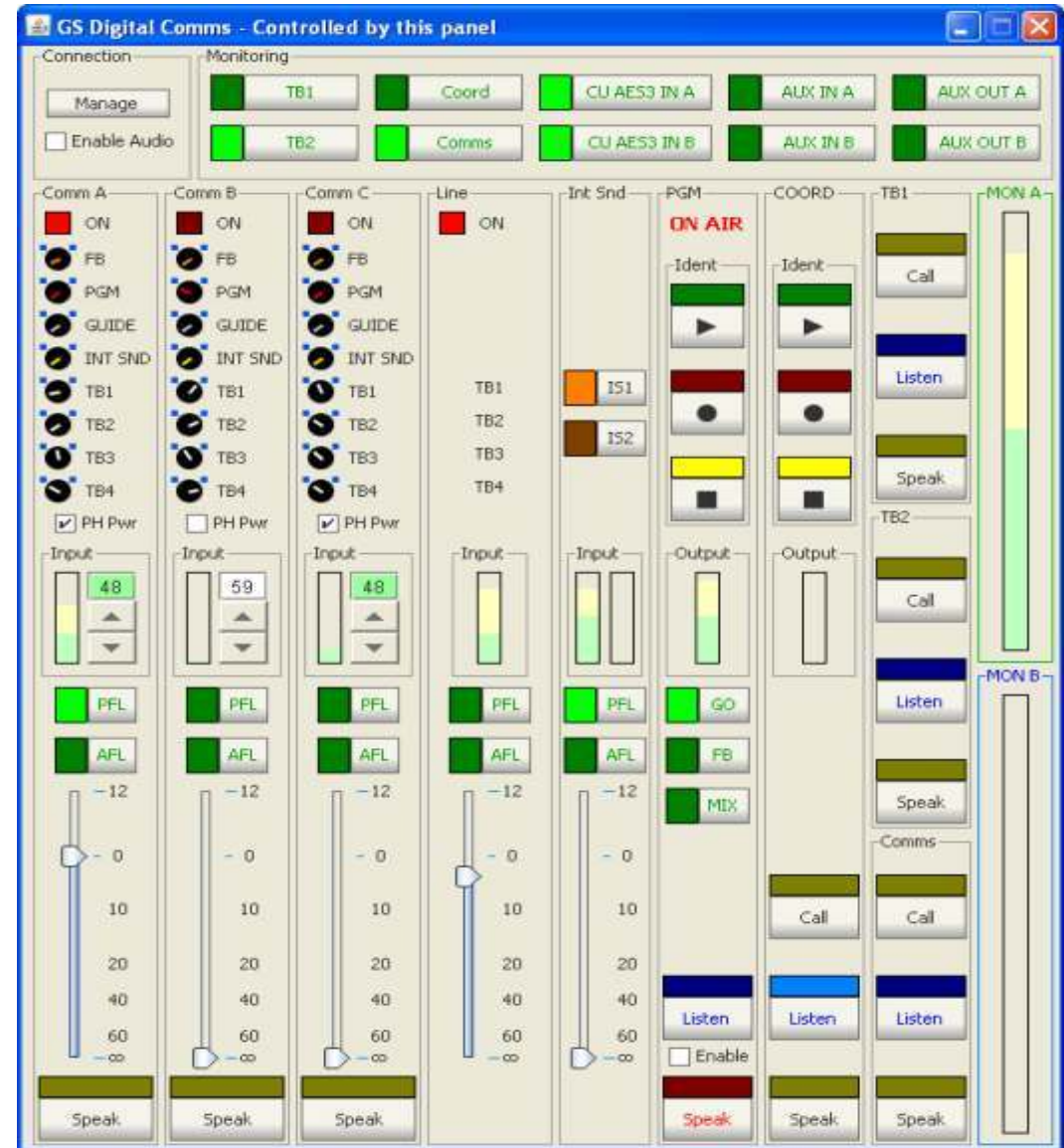
For any dCCU operator it is vital to be able to listen to the audio circuits and talkback to the commentators and off air talkback circuits. Our Java enabled control interface allows this. Audio is streamed over the IP network bi directionally between the dCCU and your PC. This is not compressed audio so the network connection must be of suitable bandwidth.

## Multiple systems

For remote control of multiple commentary systems simply open a new tab in your browser and point it at the IP address of the next dCCU that you want to control, keep doing this

until you have connected to as many dCCUs as you want. If you are monitoring audio across the IP link then windows allows you to hear audio from all tabs at the same time.

For a high specification high tech system it is incredibly intuitive and easy to use.





# SYSTEM CONFIGURATION BY USB

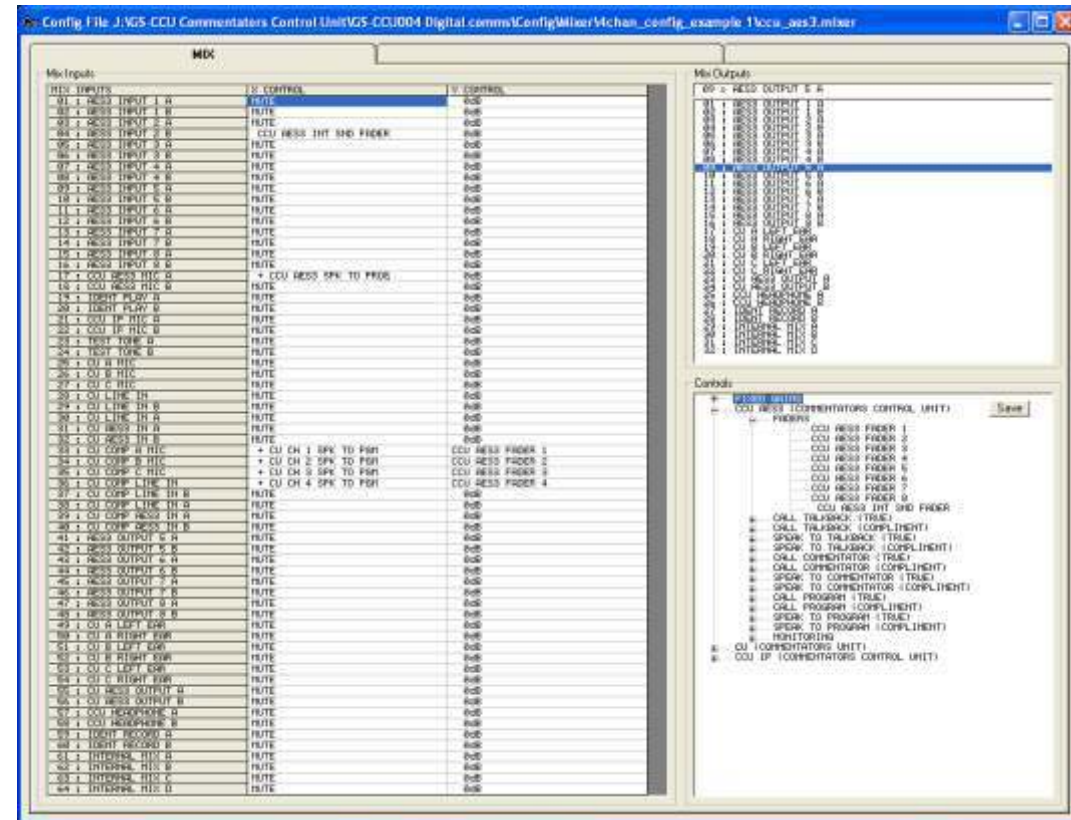
To allow initial system setup 2 easy to use programs are supplied for setting up switch operation and the mixers parameters.



The operation of all dCU3 switches both on air 'PGM' and talk back can be set separately for all 3 commentators and the line level dCU3 input.

Switches can be set to operate in any conceivable fashion, so you can decide how your system will work.

Once a configuration has been set it can easily be uploaded to the dCCU via the USB interface.



To make full use of the ability of the system to tailor individual mixes and internally route audio from any point to any other and to allow a setup configuration to match the way that you want to work a mixer configuration program is provided. A factory default

setting will provide standard commentary facilities, however the ability to program the mixer yourselves for a fully customized commentary setup makes the system infinitely powerful.







# REFERENCE IMAGES



*dCU/3 - Top Panel*



*dCU/3 - Rear Panel*



*dCCU - Front Panel*



*dCCU (AES Version) - Rear Panel*

