AEQ REFERENCES SPORTS AND LARGE BROADCAST EVENTS

AEQ

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At the following major events, we have undertaken the supply and/or the Installation, engineering and operation of equipment for Transmission, Venue inter- connection or - communication purposes, Unilateral Commentary Signals, Commentary Positions, Audio Distribution and Commentary Switching Facilities;

Last updated: September 2018

2018 European Championships, Glasgow and Berlin, Europe.

The EUROPEAN CHAMPIONSHIPS 2018 took place during the first 10 days of August 2018. It is the first issue of these championships. Around 4500 athletes from 52 different countries have participated and competed for one of the 187 gold medals at stake.

This first edition of the European Championships was co-hosted between Glasgow and Berlin, with another two venues at other locations: Edinburgh for open water swimming competitions and Gleneagles for golf competitions.

AEQ has provided nearly 80 OLYMPIA3 commentary positions, to be installed at the 16 different venues, including Berlin Olympic Stadium as the headquarters of the athletics competitions.


The entire AEQ OLYMPIA 3 system works over IP networks using DANTE – AES 67 protocol for the transmission of multichannel audio, what makes dynamic signal routing much easier. The system was supported totally by remote control from one or several distributed PCs.

The OLYMPIA 3 is the latest standalone Commentary Unit (CU) released by AEQ. The CU offers connectivity by AoIP with 8 channels via Dante^{TM} protocol a scalable architecture: simple routing to Dante^{TM} IP devices; integrated in IP intercom system, or connected to IP Commentary System Matrix.

In addition, AEQ also supplied 14 units of the AEQ NETBOX 4. These interfaces have been used in locations and workplaces as a substitute of the OLYMPIA 3. In these positions it was not required the entire functionality of the CU, but there was a need to insert and extract audio to/from the main DANTE – AES67 IP network.

NETBOX 4 is an IP audio interface which provides high quality microphone inputs and headphone outputs. As an IP device, it may be placed anywhere across the Dante protocol based IP network. The NETBOX 4 range also provides the same inputs and outputs in balanced analog line format, as well as 4 general-purpose inputs and outputs (GPIO) which can be used as signaling interfaces to be transported between different devices in the IP network.
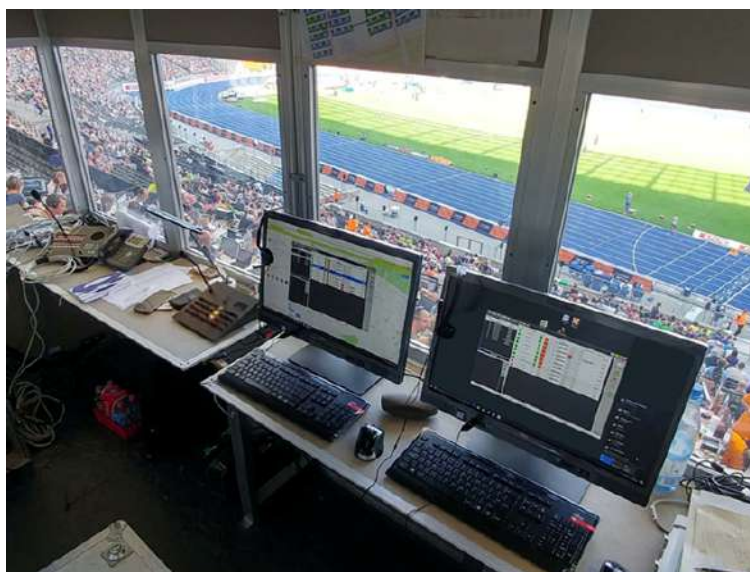
30 VENUS 3 audiocodecs have also been provided for external communications, allowing for the connection of the audio produced in the OLYMPIA 3 Cus, with the remote destinations at the home countries of each radio & TV producer's participating in the event. AEQ VENUS 3 offers a great advantage, as it features integrated Dante connectivity, so in most cases the audio signal path can be 100% IP-based from the place it is generated to the destination it is distributed to, without any intermediate conversions.

VENUS 3 is a dual, full-duplex stereo IP audiocodec with local analog, digital and AoIP Dante ^{TM} connectivity. It is remotely controlled by means of a multi-user and multi-device software application. It provides "carrier-grade" features such as redundant power supplies -optionally accepting 48V DC-, dual LAN port and dual RS232 auxiliary data link. It also offers OPUS coding algorithms, GPIO and complies with the EBU N/ACIP standard.

For internal communications, AEQ has provided the event's Host Broadcaster with a complete CROSSNET intercom system for internal coordination. Of course, just like the commentary units, the NETBOX 4 interfaces and the audiocodecs, this CROSSNET intercom system is IP native and operates with high-quality multichannel audio in DANTE - AES67 format.

CrossNET is a high-performance intercom matrix with IP connectivity, transporting broadcast quality audio. It also features high quality, balanced analog inputs and outputs able to transmit compressed, telephonic bandwidth audio. It can be scaled from 40 to 168 ports.

Being a world-class sports event, the largest broadcasters in the world have been present there

2018 Olympics Winter Games, PyeongChang, South Korea.

PyeongChang 2018, was an international winter multi-sport event that was held between 9 and 25 February 2018. The Games featured 102 events over fifteen disciplines in seven sports and with 2,914 athletes from 92 countries, including the debuts of Ecuador, Eritrea, Kosovo, Malaysia, Nigeria and Singapore.

15 sport disciplines took place in a total of 13 event venues, which were divided into two clusters: PyeongChang Alpensia Cluster and Gangneung Coastal Cluster.

The Host Broadcasting Organisation deployed the AEQ Commentary System for the third time at a Winter Game and it consisted in 502 Commentary Positions and a large number of BC 2000D Frames for the Commentary Switching Centre at the IBC and the different Venues. The Links that were set up to connect the Venues and the IBC were long distance MADI links over dark fiber. The system is a very complex routing, transport, distribution and control system for the audio signals between the competition venues and the International Broadcasting Center (IBC) in the Alpensia Cluster.

Of the more than 105 international broadcasters transmitted the Pyeongchang Winter Games, and 45 were present in the IBC and provided with Unilateral Commentary Signals via MADI or AES / EBU link.

The magnitude of a system like this is difficult to comprehend. In excess of 100 BC2000D chassis with 268 redundant fiber MADI interconnection links and high-speed links with capacity of 1024 Audio channels were deployed to inter-connect audio distributors and concentrators.

Intercommunication circuits between RHB commentators, Commentary System operators and supervisors at the IBC and Venues are accomplished through the AEQ VoIP card (BC2219) that is integer part of the Commentary System and is installed in frames where so required. The card acts as a communications interface between the SW control system and the PC's audio ports system, including commentary positions. Thus audio communications are maintained within the overall TDM system but in a format that makes it possible to convert a PC or a Laptop intercom terminal.

The complete system was controlled by a "suite" of software and according to the required functions for each different type of operator in charge of delivering the services for example, merely monitoring and quality control to operators at Venues who need to make adjustments and assist the talents that provides the signature commentary for their unilateral audio coverage of the competition. The system offered a full range of audio signal processing functions as for example compressor / limiter, expander, noise gates, high pass filters or low gain level processors etc. and that can be applied to each audio input of the system without limiting the total number of system processes, i.e. any signal can be processed in the system.

As mentioned above, this was the third time this system was deployed at an Olympic Winter Game and the fifth counting in the Summer Games.

2018 European Figure skating Championships, Moscow. Russia.

MX1's is a leading global media services provider. Based in Tel Aviv the offer live events/production services, bundled with global distribution services via MX1's global network, optimising satellite, fibre & IP delivery to reach the widest possible audience.Sport Division provides 24/7 customer service in multiple languages, full project & technical management & production expertise. Recently, Mx-1 has provided a contribution to several asian countries with live broadcasting of the International Ice Skating Competition held in Moscow.

The contribution was provided off tube and managed by Avi Bozo, head of Technical Solutions in MX-1 Sport Division.

AEQ's Commentary system was used for audio broadcasting in 5th Asian Indoor Games 2017. Turkmenistan.

Ashgabat (Turkmenistan) held the 5th Asian Indoor Games during September 2017, within the city's new Olympic complex. This area comprises 30 buildings, including the Central Stadium, Aquatics venue, Velodrome, Judo pavilion, Athlete's village and the International radio and television Broadcasting Center (IBC).

During two weeks, more than ten thousands athletes from 17 different Asian and Oceania countries competed for medals in 21 different sports such as tennis, chess, weight lifting, fighting, etc.

The organizing committee selected AEQ digital technology to build the complete commentary audio system during the celebration of these games. The selected platform was AEQ OLYMPIA commentary system, thanks to its ability to cover large sports events (managing up to 5000 independent audio channels), its high reliability -featuring redundant options for each of its components- and its proven solvency in many similar events as demonstrated by AEQ references such as Olympic events, football world and European cups, athletics world championships, etc.

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AEQ Olympia commentary system comprises the commentary positions, together with several micro-headphones connected to each one, the BC2000-D system frames and some software tools.

BC2000-D frames hold different kinds of specialized modules: system controllers, DSP, analog and digital input/output, MADI Multichannel digital links, IP intercom and monitoring and commentary position control cards.

The most important software application is the commentary position controller (Virtual CCU). Sometimes, other tools are used, such as circuit testers and IP intercoms. The system is fully tailored to the customer's requirements.

The complete system included 52 commentary positions, some of them deployed permanently in 10 fixed locations, while others were dynamically distributed among the rest of venues. These commentary positions were connected to 23 BC2000-D frames where the audio signals are concentrated, processed and distributed. Also, 40 AEQ Phoenix audiocodecs were installed to transmit the commentary audio signals from the IBC to each broadcaster's central studio in Ashgabat during the competitions.

The deployed architecture allows for total system integration, permitting either centralized or local control according to each particular need, with no hardware modifications required.

In order to ensure the successful project's completion, AEQ has sent, during the last 3 years, several specialists from Madrid to Ashgabat, leaded by CTO Jose Antonio Martinez, in order to collaborate during the installation, start-up and configuration phases and, finally, during last September, an important human team was also deployed to provide technical service and system operation.

2016 Olympic Games, Rio de Janeiro.

Over 1.100 commentary units of AEQ's Olympia Commentary System were deployed at the Games in Rio de Janeiro. Servicing the majority of the well over 1500 commentary positions that the Host Broadcasting Organisation for the games were offering the Rights-holding broadcasters for their unilateral commentary audio production.

This was the fourth time that the AEQ Olympia commentary system was deployed at an Olympic Games.

Based upon the BC2000D routing systems and with a total routing capability of over 5000 x 5000 cross-points, the system contains all the necessary elements for interconnection of all the competition venues and the International Broadcasting Centre through long range MADI links over fiber networks. Control of the Commentary System is both local and centralized at the International Broadcast Centre, where all the signals are converging for Distribution to the RHB's.

Irish public broadcaster RTE provided the coverage for the Rio Olympics and Paralympics. The 16 channels of commentary audio that RTE was producing in Rio through the fully equipped commentary positions from OBS at the different venues were channelled through the 8 AEQ Phoenix VENUS IP AudioCodecs that RTE had acquired for the occasion. Logically, four of the Codecs were located at RTE's installations in Dublin and the other four in the RTE's Rio IBC facilities. The Control Phoenix Management Software application allows RTE to have full control of the Codecs

both in Rio and Dublin and on the same computer, making operations very convenient and easy.

Each AEQ Phoenix VENUS is capable of establishing 4 simultaneous bi-directional mono channels to two different destinations so the 16 channels of commentary audio fitted snugly into the 4 Units at each end.

Claro Sports deployed in Rio to produce its unilateral coverage based off OBS' multilateral production. The signals of the finished product were provided to all the different distribution platforms for 17 countries. Also, Claro Sports undertook to provide the commentary audio channels in Spanish language for OBS' multilateral coverage services; Multi-Channel Distribution Service and Olympic Video Player.

Claro Sports' deployment included an AEQ ARENA / BC2000D audio routing and mixing system for signals originating at the venues where Claro Sports had booked fully equipped commentary positions as well as from 13 of the OBS off-tube cabins in the IBC. These latter were providing OBS' OVP services with Spanish commentary. Claro Sports used a full bandwidth AEQ ConeXia intercom system with DANTETM AoIP multi-channel networking simultaneously and on the same BC2000D matrix platform and that assured a perfect coordination between Claro Sports' talents at the commentary positions of the different venues and technical personnel both in Rio and Mexico. The IBC installations also counted on 10 Intercom user-panels Kroma TP8116 series from AEQ connected through a DANTETM multi-channel AoIP Network. Furhter, the ConeXia Intercom system was equipped with analogue 4-wire interfaces to connect a total of 42 intercom devices such as CCU's, Belt-packs and dedicated IFB's.

Additionally, Claro Sports installed two Off –Tube booths within its premises at the IBC to meet additional demands for commentary without having to make use of bookable positions. Given the flexibility and versatility in combination with its input and output options for almost any situation, the Off-Tube booths were equipped with the portable AudioCodec AEQ Phoenix Alio as a commentary unit.

For control and mixing of the International Sound packages delivered by OBS in MADI format with the Spanish Language Commentary audio, Claro Sports used an AEQ ARENA digital console with 15 motorized faders and capability of up to 9 pages. A multi-

channel DANTETM AoIP network was installed to link the mixing console with the main Audio Matrix and the ConeXia Intercom System, including the TP8116 User Panels installed in Continuity control and the two live TV sets of Claro Sports at the IBC and their studio in the Olympic Park.

Quality control was accomplished with an AEQ CAPITOL IP mixing console connected to the AoIP Network in combination with DANTE^{TM} Virtual soundcard application installed on computers for the discreet monitoring of any signal available on the AoIP multi-channel network.

28 sports
98 Medal events, all live and in HD
34 competition venues
2.800+ hours of live sports, 7.100+ hours of content produced
456 hours of coverage streamed ONC

8.000+ employees to provide television and radio coverage of the Games
1000+ cameras
1.100 commentary positions (including positions partially equipped)
79 Rights Holding Broadcasters + sub-licensees
85.400 square meters of function space in the IBC, 79.000 Broadcast Space

Commentary system used at the IAAF World Championships in Beijing 2015 relied on AoIP multichannel network solutions from AEQ.

The IAAF World Championships, Beijing 2015 took place between 22 and 30 August 2015, was primarily hosted in the Bird's Nest, which was the venue for the 2008 Olympic Games and is the setting for the annual IAAF World Challenge meeting. The IAAF World Championships will become the biggest sporting event on the planet when 2015 ends. 2000 athletes from over 200 nations assembled in Beijing for nine days of competitions that were broadcasted to an accumulated audience of 6 billion worldwide.

AEQ provided all the Commentary Units for the fully booked commentary positions at the IAAF WC 2015 in Beijing. CCTV was acting as the Host Broadcaster (in consortium) and the Championship was held at "the Birds nest" or the National Stadium that was built for the 2008 Olympic Games.

This was actually the second time that the AEQ commentary gear has been at this stadium, but on the occasion of the Olympics in 2008, the setup was in all aspects much more complicated. It was a larger system and much more complex system and the connections between the Commentary Control Unit frames (CCUs) in the Commentary Control Room (CCR), the Broadcast Compound and the International Broadcast Centre (IBC) were of a completely different scale. At that occasion we had to rely on traditional Telecoms infrastructures such as E1 Audio Multiplexer systems (also supplied by AEQ) and similar.

For the IAAF WC 2015 the system was much smaller and also simplified. In the opinion of the writer it was also much more efficient in terms of what is needed in both time and resources to be deployed, thus impacting very positively in the number of man-hours required for planning, Installation, setup, operations and maintenance and eventually dismantling.

The way that the Commentary System was deployed and installed was in essence the same as back in 2008, but the transport of the uni-lateral signals from the CCUs in the CCR to the Commentary Switching Centre in the IBC were significantly simplified. The CCUs in the CCR presented the unilateral commentary signals to the AEQ NetBOX 32 Audio Interfaces and network nodes. These were connected to a standard, managed gigabit switch with fibre links. Two redundant and diverse dark-fiber paths linked the CCR

with the Commentary Switching Centre (CSC) in the combined IBC/Broadcast Compound and where a pairing set of managed switch and NetBox 32's. From here the signals are distributed to the RHBs in Analogue or Digital. AEQ and the Host Broadcaster would have loved to be able to give them a port on a standard Gigabit Network Switch, but there are still a few RHBs that don't have AES67 or Dante[TM] compatible equipment and the HB rate-card did not include this option. Since the system is bi-directional there was obviously a return path from the RHBs IBC facilities to the CCR via the commentary Switching Centre.

In order to control and monitor the system signals, Dante[TM] Controllers and DANTE Virtual Sound cards on computers were used at both locations (CCR and CSC), This allowed for both the control of the signal paths and to monitor the commentary signals Program Go and F'back, Coordination Go and F'back, International Sound, Auxiliar, Guide, etc. Further the International Sound (IS1 for TV and IS2 for Radio) for the commentators was produced in the Compound and was conveyed to the the CCR using the same signal path as the RHB coordination and return signals. All the other required signals that were also common signals for the commentator, such as PA and also two CUE signals were also available through this Dante[TM] Multichannel IP Audio Network.

Part of the international PoP was located in the same area as the CCR. And weather or not the RHBs were using ISDN or IP connectivity or not , all the signals were coming on the same signal path as previously described and were routed to the AEQ Phoenix Stratos IP and ISDN codecs. This part of the system provided for the International connectivity of the Commentary signal and bi-directional program and coordination with the RHB facilities in the IBC and the Commentary positions in the stadium.

The beauty of the system is that it can be built as a very simple "isolated" network, where the system clock is generated by one of the NetBox 32's. The same network was also

used for control and management of for example the commentary control unit frames, the AEQ Phoenix Stratos multi-format AudioCodecs - including signal monitoring. With full control of this network it is very simple to establish the necessary responsibility demarcation points.

For the setting-up, testing and operations, AEQ sent two of its engineers, Luis Hernandez and Javier Muriel to lead and assist the teams of the Host Broadcaster and its main contractor - CSS-Group at the Beijing national stadium. These companies undertook the tasks to provide the services and broadcast signals to the world broadcasting community with great professionalism.

From these lines we would like to express its gratitude to CCTV as the acting host broadcaster and CSS-group for the trust deposited in AEQ.

TECHOLOGY FROM AEQ-KROMA AT THE FIRST EUROPEAN GAMES HELD IN BAKU 2015, AZERBAIJAN

The 2015 European Games were held in Baku, Azerbaijan, between 12 and 28 June 2015. It was the inaugural edition of this multi-sport event for athletes from the European federations of athletics and with similar characteristics to the Games Pan American or Asian Games. These Games drew more than 6,000 athletes from 50 NOCs competing in 20 sports in 253 events held in their 15 respective venues and stadiums. The Spanish delegation finished in an outstanding tenth place ranking in the medal table with 8 gold, 11 silver and 11 bronze medals.

International Sports Broadcasting - ISB – was appointed Host Broadcaster of the games and the producer of the multilateral signals for radio, television and internet and also the coordinator of all the broadcast unilateral services for the event. When appointed Host Broadcaster for the event, ISB selected AEQ and its engineering and consultancy company, Broad Services, as providers of numerous solutions for this major broadcast project.

AEQ contributed both with both audio and video equipment, with for example, digital audio mixing consoles AEQ CAPITOL as part of the commentary audio systems, communications with AEQ Phoenix VENUS and MOBILE deployed in most stadiums and venues. Also to be mentioned, AEQ provided a great quantity of broadcast monitors "KROMA by AEQ" used in the numerous technical operations centers. Further, AEQ provided consultancy, engineering and integration services for the broadcast telecommunications equipment in the technical operation centres at the venues. This equipment was housed in flight-cases designed to be ready for transport and allowing for the deployment and operation within minutes upon arrival at the venues.

The supply was completed with an AEQ DCS-10 Commentary System used for all "off-tube" booths at IBC. The system also rendered commentator service for the host organization for the news channels and direct feeds available during events for, for example, ASBU - Arab Broadcasting Union and English speaking Broadcasters.

For the broadcast telecommunications at the technical operation centers -"TOC's", that is, the equipment necessary for the transport and control of Multi- and Unilateral signals generated at the Venues, ISB trusted AEQ and its affiliate Broad Services with the task of the engineering, integration, installation, cabling and supply of 18 Fly-packs for these functions. Apart from the transmission and reception equipment using dark fiber for the HD Video and Audio signals, all systems were supplied with "KROMA by AEQ" 3G-capable Broadcast monitors in formats ranging between 9 "and 18.5".

AEQ also supplied a system capable of receiving signals from all the venues and distribute the signals both to the different production areas of ISB in the IBC, as well as to the different broadcasters at the IBC.

To optimize space and monitoring needs, the preferred and monitor deployed was the Quad-split QS7018. Apart from the functions of Quad-split, this monitor has a number of functions and measurement instrumentation that facilitates and simplifies an operation of this type.

Included in this equipment for the "TOC's" and necessary for the communications, AEQ supplied ISB with 36 units of AEQ Phoenix VENUS dual channel IP audio codecs to create the circuits for technical coordination between the Venues and production control at the IBC. Another 5 units AEQ Phoenix VENUS were used to transport the program signal generated in mixed zones of the venues. The chapter of communications was completed with the AEQ Phoenix MOBILE, portable IP audio codec, as the commentary unit for each of the Venues fully equipped commentary positions.

The broadcast monitors "KROMA by AEQ" in formats from 9 "to 18.5" were present in all the studios, technical operation centers and production controls at the I Baku 2015 European Games.

Given the magnitude of the event, a technical team was sent to Baku by AEQ and was lead by the engineers Jennifer Suarez and Luis Hernandez, for all phases of installation, commissioning, training, operation supervision and technical assistance during the event.

SOCHI 2014 Winter Olympic Games

As well known AEQ has participated in a significant way at major sporting events, providing equipment and services to the global broadcast community. Again, AEQ played an important role in providing the audio of the commentators in the biggest winter sporting event in Sochi.

With over 80 Rights Holding broadcasters on site to cover winter sports event par excellence, the host broadcaster, Olympic Broadcasting Services, displayed the best of the best in production equipment. This included a total of 532 AEQ Olympia latest generation of commentary positions.

It should be clarified that this commentator system was not only consisting in a number of positions for the journalists, but also a very complex routing, transport, distribution and control system for the audio signals between the 11 competition venues and the Mountain Broadcast Center (MBC) in Krasnaya Polyana and the International Broadcasting Center (IBC) in Sochi. The MBC is deployed and set to provide a more dedicated service to the venues that are in the mountain area as for example the Alpine and Nordic skiing centers.
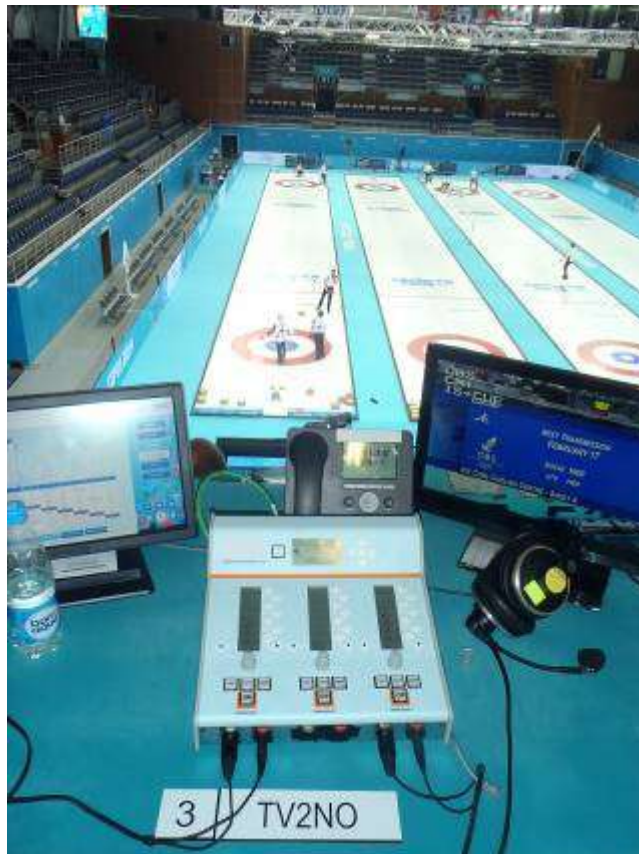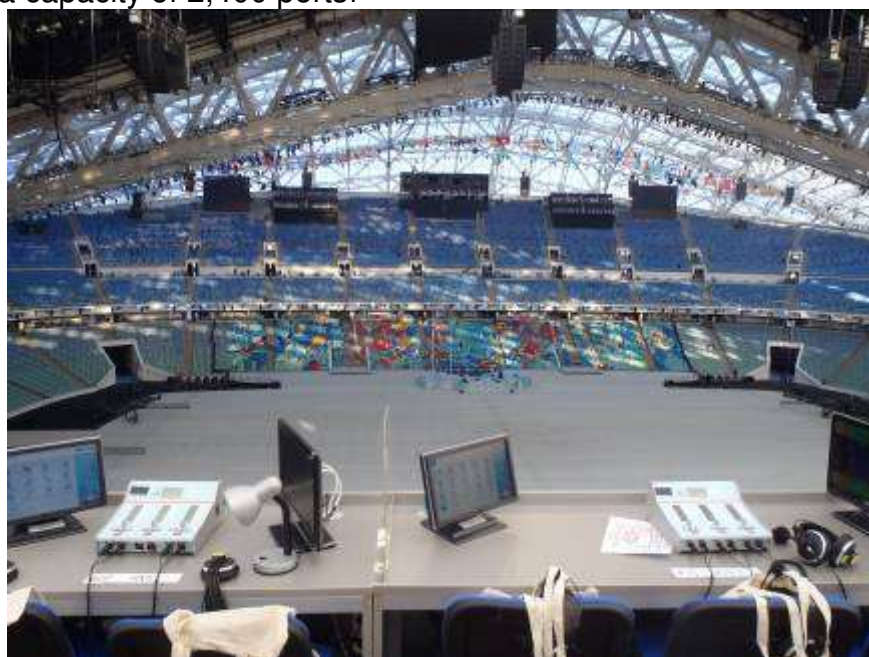

Of the more than 80 international broadcasters deployed in Sochi, about 55 were equipped with an AEQ digital audio panel (DAP) at their facilities in IBC or MBC. The DAP consist in of a chassis BC2000D router and fitted with audio input and output cards to comply with the requested services and audio channels provided by the Host Broadcaster, including those from the

commentary positions at headquarters. Broadcasters without DAP Audio signals received via a MADI or AES / EBU link to their own computers.

The magnitude of such a system is difficult to digest. Over 100 BC2000D chassis with 221 redundant fiber MADI interconnection links and 28 high-speed links with capacity of 1024 Audio channels were deployed to inter-connect audio distributors and concentrators. The whole system has the redundant capacity equivalent to 5000 x 5000 circuits of which were used about 1,600. Only the redundant power supplies used have a combined capacity of about 110,000 W!

Interconnectivity for operators and supervisors of IBC, MBC, the Venues and the commentators, an AEQ VoIP card (BC2219) was installed in the system chassis where required. The card acts as a communications interface between the SW control system and the PC's audio ports system, including commentary positions. Thus audio communications are maintained within the overall TDM system but in a format that makes it possible to convert a PC or a Laptop intercom terminal. About 120 cards with VoIP capacity for 20 bidirectional channels each were used. This alone would amount to an intercom with a capacity of 2,400 ports!

The complete system was controlled by a "suite" of software and according to the required functions for each different type of operator in charge of delivering the services for example, merely monitoring and quality control to operators at Venues who need to make adjustments and assist the talents that provides the signature commentary for their unilateral audio coverage of the competition. The system offered a full range of audio signal processing functions as for example compressor / limiter, expander, noise gates, high pass filters or low gain level processors etc. and that can be applied to each audio input of the system without limiting the total number of system processes, ie any signal can be processed in the system.

For the global control of this, a dedicated network of more than 600 data IP addresses had to be created. That's a lot of planning for 16 days of competition. This part of the system is critical. In order to configure and deploy a system of this size temporarily but with all the redundancy that is needed for an event like the Olympics, it must have adequate and powerful tools. The system has a planning SW allows to accurately estimate the amount of required hardware, configuring ports and necessary links, sub-systems and redundancies. Nothing is left to chance. The SW has a complex data base to accommodate all possibilities, including possible exceptions. Once the planning phase is completed and is physically configured each chassis necessary, the SW is used to send the operational settings.

It was the third time this system was used for an Olympics and the second winter games.

AEQ has equipment and qualified expert staff for worldwide coverage of major sporting, political and social events, having supplied equipment for more than 20 years in all Olympic Games, World Cup, athletics, swimming, skiing, etc ...

Sochi Winter Olympics summarized in figures of the Host Broadcaster:

7 sports
15 disciplines
98 Medal events, all live and in HD
11 competition venues
5 non-competition venues
1.300+ hours of live sports, ceremonies and ONC (Olympic News Channel)
456 hours of coverage streamed ONC
1.150+ hours of programming Multichannel Distribution Service (MDS), excluding ONC.

Approximately 2,700 employees to provide television and radio coverage of the Games
450+ cameras
700 commentary positions (including positions partially equipped)
700 seats for observers (Radio and TV)
80+ Rights Holding Broadcasters
40,000 square meters of function space in the IBC
5,000 functional square meters in the MBC (Mountain Broadcast Centre)

IAAF World Championships, Moscow 2013.

Between the 10 and 18 of August, 2013, IAAF organised the World Championships in athletics in the famous Luzhniki stadium of the Russian capital.

The stadium with a total capacity of +78.000 spectators became the home for 1.970 athletes representing 206 national federations and the worlds broadcasting community that were covering the event.

Eurovision was entrusted the task of acting as Host Broadcasting Organisation and readily asked AEQ to provide 40 Commentary Units of the AEQ DCS-10 commentary system to provide the necessary unilateral commentary audio services. Eurovision also used the BC2000D audio multiplexers to offer the necessary E1 links for its members and the Phoenix Studio AduioCodec platform to offer the international distribution of Commentary Audio to the Rights Holding Broadcasters through either IP or ISDN networks.

FINA World Championships, Barcelona 2013.

The XV FINA World Championships were celebrated in Barcelona (Spain) between July 19 and August 4, 2013.

A total of 2.293 athletes from 181 countries participated in the different federated disciplines of the International Federation of Swimming (FINA) – Swimming, Open waters swimming, synchronized swimming, diving and water-polo.

The national Spanish television –TVE acted as Host Broadcaster and produced the multilateral feeds for Radio and Television. For the unilateral commentary services TVE, used the AEQ DCS-10 digital commentary system to furbish the fully equipped commentary positions at the different venues of the event.

2012 Olympic Games, London.

Over 1.000 commentary units of AEQ's new generation Commentary System were deployed at the London Games. Servicing the majority of the 1.275 commentary positions that the Host Broadcasting Organisation for the games were offering the Rights-holding broadcasters for their unilateral commentary audio production.

This was the second time that the new generation of AEQ commentary system was used in an Olympic Games.

Based upon the BC2000 routing systems and with a total routing capability of over 5000 x 5000 cross-points, the system contains all the necessary elements for interconnection of all the competition venues and the International Broadcasting Centre through either E1/T1 networks or through long range MADI links over fiber networks.

Also on this occasion, EBU was one o the major rights holding broadcaster unions and took delivery of additional modules for its BC2000 D Router Matrix that is used for their 4W commentary circuits.

Equipment upgrade included among other things the implementation of AoIP intercom and monitoring facilities and the capacity to receive the commentary signals from the Host Broadcasters Commentary System.

XIV IAAF Indoor World Championships in Athletics, Istanbul, Turkey. March 2012.

Between March 9 and 11 the XIV IAAF Indoor World Championships in Athletics were held in Istanbul.

An intense 4 days of competition gathered athletes representing 170 countries, in 26 different sports. The host broadcaster TRT (Turkish public broadcaster) for the 2012 IAAF World Championships was decided to provide world class services in general. Their choice of AEQ was made after carefully evaluating renowned companies and with proven track record. AEQ was requested to propose a solution and after carefully studying the options and the available telecoms structure, recommended the use of its DCS-10 commentary system in combination with the AEQ Phoenix Studio IP and ISDN audio-codecs for international contribution.

For the fully equipped – full service commentary positions at the Atakoy Athletics Stadium, AEQ supplied a total of 20 Commentary units for up to three commentators and one guest.

Additionally for international contribution AEQ supplied 20 PHOENIX STUDIO, a multi-format, multi-algorithm dual channel audio-codec designed for stationary rack-mounted applications, like links between studios or STL. PHOENIX STUDIO offers the options of working over ISDN and IP networks and provides two simultaneous channels with high quality Audio, in independent dual mono formats or stereo, or in a combination of both.

AEQ in coordination with local partner IDEAPRO also provided system maintenance from set-up through games time, and ten AEQ TLE02-D portable audio-codecs for backup or last-minute extra stand-alone commentary positions.

PANAMERICAN GAMES 2011, GUADALAJARA, MEXICO

Between October 14th and 30th , 2011 the Panamerican Games were held in the city of Guadalajara in Mexico. Athletes representing the 42 different countries were competing during two weeks in the 24 venues hosting this great sporting event event. .

The host broadcaster of the event, International Sports Broadcasting, was decided to provide its customary world class services. The choice of AEQ was easily made considering AEQ's more than proven track record.

After studying different options and the available telecoms structure, ISB decided to use the DCS-10 commentary system in combination with the AEQ RANGER E1/T1 Audio Multiplexer systems for venues interconnectivity. Among the reasons why the choice of gear fell on AEQ was the very long and proven track record of service that the AEQ equipment offers together with the ease of maintenance and installation. The DCS-10 has been in service for the commentary systems at most of the worlds largest sporting events since 1998 and the RANGER Multiplexers since year 2000.

For the fully equipped – full service commentary positions at the different venues, AEQ supplied a total of 60 Commentary units for up to three commentators and one guest. The DCS-10 Commentary unit provides very easy to use intercom and talk-back facilities, enabling the commentator to be in communication with his home studio through both Programme and Coordination circuits and with the local commentary technician. For

monitoring, the commentator can choose any mix of his own Programme and Programme return, PA, International Sound, Guide and/or Auxiliary channel. Further, the unit allows the commentator to choose for which ear what signal is to be present in his headset. without having close the programme circuit.

For venues interconnectivity, AEQ also supplied 22 RANGER MULTIPLEXER SYSTEMS. The Multiplexers offer selectable Audio encoding/de-coding algorithms adapting perfectly to the different needs regarding level of service required. Audio bandwidths from 3,5 Khz in Mono to 15 Khz Stereo can be offered in any combination and providing up to 62 Channels per E1 connection. Further, for the technical operations intercommunication between the Commentary Control Rooms at the different venues and the Commentary Switching Centre at the IBC, the AEQ analogue Intercom systems IN-02 and IN-03 were used.

AEQ also provided system maintenance from set-up through games time.

2011 FINA WORLD CUP

The 14th FINA World Championships were held at July 16–31, 2011 in Shanghai, China at the Shanghai Oriental Sports Center. The 2011 World Championships featured five aquatics disciplines: swimming, water polo, diving, open water, and synchronised swimming. At this championships, scryncronized swimmer Natalia Ishchenko, of Russia, was the most decorated competitor winning all six gold medals of her events, at solo, duet and team routines. These championships served as qualifying stages for the 2012 Summer Olympics.

AEQ provided to host broadcaster 55 AEQ TLE02-D portable audiocodecs and 110 professional headsets to be used like commentary position.

2011 FIFA U-20 WORLD CUP

The 2011 FIFA U-20 World Cup (Spanish: Copa Mundial Sub-20 de la FIFA Colombia 2011) was the eighteenth edition of the FIFA U-20 World Cup since its inception in 1977 as the FIFA World Youth Championship. Colombia hosted the tournament between 29 July and 20 August 2011, with matches being played in eight cities. The tournament was won by Brazil who claimed their fifth title.

In late 2009 the Colombian Football Federation unveiled the budget for conducting the event, to be COP 150 billion[6] (USD 75 million). An estimated 1,021,000 tickets have already been sold, including a complete sell out of all matches that are to take place at the Estadio Nemesio Camacho in Bogotá

AEQ provided to RCN (host broadcaster) 10 AEQ TLE02-D portable audiocodecs and 30 headsets to be used like commentary position.

IAAF WORLD CHAMPIONSHIP IN DAEGU, KOREA 2011

Between August 27 and September 4, 2011 the World Championships in Athletics were held in the city of Daegu in South Korea. With over 1900 athletes representing 202 countries, the event has been the largest broadcasting event covering athletics in 2011.

The host broadcaster consortium for the 2011 IAAF World Championships, were decided to provide world class services in general. Their choice of AEQ was made after carefully evaluating renowned companies and with proven track record.

AEQ was requested to propose a solution and after carefully studying the options and the available telecoms structure, recommended the use of its DCS-10 commentary system in combination with the AEQ Phoenix Studio IP and ISDN Audio-codecs for venues interconnectivity and international contribution. The DCS-10 has been the used for the commentary in most of the worlds largest sporting events since 1998. Contrasting to this, the Phoenix Studio saw its first appearance for a big event. The need to be able to offer a complete service to the world broadcasting community from a sole supplier with experience and the operational know-how for this type of events, were also among the reasons why the definitive choice of gear fell on AEQ.

For the fully equipped – full service commentary positions at the Athletics Stadium and outside races starting venue, AEQ supplied a total of 35 Commentary units for up to three commentators and one guest. The DCS-10 Commentary unit provides very easy to use intercom and talk-back facilities, enabling the commentator to be in communication with his home studio through both Programme and Coordination circuits and with the local commentary technician. For monitoring, the commentator can choose any mix of his own Programme and Programme return, PA, International Sound, Guide and/or Auxiliary channel. Further, the unit allows the commentator to choose for which ear what signal is to be present in his headset. without having close the programme circuit.

For venues interconnectivity and international contribution AEQ also supplied 35 PHOENIX STUDIO, a multi-format, multi-algorithm dual channel audio-codec designed for stationary rack-mounted applications, like links between studios or STL. PHOENIX STUDIO offers the options of working over ISDN and IP networks, among many others. The IP communications interface is fully compatible with the EBU-TECH 3326 technical specification issued by the EBU N/ACIP working group.

.FIFA U-17 WORLD CUP IN MEXICO 2011

When Televisa SA de CV was commended with the task to act as the Host broadcaster for the U-17 World Cup (soccer) in Mexico this summer, they were on the clear with that the choice of equipment had to be world class and with a proven track record.

AEQ was requested to propose a solution and after carefully studying the options and the available telecoms structure, recommended Televisa to use the MPAC-02. Even if this work horse from AEQ has been in production for 12 years, the features and services required were perfectly met by the AEQ MPAC-02; up to three commentators, auxiliary mic/line input providing an additional local audio source and the possibility to transmit over ISDN, PSTN and including V.35 ports for dual audio channel connectivity, etc., etc. The need to be able to offer simultaneous independent program and coordination circuits with return paths were also among the reasons why the definitive choice of gear fell on AEQ.

GUANGZHOU 16th ASIAN GAMES 2010

Equipment supply and maintenance: 280 AEQ DCS-10 commentary units and Ranger E1/T1 Audio Multiplexors for contribution network interconnections. Further, some 90 TLE-02D portable ISDN audiocodec were used to interconnect the smaller venues with the IBC through ISDN lines.

All the interconnections of the 51 stadiums to the IBC were done through 2Mbps E1 links using AEQ RANGER multiplexers, and ISDN lines with the AEQ TLE-02D Portable audiocodec.

VANCOUVER 2010 WINTER OLYMPIC GAMES

AEQ produced and delivered the new generation of commentary system based upon its BC2000 routing systems and with a total routing capability of over 5000 x 5000 cross-points. The system is containing all the necessary elements for interconnection of all the competition venues and the International Broadcasting Centre through either E1/T1 networks or through long range MADI links over fiber networks.

EBU being one of the major rights holding broadcaster unions took delivery of additional modules for its BC 2000 D Router Matrix that is used for their 4W commentary circuits. Equipment upgrade included among other things the implementation of the capacity to receive the commentary signals from the New Commentary System used in Vancouver. Additionally, all the EBU broadcasters and other major rights holding organisations were using AEQ's Commentary Console at the different Competition Venues.

CAF AFRICAN CUP 2010, ANGOLA

Services: 100 AEQ DCS-10 commentary units. Course AudioCodec systems and Ranger E1/T1 Audio Multiplexors for contribution network interconnections. Installation, maintenance and operation.

AEQ provided complete installation and operation of the total commentary system for four stadiums and a modern International Broadcasting Center to centralize all the communications. Luanda stadium has 40.000 seats and uses 40 CU. Bengela, Lubango and Cabinda stadiums have 20000 seats and use 20 CU each. All the interconnections of the stadiums to the IBC are done over 2Mbps E1 links using AEQ RANGER multiplexers, and the external communications use ISDN lines over AEQ COURSE multi-codec.

BEIJING OLYMPIC GAMES 2008 CHINA

Equipment and Services: 1200 AEQ DCS-10 commentary units and Ranger E1/T1 Audio Multiplexors for contribution network interconnections.

Once again, AEQ played a significant role as the supplier of commentator audio equipment for the 2008 Beijing Olympic Games.

Since the Nagano Games in 1998, commentators at the various competitive venues have used AEQ's DCS 10 Digital Commentator consoles, giving them the ability to accommodate three reporters plus a guest.
As has been the case since the Sidney Games in 2000, AEQ's Ranger Multiplexers were used to broadcast program and coordination information (and the returns) to the International Broadcasting Center.

The International Broadcasting Center's Commentary Switching Center is where all circuits from the multiple venues are received and supervised. A wide assortment of AEQ products are employed during these events. They include: circuit distribution frames, patch panels, audio distribution amplifiers, intercoms, line identifiers, monitors, audio quality monitors, just to mention a few.

Some of the Olympic broadcasters who used AEQ equipment were: TV AZTECA and TELEVISA (Mexico); Radio Caracol (Colombia); ENTV (Algeria); RTRRA (Russia), ROR (Romania), SABC (South Africa), RTVE (Spain), France 2; Globo (Brazil) and NHK (Japan).

17 ALFACAM OB Vans were used at the multiple venues and the Olympic Stadium to produce HD video had AEQ equipment installed as part of their equipment suites. The most frequently used equipment items were: DA-26, EAGLE, SWING, MPAC-02, Mar4Win, TLE 02, Ranger, and the ACD 5001.

Special mention goes out to the European Broadcasting Union, EBU (EUROVISION), and the primary broadcasters association. For many years the EBU has used AEQ's Impact Digital Switching Center and Course Codecs to deliver audio from the Games.

EBU's Switching Center in Beijing includes AEQ's Impact, Course, and BC 2000D equipment. RNE's engineer Javier Ferreras is operating the equipment.

FIBA, Basketball World Championship, Japan 2006.

Equipment supply: 41 AEQ MPAC-02 commentary units supplied to the Host Broadcaster, Japan Broadcasting Corporation (NHK).

AEQ supplied 41 MPAC 02 codecs to the Japan Broadcasting Corporation, NHK, in order to broadcast the FIBA Basketball World Championship which was hold in September of 2006, by the commentators of the different televisions that attended this event.

AEQ continues its participation in the supply of equipment for big sports events, that begun at the Olympic Games in Seoul 1988 and that is continued uninterruptedly in these last 18 years.

Torino 2006 Winter Olympics, Italy.

Services Rendered: Design, Installation and Maintenance.

Equipment Supply: Delivery of over 750 Commentary Positions of the AEQ DCS-10 Digital Commentary System for all the Venues at the Torino Winter Olympics.

Delivery of the Commentary Switching Centre and 4W intercommunication equipment for Commentary Switching Centre at IBC.

The commentary Switching held the capacity of an equivalent of over 4500 4W circuits.

The Commentary Audio was integrally generated by a Digital Commentary System.

Transmissions on the International Side were integrally carried out through ISDN AudioCodecs.

On the international Side Supplementary contracts were awarded to AEQ for the same type of equipment from EBU Sports (European Broadcasting Union) and were distributed throughout the World among the EBU Members and other Broadcasters that contracted this service from EBU Sports.

FIBA, Basketball European Championship, Serbia 2005 .

Equipment Supply: delivery of 30 portable audiocodecs AEQ Swing and 5 rack-mounted audiocodecs AEQ Eagle.

These equipment have been used in the retransmission of the European Championship of Basketball 2005, which was hold in four Serbian venues: Belgrade, Novi Sad, Vrsac and Podgorica, from 16th to 25th September 2005

Athens Summer Olympics 2004.

Services Rendered: Venue Cabling Services, Design and Maintenance.

Equipment Supply: Design and Delivery of over 1.000 Commentary Positions of the AEQ DCS-10 Digital Commentary System for all the Venues at the Athens Summer Olympics.

Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC. The commentary Switching held the capacity of an equivalent of over 5.500 4W circuits.

For the fourth time in History and for an event of this size, the Commentary Audio was integrally generated by a Digital Commentary System.

Over 130 AEQ Ranger 2 Mb. Multiplexer Systems supplied by AEQ handled transmissions on the National side (Venues to IBC and Vice-versa).

This was the fourth time in History that such specific Audio Encoding/Decoding-Multiplexing Equipment was used for the Transmission of the Commentary Circuits.

Transmissions on the International Side for the European Broadcasting Union were integrally carried out through ISDN AudioCodecs.

Furthermore, on the international Side Supplementary contracts were awarded to AEQ for the same type of equipment from Different Broadcasting Unions and were distributed throughout the World among the EBU Members and other Broadcasters that contracted this service from EBU and other associations.

UEFA Euro-Cup, Portugal, June 12 – July 4, 2004.

Services Rendered: Pre-Cabling Services, Design, Installation, Operation, Maintenance and de-rigging.
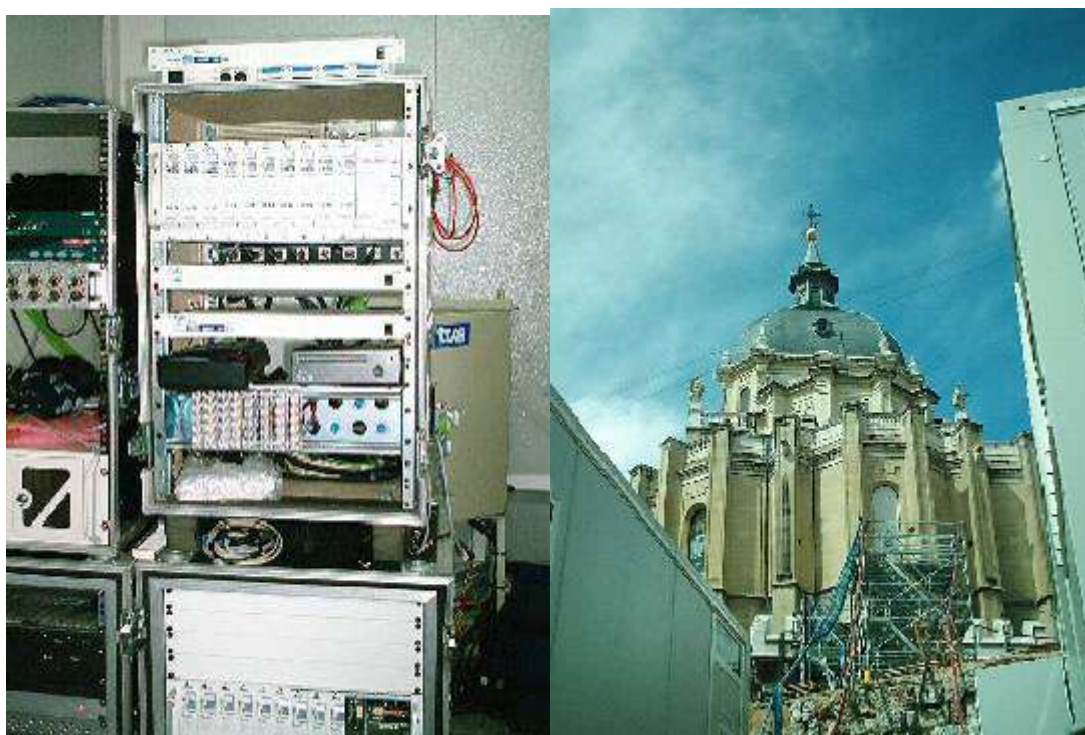
Equipment Supply: Design, Delivery, Installation and Operation of 320 Commentary Positions of the AEQ DCS-10 Digital Commentary System for the 10 different Stadiums for the UEFA Euro-Cup in portugal.

The Delivery, Installation and Operation of 320 Dual Channel AudioCodecs Mounted in 32 Course Multiple AudioCodec Frames Completely Software Controlled and the Cabling of the ISDN Intercom Facilities for the 10 different Stadiums for the UEFA Euro-Cup in Portugal.

The design and delivery of all the interconnections and cables for Compound Area and TOC of all the 10 different Stadiums for the UEFA Euro-Cup in Portugal.

All the equipment and interconnection cables relative to Stadiums, TOC and Compounds were dismantled after each Match, to be transported to the next venue or Stadium on schedule, installed and operated the next day.

Royal Wedding H.R.H. The Prince of Asturias and Doña Letizia Ortiz, May 22, 2004.

Services Rendered: Pre-Cabling Services, Design, Installation, and Maintenance.

Equipment Supply: Design, Delivery, Installation and Maintenance supervision o 2x20 ISDN Lines SYSTEL-6000 Multiplex and Multi-conference Systems for the General Coordination System for the OB-Units during the Broadcast Operations in connection with the Event. The Systel-6000 Systems Consists in a total Hardware Integration through Software of the AEQ Impact Digital Audio Router with AEQ Caddy AD/DA Converters and AEQ Course MultiCodec Systems. The two Systems supplied had a total Multiplexing Capability of up to 40 ISDN communications towards the MCR at Prado del Rey and vice

versa, and was Hierarchically structured for 12 different levels of Multiplex, i.e. 12 simultaneous multiplex for different levels and purposes.

African Cup of Nations, Tunis, 2004.

Services Rendered: Equipment Supply.

Equipment Supply: Design and Delivery of 10 Commentary Positions of the AEQ DCS-10 Digital Commentary System for the Venues at the African Cup of Nations, Tunis, 2003. The delivery eas to complement the already available System in property of the Tunisian Radio and Television, and aqcuired in 2001 for the Mediterranean Games. Additionally 20 AEQ MPAC-02 Portable ISDN AudioCodec and Communications Unit was delivered for the partially equipped Commentary Positions at these venues.

Delivery of our equipment was accomplished through AlfaCam of Belgium, as our main contractor.

Cycling World Championships, Hamilton, Canada, October 2003.

Services Rendered: Equipment Supply.

Equipment Supply: Delivery of the EBU (European Broadcasting Union) AudioCodec Systems for the Commentary Audio Circuits. A total of 7 Complete AEQ COURSE Multi-Codec Systems were supplied, equalling to 140 4W Circuits interconnected to EBU's DATA Multiplexer for the international Contribution of the Commentary Signals.

Direct Commentary Unilaterals were Achieved with the AEQ Swing Portable AudioCodec and Transmission Unit. A total of 26 Units were delivered for the Event Through the Eurpean Broadcasting Union.

8th AAG (All Africa Games), The Unity Games, Nigeria, October 4-18, 2003.

Services Rendered: Consultancy, Design, Equipment Supply, Installation, Set-up, On-site Training, Operation and Maintenance.

Equipment Supply: Design and Delivery of 110 Commentary Positions of the AEQ DCS-10 Digital Commentary System and the Complete Commentary Switching Centre within the MCR, for all the Venues at the All Africa Games in Abuja, Nigeria, 2003.

The Complete Equipment Delivery was accomplished through Thomson Broadcast Systems, as the Main Contractors to NTA/COJA.

IAAF (Athletics) World Championships, Paris, France, August 2003.

Services Rendered: Equipment Supply.

Equipment Supply: Delivery of the EBU (European Broadcasting Union) AudioCodec Systems for the Commentary Audio Circuits. A total of 7 Complete AEQ COURSE Multi-Codec Systems were supplied, equalling to 140 4W Circuits interconnected to EBU's DATA Multiplexer for the international Contribution of the Commentary Signals.

Direct Commentary Unilaterals were Achieved with the AEQ Swing Portable AudioCodec and Transmission Unit. A total of 14 Units were delivered for the Event Through the Eurpean Broadcasting Union.

Volleyball EuroCup Finals, Madrid, Spain, June 2003.

Services Rendered: Equipment Supply through RTVE.

Equipment Supply: Delivery of 20 MPAC-02 ISDN AudioCodecs and Commentary Mixer for the Installation at the Commentary Positions and Transmission of the Commentary Audio Circuits from the Different Venues in Madrid (Spain).

This was the first time in History that an Event of this type was covered integrally through the Use of ISDN Codecs/Mixers of this Type.

Swimming World Cup Barcelona, Spain, June 2003.

Services Rendered: Equipment Supply.

All in all some 55 AEQ DCS-10 Digital Commentary Positions pertaining to RTVE of Spain (Host Broadcaster for the Event) were installed. The Commentary Audio was entirely transmitted from the event with the AEQ Course MultiCodec System for all the Commentary Positions that were fully Equipped. Alternative Positions were equipped with AEQ MPAC-02 portable Audioodec and Commentary Unit.

Cricket WorldCup, South Africa, February 2003.

Services Rendered: Equipment Supply.

Equipment Supply: Design and Delivery of 30 Commentary Positions of the AEQ DCS-10 Digital Commentary System and 30 MPAC-02 Portable AudioCodec for all the Venues in South Africa. The communications between Venues and IBC and Unilaterals was accomplished through Eagle and Course Multicodec Systems from AEQ.

In January 2002 the South African Broadcasting Corporation purchased three complete AEQ Commentary Systems and three COURSE codec systems to be used at the 2003 World Cup Cricket tournament hosted in South Africa during February 2003. The S.A.B.C. was contracted by the host broadcasting company for the 2003 World Cup Cricket to provide the commentary positions at all the venues. S.A.B.C.'s RPS Remote, responsible for the technical operations of remote broadcasts for the S.A.B.C.'s radio services, will also be using the commentary system for the multitude of sports events that is broadcasted regularly on the various language services. During the same period the S.A.B.C. also purchased approx. 25 AEQ EAGLE codecs and a number AEQ TH-02EX MkII digital telephone hybrids. These units were used at the 2002 World Summit for Sustainable Development, hosted in South Africa in August last year from various venues across South Africa. The AEQ EAGLEs were again used by the S.A.B.C. at the African Union Summit, held in Maputo, Mozambique in July 2003.

FIFA World Cup, Japan and Korea, June, 2002.

Services Rendered: Equipment Supply and Maintenance.

Equipment Supply: Design and Delivery of over 830 Commentary Positions of the AEQ DCS-10 Digital Commentary System for all the 10 Venues on the Japaneese side at the JAPAN AND KOREA FIFA WORLD CUP.

210 AEQ Ranger E1/T1 Multiplexer Systems, effectively comprising of a total number of 850 multi channel AudioCodecs for a total of some 6000 bi-directional High Quality Audio Circuits, was supplied by AEQ. These Systems handled transmissions on the National side (all 20 Venues to IBC1 (Seoul) and IBC2 (Yokohama) and Vice-versa). The Contracts were awarded by KoreaTelecom for the Korean Side of Operations and by Japan Telecom on the Japaneese side, both carriers being the official carriers for the Event.

Also this was the first time in History that such specific Audio Encoding/Decoding-Multiplexing Equipment was used for the Transmission of the Commentary Circuits, as this had until this event been done either through ISDN AudioCodecs or through standard 4W lines provided by the PTT's assigned as carriers. The difficulty on this specific occasion was residing in the fact that on the Korean Side the E1 protocols prevails and on the Japanees side the Systems had to operate on T1. The solutions given by both operators in order to inter-link the two systems in IBC1 in Seoul was considered as optimum since the Audio Encoding Standards were kept intact through the AEQ Multiplexers.

On the international Side Supplementary contracts was awarded to AEQ for AudioCodecs the for EBU Associates and were distributed throughout the World among the EBU Members and other Broadcasters.

FIFA Under 18 WorldCup, Mali, June 2002.

Services Rendered: Equipment Supply through EuMovil pertaining to MediaPro Group.

Equipment Supply: Delivery of 45 MPAC-02 ISDN AudioCodecs and Commentary Mixer for the Installation at the Commentary Positions and Transmission of the Commentary Audio Circuits from the Different Venues in Mali (Africa).

This was the first time in History that an Event of this type was covered integrally through the Use of ISDN Codecs/Mixers of this Type.

SALT LAKE CITY WINTER OLYMPICS, USA, 2002

Equipment supply: AEQ DCS 10 Digital Commentator Consoles. A total of 450 Commentary Units were deployed at the 13 Olympic Venues.

For the transmission of program signals and coordination signals when required, as well as the respective return audio to the International Broadcasting Center, 50 pairs of AEQ Ranger Multiplexers were used. Each one allowed between 14 and 62 two-way audio signals to be sent (depending on the quality requested) through E1 or T1- type high capacity digital circuits.

The Commentary Switching Center in the International Broadcasting Center, the nerve center where the circuits coming from the venues were received and supervised, was also supplied by AEQ. There, circuit distribution frames were installed connected to more than one hundred 48x2-circuit patch panels, AEQ DA 16 T audio distributors, AEQ IN 02 intercoms, AEQ SSR 10 line identifiers, audio quality monitors and meters and video monitors. From there, signals were controlled and re-routed between the venues, the temporary studios for each television or radio station installed at the International Broadcasting Center, and via cable or satellite to the broadcasters' permanent studios in each country. Through it, hundreds of circuits were set up and controlled.

A technological innovation was the implementation of the new Switching Center for the European Broadcasting Union EBU at the International Broadcasting Center to replace an old mechanical relay matrix that had been in service since Montreal 1976, serving the main European radio and television networks and those of other countries.

EBU chose a 400x400-circuit AEQ Impact Caddy audio matrix with digital technology. Its exclusive software application incorporates a booking management system that implemented from Salt Lake City, in real time, the necessary switching between the circuits from the venues and the international circuits destined for each broadcaster, and following the production of the multilateral television signal distributed to all of Europe through the EUROVISION network.

To send the audio to EBU members and associates between Salt Lake City and the program production centers in each European country, AEQ Course multiple audiocodecs were used, valid for point-to-point lines with V35 or ISDN interfaces, located next to the EBU Switching Center at the International Broadcasting Center. Their lines were paired up with those of other AEQ Course codecs, or even with those of other manufacturers, deployed at each member's or associate's stations.

This was the first time that the complete commentator audio circuitry for the main broadcasters in the world, from the origination point at the Olympic venues to each radio or television station, was done with AEQ equipment.

Digital Switching Facilities for EBU Operations Group, 2001.

Services Rendered: Design, Installation and Maintenance.

Equipment Supply: 400x400 (4Wire) Digital Summing and Distribution Switching Matrix AEQ IMPACT, including Gain Control for all Output – ports, with Auto-ranging and Auto-redundant Power supply, 90 – 250 V AC 50-60 Hz.

20 (twenty) Modules AEQ CADDY, A/D D/A Multiple Converters: 24 Mono Analogue Inputs to 12 Stereo Digital Outputs and 12 Stereo Digital Inputs to 24 Analogue Outputs.

Unlimited Member Client Software License.

1 (one) Master Control and "E@sy" Server License and the required Adaptations to the Specific need of EBU.

This Digital Audio Routing System replaces the now obsolete Router System from Ghilmetti and Sandar Electronics, and that serves EBU Operations Group for their Unilateral Transmissions from all Major Sporting events throughout the World.

The first time the system was used was during the Salt Lake Winter Olympics 2002.

United Nations Framework Convention on Climate Change, Session No. 7, Marrakech, Morocco, 2001.

Services Rendered: Operational Assistance and emplacement.

Equipment Supply: Delivery of 20 MPAC-02 ISDN AudioCodecs and Commentary Mixer for the Installation at the Commentary Positions and Transmission of the Commentary Audio Circuits from the Convention Centre in Marrakech, Morocco.

Delivery of the Software Recording and Automation System Mar4Win with Multi-Track Recording/editing Facilities for the real-time editing of the Audio signal,
Simultaneous Translation and Logging.

Mediterranean Athletic Games, Tunis, 2001.

Services Rendered: Operation and Maintenance.

Equipment Supply: Design and Delivery of 160 Commentary Positions of the AEQ DCS-10 Digital Commentary System for all the Venues at the Mediterranean Athletic Games, Tunis, 2001.

Delivery of our equipment was accomplished through Thomson Broadcast systems and Alfacam of Belgium, our main contractors.

The Complete Equipment Delivery was accomplished to Thomson Broadcast Systems and Alfacam of Belgium as the Main Contractors.

World Championship Athletics, Edmonton, 2001.

Services Rendered: Operational assistance and Maintenance.

Equipment Supply: Delivery of the EBU (European Broadcasting Union) AudioCodec Systems for the Commentary Audio Circuits. A total of 7 Complete AEQ COURSE Multi-Codec Systems were supplied, equalling to 140 4W Circuits interconnected to EBU's DATA Multiplexer for the international Contribution.

Furthermore, AEQ Delivered to the EBU members in 18 Countries, some 50 AEQ ACD-5001 Dual Channel Multiformat AudioCodecs in order to receive correctly the Generated signals in Edmonton.

FINA World Championships, Fukuoka, Japan, 2001.

Services Rendered: Maintenance, and Instructions for operation.

Equipment Supply: Delivery of 60 MPAC-02 ISDN AudioCodecs and Commentary Mixer for the Installation at the Commentary Positions and Transmission of the Commentary Audio Circuits from the Different Venues in Fukuoka and its surroundings.

This was the first time in History that an Event of this type was covered integrally through the Use of ISDN Codecs/Mixers of this Type.

The Host Broadcaster TV Asahi jointly with the official Carrier Japan Telecom chose this equipment for its optimum performance, security in transmission and flexibility of operation.

Furthermore, AEQ Delivered to the EBU members in 18 Countries, some 50 AEQ ACD-5001 Dual Channel Multiformat AudioCodecs in order to receive correctly the Generated signals in Fukuoka.

Handball World Championships, France, 2001.

Services Rendered: None.

Equipment Supply: Delivery of 20 MPAC-02 ISDN AudioCodecs and Commentary Mixer for the Installation at the Commentary Positions and Transmission of the Commentary Audio Circuits from the Different Venues in France for the World Championships in Handball.

This was the Seccond time in History that an Event of this type was covered integrally through the Use of ISDN Codecs/Mixers of this Type.

EBU Sports AudioCodec Facilities, 2001.

Services Rendered: Design, Installation and Maintenance.

Equipment Supply: 33 AEQ COURSE Multi-Codec Systems, equalling to 330 Dual Line AudioCodecs or 660 4W circuits or Transmissions over ISDN Networks.

The AudioCodec System is fitted with a Universal Terminal Adapter allowing for the Connection to any Standard ISDN protocol (both ANSI and ETSI S or U interface) available in the World.

Furthermore, it is equipped with V.35 Ports allowing for data transmissions of up to 256 KBPS. Per Codec. This Equipment forms part of the long term equipment policy of EBU Operations, that allows for expansions and flexibility in operation whenever needed for a Sport Event anywhere in the World.

BBC - General Election Campaign Coverage, 2001.

Services Rendered: None.
Equipment Supply: Delivery of 20 MPAC-02 ISDN AudioCodecs and Commentary Mixer for the Integer coverage of the British General Elections in June 2001.

This was the first time in History that BBC covered integrally a General Election through the use of ISDN Codecs/Mixers of this Type.

G-8 SUMMIT, GENOVA, ITALY, 2001.

Equipment Supply: Delivery of 30 AEQ ACD-5001, Dual Channel Multiformat ISDN AudioCodec for the International Transmissions from Genoa.

All equipment was delivered to the Main Contractor and Host Broadcaster for the Event, Ellettronica Industriale, Milano, Italy.

UEFA Champions League Final "SAN SIRO" MILANO, 2001.

Equipment Supply: Delivery of 30 Commentary Positions of the AEQ DCS-10 Digital Commentary System for the UEFA Champions League Final "SAN SIRO" MILANO, 2001.

The International Transmissions were integrally carried out through the AEQ ACD-5001, Dual Channel Multiformat ISDN AudioCodec. All equipment was delivered to the Main Contractor and Host Broadcaster for the Event, Grupo Ellettronica Industriale, Milano, Italy.

Sydney Summer Olympics 2000.
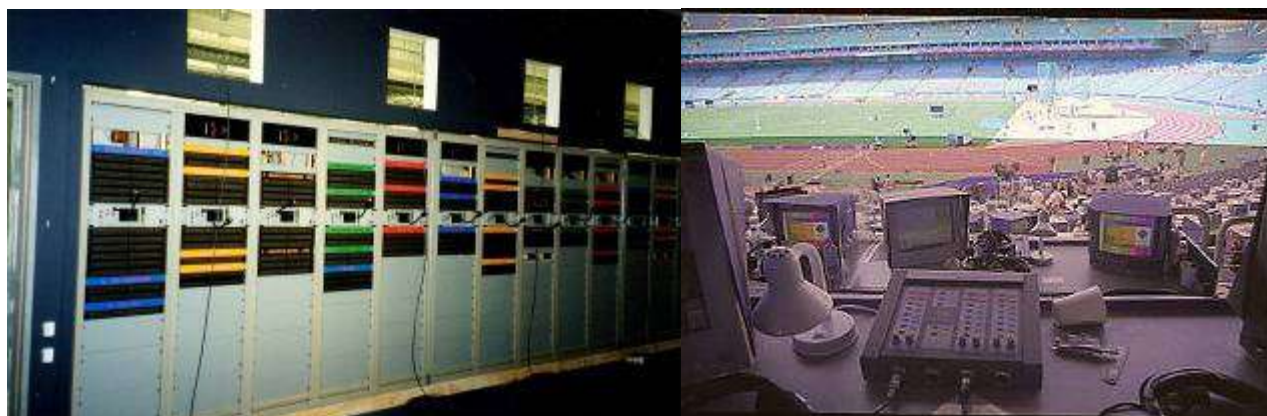
Services Rendered: Design and Maintenance.

Equipment Supply: Design and Delivery of over 900 Commentary Positions of the AEQ DCS-10 Digital Commentary System for all the Venues at the Sydney Summer Olympics.

Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC. The commentary Switching held the capacity of an equivalent of over 5000 4W circuits.

For the first time in History and for an event of this size, the Commentary Audio was integrally generated by a Digital Commentary System.

Over 120 AEQ Ranger 2 Mb. Multiplexer Systems supplied by AEQ handled transmissions on the National side (Venues to IBC and Vice-versa). Sydney Broadcasting Organisation, the Host Broadcaster, and TELSTRA, the Official Carrier, Jointly made the selection of AEQ over its competitors.

Also this was the first time in History that such specific Audio Encoding/Decoding-Multiplexing Equipment was used for the Transmission of the Commentary Circuits, since this event been done either through ISDN AudioCodecs or through standard 4W lines provided by the PTT's assigned as carriers.

Transmissions on the International Side for the European Broadcasting Union were integrally carried out through ISDN AudioCodecs.

The ACD-5001 was also the choice made by TELESTRA, the EBU Operations Group and SOBO as the Host Broadcaster**.**

Furthermore, on the international Side Supplementary contracts were awarded to AEQ for the same type of equipment from Different Broadcasting Unions and were distributed throughout the World among the EBU Members and other Broadcasters that contracted this service from EBU and other associations.

UEFA Euro-Cup, Belgium/The Netherlands, 2000.

Services Rendered: Design, Installation, Operation, Maintenance and de-rigging.

Equipment Supply: Design, Delivery, Installation and Operation of 180 Commentary Positions of the AEQ DCS-10 Digital Commentary System for the 8 different Stadiums for the UEFA Euro-Cup in The Netherlands and Belgium.

The Delivery, Installation and Operation of 180 Dual Channel AudioCodecs with intercom facilities for the 8 different Stadiums for the UEFA Euro-Cup in The Netherlands and Belgium.

The Delivery of all the National side AudioCodecs for interconnection of the for the 8 different Stadiums for the UEFA Euro-Cup in The Netherlands and Belgium and the International Broadcast Centre located in Amsterdam, the Netherlands.

The design and delivery of all the interconnections and cables for Compound Area and TOC of all the 8 different Stadiums for the UEFA Euro-Cup in The Netherlands and Belgium.

All the equipment and interconnection cables relative to Stadiums, TOC and Compounds were dismantled after each Match, to be transported to the next venue or Stadium on schedule, installed and operated the next day.

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IBERO-AMERICAN SUMMIT, HAVANA, CUBA, June 2002.

Services Rendered: Equipment Supply.

Equipment Supply: Delivery of 5 MPAC-02 and 5 AEQ TLE-02D ISDN AudioCodecs and Commentary Mixer for the coverage of the Summit through NERA Satphone Systems (Inmarsat). The operation was accomplishe by RTVE of Spain..

This was the first time in History that an Event of this type was covered integrally through the Use of ISDN Codecs/Mixers in combination with Inmarsat Communications Systems from NERA of Norway.

APLICACIONES ELECTRONICAS QUASAR S.A.

Margarita Salas, 24 , 28919 LEGANÉS. MADRID (SPAIN) Tel.:(34) 91 686 13 00 * FAX: (34) 91 686 44 92 .E-mail: aeqsales@aeq.es. Web:http://www.aeq.eu/

ICE HOCKEY WORLD CHAMPIONSHIPS, ST. PETERSBURG, RUSSIA, 2000.

Services Rendered: None.

Equipment Supply: Delivery of 40 MPAC-02 ISDN AudioCodecs and Commentary Mixer for the Installation at the Commentary Positions and Transmission of the Commentary Audio Circuits from the Different Venues in St. Petersburg, Russia and its surroundings.

This was the first time in History that an Event of this type was covered integrally through the Use of ISDN Codecs/Mixers of this Type.

Eurovision Song Contest, Stockholm 2000.

Services Rendered: None.

Equipment Supply: Delivery of 40 ACD-5001 ISDN AudioCodecs for the Transmission of the Commentary Audio Circuits to the EBU Members that participated in the event.

NBA ALL-STARS, LOS ANGELES, 2000.

Services Rendered: None.

Equipment Supply: Delivery of 50 Commentary Positions of the AEQ DCS-10 Digital Commentary System for the NBA All-Stars in Los Angeles, 2000.

AEQ Digital Commentary System Facilities for Elettronica Industriale, Milano, Italy, 1999.

Services Rendered: System Installation for self-contained Commentary Facilities.

Equipment Supply: Delivery of the Digital Commentary System DCS-10 and the CAT-5 Structured Cabling.

AEQ Digital Commentary System Facilities for Media-Set, Switzerland, 1999.

Services Rendered: System Installation for self-contained Commentary Facilities.

Equipment Supply: Delivery of the Digital Commentary System DCS-10 and the CAT-5 Structured Cabling.

AEQ Digital Commentary System Facilities for Radio and Television Slovenia, Ljubliana, 1999.

Services Rendered: System Installation for self-contained Commentary Facilities.

Equipment Supply: Delivery of the Digital Commentary System DCS-10 and the CAT-5 Structured Cabling.

FIFA World Cup sub-18, Nigeria 1999.

Services Rendered: Design, Installation, Operation and Maintenance.

Equipment Supply: Design and Delivery of 120 Commentary Positions of the AEQ DCS-10 Digital Commentary System for all the Venues at the FIFA World Cup sub-18 in Nigeria.

Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC. The commentary Switching held the capacity of an equivalent of over 500 4W circuits. For the first time in History and for an event in Africa of this size, the Commentary Audio was integrally generated by a Digital Commentary System.

AEQ equipment was delivered through the main contractor, Thomson Broadcast Systems.

FIS Skiing World Cup, Vail, Colorado (EEUU) 1999.

Services Rendered: Operation and Maintenance.

Equipment Supply: Design and Delivery of 120 Commentary Positions of the AEQ DCS-10 Digital Commentary System for all the Venues at the FIS alpine skiing World Cup in Vail/Beaver Creek, USA.

Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC. The commentary Switching held the capacity of an equivalent of over 500 4W circuits. For the first time in History and for a FIS event of this size, the Commentary Audio was integrally generated by a Digital Commentary System.

Transmissions on the International Side were integrally carried out through ISDN AudioCodecs. The Choice jointly by EBU Sports and BELL, the International Carrier was the ACD-5001.

On the international Side Supplementary contracts was awarded to AEQ for the same type of equipment from EBU Sports (European Broadcasting Union) and were distributed throughout the World among the EBU Members and other Broadcasters that contracted this service from EBU Sports.

Eurovision Song Contest, Israel 1999.

Services Rendered: Design, Installation and Operation.

Equipment Supply: Design and Delivery of 60 Commentary Positions of the AEQ DCS-10 Digital Commentary System for the Venues in Tel-Aviv, Israel.

Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC. The commentary Switching held the capacity of an equivalent of over 150 4W circuits. For the first time in History and for this EBU event, the Commentary Audio was integrally generated by a Digital Commentary System.

Transmissions on the International Side were integrally carried out through ISDN AudioCodecs. The Choice jointly by Israeli Broadcasting Authorities (IBA) and EBU was the ACD-5001.

On the international Side Supplementary contracts was awarded to AEQ for the same type of equipment from EBU Sports (European Broadcasting Union) and were distributed throughout Europe among the EBU Members and other Broadcasters that contracted this service from EBU.

IAAF World Championship Athletics, Seville 1999.

Services Rendered: Installation, Maintenance and Operation.

Equipment Supply: Design and Delivery of 80 Commentary Positions of the AEQ DCS-10 Digital Commentary System for the Seville Athletics Stadium.

Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC. The commentary Switching held the capacity of an equivalent of over 200 4W circuits.

For the first time in History and for an event of this size, the Commentary Audio was integrally generated by a Digital Commentary System.

Transmissions on the International Side were integrally carried out through ISDN AudioCodecs. The Choice jointly by Radio Televisión Española (RTVE) and EBU was the ACD-5001.

On the international Side Supplementary contracts was awarded to AEQ for the same type of equipment from EBU Sports (European Broadcasting Union) and were distributed throughout Europe among the EBU Members and other Broadcasters that contracted this service from EBU Operations.

San Marino GP F1, Imola 1999.

Services Rendered: Maintenance and Operation.

Equipment Supply: Design and Delivery of 60 Commentary Positions of the AEQ DCS-10 Digital Commentary System for the San Marino Grand Prix Formula 1 at the Imola Race Course in Italy.

This was the first time that Radio Televizione Italiana (RAI) deployed the AEQ DCS-10 Digital Commentary System for an event in Italy of this calibre and also the First Time in History that a Digital Commentary System was used for such an event.

Italy GP F1 Monza, 1999.

Services Rendered: Maintenance and Operation.

Equipment Supply: Design and Delivery of 60 Commentary Positions of the AEQ DCS-10 Digital Commentary System for the Italian Grand Prix Formula 1 at the Monza RaceCourse in Italy.

This was the second time that Radio Televizione Italiana deployed the AEQ DCS-10 Digital Commentary System for an event in Italy of this calibre. This was the last time that RAI required assistance from AEQ and from this moment and to date, RAI solely runs the operation and maintenance of their Commentary Facilities.

Cycling World Championship, Italy 1999.

Services Rendered: None.

Equipment Supply: Delivery of 50 Commentary Positions of the AEQ DCS-10 Digital Commentary System for the Cycling World Championship, Italy 1999.

AEQ also delivered 20 ACD-5001 ISDN AudioCodecs for the Transmission of the Commentary Audio Circuits to the different Broadcasters that participated in the event.

Commonwealth Games, Kuala Lumpur '98.

Services Rendered: Design, Installation, Operation and Maintenance.

Equipment Supply: Design and Delivery of 120 Commentary Positions of the AEQ DCS-10 Digital Commentary System for all the Venues at the KL Commonwealth Games.

Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC. The commentary Switching held the capacity of an equivalent of over 500 4W circuits.

For the first time in History and for this specific event, the Commentary Audio was integrally generated by a Digital Commentary System.

17th European Championship in Athletics, Budapest 1998.

Services Rendered: Maintenance and Operation.

Equipment Supply: Design and Delivery of 75 Commentary Positions of the AEQ DCS-10 Digital Commentary System for the Budapest Athletics Stadium.

Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC. The commentary Switching held the capacity of an equivalent of over 200 4W circuits.

For the first time in History and for an event of this size, the Commentary Audio was integrally generated by a Digital Commentary System.

On the international Side Supplementary contracts was awarded to AEQ for AudioCodecs for EBU Sports (European Broadcasting Union) and were distributed throughout the World among the EBU Members and other Broadcasters that contracted this service from EBU Sports.

AEQ Digital Commentary System Facilities for RAI, 1998.

Services Rendered: System Installation for self-contained Commentary Facilities.

Equipment Supply: Delivery of the Digital Commentary System DCS-10 and the CAT-5 Structured Cabling.

FIFA World Cup, France'98.

Services Rendered: Design and Maintenance.

Equipment Supply: Design and Delivery of over 800 Commentary Positions of the AEQ DCS-10 Digital Commentary System for all the 10 Venues at the FRANCE FIFA WORLD CUP.

Design and delivery of the Audio Distribution Equipment, Monitoring and 4W intercommunication Equipment for Commentary Switching Centre at the IBC.

The commentary Switching held the capacity of an equivalent of over 5000 4W circuits. For the first time in History and for an event of this size, the Commentary Audio was integrally generated by a Digital Commentary System.

On the international Side Supplementary contracts was awarded to AEQ for AudioCodecs for EBU Sports (European Broadcasting Union) and were distributed throughout the World among the EBU Members and other Broadcasters that contracted this service from EBU Sports.

AEQ also supplied Line Equalisation Equipment in order to adopt all the National Lines from France Telecom to nominal levels within the International Broadcast Centre (IBC) and back to Telecom Nominal Levels on the return Path.

Nagano'98 Winter Olympics, Japan.

Services Rendered: Design, Installation and Maintenance.

Equipment Supply: Design and Delivery of over 750 Commentary Positions of the AEQ DCS-10 Digital Commentary System for all the Venues at the Nagano Winter Olympics.

Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC.

The commentary Switching held the capacity of an equivalent of over 4500 4W circuits. For the first time in History and for an event of this size, the Commentary Audio was integrally generated by a Digital Commentary System.

Transmissions on the International Side were integrally carried out through ISDN AudioCodecs. The Choice jointly by KDD as the International Carrier and Matsushita/Panasonic as main contractor was the ACD-3001.

On the international Side Supplementary contracts was awarded to AEQ for the same type of equipment from EBU Sports (European Broadcasting Union) and were distributed throughout the World among the EBU Members and other Broadcasters that contracted this service from EBU Sports.

AEQ also supplied Line Equalisation Equipment in order to adopt all the National Lines from NTT to nominal levels within the International Broadcast Centre (IBC) and back to Telecom Nominal Levels on the return Path.

Atlanta Olympic Games, USA Atlanta'96

Services Rendered: Maintenance.

Equipment Supply: Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC.

Once again, and for an event of this size, the Commentary Audio transmissions on the National Side were integrally carried out through ISDN AudioCodecs.

AEQ delivered over 600 Units of the AEQ ACD-3000/3001 for the circuits belonging to the National Side.

On the International Side Supplementary contracts was awarded to AEQ for the same type of equipment from EBU Sports (European Broadcasting Union) and were distributed throughout the World among the EBU Members and other Broadcasters that contracted this service from EBU Sports.

Pan-American Games, Mar del Plata'95.

Services Rendered: Maintenance.

Equipment Supply: For the first time in History and for an event of this size in Latin America, the Commentary Audio transmissions on the National Side were integrally carried out through ISDN AudioCodecs. The Choice was close to 200 Units of the AEQ ACD-3000/3001 that won the Equipment evaluation performed by TYSSA (Telefónica y Sistemas in Argentina).

FIFA World Cup, USA-94.

Services Rendered: Maintenance.

Equipment Supply: Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC.

For the first time in History and for an event of this size, the Commentary Audio transmissions on the National Side were integrally carried out through ISDN AudioCodecs.

The Choice was close to 700 Units of the AEQ ACD-3000/3001 that won the Equipment evaluation performed by AT&T.

On the international Side Supplementary contracts was awarded to AEQ for the same type of equipment from EBU Sports (European Broadcasting Union) and were distributed throughout the World among the EBU Members and other Broadcasters that contracted this service from EBU Sports.

Winter Olympics, LILLEHAMMER '94, Norway.

Services Rendered: Maintenance.

Equipment Supply: Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC.

Barcelona 92".

Services Rendered: Installation and Maintenance.

Equipment Supply: Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC.

Seville "WORLD EXPO 92".

Services Rendered: Installation and Maintenance.

Equipment Supply: 4W intercommunication Equipment and Sound Re-enforcement and Acoustics.

Winter Olympics ALBERTVILLE '92, France.

Services Rendered: Maintenance.

Equipment Supply: Design and delivery of the Commentary Switching Centre and 4W intercommunication Equipment for Commentary Switching Centre at IBC.

WORLD CUP ITALY 1990.

Services Rendered: Maintenance.

Equipment Supply: 4W intercommunication Equipment for Commentary Switching Centre at IBC.

OLYMPIC GAMES SEOUL 1988.

Services Rendered: None

Equipment Supply: 4W intercommunication Equipment for the International Broadcasting Centre.