

OUTDOOR
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Blackmagicdesign

The Green Room

Professional Studio & Live Production Guide

Blackmagic Design in Partnership with Outdoorphoto

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Introduction

Video content production by individuals and small production teams has been growing at an enormous rate in recent years.

Podcasts from entrepreneurs and enthusiasts are guiding our lifestyle and purchase choices and teaching us new skills. Education institutions are delivering elements of their courses remotely and all manner of businesses and organisations are embracing video as a highly effective way of communicating with customers, stakeholders and partners.

There is a wide range of distribution options to suit every application. Videos embedded in web pages are increasingly used to engage visitors and the channels of short and long-form videos hosted on social media platforms attract millions of

viewers and subscribers. Many of these platforms also offer live streaming facilities that are used for webinars and to enable an increasing number of business and performing arts events to increase their reach.

Video equipment is constantly evolving to better match the needs of the various production sectors and the growth in small studio and live production has given rise to some interesting developments. This guide has been produced to provide insights into techniques and equipment used for content creation and live streaming for people and organisations who are considering their first steps into content production and streaming as well as existing content producers looking to upgrade or expand their current systems.

Equipment

Cameras

There is a wide choice of familiar technologies that fit budgets for smaller studios and live production;

- Mirrorless and DSLR cameras are optimised for photography and offer extensive video capabilities. Accessories and adaptors are frequently added to provide some professional studio features including XLR audio and larger viewfinder screens
- Camcorders are optimised for video acquisition on the move and content producers are using consumer models for basic studio and live operations as well as prosumer models that offer professional features such as XLR audio and SDI at the higher end.
- A new range of Studio Cameras is now available from Blackmagic Design that is specifically designed for small studio and live events. They incorporate key studio features into a single unit, thereby avoiding the need for bolt-on accessories and their additional cables

Switchers

The central hub of a live studio, it brings together images from the cameras and other sources such as graphics and video players.

- Primarily to switch the programme output from one camera to another, some of the smallest switchers now offer capabilities such as picture-in-picture and overlaying titles and graphics
- Switchers such as the ATEM Mini Pro series also incorporate hardware encoders for streaming content directly onto the internet
- Small production switchers operate on an HDMI infrastructure for HD production with more sophisticated switchers operating on an SDI infrastructure for production in 4K

Audio Mixer

Microphones can be connected directly to the camera or connected to a separate audio mixer. However, switchers such as the ATEM Mini series incorporate their own audio mixer.

Microphones

The impact of good audio is not to be underestimated. Camcorders and some cameras have on-board microphones but high quality external microphones are the norm. Microphones can be connected to the camera via unbalanced audio cables using a 3.5mm jack or via XLR for high quality, balanced audio.

Lavalier microphones connected to a good wireless transmitter-receiver system, hand-held or desk mounted microphones are ideal for studio use depending on your application. Directional microphones can be fixed to the camera or operated on a boom.

These are just some of the main components of a production system that will operate with the support of additional items such as lights, stands, tripods and cables, to name just a few. It is advisable to consult with a trusted reseller when considering video equipment purchases. They will be able to match your production style, workflow and budget with the most appropriate equipment.

Blackmagic Design maintains a close relationship with members of the production community and the following pages are a compilation of common configurations and applications we are seeing used by our customers. They may provide insight and inspiration for your next project.

Single camera HD production

This configuration can be used to greatly enhance basic webinars covering a multitude of applications including training, corporate and stakeholder updates, education institutions providing lectures remotely as well as for podcasts streamed on social media platforms covering a myriad of topics as broad as your imagination.



The combination of a high quality camera and an ATEM Mini switcher can greatly enhance the professionalism of webinars delivered over video collaboration platforms such as Zoom, Teams and Skype.

It is also the basic configuration for streaming content such as podcasts over social media outlets including YouTube, Facebook and Twitch.

The output of the ATEM switcher will be seen as a webcam by the video collaboration and social media platforms making access to audiences simple and straightforward.

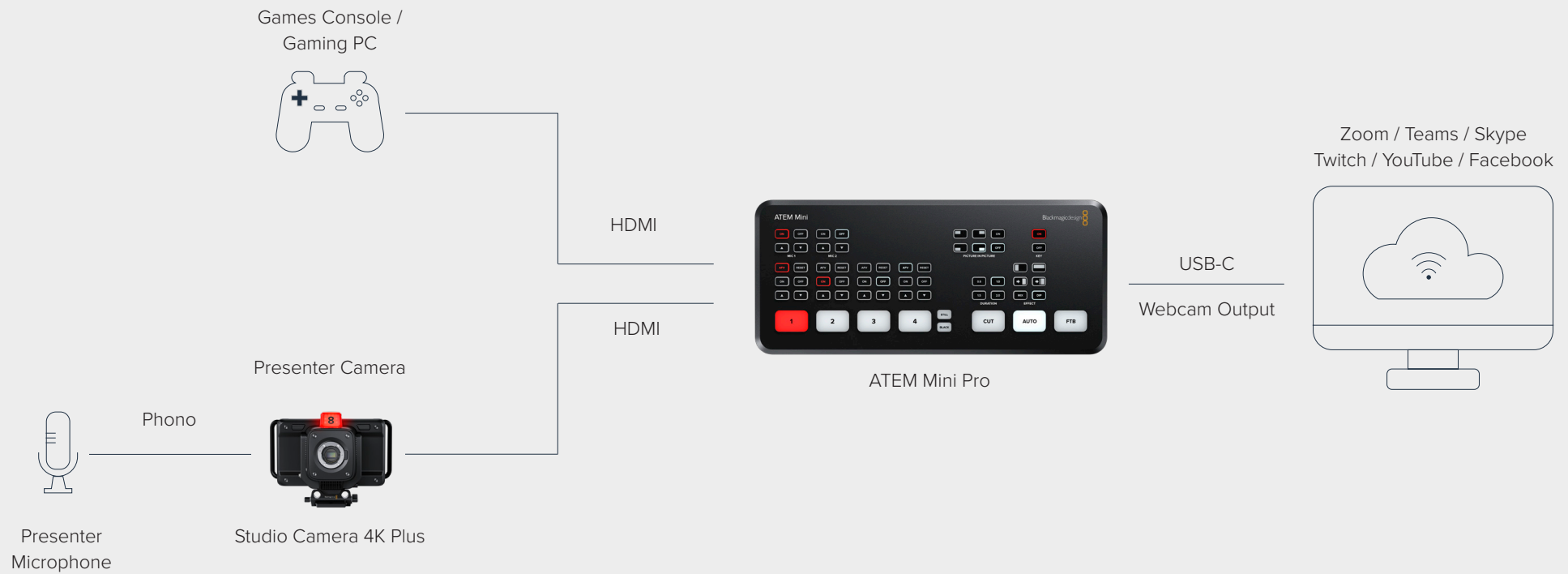
Selecting an external, high quality camera such as the Studio Camera 4K Plus or Pocket Cinema Camera 4K provides a superior image to the laptop's built-in camera and allows you the freedom to reframe the image and customise camera parameters such as the colour balance using the ATEM software control.

With the presenter camera as one input to the ATEM switcher and a computer running presentation graphics connected to a second input, the webinar or podcast can be run entirely by the presenter selecting between the camera image and graphics throughout the presentation.

In the case of streaming on Twitch, a gaming PC or games console can be connected as the the second input on the ATEM switcher. The switcher can display the camera image of the gamer providing live commentary as a picture-in-picture in the corner of the live stream of the game.

This configuration provides a very effective platform for delivering high quality, more engaging webinars and streamed content.

Single camera HD production



Dual camera HD production

Ideal for podcasting, corporate and training videos using a single presenter or joined by a co-presenter or guest. It is also an effective combination for live training sessions and productions requiring a close-up view of a physical demonstration.



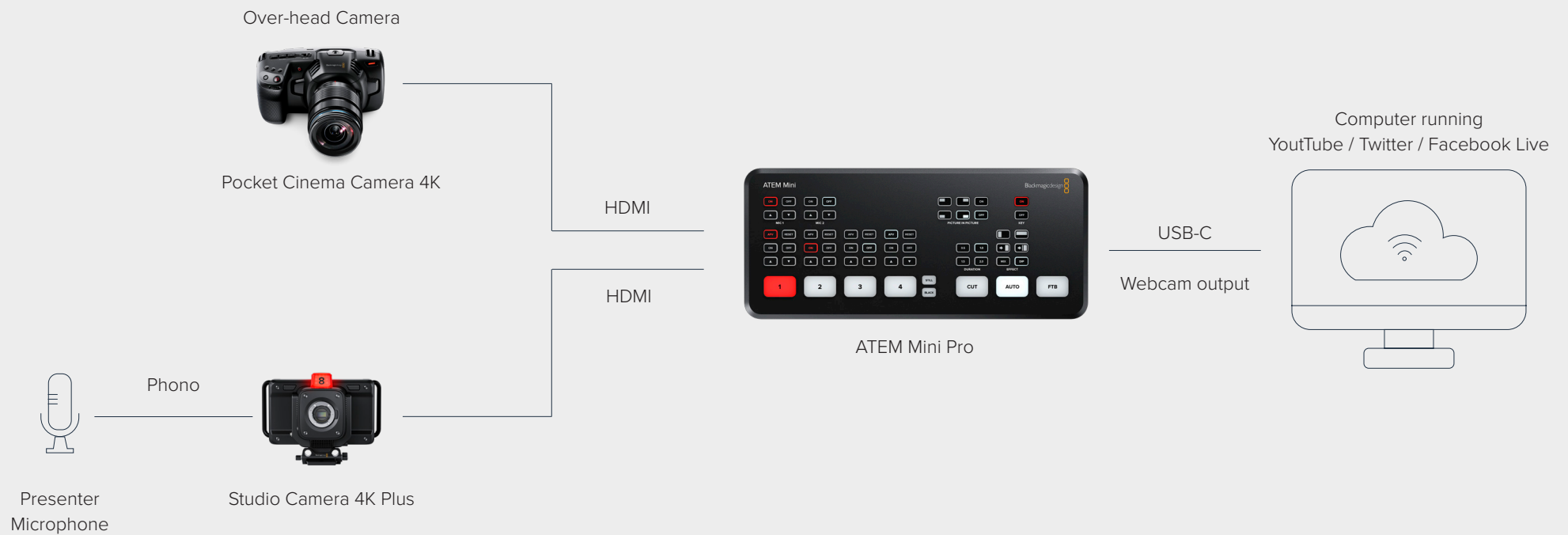
An additional camera can make productions more dynamic. Cutting between two views of a single presenter adds interest as well as being able to cover a guest on the show.

There is another key application for a second camera and it is one of the cases where a mixed economy of cameras may provide a more optimised solution. There are times when the production is enhanced by showing the audience a plan view of a piece of work using an overhead camera. For example, an illustrator teaching new techniques, or a chef demonstrating the best way to prepare ingredients for a recipe or a technical trainer showing how to dismantle and reassemble a product.

It is an advantage for an overhead camera to be relatively small and lightweight for mounting on the overhead rig. But this has to be balanced with other factors such as the desired image quality (determined by the camera sensor and lens size) as well as level of integration with other components in the system. While a consumer camcorder may be an attractive size, in order to keep production values high it is more likely that an MFT camera would be more suitable to match the quality of the main camera and offer the same remote control functionality.

In this case it would be beneficial to combine the Pocket Cinema Camera 4K, as the overhead camera, with the Studio Camera 4K Plus as the main presentation camera. They have the same camera sensor and image processing so the visual performance will be identical and the two cameras can be quickly matched remotely from the switcher control software.

Dual camera HD production



Small HD multi-camera studio



A popular configuration for content involving small groups of presenters and participants such as round table or panel discussions and interviews for use by podcasters on social media platforms or businesses and other organisations for stakeholder communications.

Small multi-camera studios are highly suitable for productions with several participants including round-table discussions and for presenting to camera from the studio floor. Cameras can be allocated to each presenter plus one for a wide shot.

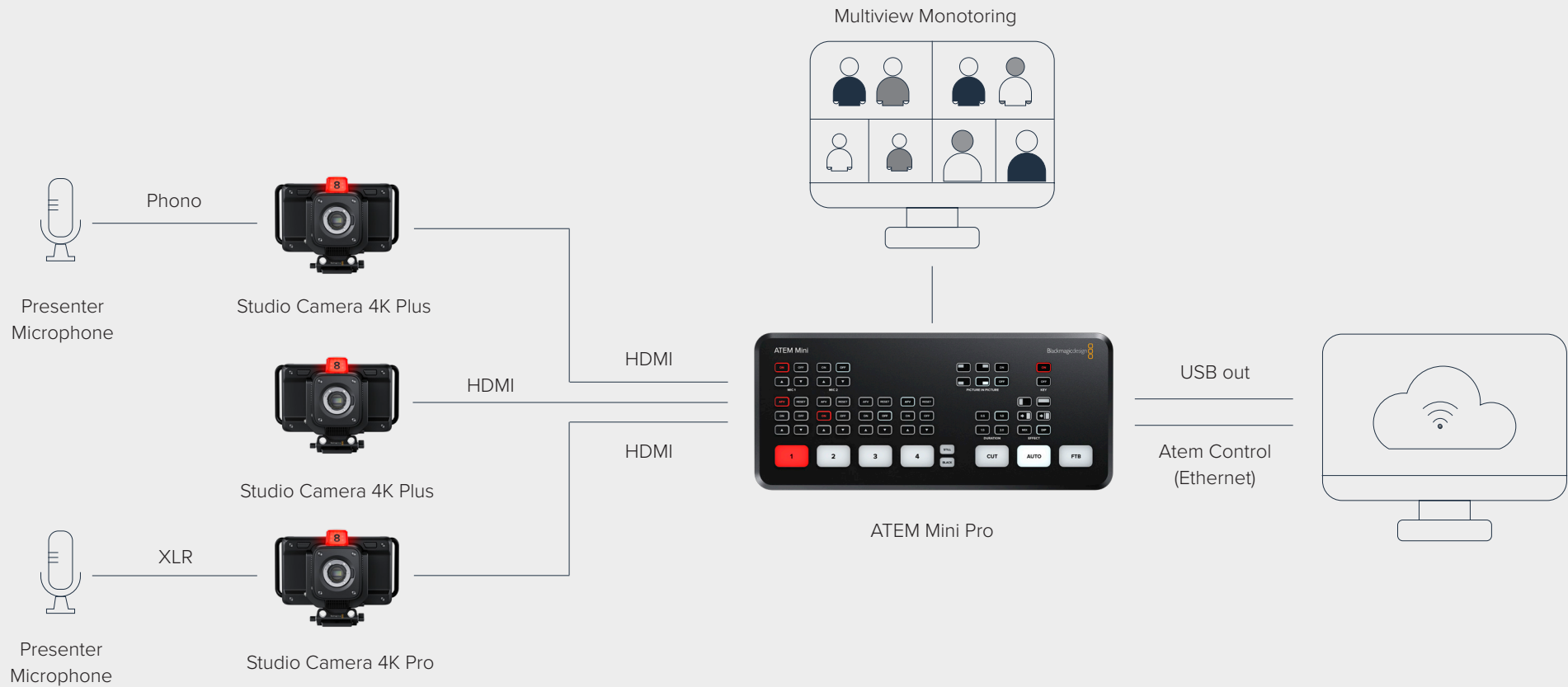
HDMI connectivity remains a good option and is suitable for cable lengths up to 10m which provides flexibility in the layout of a small studio.

The increased number of cameras places additional workload on a small production team, however, the combination of the Blackmagic Design Studio Camera 4K Plus and ATEM Mini series switchers introduces a number of workflow efficiencies;

- Studio style cameras with large viewfinders and tactile controls make it easy for a single camera operator to quickly check each camera on rotation, rather than trying to assess the image quality on the tiny flip-out screens used by mirrorless cameras and camcorders
- The increased number of cameras can be managed best using an ATEM Mini Pro switcher which accepts up to four camera inputs (Extreme versions accept eight) and provides multi view camera monitoring on a single screen
- Camera set-up parameters for level, colour and motorised lenses can be adjusted remotely using the ATEM software control application
- Studio Camera 4K Pro cameras can be integrated into the HDMI system when XLR audio connection is required for professional microphones and wireless mics

If your productions require external shots, perhaps for pre-recorded segments to be played back in a live production, consider substituting one Studio Camera with a dual use Pocket Cinema Camera 4K. It provides mobile flexibility and inside the studio it integrates seamlessly with the Studio Camera 4K range by offering the same HDMI interfaces and ATEM remote control compatibility.

Small HD multi-camera studio



High quality 4K studio



Producing in 4K elevates the quality and impact of your content to satisfy the needs of the most demanding clients and audiences. This configuration is also suitable for round-table discussions and presenting from the studio floor, but the move to SDI connectivity gives the flexibility to operate a small studio at the highest quality or expand into a larger space with more cameras and a larger crew.

Adopting 4K quality can help differentiate your productions from the competition as part of a brand strategy as well as to access new features not available on HDMI-based equipment.

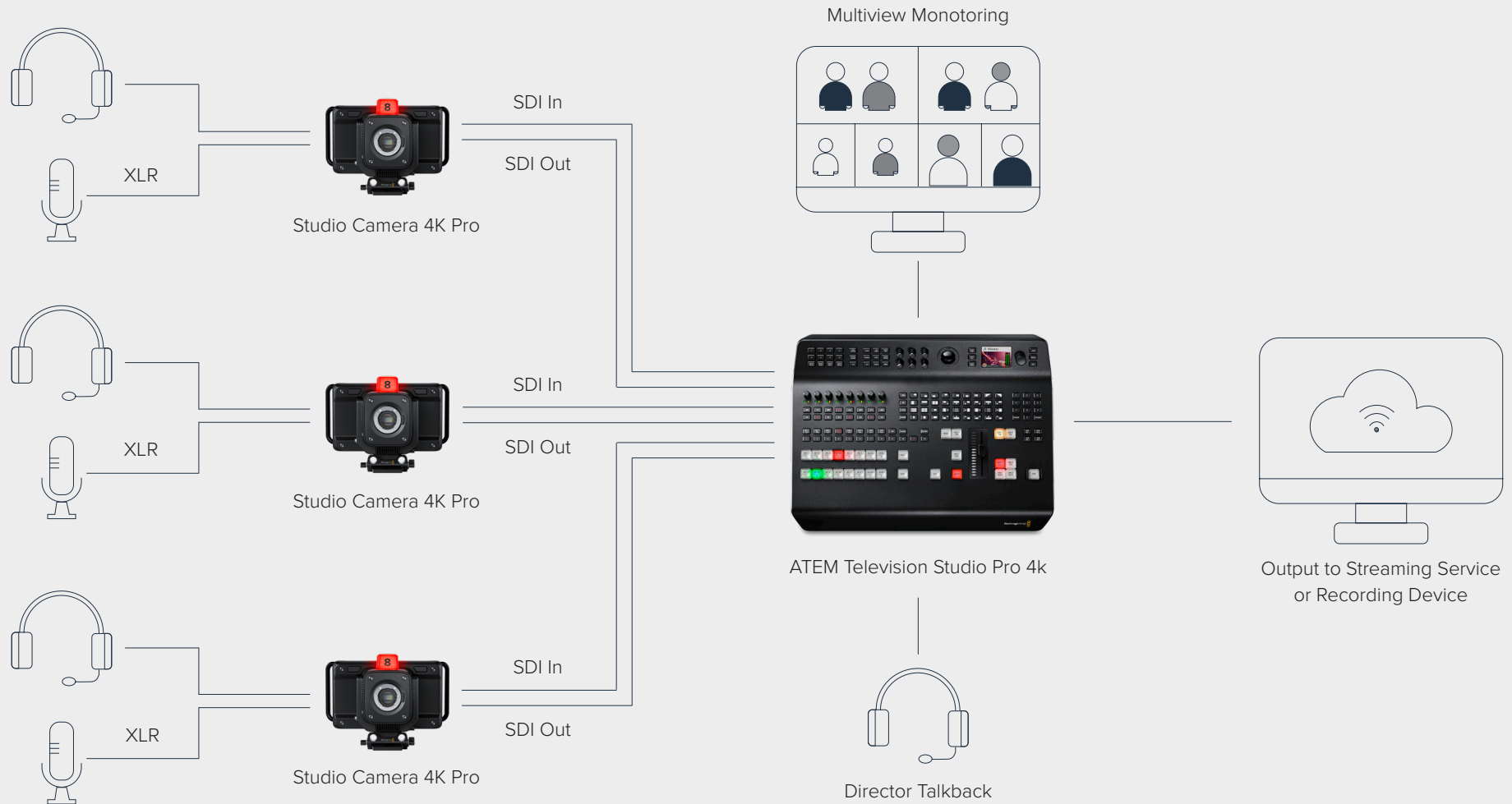
Studio and live production in 4K is based on professional SDI video and XLR audio connectivity. Mirrorless and DSLR cameras and most prosumer camcorders use HDMI, so are not a natural fit for this environment. However, the Blackmagic Design Studio Camera 4K Pro with professional interfaces is specifically designed for multi-camera 4K studio applications centred around a more sophisticated switcher like the ATEM Television Studio Pro 4K.

This combination provides flexibility and functionality not available with camera and camcorder alternatives, namely;

- Cable runs greater than the 10m limit of HDMI allows more flexibility in positioning the switcher and cameras
- Talkback ensures effective communication between the Director and camera operators
- Return video allows camera operators to quickly switch their viewfinder display between camera output and the main programme output to help with framing shots

This configuration allows you to make the production environment as simple as you like while moving up to outstanding 4K image quality. But the capability is there to expand the number of cameras and the size of crew and still maintain an efficient production workflow by taking advantage of the additional features inherent in an SDI infrastructure.

High quality 4K studio



High quality 4K live production

SDI connectivity provides the long camera cable runs required for live coverage of business and social events in halls and conference centres, theatres and music venues.

Covering live events including conferences and performing arts, such as theatre and music, presents a new set of operational challenges in comparison to a small studio. Cameras need to be rugged enough to withstand repeated rigging and de-rigging and professional video and audio connectors are essential to ensure dependable signal connections.

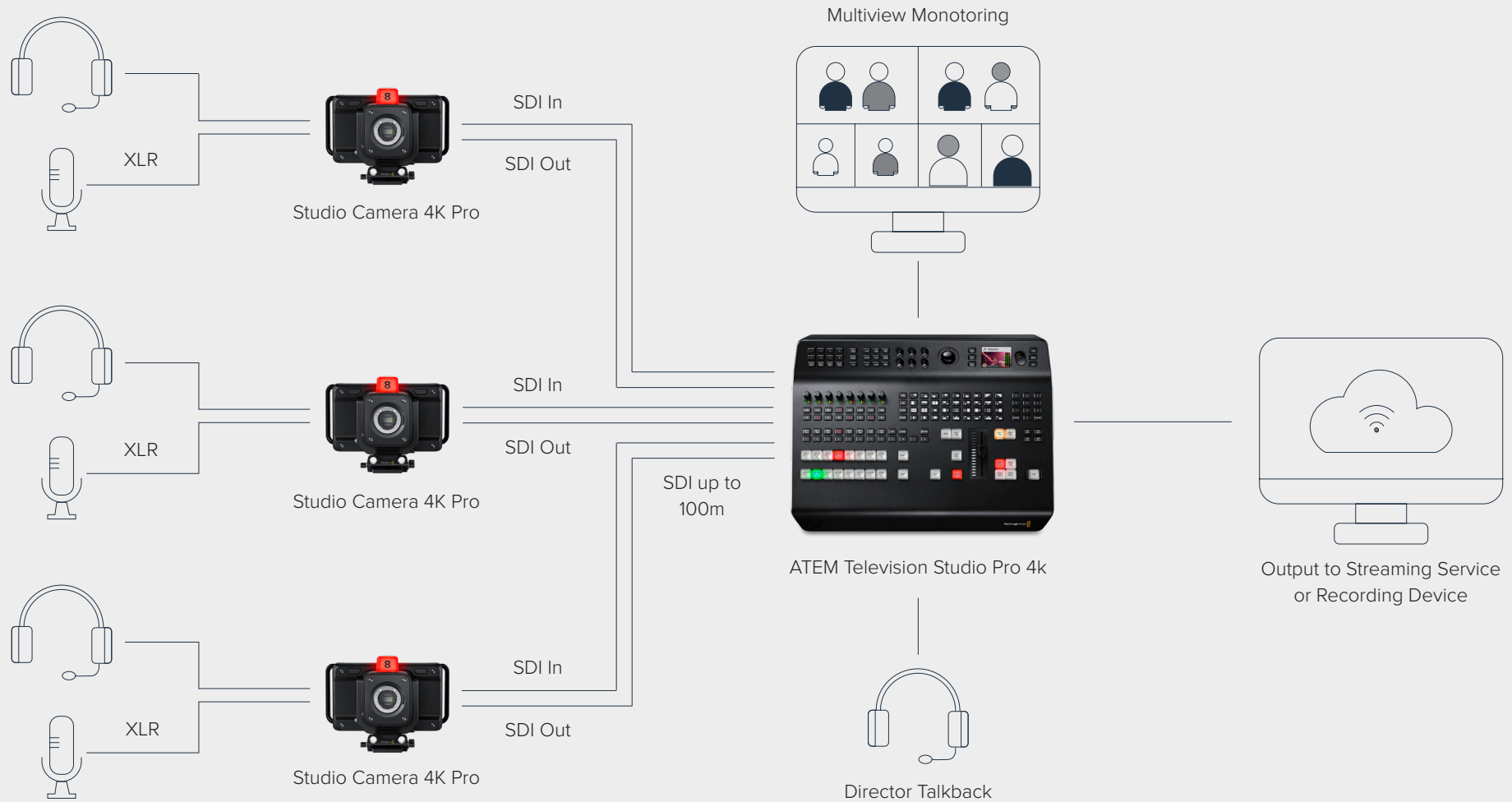


Again, a multi-camera combination of Studio Camera 4K Pro and ATEM Television Studio Pro 4K switcher is an ideal match for this application because SDI connectivity is necessary in venues where camera positions are likely to be located more than 10m from the switcher. Depending on cable quality, SDI can be used for lengths up to 100m with the added advantage the cables are more rugged, with BNC twist lock connectors to prevent them from being pulled out accidentally.

SDI signals support high quality 4K video, multi-channel audio plus Tally, Talkback and camera control signals. All of these features are fully utilised in live event coverage;

- The balanced XLR audio inputs on the Studio Camera 4K Pro can be used for wireless microphone receivers covering presenters/performers or other mics to capture the energy of the audience and route the signals down the SDI to the switcher's built-in Fairlight audio mixer.
- Large clear Tally lights are especially effective in signalling to on-stage talent which of the cameras distributed around the venue is on-air.
- The production crew may need to be larger than for a small studio and with greater separation between the Director and camera positions, so Talkback is crucial for effective direction of the camera operators.
- The ATEM software control can be used to remotely optimise and match the colour balance of all Studio Camera 4K Pro Cameras.

High quality 4K live production



High quality 4K live using 10G Ethernet

The 10G Ethernet camera cable system is also suitable for covering business and social events in halls, conference centres, theatres, music venues and houses of worship with the added benefit of simplifying long cable runs down to a single cable per camera.



The mainstream, broadcast studio and live cameras used on large budget productions use a single optical fibre cable to simplify cabling between the camera and switcher. Fibre is used for convenience on short cable runs in a broadcast television studio and out of necessity for large sporting events such as golf and horse racing where camera cable lengths can exceed 1Km.

Blackmagic Design has adapted this approach for professional, multi-camera applications using single 10G Ethernet cables for connection between each Studio Camera 4K Pro and a switcher, such as the ATEM Television Studio Pro 4K, that can be located up to 70m away.

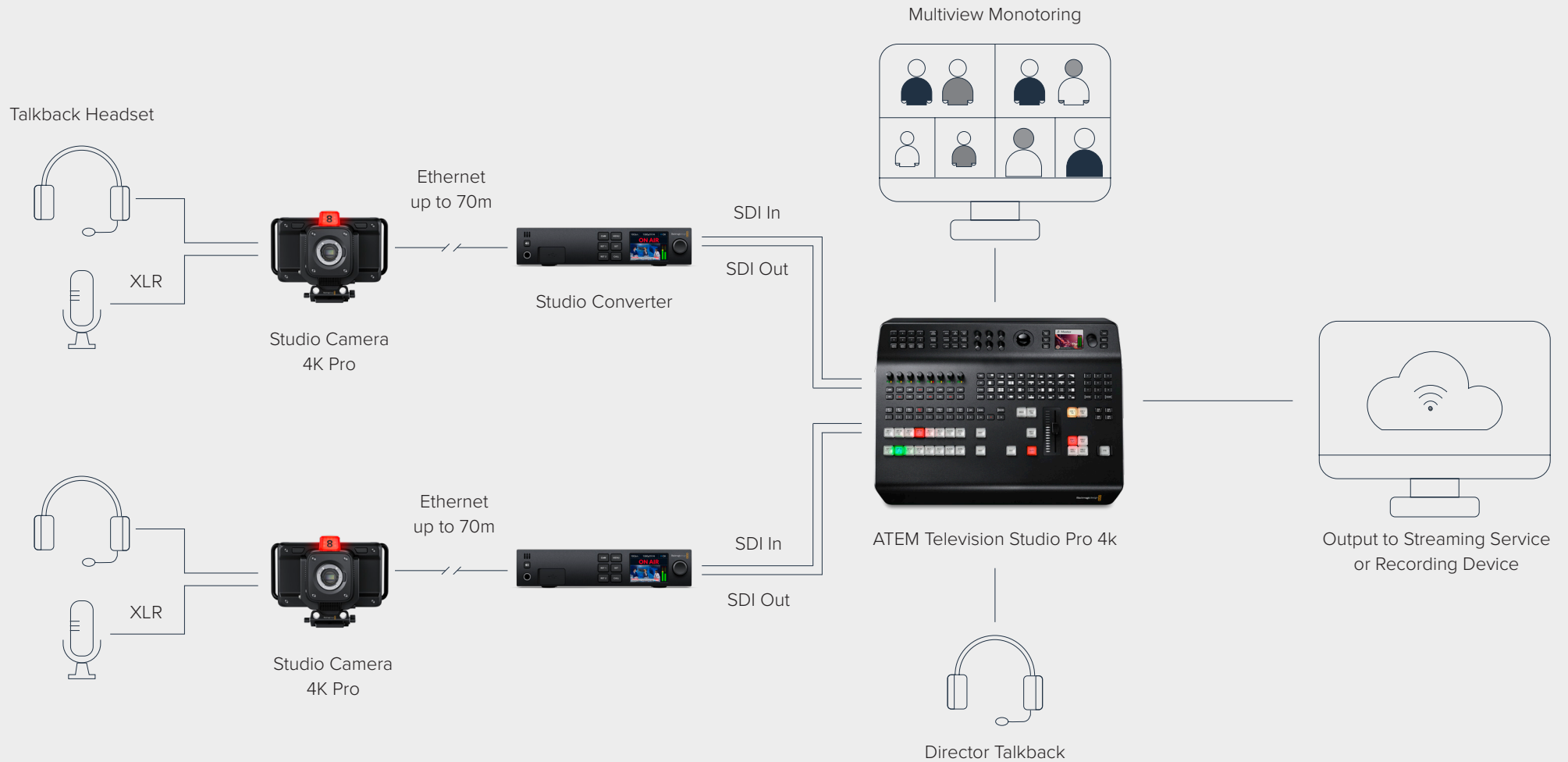
The 10G Ethernet connection from each camera provides the same, full camera signalling and control as an SDI-based system but replaces the cable loom with a single, easy-to-deploy cable, capable of long cable runs.

A single CAT-6A copper Ethernet cable carries bi-directional video, audio and Talkback signals, as well as the Tally and camera control signals output by the switcher. The system requires a Blackmagic Design Studio Converter unit for each camera, which is positioned at the switcher end, to interface between the camera's Ethernet connection and the switcher's SDI infrastructure. Each Studio Converter unit also provides power-over-ethernet (PoE++) to the camera in case a power outlet is not available nearby.

The system uses off-the-shelf or customised lengths of CAT-6A cable which are cost effective and straightforward to repair, unlike fibre which is expensive and requires specialist skills and tools. On a practical note, thanks to the low cost, it is feasible to lay a spare CAT-6A cable from the switcher to each camera position as a back-up.

Production crews covering events in large venues will delight at the full camera functionality of this system combined with the ease of rigging and de-rigging long length cabling.

High quality 4K live using 10G Ethernet



Blackmagic Design

Unit 5b, Chistleton Court,
Manor Park,
Runcorn,
Cheshire,
WA7 1ST

Phone: +44(0) 1565 830049
Email: info-emea@blackmagicdesign.com
Website: www.blackmagicdesign.com

Outdoorphoto

Shop No 3, Lighting Warehouse Building
Corner of Garstfontein Rd & January Masilela Dr
Waterkloof Glen
Pretoria
South Africa, 0181

Phone: 012 348 3693
Website: www.outdoorphoto.co.za