Livestreaming Research Intro

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Introduction

We have done fairly extensive research into livestreaming over the past few months. Main sources have been Google, Youtube, Facebook – Churches that livestream group, CVP.com, ProAV.com, conversations with supply companies (Rock Tech, Ashdown Audio Visual, Avenue Services) and we have also consulted a professional video editor who has worked on livestreaming professionally, a professional Artistic director, a professional music producer, a professional video production company director, a former BBC signals specialist who helped operated a livestream at their previous church for the last two years. (We’re very lucky to have had access to these people in our congregation).

Having said that, I, a curate, have drawn it all together, and it is also comparatively a very new area of technology. Despite this, we have received support from our technical team at Christ Church (the professionals mentioned above) to pursue a final proposal (see Tech brief and Most up to date quote), with the addition of some lighting to improve the picture quality we will get (something that is actually quite important). One of the benefits of having a ‘lay’ (with regards to all things technical) person draw this up has been that hopefully the explanation you find below, particularly in Appendix 2 of the Standing Committee Report, will be understandable to those new to the area of livestreaming.

All three companies we have dealt with have been helpful and are familiar with churches and I’m sure would be happy to offer expertise and quotes.

We have come quite a long way since beginning the research in terms of the exact technical components we are planning on buying and using. The Standing Committee report is now out of date for us, but might offer some useful background knowledge with which to arm yourself for conversations with potential supply companies. Perhaps the most important thing to consider, which I have sometimes struggled to keep in mind is – what exactly are you planning on doing? What type of online service? Where will you ‘stage it’? How many cameras do you want/need? And obviously there will also be the significant questions of budget and volunteer capacity (skill and time).
The process of researching and refining the technical side of things, as well as answering these questions is continuing for us still. We recently discovered that livestreaming sung worship, using a band, will be very difficult to manage if we want a high quality sound. A lot of work can be done to improve the sound of a band if it is pre-recorded and then edited using audio editing software (Logic/Ableton Live/ProTools). Therefore we are not pushing to do this, although at some point in the future perhaps we might try. We are also a fairly technically minded church which already had a good set up with advanced sound desk and ProPresenter for lyrics (and a knowledgeable team).

There are some very good and simple solutions for livestreaming such as the Blackmagic Design ATEM mini which could be appropriate for many churches (although as they’re in high demand there might be a wait if you want to buy one right now). If you are looking for something simpler, then Appendix 2 of the Standing Committee report (p.10), and diagrams (p.14), the Salvation Army quotes (p.18) and talking to an external company might be the most useful place to start.

Hopefully the research we’ve done might be helpful. Happy to answer questions if I can.

Rev. Gordon Taylor
gordon@cctw.org.uk
Standing Committee Report:
Long term livestreaming solutions

Background
Livestreaming is an incredibly broad subject. It is now possible for a church to livestream from a single mobile phone to Facebook or to spend tens of thousands of pounds to create an almost professional livestreaming setup. There are questions about cameras, interface devices between cameras and computers, new computers, new sound equipment and livestreaming software, all of which need to be considered, and need to be compatible with each other. Technology is also constantly changing, and with it, expectations of quality are always on the rise. We need to figure out what we want to do, how we want to do it and how much we are willing to spend, whilst considering our limitations, particularly volunteer recruitment, time and expertise.

What we’re currently doing
At the moment our current setup is:
- Camera: Mobile phones belonging to staff members.
- Sound: Tie clip microphones plugged in to phones.
- Interface: Software enabling phones to broadcast over internet to Wirecast software on Tech manager’s computer
- Software: Wirecast studio
- Computer: Tech manager’s macbook
- Operator: Tech manager (temporarily contracted paid professional)
- Broadcasting destinations: Facebook and Youtube (embedded on website as well)

What we’re planning for?
In the long term we are aiming to have a fixed system whereby equipment can be left in place securely and operated by a minimal number of people. This system will be integrated with the new building development. In the short term we are aiming for a system that produce a reasonably high quality livestream whilst the church building remains restricted to a small team. Therefore we should consider the best long term outcome and then implement a small scale version in the short term that can be built on so that it will one day become the long term solution. Government guidelines suggest that places of worship could open as early as 4th July.
Priorities and constraints

Before considering the possible technical solutions, our priorities and constraints should be considered. (Appendix 2 contains detailed explanation behind some of these suggestions)

Some suggestions are:

Priorities

- High quality livestream on Youtube and Facebook
  - 1080p HD resolution
  - 2 Cameras?
  - Audio input from sound-desk
- Makes use of Wirecast (which we have already purchased)
- Simple to use.
  - Split lyrics and livestreaming role – purchase extra computer.
- Requires limited additional volunteer roles – one extra volunteer in addition to sound desk operator and lyrics operator.
- A price which the standing committee/pcc can agree.
- Initial short term solution can be acquired and installed by July

Constraints:

- Set up must work within the Sanctuary space (i.e. cameras and kit must have limited effect on seating, space and service running).
- Our internet upload speed will be a major constraining factor on the quality of the livestream and will dictate which equipment should be bought (there’s no point in buying cameras with 4k resolution when our internet will only handle broadcasting HD).

Decisions to make

- Agree priorities and constraints, including indicative budget (Appendix 1 contains indicative options).
- Seek external professional advice – it will be invaluable to seek out advice and at least 3 quotes from professional companies that provide livestreaming solutions (to churches and other organisations), particularly with regard to new computers and additional hardware for interfacing cameras and video feeds.
- Work up a short term solution and begin testing.
- Consult tech experts known to the church (congregants, friends, colleagues in other churches) to further clarify specifications and requirements from a livestreaming solution.
- Share our working and findings with the wider church.
Appendix 1 – Options and proposals

<table>
<thead>
<tr>
<th>Option</th>
<th>Approx Price</th>
<th>Comment</th>
<th>Proposal No.</th>
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</thead>
<tbody>
<tr>
<td>Using existing kit, including Tech manager’s laptop</td>
<td>£300.78</td>
<td>This means we are reliant on kit owned by Curate and Tech manager. We may also not be able to display lyrics on both the projector and monitor screen.</td>
<td>1</td>
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<tr>
<td>1 DSLR Camera</td>
<td>£4880.08</td>
<td>A simple set up with just one dslr camera and mid-spec computer</td>
<td>2</td>
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<tr>
<td>1 Camcorder</td>
<td>£6465.70</td>
<td>A more complicated setup with 1 camcorder and the capacity to add one more as and when. Mid-spec computer.</td>
<td>3</td>
</tr>
<tr>
<td>2 Camcorders</td>
<td>£8256.10</td>
<td>A full set up with 2 camcorders and a hi-spc computer.</td>
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<tr>
<td>3 PTZ Cameras</td>
<td>£11,537.10</td>
<td>A setup using PTZ cameras and wirecast gear computer.</td>
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Proposal 1:- Super short term – Existing camera (Curate’s), existing tripod and use Black magic ultrastudio interfaces – HDMI connections. Use Tech manager’s laptop. Would require camera to be close to AV area. Use HDMI splitter to try and link projector and monitor screen to mac.

<table>
<thead>
<tr>
<th>Item</th>
<th>Technical description</th>
<th>Cost</th>
<th>Quantity</th>
<th>Total</th>
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<tr>
<td>Cables for cameras to video interface</td>
<td>Thunderbolt cable (2m)</td>
<td>£35.99</td>
<td>1</td>
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<td>Video interface box – in from camera and lyrics to livestream</td>
<td>Black magic ultrastudio mini recorder</td>
<td>£154.80</td>
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<td>£154.80</td>
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<td>Adaptors for Video interface boxes</td>
<td>Thunderbolt 2 to 3 adaptor</td>
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<td>HDMI Splitter</td>
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<td>Comment</td>
<td>TOTAL</td>
<td></td>
<td></td>
<td><strong>£300.78</strong></td>
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Proposal 2 – Low quality - 1 DSLR Camera, existing tripod and use Black magic ultrastudio interfaces – HDMI connections. Would require camera to be close to AV area.

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<th>Technical description</th>
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<td>1 DSLR</td>
<td>Canon M50 with EF-M 18-150mm lens</td>
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<td>Cables for cameras to video interface</td>
<td>Thunderbolt cable (2m)</td>
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<td>£35.99</td>
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<tr>
<td>Video interface case - video out from lyrics to projector, monitor screen and livestream</td>
<td>Sonnet Echo express 3-D (Thunderbolt 2)</td>
<td>£849</td>
<td>1</td>
<td>£849</td>
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<tr>
<td>Video interface contents - video out from lyrics to projector, monitor screen and livestream</td>
<td>Black magic deck link – Mini monitor</td>
<td>£131.10</td>
<td>3</td>
<td>£393.30</td>
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<tr>
<td>Video interface box – in from camera and lyrics to livestream</td>
<td>Black magic ultrastudio mini recorder</td>
<td>£154.80</td>
<td>1</td>
<td>£154.80</td>
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<tr>
<td>Adaptors for Video interface boxes</td>
<td>Thunderbolt 2 to 3 adaptor</td>
<td>£49</td>
<td>2</td>
<td>£98</td>
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<tr>
<td>New Livestreaming computer</td>
<td>iMac – mid spec 16 GB Memory 512 TB SSD 3.2GHz, 6 core, 8th Generation Intel Core i7 processor</td>
<td>£2149</td>
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<td>£2149</td>
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<td>Comment</td>
<td>TOTAL</td>
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Proposal 3 – 1 Camcorder, mid-spec computer, SDI connections.

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<td>Video interface case - video in from cameras and lyrics to livestream</td>
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<td>Video interface contents - video out from lyrics to projector, monitor screen and livestream</td>
<td>Black magic deck link – Mini monitor</td>
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<td>Video interface contents - video in from cameras and lyrics to livestream</td>
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**Comment**

**TOTAL**

£6165.70
## Proposal 4 – 2 Camcorders, SDI connections and hi-spec computer

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<tr>
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<td>Cables for cameras to video interface</td>
<td>SDI cables (20m)</td>
<td>£33.60</td>
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<td>Video interface case - video out from lyrics to projector, monitor screen and livestream</td>
<td>Sonnet Echo express 3-D (Thunderbolt 2)</td>
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<td>Sonnet Echo express 3-D (Thunderbolt 3)</td>
<td>£829.20</td>
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<td>Video interface contents - video out from lyrics to projector, monitor screen and livestream</td>
<td>Black magic deck link – Mini monitor</td>
<td>£131.10</td>
<td>3</td>
<td>£393.30</td>
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<tr>
<td>Video interface contents - video in from cameras and lyrics to livestream</td>
<td>Black magic deck link – Mini recorder</td>
<td>£154.80</td>
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<td>New Livestreaming computer</td>
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<table>
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# Proposal 5 – 3 PTZ cameras, SDI connections and hi-spec computer

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<tr>
<td>3 PTZ cameras</td>
<td>Datavideo PTC-140w PTZ Remote Video Camera</td>
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<td>2 Tripods</td>
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<td>Video interface contents - video out from lyrics to projector, monitor screen and livestream</td>
<td>Black magic deck link – Mini monitor</td>
<td>£131.10</td>
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<tr>
<td>Hi spec livestreaming computer</td>
<td>Wirecast gear</td>
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**Comment** TOTAL £11,537.10
Appendix 2 - Livestreaming and technical decisions in more detail

Overview of components

- Camera – DSLR, Camcorder or PTZ? How many? Operated?
- Audio solution – Using existing desk vs Separate Mixer
- Lyrics solution – On same computer as wirecast or different
- Video interface – PCIe card expansion or Wirecast?
- Computer – Existing mac or new computer?
- Operators – Paid vs Volunteer, how many?

Camera – Approx cost £1000-2000 per camera (£2000-4000 in total)
The big decision with livestreaming in general, that impacts cameras is whether to use HDMI or SDI. Cameras with SDI outputs are the best solution for positioning cameras further away from the sound desk/AV area because HDMI loses signal over 3m and will require repeaters. Furthermore, SDI have BNC connectors which are very sturdy (bayonet twist) and so are not likely to come out, whereas HDMI can fall out. HDMI spec also means that sometimes when signal is lost, the only solution is to switch everything off and on again (as we’ve experienced with our projector).

Then there are 3 basic categories for cameras.

- DSLR – A digital camera designed for taking still photographs, but can be used for video. They’re good for giving a well-lit picture and are very portable for using in different contexts (interviews etc.), but generally don’t come with power adaptors which poses a real challenge for streaming a whole service.
- Camcorders – These are designed for shooting video with features like power adaptors, good options for connectivity (different types of inputs and outputs which offer better quality and ease of use) and smooth electronic zoom if needed. They are reasonably portable (they have batteries) and could be used for other contexts (like interviews). They can be more difficult to use (or at least set up).
- PTZ – Pan, tilt, zoom cameras are used by many churches. The quality is generally not as good as camcorders and DSLR’s (or at least these are more expensive for the same quality) but they can be very simple to use once installed. You can make the camera pan/tilt/zoom from a remote control or using wirecast. They can be moved or fixed in place. They don’t have batteries so could not be used outside or moved about much.

Tech manager Wilson suggested 1080p rather than 4k resolution because 4k requires much greater bandwidth to broadcast (because of the higher quality) and many people don’t have 4k TVs so they won’t be able to take advantage of it even if we did broadcast using 4k. Cameras that can shoot in 4k are also more expensive.

My suggestion would be a camcorder because of the high quality, flexibility (inputs and outputs) and ability to use in a variety of contexts, as well as being slightly cheaper. Because they have a battery they will enable us to shoot videos outside or moving round. Having said that, a PTZ camera could also be a good solution. More research and
professional advice should be sought, but the standing committee could agree in principle to purchase one camera. In the future we may wish to purchase a second or even third. We have a DSLR at the moment which we could use in the short term. Camcorders and PTZ cameras can also be acquired within 1-2 weeks. We actually already have a PTZ camera and I am working to find out how to use it for live streaming, but the quality appears to be quite poor.

**Audio solution**
The audio from the service will need to be incorporated into our broadcast to ensure good quality (rather than just having a microphone on the camera that picks up what can be heard in the sanctuary). The options for this are:

- **Taking the audio output from the sounddesk** into the broadcast. This can be done in several ways, but our preference would be to take one of the in-ear monitor mixes away from the band and use that for the livestream. This would enable the person monitoring the livestream to mix the sound themselves using an app on an ipad. We have all the necessary kit for this. The major downside is that the band will have one less in-ear monitor mix. There are quick, cheap solutions such as splitting one mix to two musicians (drums and bass) or more in depth solutions such as an additional mixer for the in ear system.

- **Purchasing a new mixer** for the broadcast. This would involve spending up to £1000 to have an additional console (or wireless mixer operated by an ipad) to remix all the sound inputs in greater detail. This would give the best quality, but would require a lot more time to set up and attention from a volunteer.

I would suggest the former option, taking audio output from the sounddesk, particularly to start with. It would still give us sufficient control over the mix which should give good quality. It also means we make the most of kit we have already bought. The impact on the band will have to be monitored and a potential solution for one less in-ear monitor mix for them will have to be taken into account.

**Lyrics solution**
This is quite a complicated aspect of the livestream. Lyrics will need to be sent to three destinations - the projector screen for those in church, the monitor screen above the sound desk for the leader/preacher/band, and to the livestream. Each of these destinations will operate using a different resolution (screen size) and therefore there is no good quality, quick solution such as simply splitting the output from the computer. There are 2 options to overcome this:

1. Use the existing computer to operate both pro-presenter and wirecast simultaneously. This will mean that one person could (in theory) operate both the livestream and the lyrics. The benefit is no extra volunteer is required, but the volunteer will need to be trained to a higher skill level. The other benefit is that pro-presenter can ‘send’ the lyrics to wirecast through changing settings in the software (making pro-presenter talk to wirecast on the same computer). The biggest risk with this system is that there is a lot of strain on both the computer and the volunteer and something could go wrong quite easily – the computer might freeze, or the
volunteer might get in a muddle with the different bits of software. This will require testing to see if the Sanctuary Mac has the capability to operate in this way.

2. Purchase additional hardware for the Sanctuary Mac. A mid-cost option would be to keep the existing mac and then buy an external piece of hardware called a PCIe card expansion system, with monitoring function. This is like a mega-dongle or hub for different connections, which then only takes up one socket in your computer. This would enable us to output the lyrics to all the screens as needed. It would also enable us to have a second screen for the operator, making it easier to operate the lyrics and livestream at the same time. This will cost approximately £1000. There is a possibility that this will slow down the Sanctuary Mac to an unacceptable level – this will require testing and further research. If the mac cannot cope with lyrics and livestreaming then there are two further options – 2b and 3 below.

b) Purchase additional hardware and new computer for lyrics and livestreaming. This would be one new computer to cope with both lyrics and livestreaming. It would have to be a very powerful computer and the risk is that one person still gets muddled or overwhelmed by the two jobs.

3. Purchase additional hardware and new computer for livestreaming. This is more expensive but would split the volunteer role in two, making each job more manageable. One person to oversee lyrics, one person to oversee the livestream. This would involve the same as option 2 but then also purchasing a new livestreaming computer (considered in more depth later).

4. A further option, which may still be necessary depending on how the Sanctuary Mac copes with operating the PCIe expansion system would be to get a new computer for the lyrics and a new computer for the livestream. This would be the most expensive option but would ensure all the external hardware is compatible with each other and that everything works exactly as it should!

Making a final decision on the lyrics solution and video interface solution will require professional help and advice.

Video Interface
In order to connect cameras to computers, some sort of external hardware is required. We currently have a ‘capture card’ (a small £200 box) which enables us to attach one camera to a mac computer. We bought this at the beginning of lockdown when we first thought we would broadcast from church. In order to project lyrics now, we will need another capture card or external hardware similar to that mentioned above. A PCIe expansion card system with recording function. This will require professional advice, but could cost approximately £1000.

Computer
At present we are using Wirecast, which is livestreaming software that requires a fairly powerful computer to operate it. Tech manager Wilson’s laptop (a very high spec Apple Macbook Pro) is currently operating it successfully. Without this there is a possibility that the Sanctuary Mac would be able to operate Wirecast (it has the recommended requirements), but testing should be carried out, especially if we try to use the Sanctuary
Mac to provide lyrics as well as operating Wirecast. Curate’s laptop, an older and lower spec Macbook Pro could be used as an alternative, but is less powerful than the Sanctuary Mac (it could possibly be used to provide lyrics whilst the Sanctuary Mac operates wirecast, as providing lyrics is generally less intensive).

However, the overall likelihood is that we will require a new computer of some description for the long term. This could be either a Mac or PC solution. Wirecast offer a computer solution but it is very expensive (at least £5750) and may perhaps not be as flexible for multiple uses as an alternative. More research is required and professional advice should be sought for this.

Operator
The big question for this sections is do we need 1 or 2 operators for lyrics and livestreaming and should any of the operators be paid.

My suggestion would be that we split the lyrics and livestreaming function between two people and have a computer for each of them. Whilst requiring an additional volunteer, it will increase the likelihood that both functions are carried out smoothly without errors. It will also mean that volunteers are not required to learn how to use Wirecast instantly, or possibly at all. If we had one person doing both, then someone who is used to operating the lyrics would be required to instantly learn and operate wirecast, even though the lyrics are comparably simple to operate.

It would be worth considering whether anyone in a paid capacity should be retained or taken on as we find our feet and train volunteers. This could be an existing contractor (like Tech manager) or a newly recruited staff member (perhaps a worship/creative director).
Rob adds himself using Wirecast software.

**Current setup** - Remote broadcasting from home using Wirecast Go remote app and Technical Wizard on Wirecast at their home.
General setup for livestreaming from church - Cameras, audio from sound desk and lyrics from propresenter/easy worship need to go into a computer for livestreaming (which could run Wirecast or vMix or OBS - livestreaming software options)
Simple setup for livestreaming from church - One digital camera, going into computer via Blackmagic Design Ultrastudio Mini Recorder (video interface - links camera to computer). Audio from desk into computer. Lyrics from propresenter into computer using another Blackmagic mini recorder.
Advanced setup for livestreaming from church - Same as above but multiple cameras into computer using video switcher or interface box.
## DESCRIPTION

**STREAMING SETUP EQUIPMENT**

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<th>QTY</th>
<th>Description</th>
<th>Rate</th>
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Sub Total  £4212.69
VAT @20%      £842.54
TOTAL        £5055.23

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**TERMS**

Quotes are valid for 30 days from date shown above, thank you. By agreeing to use Avenue Services you agree to our Terms & Conditions that can be found here: avenueservices.co.uk/tsandcs

**Avenue Services**

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CT6 5QX

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avenueservices.co.uk
@avenueservices
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Sub Total: £2907.84
VAT @20%: £581.57
Total: £3489.41
# Estimate

**From:** John-Marc Swansbury  
**Date:** 11/5/2020

**Quote Address:** Major Mark Herbert  
The Salvation Army  
South East Division

**Delivery Address:** Major Mark Herbert  
The Salvation Army  
South East Division

**Reference:** LSESA01  
**Job Number:** 11993  
**No. of Days:** N/A

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## Description: Streaming Setup Equipment

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<td><strong>Streaming Equipment Setup - Kit 3</strong></td>
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<td></td>
<td><strong>Video Equipment</strong></td>
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<tr>
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<td>Blackmagic Design Atem Mini Pro Video Switcher Streamer</td>
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<td><strong>No Installation Costs Included At This Time - TBC</strong></td>
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Sub Total: £1286.86  
VAT @20%: £257.37  
Total: £1544.23

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**Cheques**

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**Sort Code**  
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Avenue Services  
81 Gordon Road,  
Herne Bay,  
CT6 5QX
Tech brief for livestreaming solution

What we’re currently doing
At the moment our current setup is:

- Camera: Mobile phones belonging to staff members.
- Sound: Tie clip microphones plugged in to phones.
- Interface: Software enabling phones to broadcast over internet to Wirecast software on Tech manager’s computer (Wirecast Go app)
- Software: Wirecast studio
- Computer: Tech manager’s macbook
- Operator: Tech manager (temporarily contracted paid professional)
- Broadcasting destinations: Facebook and Youtube (embedded on website as well)

What we’re planning for?
In the long term we are aiming to have a fixed system whereby equipment can be left in place and operated by a minimal number of people. This system will be integrated with our current setup in church (see diagram 1). In the short term we are aiming for a system that produce a reasonably high quality livestream whilst access to the church building remains restricted to a small team. We would have an AV team of 3 (sound, lyrics, livestream), a small band with guitar, keyboard, possibly cajon and 2 vocals (a further 3-4 people), plus a service leader (or 2) and preacher. This would mean a maximum of 10 people in a service team (plus any operations staff for cleaning/sanitizing).

Priorities

- High quality livestream on Youtube and Facebook (simultaneously)
  - 1080p HD resolution
  - 2 Camera angles
  - Audio input from sound-desk (usb out or aux line out)
- Makes use of Wirecast (particularly for ability to receive remote feeds from Wirecast Go iOS app, and to include pre-recorded assets).
- Having a portable camera that can be used in other contexts (outside/) to produce good quality pre-recorded videos for website/social media.

Constraints:

- Set up must work within the Sanctuary space (i.e. cameras and kit must have limited effect on seating, space and service running). The cameras could be operated/situated at perhaps 20 metres from av hub. We think SDI would therefore be favourable over HDMI connections, but are open to NDI whilst aware of cost.
- Current internet upload speed – 10Mbps, but could go up to 20Mbps max.
Operating team

- Current AV team – Our team comprises about 7-8 people, but we do have new additions from time to time, we are also looking to recruit a part time paid production manager who would oversee recruitment, training and organising the volunteers for each Sunday (as well as operating some of the kit themselves).
- All volunteers receive training.
- 2 volunteers each Sunday, one operating Qu32 mixing desk, one operating iMac with ProPresenter 6.
- We are looking to add in a third volunteer to operate the livestreaming. This would mean operating wirecast and all cameras from one position (so fixed cameras/preset angles which could be modified at start of service but would then probably remain fixed rather than moving cameras around once service has started). In the short term we think we may have additional volunteers to help operate the system when the services are broadcast from the building, but with no congregation present in the building. So we could have a camera operator in the short-term in addition to sound desk, lyrics and livestreaming operators.

Potential new kit/costs

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<tr>
<th>Item</th>
<th>Technical description</th>
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<tr>
<td>Camcorder</td>
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<tr>
<td>Tripod</td>
<td>Video tripod – Fluid head video tripod</td>
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<td>PTZ Camera</td>
<td>Datavideo PTC-140 PTZ HD Video Camera</td>
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<td>Cables for cameras to video interface</td>
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<td>Video switcher</td>
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<td>Video interface</td>
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<td>Video Preview monitor</td>
<td>PC Monitor (spec tbc)</td>
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<td>New Livestreaming computer</td>
<td>iMac – mid spec 32 GB Memory 512 TB SSD 3.2GHz, 6 core, 8th Generation Intel Core i7 processor 4GB HBM2 graphics</td>
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Additional expenses

- We will need to upgrade ProPresenter 6 to ProPresenter 7 at a cost of $275 in order to connect the lyrics display to the livestream (the new version has a function that allows this over the network which would be a significant cost saving on physical connections).
Current Set Up

- Allen & Heath Qu32
- Audio interface
  USB out from Qu32
- iMac (late 2015) - ProPresenter 6
  3.3GHz i7
  1TB SSD
  16GB DDR3
  Intel Iris Pro Graphics 6200 1536MB
  2 Thunderbolt 2 outputs (with adaptors) for HDMI connections.
- Hisense Stage Monitor Display (HDMI)
- Projector (HDMI)
New Set Up

Allen & Heath Qu32

Audio interface
Focusrite Solo

iMac (late 2015) - ProPresenter 6
3.3GHz i7
1TB SSD
16GB DDR3
Intel Iris Pro Graphics 6200 1536MB
2 Thunderbolt 2 outputs (with adaptors) for HDMI connections.

2 Thunderbolt 2 outputs (with adaptors) for HDMI connections.

iMac (2020) - Wirecast

Sonett Chassis TB2
BMD Deck Link Duo 2

BMD Mini Recorder with TB3 adaptor

Roland V1-SDI

Hisense Stage Monitor Display (HDMI)

Projector (HDMI)

25

PTZ

CANON XF400n

Audio interface

New Set Up

Focusrite Solo

iMac (late 2015) - ProPresenter 6
3.3GHz i7
1TB SSD
16GB DDR3
Intel Iris Pro Graphics 6200 1536MB
2 Thunderbolt 2 outputs (with adaptors) for HDMI connections.

iMac (2020) - Wirecast

Sonett Chassis TB2
BMD Deck Link Duo 2

BMD Mini Recorder with TB3 adaptor

Roland V1-SDI

Hisense Stage Monitor Display (HDMI)

Projector (HDMI)

25
New Set Up:
Operators

**Sound**
- Same as at the moment
- Possibly live mix audio for stream

**Lyrics**
- Same as at the moment

**iMac (late 2015) - ProPresenter 6**
3.3GHz i7
1TB SSD
16GB DDR3
Intel Iris Pro Graphics 6200 1536MB
2 Thunderbolt 2 outputs (with adaptors) for HDMI connections.

**Livestream**
- Operate Wirecast
- Switch between cameras (2 buttons)
- Possibly live mix audio for stream
- Ensure cameras are set up (before service)

**iMac (2020) - Wirecast**

**Roland V1-SDI**

**PTZ**

**CANON XF400n**
<table>
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<th>QTY</th>
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TOTAL £9771.60