
Broadcast Centre Incident

Review

Broadcast Centre Incident Review – Welsh translation

STATEMENT

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Contents

Section

1. Overview	3
2. Background	5
3. Ofcom's Review	7
4. The Broadcast Centre incident	9
5. Broadcasters' response to the Broadcast Centre incident	18
6. Impact on viewers	24
7. Conclusions	27
8. Recommendations	29

Annexes

A1. Sonic damage	30
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1. Overview

Red Bee Media provides technical services vital for the transmission of most of the UK's Public Service Broadcasters (PSBs). On 25 September 2021, the fire suppression system at the Broadcast Centre, a building in London used by Red Bee, was triggered, releasing a gas that caused an acoustic shock wave that damaged equipment, taking several broadcasters' television services off-air.

Channel 4 and Channel 5, and the associated programme services provided by Channel 4 Television Corporation and ViacomCBS,¹ were particularly affected, with some unavailable for around one to two hours on the evening of the incident, and others for a longer period depending on the platform and service. Following a switchover to their respective emergency disaster recovery facilities, both Channel 4 and ViacomCBS continued to experience disruption to their access service provision (subtitling, audio description and signing) until November 2021.

Given the extent of the impact of this incident on viewers, Ofcom has been conducting a review to gather information around the incident at the Broadcast Centre. This review document sets out our conclusions about what happened, as well as our recommendations for what needs to happen to minimise the impact on viewers in the event of a similar situation occurring in the future.

Note on terminology: Throughout this document the term 'programme service' refers to a broadcast channel such as More4 or BBC1 that shows a sequence of TV programmes. The term 'access service' refers to a feature such as subtitling, audio description or signing that accompanies some programmes to assist people that experience impairments to their sight or hearing.

¹ ViacomCBS is the company that owns Channel 5, and has changed its corporate name to Paramount in February 2022. We refer to it as 'ViacomCBS' for the purpose of this review into the incident which occurred in September 2021.

What we have found - in brief

The incident at the Broadcast Centre on 25 September 2021 was exceptional in its scope, severity and impact, with programming for several PSBs suffering interruptions.

Although most programme services were restored relatively quickly, some suffered issues for a prolonged period, with the impact being particularly severe and lengthy for viewers relying on subtitling, audio description and signing services (which are collectively known as ‘access services’).

We are encouraged by the initiatives already under way by the broadcasters such as Channel 4’s plans to upgrade its disaster recovery infrastructure and ViacomCBS’s reviews of the operational procedures and practices used by contractors. These initiatives should reduce the impact if a similar event were to happen again.

Following our review of the incident, we make a number of recommendations which are set out below.

Given the severity of the incident, and duration of the impact on viewers, particularly those using access services, we judge that it is appropriate for Ofcom to consider whether some aspects of our recommendations should be captured in an update to the Television Technical Code, with which the Public Service Broadcasters must comply as a condition of their licences. We intend to consult upon our proposals during 2022.

Recommendations

- Broadcasters should ensure that their disaster recovery (DR) facilities are specified to carry the full suite of services normally carried by a programme (including vision, sound, and access services) and that they are tested regularly under simulated DR conditions.
- Broadcasters should ensure that all parties that operate the different stages of the broadcast chain through which their programme services pass have an adequate number of trained operators that are familiar with DR procedures, and that these procedures are tested regularly.
- Broadcasters should ensure that all parties that operate the different stages of the broadcast chain through which their programme services pass periodically audit their technical infrastructure estate with the aim of identifying vulnerabilities.
- Broadcasters should ensure that they have prepared communications plans ready to implement in case of interruptions, and that these take into account the affected audiences and their needs.
- Viewers should be provided with timely information about any loss of services including access services. EPG information detailing which programmes carry access services should be accurate.
- Ofcom will consider whether specific requirements for access services need to be added to the Television Technical Code to ensure that they are dealt with in the same way as other essential components in the technical delivery of programmes. Any proposals we make to amend the Code would be included in a consultation on wider revisions to our TV and radio Technical Codes that we intend carrying out later this year.

2. Background

- 2.1 Red Bee Media provides playout services for many broadcasters including most of the UK's Public Service Broadcasters (PSBs). Playout is the term given to a system that broadcasters use for uploading and storing content, including programming and adverts, and assembling them in the correct order against a schedule for onward distribution and transmission.
- 2.2 Red Bee also creates and adds TV access services (subtitling, audio description, and signing) to the programmes of some broadcasters. Some other broadcasters provide their own separately-originated access services to Red Bee alongside their programmes.
- 2.3 On 25 September 2021, the fire suppression system at the Broadcast Centre building occupied by Red Bee in West London was triggered as a result of the system detecting signs of a fire. The subsequent release of gas to extinguish the fire caused an acoustic shock wave that damaged some of Red Bee's technical equipment and interrupted TV services. The extent of the damage was such that the affected broadcasters had to switch to using Disaster Recovery (DR) facilities.
- 2.4 While the interruptions to BBC and ITV programmes were minimal, Channel 4 and Channel 5 and associated programme services provided by the Channel 4 Television Corporation and ViacomCBS² were off air for differing periods across TV platforms depending on the service. Many programme services were restored within 1-2 hours, most were back within the same day, although a few did not return for some days or even weeks.
- 2.5 Channel 4's access services were severely impacted for a prolonged period and did not resume full service until November 2021. Access services on the TV services provided by ViacomCBS, including on Channel 5, were also affected, although to a lesser extent and for a shorter period.
- 2.6 S4C in Wales also suffered an interruption to its TV service for some hours which affected terrestrial television viewers, although normal service was restored on 26 September with no further impact on viewers. Viewers of S4C on Sky, Freesat and Virgin Media were unaffected.
- 2.7 Ofcom is responsible for licensing the terrestrial broadcasters under the Broadcasting Acts of 1990 and 1996, and the Communications Act 2003. Given the impact the incident has had on viewers, as well as considerable interest from the public, Ofcom has carried out a review to gather information around the incident at the Broadcast Centre. Our review has helped us to draw conclusions about what happened, and to make recommendations for what measures need to be put in place to reduce the impact on viewers should a similar situation arise in the future.
- 2.8 In January 2022, Ofcom announced that it would carry out an investigation specifically into Channel 4's provision of subtitling on the Freesat platform. That investigation was carried

out separately to the broader review described in this document. We have published the outcome of the separate investigation alongside this review report.

3. Ofcom's Review

Aim of the Review

- 3.1 We have carried out this review with the aim of gathering factual information to establish what happened during and after the incident at the Broadcast Centre, how it was dealt with by the parties involved, what the consequential impact was on viewers, and then to make recommendations for how improvements could be made in dealing with similar incidents should they occur in the future.

Legal basis for our review

- 3.2 Ofcom has a principal duty in carrying out its functions to further the interests of citizens in relation to communication matters and of consumers in relevant markets³. In carrying out our duties, Ofcom is required, among other things, to secure a number of objectives including promoting the interests of all members of the public⁴.
- 3.3 Ofcom is also required to have regard to the principles under which regulatory activities should be transparent, accountable, proportionate, consistent and targeted only at cases in which action is needed⁵. Further, in performing our duties, we are required to have regard to a number of specific objectives and a range of other considerations, as appear to be relevant in the circumstances⁶. This review has been conducted as part of carrying out our functions⁷.
- 3.4 Ofcom is responsible for licensing the terrestrial broadcasters under the Broadcasting Acts of 1990 and 1996, and the Communications Act 2003. Under this legislation, Ofcom is required to include conditions in the licences for Channels 3⁸, 4 and 5, and in the licences for TV multiplex services, relating to transmission standards and reliability. Specifically, Ofcom must include such conditions as is appropriate *“for requiring the signals carrying the licensed service to attain high standards in terms of technical quality and reliability throughout so much of the relevant area as is for the time being reasonably practicable”*⁹.
- 3.5 Accordingly, these licences include conditions requiring the licensee to observe the requirements of Ofcom's Television Technical Code in all the operations under its direct control, in the Distribution of the Programmes included in the licensed services, and by any third parties involved in the provision of programmes included in the service.

³ Communications Act 2003, s.3(1)

⁴ Communications Act 2003, s.4(5)

⁵ Communications Act 2003, s.3(3)

⁶ Communications Act 2003, s.3(4)

⁷ Communications Act 2003, s.1(3)

⁸ The Channel 3 licences were awarded on a regional basis. All of these licences are now held by either ITV (in England, Wales and Northern Ireland) or STV (in Scotland).

⁹ For Channels 3, 4 and 5 see Section 66(4) of the Broadcast Act 1990

- 3.6 Although a number of broadcast TV services were affected by the incident that forms the subject of this review, we have concentrated on the commercial Public Service Broadcasters that Ofcom licenses (Channels 3, 4 and 5), as well as the BBC and S4C.

Areas for review

- 3.7 We have focused our review on addressing three principal areas:
- a) How prepared are the public service broadcasters to deal with a major transmission incident and how effectively did they respond to the equipment failures at the Broadcast Centre?
 - b) What impact has the incident had on viewers, and was appropriate information and support available for those affected?
 - c) What lessons can be learned and where should improvements be made?

How we have carried out the review

- 3.8 In the first few days after the incident occurred, once the bulk of television services had been restored (although maybe not fully), we held initial meetings with Red Bee, Arqiva¹⁰ and the Public Service Broadcasters to gather initial information on the extent of the incident, the consequences for each broadcaster's operations and the resulting impact on viewers.
- 3.9 We subsequently obtained from Channel 4 and ViacomCBS (which owns Channel 5), Red Bee and Arqiva further information about their emergency processes, how they dealt with the incident (including their approach to communications with viewers), as well as asking what they judged to have worked and what didn't.
- 3.10 Additionally, we have looked at the information published by the parties online to help assess their communication with viewers. We approached RNID and RNIB to ask them what feedback they have received from people with hearing and sight impairments on the information and support provided by the broadcasters whose access services were affected by the Red Bee incident. Ofcom also received around 500 complaints directly from the public, the feedback from which we factored into our review to further understand the impact on viewers.

¹⁰ Arqiva provides a number of services to broadcasters and other industries including operating the UK's terrestrial transmitter network and providing associated transmission management services. Relevant to this review is Arqiva's role in managing the distribution and switching of the broadcasters' programme services, which it receives from Red Bee and distributes to the various TV platforms for transmission to viewers.

4. The Broadcast Centre incident

Red Bee Media's operation at the Broadcast Centre

- 4.1 Red Bee Media provides managed broadcast services, including production, post-production, distribution and streaming services as well as playout and access services. Many broadcasters, including almost all of the UK's Public Service Broadcasters, outsource at least some of these activities to Red Bee.
- 4.2 Red Bee operates from a number of locations in the UK. One location in London is the Broadcast Centre, from which Red Bee provides services for some of the UK's Public Service Broadcasters, as well as other channels. This is the location that was affected by the major incident.
- 4.3 The Broadcast Centre houses a significant amount of the equipment which is used to provide key aspects of TV services from the BBC, Channel 4 and Channel 5. Although ITV also contracts Red Bee to provide similar services, these are located at separate premises around London and other locations.
- 4.4 The individual broadcasters provide their programmes to Red Bee, where they are stored on data servers, along with other content such as advertising and channel branding material. Some broadcasters also upload any access services files¹¹ that relate to the programmes directly to Red Bee's servers. Alternatively, Red Bee can create and add these access services to programmes on behalf of the broadcasters.
- 4.5 The programmes, access services, advertising and other material are stored until they are played out at a date and time determined by a schedule produced for each broadcast channel by the relevant channel operator. The programme being played out needs to be distributed to each of the broadcast platforms on which the programme service is carried. For the Public Service Broadcaster channels, this includes Digital Terrestrial Television (DTT or Freeview), Satellite (Sky and Freesat), Cable (Virgin Media). In addition, programme content is also made available to streaming and on-demand platforms for internet-delivered and catch-up services.
- 4.6 Distribution to the broadcast platforms involves sending the assembled programme material (including vision, sound, access services and associated technical data) via data circuits to other locations for grouping ('multiplexing') with other programme services. Distribution is carried out for Channel 4 and ViacomCBS by the transmission company Arqiva. Multiplex groups of programmes are then distributed to ground-based transmitter masts, cable distribution centres, or uplinked to satellite.
- 4.7 Red Bee's operation at the Broadcast Centre is equipped with a fire suppression system. This system is designed to quickly reduce the oxygen level in the area where a fire is detected through the release of nitrogen gas that is stored under high pressure. On

¹¹ Access services are subtitling, audio description and signing

25 September 2021, the fire suppression system activated, and the subsequent release of gas caused an acoustic shock wave (see Annex 1 for information on sonic damage) that damaged some of the components within the servers in the building beyond repair and caused long-lasting disruption to several broadcasters.

Timeline of events

First 24 hours

- 4.8 As soon as the gas release occurred, programme playout from the Broadcast Centre building was interrupted. ITV suffered no disruption as its playout is carried out from an alternative location. The BBC services usually carried at the Broadcast Centre were able to be switched to an alternative staffed Red Bee facility and suffered only short interruptions.
- 4.9 When it became clear that the Broadcast Centre had suffered a serious incident, both Channel 4 and ViacomCBS invoked their emergency procedures, which involved transferring services to disaster recovery equipment at separate locations. Channel 5's disaster recovery arrangement is provided by Red Bee at another of its premises that is designed to mirror the configuration of the Broadcast Centre, although it is normally unstaffed. Channel 4 operates its own disaster recovery arrangement, installed at third party premises.
- 4.10 Switching to using disaster recovery arrangements required extensive communication between the broadcasters (Channel 4 and ViacomCBS) and their playout and transmission providers (Red Bee and Arqiva) to ensure the programme circuits to and from the Broadcast Centre were switched to alternative destinations. Multiple channels needed to be switched to the respective disaster recovery arrangements including 27 broadcast services for Channel 4, and 25 broadcast services for ViacomCBS across satellite, terrestrial and cable platforms.
- 4.11 Channel 4 (standard definition) on all platforms, and Channel 4 HD on most platforms, was restored by 20:15. Channel 4 HD was not restored on Freeview until 23:35, by which point most other stablemate channels (such as More4 and 4seven) had also been restored. E4+1 was the last service to be restored, nearly two weeks after the incident on 7 October¹². All access services were lost from Channel 4 and its stablemate channels from the point that the disaster recovery facility was put into service.
- 4.12 Channel 5 (standard and high definition) as well as Channel 5+1, were restored across all platforms by 19:57 on Saturday 25 September, having experienced an outage of between 60 minutes and 92 minutes depending on the platform. Most of Channel 5's stablemate channels from ViacomCBS were restored by 19:55, with the last channel (5Select) returning at 23:57. The Channel 5 service and other ViacomCBS channels were transmitted with scheduled access services as planned from the point that the individual channels were

¹² Some services, such as 4Music, which although back on-air, were unable to carry normal scheduled programmes until November 2021

restored. ViacomCBS began to experience some issues a few days after the incident, which led to a reduction in its ability to provide subtitling or audio description on some programmes, although there was not a complete loss of access services and the issues were resolved by 21 October.

- 4.13 The timelines given below in Table 1 list some of the main events following the initial gas release incident at the Broadcast Centre.
- 4.14 S4C, which provides a Welsh-language PSB service in Wales, also suffered an interruption to its service on the terrestrial platform for some hours following the Red Bee incident. S4C manages its own playout in Wales, although its service passes through Red Bee’s Media centre, and shares other downstream infrastructure with other broadcasters when it is grouped (multiplexed) with other programme services prior to terrestrial transmission. S4C’s Freeview service was lost in Wales for some hours as a consequence of other broadcasters moving to their disaster recovery arrangements, although this was resolved following further technical reconfiguration the following day with no further impact on the service. S4C’s service on satellite and cable continued as normal and was unaffected by the incident.

Table 1 – Timeline of events

25 Sept 2021 18:25	Fire suppression system activated at Red Bee Media’s facility causing an acoustic wave that damaged equipment. BBC switched to a second facility almost instantaneously. BBC and ITV interruptions were minimal.	
Date and time	Channel 4	Channel 5
25 Sept 2021 18:25	Channel 4 and stablemate channels (C4+1, E4, More4, Film4, 4Seven, 4Music) began to be affected by degradations to service until all were eventually off-air by shortly after 19:00	Channel 5, and other ViacomCBS channels (Channel 5+1, 5USA, 5USA+1, 5STAR+1, 5SELECT and Paramount) off air 5STAR unaffected
25 Sept 2021 19:25 – 19:39		ViacomCBS DR facility (provided by Red Bee) started to restore services. Channel 5 and other ViacomCBS services restored on Sky, Freesat and Virgin Media. Channel 5 HD restored on Freeview. All access services are available, although the ability to provide live subtitles is not available until 11 October

25 Sept 2021 19:51	Channel 4 DR facility (self-provided) started to restore services. E4 HD, More4 HD and Film4 HD restored on satellite	
25 Sept 2021 19:57	Most TV services restored on Freeview, except Channel 4 HD, E4+1 and 4Music	Channel 5SD and Channel 5+1 restored on Freeview, leaving only 5SELECT on Freeview off air
25 Sept 20:15	Channel 4 SD + HD, E4, More4, Film4 and 4Seven restored on satellite	
25 Sept 2021 20:30	Most TV services restored on Sky and Freesat	
25 Sept 2021 20:50	More4+1 restored on Freeview	
25 Sept 2021 23:35	Channel 4 HD restored on Freeview	
25 Sept 2021 23:57	No access services are available on any of the restored services	5SELECT restored on Freeview
26 Sept 2021		On-demand programmes were affected by access services missing from new catch-up programming, these could not be added until 11 Oct. Access services were added to the backlog retrospectively (until 22 Nov)
28 September 2021		The continued loss of facilities within the Broadcast Centre started to cause issues with access services. ViacomCBS was unable to add subtitles and audio description to new programmes, which meant that some programmes had to be transmitted without subtitling (until 21 Oct) or audio description (until 17 Oct).

30 September 2021	Channel 4 – Continued disruption including playing the wrong editions of shows. Watch live online streaming services restored without subtitles for other channels	
5-11 October 2021	Channel 4 – Running subtitling tests on programmes during the day.	
7 October 2021	E4+1 restored on Freeview	
11 October 2021		New programming could again have subtitles and audio description added, although some transmitted material was still missing subtitles and audio description for a few days. Live subtitling again available
13 October 2021	All4 streaming service back to full service, but does not include access services	
14 October 2021		Subtitles and audio description were almost back to normal with almost all peak programmes transmitted with the expected access services.
25 October 2021	Subtitling restored on Freeview, Sky and Cable, but not Freesat. Signing and AD remain unavailable	
2 November 2021		Linear services returned to working as normal for Channel 5, 5Star, 5Select, 5USA and Paramount. Work continued adding access services to backlog of on-demand programmes

<p>17 November 2021</p>	<p>Full restoration of Channel 4 services including access services</p> <p>4Music restored to normal scheduled programming</p>	

First week

- 4.15 Although most channels were restored by the end of the day of the incident (except E4+1 on Freeview, and 4Seven HD on Virgin), Channel 4 continued to experience disruption to its programming such as broadcasting the incorrect episodes of some programmes. The problem of lack of access services continued throughout the first week following the Red Bee incident. The ‘Watch Live’ online service was restored from 27 September 2021 for Channel 4 alone, and three days later for the remaining channels, however subtitles were also unavailable for these services.
- 4.16 ViacomCBS was able to broadcast full programming, interstitials¹³, commercials and pre-recorded access services across all its channels including Channel 5 for the first three days after the incident through their disaster recovery facility. All of this content had been created and stored automatically when the Broadcast Centre had been fully operational. That content had been automatically ‘mirrored’ to Channel 5’s disaster recovery facility as part of normal operating procedures.
- 4.17 However, on 28 September 2021 the stock of pre-prepared material began to be exhausted, and problems emerged with replenishing it with material for future broadcast. This was because the Broadcast Centre’s ‘ingest’ facility (the normal route for new programme material to be submitted by broadcasters to Red Bee) was no longer operational. This meant that ViacomCBS had to develop a work-around process whereby it provided additional support material to Red Bee for Channel 5 and other ViacomCBS programme services. As a result of these issues, Channel 5’s provision of pre-prepared subtitled programmes reduced, as well as live subtitling¹⁴ being unavailable.
- 4.18 These issues also meant that ViacomCBS could no longer provide subtitling and audio description for new on-demand content.

First month

- 4.19 From 5 October 2021 Channel 4 started to test subtitling on programmes broadcast during daytime, with its first successful live subtitling for *Stand Up to Cancer* on 15 October 2021.

¹³ Interstitials are those elements of a broadcast TV channel which are not programming or advertising, and can include channel identification and continuity announcements, programme promotions, and schedule slides etc.

¹⁴ Live subtitling is used by broadcasters when it’s not possible (or is impractical) to pre-prepare subtitling, for example during news bulletins.

Subtitles were restored on many programmes on 22 October 2021, closely followed by other access services to all platforms except Freesat a few days later.

- 4.20 During mid-October, Channel 4 began to incrementally add access services to the Watch Live service.
- 4.21 Services provided through the All 4 streaming service remained impacted and only limited new content was added until 13 October 2021 (later for All 4 users on Sky and Virgin Media).
- 4.22 Channel 5, however, were able to add new programmes to their on-demand service throughout October, most of which had subtitles and audio description added manually from 11 October 2021. At this point Channel 5 also started work to address the backlog of access service files that had been omitted from earlier on-demand programmes.
- 4.23 Until 17 October, some audio description continued to be unavailable, and some pre-prepared subtitling was unavailable until 21 October 2021. In the second week following the incident, subtitles on Channel 5 increased to 64% as the work-around process outlined above became more established. Channel 5 restored live subtitles to their linear channels at a similar time to Channel 4, and by halfway through the month almost all peak-time programmes were being broadcast with all expected access service files.

Second month and beyond

- 4.24 Channel 4 returned to normal operations on 17 November 2021, nearly two months after the initial 25 September incident, though there remained a backlog in adding signed programmes to the All 4 on-demand service.
- 4.25 Channel 5 focused on addressing its backlog for access services on its on-demand programmes and completed this, along with the full restoration of normal operations, by the 22 November 2021.

Timeline of information/help offered to consumers

First 24 hours

- 4.26 On the evening of the incident, Channel 4 acknowledged and apologised for the ongoing disruption to viewing through a media briefing and social media posts. Channel 4's Press Office also fielded phone calls from journalists.
- 4.27 ViacomCBS's communication with viewers was minimal on the evening of the incident, and its efforts were instead concentrated on restoring services.

First week

- 4.28 Channel 4's engagement with its audiences concentrated on the use of social media, particularly Twitter, and on briefing the media. During the week, Channel 4 tweeted a number of times apologising for the disruption, examples being incorrect versions of

programmes being shown, and also an episode of its high-profile programme *Married at First Sight* being postponed. Despite a complete loss of access services, the first acknowledgement from Channel 4 that it was suffering issues with delivering access services was on 28 September 2021 via Twitter.

- 4.29 During the first five days following the incident, Channel 4 received 2,807 viewer contacts through its Viewer Enquiries service, enquiry form and phone line. 2,779 of these contacts related to subtitles, and 28 contacts related to audio description. Channel 4 added a brief overview of the incident to the top of their online Viewer Enquiries form and an acknowledgement of the incident to the overnight answer machine message for their phone line. They also used their 4Viewers Twitter account to interact with viewers directly and sent an email to all registered All 4 users apologising for the disruption to the Live TV service.
- 4.30 Channel 5 used their social media channels to post updates to their audience on the progress of the incident.
- 4.31 Channel 5 also received viewer contacts around the incident and chose to extend the opening hours for their phonenumber by an extra 30 minutes in the mornings, and an extra 90 minutes in the evenings from 27 September until 5 November 2021. Meanwhile, Channel 5 also closely monitored their viewer inbox and responded to emails between 8am and 9pm in the weeks following the incident. Over the course of the incident and recovery, Channel 5 received over 1,000 emails and over 60 calls on the issue.

First month

- 4.32 Over the month following the incident, Channel 4 posted updates to their press and corporate sites every few days and shared these updates on Twitter. Around mid-October, they also posted these updates in British Sign Language (BSL) on social media. These updates gradually increased in detail about what had happened, the ongoing issues, and what was being done to fix these issues. The update of 19 October 2021 was the first to suggest a timescale for the restoration of EPG. Channel 4 also shared these updates with the Press Association and other news outlets to raise awareness of the issues.
- 4.33 Around mid-October, Channel 4 started to provide some information on-air through continuity announcements. They created an update slide¹⁵ with a voiceover that directed viewers to watch the programmes with subtitles at All 4. This slide reached around 21 million viewers and was aired between 19 October and 16 November 2021.
- 4.34 Until 14 October 2021, electronic programming guides (EPGs) incorrectly showed that access services were being provided as normal on Channel 4 services. From 14 October, Channel 4 took steps to rectify this after prompting from the RNID and the EPG data was corrected. Channel 4 also updated their press listing site to remove access services flags so that listings in newspapers etc. would not be incorrectly flagging content as accessible.

¹⁵ A slide is an information screen (usually displaying static text) which can be shown during junctions between programmes.

- 4.35 Throughout this period and beyond, Channel 4 also held regular meetings with the RNID to answer queries and discuss feedback. They also provided updates to the RNIB.
- 4.36 After the first week, Channel 5 hired a new colleague to support their Viewer Information team, with this individual able to respond to 200 emails per day. On 5 October 2021, Channel 5 created a dedicated help page on their website. This help page was used to publish four updates between 5 October and 2 November 2021, including an announcement on 11 October 2021 that they would be manually adding access services to a selection of programmes only.
- 4.37** From 6 October, Channel 5 put a subtitle caption on affected programmes apologising for the loss of subtitling. From 13 October 2021, Channel 5 began to broadcast an apology slide with a short voiceover acknowledging the disruption across their Free-to-Air channels. This slide aired 126 times across all parts of the day. Channel 5 also placed the slide on their streaming service My5, which delivered over 1.2 million impressions.

Second month and beyond

- 4.38 A month after the incident, Channel 4's Director of Inclusion and Diversity took part in a short interview on BBC Radio 4's *In Touch* show, which is specifically aimed at blind and partially sighted viewers. Channel 4 apologised for the disruption during the interview and said that they were continuing to improve access services.
- 4.39 Following the restoration of services on 17 November 2021, Channel 4 published an update in response to a media enquiry, stating that access services capability had returned and promising to address the backlog of shows that were broadcast without these features.
- 4.40 After announcing the restoration of normal services on their website on 2 November 2021, Channel 5's complaints and queries line returned to their normal operating hours.

5. Broadcasters' response to the Broadcast Centre incident

What plans and infrastructure did the broadcasters have in place?

Channel 4

Channel 4 - infrastructure and process

- 5.1 Channel 4 operates and maintains its own DR facility, in a separate location to the Broadcast Centre, that is designed to support Channel 4's main and stablemate channels. The site where the facility is housed is run by Arqiva, with a Red Bee team responsible for operating the DR facility if an incident occurs.
- 5.2 There are arrangements between Channel 4, Red Bee and Arqiva setting out the scope for the service that each must provide, including the process that must be followed for relocation to the DR facility and the switchover process. Arqiva is responsible for the distribution and switching of programme services to DR across the satellite and terrestrial television platforms, while Red Bee is responsible for playout.
- 5.3 Channel 4's DR facility is not an exact mirror of what is provided for them by Red Bee at the Broadcast Centre, with some elements, notably audio description and signing, excluded from the specification. Channel 4 has told us that this omission seemed a reasonable compromise at the time the facility was designed (in 2013) as they envisaged using the DR facility for only relatively short periods of time, and quotas for providing AD and signing were somewhat lower then. The Channel 4 DR facility had however been designed to support subtitling.
- 5.4 Channel 4 told us that prior to the incident in September 2021 it had identified that its DR arrangement was lacking in capability and that it had already embarked on a project to build a more resilient system where playout could occur from multiple sites. The new arrangement will allow for a more seamless switchover, similar to that used by the BBC, and will also support the full range of access services. The new DR arrangement had been in its final testing stages when the incident occurred, with some of the suppliers already working with Channel 4 on migration to the new system, which was expected to have been completed around December 2021. This work was however put on hold as a result of having to concentrate efforts on dealing with the shortcomings of the existing system during much of the remainder of 2021.
- 5.5 The Channel 4 DR operation is not normally staffed and is available as a 'warm standby' ready to be brought into use relatively quickly. The facility is on occasion staffed and operated as a 'hot standby' in cases when a transition to the DR system has been planned so as to minimise interruptions to service. Channel 4 has also anticipated other modes of operation in response to minor or major events. Each of these operating modes had

different arrangements laid out, including the extent to which operational staff would need to transfer to the DR facility.

- 5.6 Channel 4 and Red Bee had an agreed process by which Red Bee would inform Channel 4 that invocation of the DR facility was required in case of a serious issue arising at Red Bee. A similar process exists between Arqiva and Channel 4 in which Channel 4 notifies Arqiva of the decision to invoke DR.
- 5.7 In the event of such incidents, Channel 4 has a Crisis Management team which reports to the CEO.

Channel 4 - testing and training

- 5.8 Channel 4 Engineering staff are trained on how to use the DR facility and rehearsals are carried out on a regular basis to both test the equipment and train new staff. There is an assigned list of Channel 4 and Red Bee staff involved in these rehearsals who can be called up in the event of an actual DR switchover. Arqiva operational teams are also present for these rehearsals.
- 5.9 These rehearsals are carried out as-live, although they are not put through the distribution chain due to operational limitations, meaning that services originating at the DR facility are not put to air during rehearsals. Unfortunately, this means that any issues that might occur between the playout and the onward distribution system would not be picked up by the routine tests. This meant that the DR system's inability to carry subtitling was not picked up until the incident in September 2021.
- 5.10 In the months prior to the incident, DR rehearsals were carried out on a restricted basis due to the pandemic, meaning some staff attended remotely, though the operational activities were the same as in a full rehearsal.
- 5.11 Channel 4 has told us it is conducting a third-party review of its operational responses.
- 5.12 The new DR arrangement planned to be adopted by Channel 4 will incorporate a mirrored playout arrangement in more than one location. This will permit near-seamless switching between playout systems and should allow for routine full testing of the DR facility.

Channel 5

Channel 5 infrastructure and process

- 5.13 Channel 5's owner, ViacomCBS has outsourced the provision of its DR facility to Red Bee for playout, and Arqiva for distribution. It was agreed that Red Bee must provide a DR playout source and present this within a fairly short defined timescale to the usual points at which the distribution network operated by Arqiva sends the TV services to the TV platforms. Arqiva should then switch to the disaster recovery configuration within a further defined timescale. The Channel 5 DR facility is designed to provide full delivery of programming, interstitials, commercials and pre-recorded access services, mirroring the usual output of the Broadcast Centre facility, except for the capability to provide live subtitling, which was added in the weeks following the incident.

- 5.14 ViacomCBS has written emergency procedures for the DR process with both Red Bee Media and Arqiva. Red Bee's DR responsibilities to ViacomCBS are divided into three tiers covering day-to-day maintenance, temporary use of the DR facility for a rehearsal or minor fault or putting the facility into use for as long as may be required to cover a major incident.
- 5.15 Red Bee and ViacomCBS have an agreed operational escalation process in place through which Red Bee's Incident Manager should contact relevant stakeholders to inform them that Red Bee will be switching to DR. All the relevant stakeholders, including Arqiva, should then join the ViacomCBS DR Payout Conference line to provide updates on the incident.
- 5.16 There are emergency procedures that set out the escalation process for invoking DR, and a back-up plan should the escalation process fail. The procedures describe Arqiva's process for switchover in detail.

Testing and training

- 5.17 Channel 5's DR processes are tested quarterly with a full switchover to the Red Bee DR equipment, live on-air. These quarterly tests are also used to train staff and involve ViacomCBS, Red Bee and Arqiva personnel.

How well were the plans executed?

Channel 4

Communications between parties

- 5.18 There was frequent communication at a technical and operational level between Channel 4 and other relevant parties including Red Bee Media, Arqiva, Sky and Virgin Media in various forms including meetings, service status updates and conference calls. This area appears to have been relatively well-executed, although there appears to be scope for improvement, particularly in how contact details are stored and how they are retrieved in an emergency situation. Clear communications between the relevant parties were however established via a "bridge" conference call on the night of the incident.
- 5.19 Until 27 September 2021 the extent of the damage to Red Bee's in-service and back-up equipment was not clear to Channel 4, and it was not until 4 October 2021 that they were told that the media management systems (the mechanism through which programme content is moved between the broadcasters and Red Bee Media) could not be restored.
- 5.20 The Channel 4 Press Office made sure that the Red Bee Media contact had sight of any updates being published, as well as communicating with the press offices of other broadcasters where appropriate.

Degradation to the transmitted service

- 5.21 Following the transfer of the Channel 4 service to the DR facility, errors and problems arose as a result of differences between Channel 4's DR system and normal operations at

the Broadcast Centre. As a result, there were inaccuracies in how channels were delivered, and viewers experienced some degradation of the service. Some of these were fairly transitory, for example, some viewers experienced audio issues when the DR service initially went live. Most services were off-air for over an hour before the transfer to DR was completed, with Channel 4 HD on Freeview taking a further two hours. Also, several commercial breaks were impacted in the first few days after the DR service went live, and there were instances of incorrect programmes being transmitted. These issues had mostly been resolved by early October.

Access services

- 5.22 A lengthier degradation was to Channel 4's ability to deliver access services. Channel 4's DR system was specified some time ago and had not been specified to provide audio description and signing, thus, the absence of audio description and signing was expected.
- 5.23 What was not expected however, was that subtitling did not work as envisaged when the DR system went live. Once the initial issue was resolved, another issue emerged whereby subtitles were appearing incorrectly in terms of content and format via the DR system.
- 5.24 New equipment was installed to provide live subtitles for "Stand up 2 Cancer" on Channel 4 and the All 4 Watch Live stream on 15 October. On 22 October 2021, the issue for non-live subtitles was identified as being between the playout and distribution services, which had not been tested in DR rehearsals. Once identified, this issue could be resolved for all platforms except Freesat.
- 5.25 Access services more generally were also impacted as the access services files were not available from the DR content archive. Access services were restored, excluding to Freesat viewers, from the 25 October 2021, and to Freesat viewers on 17 November 2021.

Switchover of programme distribution

- 5.26 Moving programme playout from Red Bee Media's systems to Channel 4's DR facility required a significant amount of switching of the programme circuits that connect the playout system to the channels that originate the content, as well as to the platforms that transmit the programmes.
- 5.27 Arqiva is responsible for the distribution of Channel 4's services and carried out the necessary circuit switching to enable a move to Channel 4's DR facility. Arqiva's operational resources were at normal levels on 25 September and generally Arqiva noted no issues with the implementation of agreed procedures.
- 5.28 There was a delay in the process as staff had to travel to the alternative DR facility which is normally unstaffed and is located outside London.

Channel 5

Communication between parties

- 5.29 ViacomCBS has told us that it believes that there are issues that need to be resolved between the parties relating to staffing and training of staff in DR procedures at Arqiva relating to this incident
- 5.30 ViacomCBS has also told us that there were issues with the communications in the immediate aftermath of the incident. Although conference call lines were available, as noted above, there appears to be scope for improvement in how contact details are provided, stored, and how they are retrieved by some participants to the calls. ViacomCBS has told us that they are working to resolve this issue with the relevant parties.
- 5.31 The decision to switch to the DR arrangement was also potentially delayed as a result of lack of clarity over roles and ownership of the decision between Arqiva and ViacomCBS. The two parties are also working to review this issue.
- 5.32 Once lines of communications had been established on 25 September, there was subsequently regular communication between the parties, with daily conference calls for the first two weeks following the incident.

Switchover of programme distribution

- 5.33 As for Channel 4, moving the ViacomCBS channels over to their disaster recovery facility requires a significant amount of switching programme circuits. ViacomCBS has told us that parts of the process worked as expected, including meeting the target switchover time for playout by Red Bee which. However, complications arose with Arqiva carrying out the process of circuit switching.
- 5.34 ViacomCBS has told us that there are issues that need to be resolved between the parties relating to the levels of staffing and training of staff in DR procedures at Arqiva. Arqiva has told us that on the night of the incident, staffing levels were normal and fully trained operators were on-shift. They have told us that communication between parties was hectic, but under control. Following the incident, ViacomCBS and Arqiva have been working to refresh procedures, escalation routes and testing as well as adding additional staff to strengthen the area. Arqiva has told us that this work includes
- a) Reviewing, updating and testing the major incident process within the live environment;
 - b) Continuing ongoing quarterly disaster recovery testing;
 - c) Auditing and updating all service, stakeholder and configuration data; and
 - d) A review and update of all escalation processes and relevant documents.

Degradation to the transmitted service

- 5.35 Following the gas release, Channel 5 and Channel 5+1 were off-air for between 60 and 92 minutes depending on the service, with most other stablemate channels restored by 19:55.
- 5.36 Programme delivery was relatively unaffected with only two Channel 5 programmes lost (both in the first 24 hours of DR) during the entire period that the DR facility was active
- 5.37 Directly following the incident, ViacomCBS lost the ability to play continuity announcements for the rest of the evening. Although Channel 5 was able to establish a way to deliver these announcements, problems with integrating this method into the Red Bee DR arrangement meant it took between 72 and 120 hours to full establish the continuity announcements.

Access services

- 5.38 On the fourth day following the incident, the infrastructure failures within the Broadcast Centre began to cause further issues meaning that ViacomCBS had to manually create and send content to Red Bee to support access services.
- 5.39 While the ability to create live subtitles was available, the system that automatically sends programme content for subtitling and that receives the pre-prepared subtitling was damaged, and had to be re-built. This had a serious effect on production capability for access services.
- 5.40 Problems with the linear platform's access services had a consequential impact on the on-demand content leading to a backlog in subtitling and audio description. From 28 September until 11 October, ViacomCBS was unable to add subtitles and audio description to new on-demand content.

6. Impact on viewers

Information and support provided for consumers

- 6.1 Ofcom was contacted by around 500 people that were affected by the loss of access services.
- 6.2 Many consumers did not realise that access services had ceased to be available until they attempted to watch programmes. They also suffered a delay in receiving sufficient, accessible information from the affected broadcasters. This left some viewers feeling isolated: for a viewer with a severe hearing impairment or loss, for example, the loss of subtitles can be equivalent to the loss of audio for viewers without hearing loss, as it can make the programme difficult or impossible to understand or enjoy.
- 6.3 Additionally, the lack of clear explanation as to why access services had taken much longer to restore than video and audio meant that some people with sight or hearing impairments were left feeling unimportant relative to other viewers.
- 6.4 Some viewers were also frustrated by the difficulty in finding the content which did have access services available due to inaccuracies in TV guides and on-demand platforms, with many programmes continuing to be labelled as carrying access services, when in reality they did not.

Channel 4

- 6.5 Channel 4 started to provide updates for viewers shortly after the incident occurred and used a range of communication channels including social media and updates to their website. However, the delay in Channel 4 carrying information about their incident on their broadcast channels themselves meant they could not reach all affected viewers who may not see posts on social media or the website. We note that a large proportion of those with hearing or sight impairments are elderly and may use the internet and social media channels less. It wasn't until 15 October 2021, nearly three weeks after the incident, that Channel 4 acknowledged the problems with access services directly through their television services. Channel 4 has told us that the delay was due to technical issues in getting messages uploaded into the affected systems, and that they were unable to use live announcers.
- 6.6 Initially, Channel 4's communications to viewers were imprecise and lacked sufficient information to explain what had happened, or the timescales for when viewers could expect the issues to be resolved. Whilst to a degree this is understandable, given that Channel 4 is likely to have also been dealing with uncertainty internally, there is still more that could have been done.
- 6.7 These shortcomings put the onus on the viewers to then keep having to look for updates, and also left some viewers with hearing and sight impairments feeling that access services were perceived by the broadcaster as an afterthought. The first acknowledgement of

issues with access services was in a tweet on 28 September 2021. However, a more detailed update on access services was not provided until the statement of 7 October 2021 which promised a “return to a normal service as soon as possible.” Following correspondence with Ofcom, Channel 4 published further detail on the access services issue on 13 October 2021. It took three weeks after the incident for Channel 4 to provide a possible timescale for the return of access services, and this was published on 19 October 2021.

- 6.8 Much of the communications, particularly early on, were published in written English only until the RNID recommended that communications should also be available in British Sign Language to make them more accessible to viewers with hearing impairments for whom BSL is their first language. The first information provided to viewers in BSL was published on 15 October 2021. It is unlikely that the ability to provide content in BSL through social media was impacted by the incident, therefore it appears to be an oversight on Channel 4’s behalf not to have provided this sooner.
- 6.9 Until 14 October 2021, electronic programme guides (EPGs) incorrectly showed that access services were being provided as normal on Channel 4 services. This meant that audiences expected to be able to watch programmes with access services when they could not. From 14 October 2021, Channel 4 took steps to rectify this after prompting from the RNID and the EPG information was corrected, however for nearly three weeks viewers were provided with incorrect information.

Channel 5

- 6.10 Channel 5 started to provide updates quickly after the incident through a range of platforms, although they did not have a prepared emergency communications plan in place.
- 6.11 Like Channel 4, most communications were published in written English only, making them less accessible to those viewers who communicate mainly by BSL. The reliance on social media, especially early on after the incident, also risked excluding customers that did not have access to either social media, or the internet in general. It is clear from examples of the correspondence received from viewers that the lack of information was particularly distressing for viewers with hearing and sight impairments.
- 6.12 It took a week after the incident for ViacomCBS to acknowledge the issue with access services and to provide some degree of explanation on the website, leaving viewers uncertain of when they would be able to watch their programmes again. In correspondence from the audience, viewers questioned why access services had not been ‘backed-up’ in the same way as programming so that there could be a speedy restoration of accessible programming.
- 6.13 ViacomCBS has confirmed that from 6 October 2021 all programmes affected by the loss of subtitling carries a closed caption apology, and from 13 October 2021 an open apology caption was broadcast where subtitling was not available. The slide aired 126 times across

all parts of the day. It was also placed on the streaming service My5, which delivered 1,297,385 impressions.

7. Conclusions

- 7.1 The incident at Red Bee media was exceptional in its scope, severity and impact. Programme services for several PSBs were interrupted, with some suffering issues for a prolonged period.
- 7.2 It is a cause for concern that a sufficient quantity of equipment at Red Bee Media was damaged simultaneously by the release of pressurised gas to render it unable to provide playout or other services to its customers for many weeks while the systems were physically rebuilt, configured and tested.
- 7.3 Absence of the Broadcast Centre's facilities meant that some PSBs had to invoke their disaster recovery procedures into use for a prolonged period. All organisations had such procedures and preparations in place, as well as a programmes of regular testing, although these did not in all cases result in actually putting disaster recovery infrastructure on-air.
- 7.4 Some PSBs such as ITV and the BBC were little affected by the incident at the Red Bee Media Broadcast Centre, due either to not having any facilities located there, or having mirrored standby playout facilities that could be brought into use almost seamlessly.
- 7.5 S4C's playout was not affected, and it did not have to move to a disaster recovery facility itself, although it suffered an interruption to its terrestrial service for some hours due to reconfigurations resulting from the incident.
- 7.6 Channel 4 and Channel 5 were able to bring their disaster recovery facilities into use relatively swiftly, although some issues were encountered. For both services, restoration times for some platforms was longer than anticipated, seemingly as a result of a sudden demand upon operational staff to switch circuits for many programme services.
- 7.7 Channel 4's disaster recovery equipment was not able to provide any access services from the time it was put into service on 25 September until subtitling was restored about one month later. Full capability was not restored until November 2021.
- 7.8 Channel 5 was able to provide access services once services had been restored, although the scale of the infrastructure loss at Red Bee Media meant that adapted processes had to be quickly developed which led to some errors and degradations to transmitted services, including loss of access services on some programmes.
- 7.9 Communication of the prolonged issues to viewers, particularly the lack of access services, was slow, and not initially delivered in a form that would be of most use to those that rely upon access services. Delays in updating programme guides meant that information presented to viewers seeking programmes carrying access services was not accurate, which caused frustration.
- 7.10 In their replies to our requests for information, Channel 4 and Channel 5 have told us that they are taking steps to address many of points we have identified. Channel 4 is expected to move to a new arrangement for its playout which would see it benefit from a new DR

facility that will permit near-seamless switching and would be capable of fully supporting access services. Channel 5 is working to address the process shortfalls that occurred.

7.11 We are encouraged by the initiatives already under way by the broadcasters and these should reduce the impact if a similar event were to happen again. Following our review of the incident, we make a number of recommendations which are set out in the following section.

7.12 Given the severity of the incident, and duration of the impact on viewers, particularly those using access services, we judge that it is appropriate for Ofcom to consider whether some aspects of our recommendations should be captured in an update to the Television Technical Code, with which the Public Service Broadcasters must comply as a condition of their licences. We intend to consult upon our proposals during 2022.

8. Recommendations

Aspects of the broadcasters' plans and processes that need to be improved

- 8.1 Disaster recovery facilities should be specified to carry the full suite of services (vision, sound and access services), and be tested regularly under simulated disaster recovery conditions to identify performance shortfalls or operational bottlenecks anywhere in the broadcast chain.
- 8.2 All parties in the signal chain should ensure that they have adequate numbers of trained operators that are familiar with disaster recovery procedures, and that these procedures are kept up to date and tested regularly.
- 8.3 All parties in the signal chain should periodically audit their technical infrastructure estate with the aim of identifying vulnerabilities such as multiple servers in a room that could be damaged by a sonic wave or similar incident and put in place appropriate mitigation measures.

Aspects of viewer communication that need to be improved

- 8.4 Broadcasters should ensure that they have prepared clear communication plans ready to implement in case of interruptions to service, and that these take into account the affected audiences and their needs.
- 8.5 Where possible and proportionate, broadcasters should make use of their own TV channels (and not just social media) to communicate with viewers. Information provided should be accurate (e.g. EPG data on the availability of access services should be accurate if any services have been lost). Where there is expected to be a protracted outage, viewers should be informed quickly on the cause of the outage, steps being taken to remedy it, and the likely time for full restoration of service. Also, viewers should be promptly informed when services have been restored.

Changes to licences and responsibilities of licensees

- 8.6 As the quotas for providing access services do not account for prolonged outages in service, we will consider whether specific requirements for access services need to be added to the Television Technical Code to ensure they are dealt with in the same way as other essential components such as vision and sound in the technical delivery of programmes. It is not acceptable to have lengthy outages of popular programmes for any section of the audience.
- 8.7 Any proposals we make to amend the Code would be included in a consultation on wider revisions to our TV and radio Technical Codes that we intend carrying out later this year.

A1. Sonic damage

- A1.1 There have been several reports of ‘sonic wave damage’ to data centres occurring globally following the release of fire suppressant gas. Below we have collected together a selection incidents that have been reported.
- a) In 2015, a study by Siemens warned that the nozzles used by some fire suppression systems could cause ‘fatal’ damage to hard disks due to sonic waves.¹⁶
 - b) Utah, 2010 – The operations of major web-hosting provider, WestHost, were halted for six days after the accidental discharge of a fire suppression system damaged hundreds of servers, with some data irretrievably lost.¹⁷
 - c) France, 2013 – A fire suppression system at a government data centre was accidentally discharged, taking the French government’s accountancy software temporarily offline.¹⁸
 - d) Glasgow, 2015 – The release of gas from a fire suppression system at Glasgow City Council is believed to have caused a vibration that damaged IT equipment.¹⁹
 - e) Bucharest, 2016 – The fire suppression system of a bank’s data centre was accidentally discharged, taking cash machines, online banking and the bank’s website offline for 10 hours. The high-pressure release of gas created a sound above 130 decibels.²⁰
 - f) In 2017, the Uptime Institute Data Center Industry Survey revealed that around a third of data centre operators have experienced an accidental discharge of their fire suppression systems. The Institute recommendations included installing sound-insulating cabinets, as well as completely replacing the systems with a pre-action or chemical suppression system.²¹

¹⁶ <https://www.bbc.co.uk/news/technology-37337868>

¹⁷ <https://www.datacenterdynamics.com/en/news/fire-suppression-kills-glasgow-city-councils-it/>

¹⁸ <https://www.bbc.co.uk/news/technology-37337868>

¹⁹ <https://www.datacenterdynamics.com/en/news/fire-suppression-kills-glasgow-city-councils-it/>

²⁰ <https://www.bbc.co.uk/news/technology-37337868>

²¹ <https://journal.uptimeinstitute.com/fire-suppression-systems-bring-risk/>