

REPORT OF  
THE PRINCIPAL COMPLAINTS  
COMMISSIONER

Dick Sawle

Re

KTV Ltd v.

The Falkland Islands Government

07 DECEMBER 2019

Submitted for consideration by

The Honourable Roger Spink MLA

## 1. Receipt of Complaint

The complaint was forwarded to me by email by MLA Roger Spink on the 26<sup>th</sup> April 2019.

In addition to passing on the details of the complaint, MLA Spink queried whether or not it was covered by my jurisdiction and requested that I consider this point carefully. I understand why this was a matter of concern to him, and am grateful to him for giving me the opportunity to consider it as part of my decision.

## 2. Background

Sure implemented a 4G network that first went live in April 2018 in order to meet with their licence KPI requirements using the following frequencies:

FDD band 20 810Mhz Downlink and 851Mhz Uplink with 20Mhz Bandwidth.

KTV were issued with a licence in 2015 that allowed spectrum to be used from 618 MHz to 778MHz.

## 3. The Complaint

KTV Ltd.'s complaint against the Falkland Islands Government (FIG) can be summarised as follows:

The core of their complaint is that FIG failed to adequately control the allocation of radio spectrum frequencies, the consequence of which was that KTV suffered from interference from the new 4G network installed by Sure. This resulted in a sudden spate of complaints from their customers stating that the KTV broadcast service was no longer working as broadcast quality was so poor.

The complainant had no problem of this nature before the installation of Sure's 4G network and attribute the problems caused to a failure by FIG to protect the terms of KTV's pre-existing licence.

In particular, they allege that:

- (a) They were not formally consulted by FIG before Sure installed the 4G network.
- (b) They were given no opportunity by FIG to state if there might be any conflict between the frequencies concerned.
- (c) Whereas normal procedure (in the UK) in these circumstances is to provide notice of up to five years to ensure that the new system operates smoothly and without conflict, in this case the new system was introduced without any prior formal notice to KTV by FIG. [*for the sake of completeness, it is the case that it was made public that Sure would be implementing a 4G network following the Cartesian report which was published in 2015 and which referred to the use of LTE800 – the frequencies that Sure went on to use, but no formal notice was given to KTV*]

KTV allege that as a result of the actions of FIG described above, they have suffered inconvenience, loss and expense. They add that they have had little if any proactive response from FIG in seeking to resolve these issues.

As a result, in April 2019 the complainants requested MLA Spink to refer their complaint to the Complaints Commissioner under the terms of Chapter 1X of the Constitution and the Complaints Commissioner Ordinance 2010.

Initially MLA Spink responded stating “*I believe that this is a commercial or contractual matter and therefore under schedule 2 part 2 (21) and also section 10(3) the Complaints Commissioner does not have jurisdiction*”

However, following further correspondence by email with the complainants, MLA Spink did forward the complaint for consideration but with the caveat that I carefully consider the matter of jurisdiction.

#### **4. Jurisdiction**

A complaint submitted to the PCC (Complaints Commissioner Ordinance Section 3) is made by an aggrieved person [a member of the public] “*who claims to have suffered injustice in consequence of –*

- a) maladministration in the government of the Falkland Islands...; or*
- b) conduct mentioned in subsection (2)”*

Section 16 of the Ordinance states that on receipt of a complaint “[The MLA] *is to decide whether or not to forward it to the Principal Complaints Commissioner*”.

No guidance is given as to how such discretion should be exercised. In these circumstances it is fair to assume that the exercise of such discretion should be both fair and reasonable. Furthermore, given that the objective of Chapter 1X of the Constitution is “*to investigate...any complaint of maladministration in the government of the Falkland Islands..*” it would be reasonable to assume that the exercise of such discretion would lean in favour of the complainant.

This puts the MLA, acting as a filter to any complainant, in a potential conflict of interest, especially if the MLA also carries the portfolio responsibility for the matter under consideration as is the case with this complaint.

It is the case that Schedule 2 part 2 (21) of the Ordinance clearly states that the Complaints Commissioner does not have any jurisdiction in “*any contractual or commercial transaction*”.

In this case, the complaint is not about a contractual issue – it is about the manner in which FIG exercised its administrative function which, in the complainant’s view, was exercised arbitrarily and negligently. Nor can this complaint relate to any contract between the complainants and Sure as there is no contract between them. Whilst parties to a contract may sue each other, a third party cannot, so the complainants have no recourse in law against Sure.

Turning to the consideration of whether or not the complaint relates to a commercial transaction – the complainant is a limited company and therefore by definition engaged in commerce, but that fact alone should not prevent the jurisdiction of the Complaints

Commissioner. Indeed, the Ordinance anticipates complaints by commercial bodies – see section 3 which states that “*member of the public*” includes a body of persons (whether incorporated or unincorporated) other than a public body and “*person*” includes a body of persons (whether incorporated or unincorporated).

An incorporated body of persons is by definition a limited company which by definition exists to carry out commerce. Further, section 12 (3) refers to the eligibility of a person/body “*who is not an individual, having an office in the Falkland Islands*” – presumably such a person would be a commercial entity. Nowhere in the Ordinance does it state that persons engaged in commerce are excluded from making complaints.

Therefore, while the complaint in this case is made by a commercial body, it is not concerning any commercial transaction. It is about the exercise of administrative functions by FIG, where maladministration is alleged.

Section 10 (3) states that “*a Complaints Commissioner is not to investigate a complaint in respect of which an aggrieved person has or had (a) a right of appeal....; or (b) a remedy by way of proceedings in a court of law [in both cases] unless the Commissioner is satisfied that, in the particular circumstances, it is not reasonable to resort to or have resorted to that right or remedy*”.

Neither of those remedies exists here, save perhaps an application by the complainants for a judicial review of FIG’s apparent decision not to take any remedial action. In any event it would be for the Complaints Commissioner, not the referring MLA, to make judgment on the issue as to whether or not [he] “*is satisfied that, in the particular circumstances, it is not reasonable to resort to or have resorted to that right or remedy*”

I also note that the complainants have been advised by their solicitors in writing that they have no remedy at law to pursue.

I have therefore carefully considered the matter of jurisdiction and have concluded that it is within my jurisdiction to consider the complaint both on the grounds of maladministration and conduct.

## **5. Maladministration**

Maladministration is not fully defined in my governing legislation (Complaints Commissioners Ordinance 2010). This is deliberate. In keeping with similar legislation, it has been argued that any attempt to define maladministration might prevent those with a legitimate grievance outside a strict definition from obtaining a remedy.

Although there is no specific and detailed definition, maladministration can broadly be defined as “*the public body not having acted properly or fairly, or having given a poor service and not put things right*” (House of Commons briefing paper 07587)

## **Could or should FIG have acted differently and avoided the problem?**

In making my decision, I took into account comments made to me by KTV, the Plum report and the Regulator's findings, together with further factual advice from the Regulator, whose cooperation was helpful to my considerations. I enclose as reference both the Plum report and also the Regulator's findings and will not repeat their content.

When FIG issued the exclusive operating licence to Sure, in April 2017, one of the agreed Key Performance Indicators was the introduction of a 4G mobile network. A new Communications Ordinance came into force at the same time and in tandem with it came a full-time operationally independent Communications Regulator. Provision also was made for spectrum management with statutory responsibility for this being given to the Regulator, thus moving it away from the auspices of FIG.

The top priority though was to introduce the 4G mobile network and spectrum management has only recently been introduced. It would most likely have been the case that if spectrum management had been introduced earlier, then KTV would have been given formal notice to test their systems to ascertain whether they needed to move frequencies or take any other remedial actions to avoid any interference.

Cartesian undertook a strategic review of communications for FIG in 2014 and provided a full report in 2015. Part B of this report was confidential and only an element of this entered the public domain. The following extract from the confidential section of the report has been provided to me by the Regulator for the purposes of this specific matter.

*"We are assuming deployment of LTE in either the 700 MHz or the 800 MHz bands. These frequency bands have better propagation characteristics than the bands used currently by WiMAX (i.e. 2.5 GHz and 3.5 GHz). The coverage provided by LTE in these bands is in excess of 50 km for the rural fixed installation and in excess of 26 km for outdoor mobile coverage. Specific extended range coverage solutions are available which are able to extend reach to 100 Km in sparsely populated rural areas."*

The Cartesian report doesn't raise the issue of interference with broadcasting but did make the following recommendation *"For FIG to proactively manage spectrum and issue spectrum licences accordingly. This is most relevant for imposing specific coverage and rollout obligations for LTE (including timeline for deployment) to help address current coverage issues. The report goes on to state "Currently, FIG has a hands-off approach to the management of spectrum, which is left to the military and Sure to manage on an ad-hoc basis. It is important for FIG to develop a strategy to fully understand and manage the spectrum in use today, as well as anticipate and respond to changes in technology, services and application trends that may require the appropriate future allocation of spectrum to enable the launch of those new services."*

Both the Plum report and the Regulator's findings reinforce these arguments and do not dispute them.

The Regulator states (Finding 2)

*“The Falkland Islands Government (FIG) issued a licence to KTV in 2015 at the same time as discussing the implementation of 4G with Sure. FIG should have assessed the implications and consulted with all parties and taken appropriate steps to mitigate the impact of interference on KTV.”*

The reasons for the failure to consult are not known and there is no merit in trying to establish this now as the people working within FIG that should have consulted with KTV are no longer present and it would not impact on the outcome of the complaint.

It is not my task to attempt to assign blame but rather to state facts and make recommendations to ensure similar problems do not arise in the future. It was, in my view, an oversight on FIG’s part. I would doubt any of the officers involved at the time would be aware of possible technical issues.

What is evident to me is that once the problem had been recognised, the Regulator engaged with KTV and took responsibility for liaising with KTV and reporting back to FIG on her findings and make a full report. This was done.

Feedback from KTV is that in some situations the filters worked well and removed all interference and in other cases they did not work. Other work had to be carried out. Some aerials had to be refitted or repositioned, cabling renewed or changed. However, no evidence was received from KTV that would have enabled the Regulator or FIG to quantify the extent of the problems or of the remedial works that had to be carried out by KTV.

## **6. Quantifying the problem**

Plum consulting made a recommendation fully supported by the Regulator as stated below:

*“A detailed log of cases, giving locations, type of system (amplified or not, coax type, aerial type & location) and impact of filter should be sought.*

*We also think that there are some lessons that can be taken from this problem in case a similar problem manifests itself:*

- 1. There should be a log maintained of all interference cases detailing the problem and how it was resolved and who dealt with it. Currently it does not appear that there is anyone who has a full picture of the 800 MHz interference problem, for example number of households impacted, their location, type of system and what has been done and whether the problem was resolved.”*

The Director of Development and Commercial Services wrote to KTV on 16<sup>th</sup> May 2019 following up on these points and requesting complete information on the number of households affected, any remedial action taken, impacts of any filters fitted and a number of other details – all of which would enable FIG to consider the amount of any compensation.

KTV have not been able to supply that information and consequently the dispute remains unsettled. From my communication with KTV it appears that, at the time of the interference, they were fully occupied in trying to keep customers satisfied and consequently no log of activity was kept.

## **7. Conduct**

Part of my investigation requires me to consider whether or not there has been conduct on the part of FIG *“in respect of which a member of the public would feel a sense of injustice”*. The legislation gives examples of such conduct – e.g. *“discourtesy, a refusal to rectify a mistake and unhelpfulness”* amongst others.

FIG did recognise that there was a problem. The Attorney General recognised the issues and entered into correspondence with KTV rapidly after the initial interference was identified and subsequently met with KTV. A letter was sent by the Attorney General (FIG) to KTV on 10 May 2018 -this was a follow up from a meeting the AG had with Mario Zuvic of KTV on 3 May 2018 which was a prompt response to the first report of interference on 27 April 2018. This letter indicates FIGs willingness to work with KTV on resolving matters promptly. FIG attempted to correct it via the Regulator who commissioned the Plum report and gave her findings on it. Sure also assisted with the purchase of filters and FIG requested information from KTV that would have been used to quantify any compensation.

## **8. Findings and Recommendations**

### a) Maladministration

#### **Finding:-**

There was maladministration. The Regulator recognised that there was a failure by FIG to adequately consult and that consultation should have taken place. In my view this failure amounts to maladministration.

While I have made a finding of maladministration, I acknowledge, and am encouraged to see that this has already been recognised and that the means to ensure that this type of problem does not occur in the future has already been put in place with both a full-time Regulator and active Spectrum Management.

#### **Recommendation:-**

I recommend that the FIG write a letter of apology to KTV recognising that there was a failure to formally consult prior to the introduction of the 4G system. This should be done within a period of one month from consideration of this report by Executive Council with a copy of the letter sent also to myself.

I recommend that FIG compensates KTV for the inconvenience, disruption to business and costs incurred. I note that requests from FIG for details from KTV that would allow for an objective calculation of costs incurred have not been answered by KTV. In communication with KTV I understand that they incurred legal costs of over three thousand pounds together with further equipment costs and inconvenience. I recommend that FIG compensates KTV in the sum of £5,000 to be paid within one month of this report being considered by Executive Council. At that point FIG should confirm with me that the amount has been paid or why it as not.

**b) Conduct**

From email exchanges that I have seen between FIG and KTV and accounts of some meetings, it is evident that at times frustrations have become apparent. However, FIG acted promptly -a matter of days after they had been made aware of the problem. There was no lack of engagement by FIG as they had quite rightly appointed the Regulator to deal with the matter. The Regulator is legally independent of FIG. She acted promptly and with courtesy throughout. She commissioned the Plum report and submitted her findings to FIG. FIG then engaged with KTV to quantify the problem and arrive at a figure for compensation. KTV could not supply that information.

I find no evidence of any misconduct by FIG, examples of which are given in the Complaints Commissioner Ordinance 2010 Section 3 (3).

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## Falkland Islands Communications Regulator

### Regulatory Report: spectrum interference

The Communications Regulator received notification from KTV in April 2018 that a number of KTV customers had reported problems with their television service. The cause of these problems was identified as signal interference coming from the new 4G mobile phone signal. This report outlines the summary of the findings, followed by a detailed analysis of how these findings have been reached.

### Regulatory findings: summary

1. The signal interference caused by 4G was not the result of any breach of license or law.
2. The Falkland Islands Government (FIG) issued a licence to KTV in 2015 at the same time as discussing the implementation of 4G with Sure. FIG should have assessed the implications and consulted with all parties and taken appropriate steps to mitigate the impact of interference on KTV.
3. The Regulator commissioned Plum Consulting to review the actions taken by all parties following the identification of interference. The Regulator fully agrees with all the points made in that report and endorses those findings as the means to resolve ongoing interference.
  - Filters have been the first line of action in other jurisdictions where interference has occurred between LTE 800 (4G) and broadcasting services. Filters have been found to be effective in the Falkland Islands.
  - With effective filtering KTV should be able to continue to use all the frequencies allocated to them under the terms of the licenses issued to them in 2015.

### Legal basis for findings

**Finding 1** - The signal interference caused by 4G was not the result of any breach of licence or law.

KTV Limited has three licences. The first was issued under section 4 of the Broadcasting Ordinance 2004, which authorises the company to provide a satellite broadcast service. The second under section 3 of the Broadcasting Ordinance authorises a rebroadcasting service in relation to television and radio. The third licence was granted under section 6 of the Telecommunications Ordinance 1988 and also authorises the operation of a broadcasting station for the broadcast of television and radio programmes. The second and third licences contain schedules setting out certain conditions under which the permissions granted were to operate. In particular they each list the same eight digital transponders, with corresponding frequencies. All three licences were granted by the Executive Committee (ExCo) on 16 March 2015 and expire on 23 March 2020. KTV are operating as per the terms of their licence.

Sure operates under an exclusive licence issued under Part 7 of the Communications Ordinance 2017. The licence was issued to Sure in April 2017 but had been subject of several years discussion prior to that time. Sure are obliged under the terms of their licence to introduce a new 4G network

by October 2018. The Sure licence issued in April 2017 is a service licence, it does not explicitly provide for the licensing of the spectrum used by Sure to provide services. The Sure licence makes reference to an 'Individual Spectrum Licence' which refers to a licence issued under the terms of section 55 of the Communications Ordinance 2017. FIG first discussed the requirement to implement 4G in early 2015 following the recommendation from Cartesian that the most appropriate spectrum would be LTE 800 bands. It is therefore necessary to look at both the legislation that was in place at the time of those discussions in 2015 as well as what was in place at the time that the system went live in April 2018.

There was no requirement within the Telecommunications Ordinance 1988 to license the spectrum used by Sure nor were there any provisions relating to the management of such spectrum and/or standards applicable to the relevant apparatus. Cartesian undertook a full review of telecommunications in the Falkland Islands in 2014 and a report was submitted to FIG in March 2015. Cartesian noted that there were no defined policies in place within the existing regulatory framework, at that time, for issuing and managing the spectrum with FIG taking a 'hands-off approach to the management of spectrum'. In view of this Cartesian recommended that FIG should proactively manage spectrum and issue spectrum licences accordingly stating that this was most relevant for imposing specific coverage and roll-out obligations for LTE (4G). Cartesian went on to state that a spectrum licence for 4G should be issued to Sure prior to the network being rolled out. FIG progressed this action through the inclusion of spectrum management within the Communications Ordinance 2017.

The Communications Ordinance 2017 came into law on 30 March 2017. Under Part 6 of this Ordinance the Regulator is given general responsibility for the management of the radio spectrum in the Falkland Islands. This was the first time that such a requirement for spectrum management had been put in place. Section 55 states that the Regulator may impose a requirement for a licence for the use of frequencies on the spectrum. When doing so the Regulator must have regard to the spectrum plan. Section 54 states that the Regulator must publish a plan for the use of the radio spectrum during the period of 2 years from the commencement of the Communications Ordinance; therefore, a plan needs to be in place by April 2019. The Regulator is not in a position to license spectrum under the Communications Ordinance 2017 until such a time as the spectrum plan is in place. At the time that Sure turned on the 4G masts in Stanley there was no requirement for a licence.

**Finding 2** - The Falkland Islands Government (FIG) issued a licence to KTV in 2015 at the same time as discussing the implementation of 4G with Sure. FIG should have assessed the implications and consulted with all parties and taken appropriate steps to mitigate the impact of interference on KTV.

The Regulator has found that FIG and Sure initiated negotiations on the licence requirements for the 4G network in 2015, at a time when there was no requirement for licensing nor was there any active spectrum management taking place. At the same time FIG issued KTV with a new licence. There is no information available to the Regulator to suggest that FIG alerted KTV to the discussions that were taking place with Sure regarding the use of the LTE 800 frequency and the details of the KTV licence were not shared with Sure. There was a number of opportunities between the time that FIG first initiated discussions with Sure with regard to the roll out of 4G using the LTE 800 band and the 'go live' of the network in April 2018. Unfortunately these opportunities were missed and as a result the first that either KTV or Sure was aware of the interference was in April 2018 when the new 4G towers were turned on.

**Finding 3** - The Regulator commissioned Plum Consulting to review the actions taken by all parties following the identification of interference. The Regulator fully agrees with all the points made in that report and endorses those findings as the means to resolve ongoing interference.

Plum Consulting has submitted an interference report to the Regulator. The regulatory findings in this report have been informed by that report and should be read in conjunction with it. The full Plum report is available in Annex 1 and provides the technical analysis of the interference.

## **Conclusion**

The Regulator concludes that the interruption of KTV services caused by interference from the 4G signal could have been anticipated. Steps could have been taken to prevent it, prior to the 4G network going live in April 2018, if FIG had been actively managing the spectrum. Interference between digital broadcasting and 4G at LTE 800 is well known internationally. Whilst the Government was responsible for the spectrum prior to the commencement of the Communications Ordinance 2017 the implementation of 4G was well publicised. No steps were taken by either Sure or KTV to discuss the potential implications of this. Those measures would have included timely consultation with both KTV and Sure prior to the roll out of the 4G network. However, the solution would have been the same as the one that has been rolled out since May 2018, the provision of filters to those KTV subscribers affected by the interference.

## **Next steps – Options for consultation with interested parties**

### **Option 1**

That both FIG and Sure contribute to a fund for the ongoing provision of filters that is used by the Regulator for the provision of filters to KTV. KTV need to maintain a log of all interference cases detailing the problem and how it was resolved in order to access this fund. This log will be shared with the Regulator in order for the Regulator to appropriately manage the fund and allocate filters appropriately.

### **Option 2**

KTV should submit a compensation claim to FIG, which will include the ongoing cost of filters. This compensation payment should cover the cost to KTV of the filters. Upon payment of compensation the matter will be closed with no further action being required by the Regulator, FIG or Sure.

This report will be issued to interested parties for consideration of these options. Written responses to this report should be submitted to the Communications Regulator by Friday 26 October 2018 either by email to [regulator.telecoms@sec.gov.fk](mailto:regulator.telecoms@sec.gov.fk) or by post.



Susannah Nightingale

**Communications Regulator**  
**05 October 2018**



# DTT Interference

Report | 1 October 2018

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## 1 Introduction

This report provides the results of an investigation into interference into household TV receivers in Stanley following the switch on of LTE 800 base stations in the area. The analysis is based on:

- Inputs from the Regulator in the Falkland Islands providing information on emails and documents that had been exchanged relating to the interference problem, measurements (with and without LTE sites active) undertaken to assist in understanding the problem and information on transmitter locations and main areas where interference was being experienced.
- Inputs, via conference calls during early September, from Mario Zuvic Bulic at KTV and Justin McPhee at Sure and exchange of emails with Giles Finch at BFBS.
- Plum's prior experience in assisting DMSL<sup>1</sup> in the UK on deployment of LTE800 in the UK and providing advice on interference issues that might arise during switch on of the LTE base stations. Plum was also one of the teams that responded to and provided solutions in the instances of interference to DTT reception.

In the following sections we address:

- The criterion that need to be met for deployment of LTE in the 800 MHz band;
- Approach adopted in the UK;
- Analysis of the situation in the Falkland Islands
- Recommendations

## 2 Co-existence criterion between DTT and LTE at 800 MHz

The 800 MHz band<sup>2</sup> has been used for LTE mobile systems in Europe following studies undertaken in CEPT<sup>3</sup> which provided the basis of setting the necessary technical and regulatory conditions. These conditions were intended to allow adjacent band sharing between DTT and LTE and included:

- A guard band of 1 MHz between the upper DTT frequency at 790 MHz and the lower LTE frequency at 791 MHz

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<sup>1</sup> DMSL – Digital Mobile Spectrum Ltd. was established in 2012 to run the 'at800'-branded support programme to provide interference free use of radio spectrum in the UK. It managed the work since 4G services at 800 MHz began to be deployed and operated in the summer of 2013. DMSL was funded by the UK mobile operators that held allocation at 800 MHz. DMSL was overseen by a board representing Ofcom, the broadcasters, viewers and the Department for Digital Culture Media and Sport (DCMS).

<sup>2</sup> 3GPP band 20 (832-862 MHz paired with 791-821 MHz)

<sup>3</sup> The European Conference of Postal and Telecommunications Administrations

- Reversing the duplex of the LTE band so base stations transmit in the upper portion of the paired frequency band (i.e. 832-862 MHz)<sup>4</sup>;
- Specifying the LTE base station Block Edge Mask (BEM)<sup>5</sup> to minimise the risk of interference.

It was also recognised that it would be necessary for Administrations to put in place a procedure for bringing into operation the LTE base stations so that the interference potential could be predicted beforehand and the impact minimised. Additionally, a set of mitigation techniques that could be implemented, on a case by case basis, to resolve interference into the TV receivers were identified. The most effective approach was to insert a rejection filter between the household TV aerial and the receiver or between the TV aerial and the mast head amplifier. This would effectively filter out the LTE signals and prevent the TV receiving systems being overloaded by the high field strengths of the LTE transmissions which fall within the original design bandwidth of the TVs and aerial systems.

### 3 Approach adopted in the UK

The approach adopted in the UK to enable licensing and deployment of LTE 800 included:

- Consultations on the refarming of the upper TV band for mobile broadband and the necessary licensing conditions and method of award.
- Establishment of DMSL to identify the potential for interference into TV receivers and facilitate the deployment and taking into operation of the LTE base stations with the minimum impact on TV viewers. This involved the development of models to predict potential areas of interference as well as studies to understand typical household TV installations and the likely sources of problems.
- Pilot trials which were organised in 2013 to assess the likely magnitude of the problem<sup>6</sup>.
- Notification to viewers, in advance, of LTE base station switch-on and provision of contact details in case of interference problems.

It was found that in the majority of the interference cases that the *at800* approved filter<sup>7</sup> resolved the interference. The filter was fitted between the TV aerial and the distribution amplifier or splitter but in the case of roof top amplifiers a weather-proofed version of the *at800* filter was used. Where the filter did not resolve the problem then there were some alternative solutions:

- Install a different type of TV amplifier;
- re-align or replace the existing TV aerials; and / or
- improve the cabling.

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<sup>4</sup> The approach adopted in mobile bands is generally for the lower frequencies of a paired band to be used for the up link (mobile transmit to base station receive) and the higher frequencies to be used for the down link (base station transmit to mobile receive). In the case of the 800 MHz band this is reversed with the up link being in the upper part of the paired band.

<sup>5</sup> A BEM defines the transmitter spectrum mask which provides the technical conditions that must be met at the edge of a licensed block of spectrum and is intended to limit the potential for interference into any receivers (of another system / service) using the adjacent frequency block.

<sup>6</sup> Initially research indicated 2.3 million households could be impacted but after the pilot trials it was estimated that it might be 90,000 households and in practice it was considerably less.

<sup>7</sup> <https://at800.tv/industry-trade/approved-filters/>

## 4 Analysis of the situation in the Falkland Islands

### 4.1 Digital TV - KTV

KTV has been providing TV services to Stanley from their transmitter site on Dairy Paddock Road, shown in Figure 1, for nearly 25 years. This site is situated towards the west of Stanley.

Figure 1: Location of KTV transmitter site<sup>8</sup>



In 2015 KTV were licensed, for 5 years, to provide DTT on 8 transponders (8 frequencies) as shown in Table 1.

Table 1: Transponders and associated frequencies licensed to KTV

Transponder	Frequency (MHz)
19	618
21	634
23	650
25	666
33	730
35	746
37	762
39	778

<sup>8</sup> It was noted that the geographic coordinates provided by KTV placed the TV transmitters on the other side of the road in a field to the South. However this has no real impact on the findings in this report.

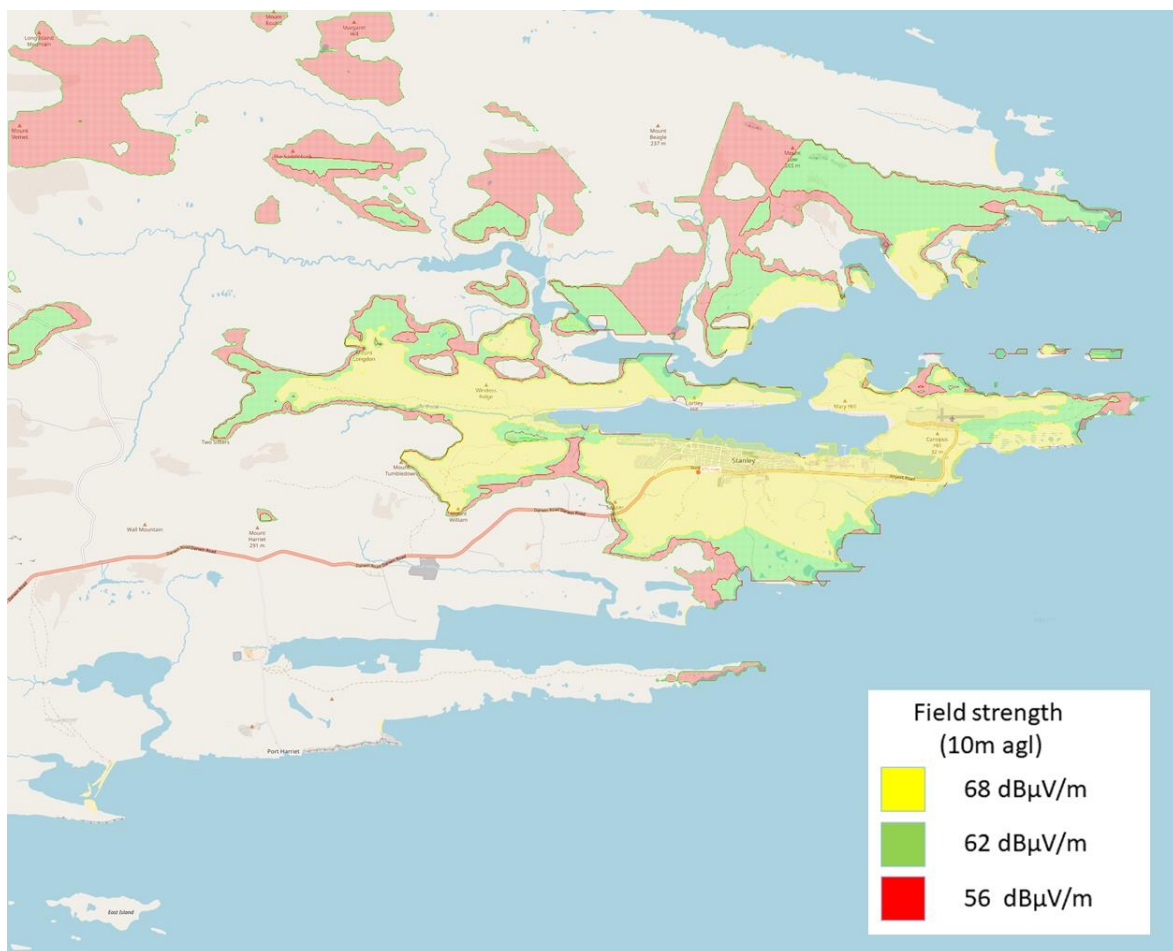


Currently the lower 6 transponders are operational with each having a 5 watt transmitter output power as specified in the licence. Coverage to Stanley is provided by using two horizontally polarised panel antennas – one facing west and the other east with a slight tilt to the north. The geographic area of Stanley is limited (approximately 500 metres by 3.5 kilometres) and the KTV deployment should, depending on the terrain and clutter, allow the majority of households to receive TV services without the addition of amplifiers. We understand that log-periodic aerials are generally used in receive installations.

However, it is understood from both KTV and Sure that there are some locations in Stanley where there is no line of site to the TV transmitter and it is necessary to deploy mast head amplifiers. One specific problem area that was noted by KTV is east of the cemetery and the H Jones Road LTE base station, because every house in that location is situated in a valley.

Figure 2 below indicates the predicted level of coverage from the KTV transmitters<sup>9</sup> calculated using Plum’s software which incorporates the ITU-R propagation model of Recommendation P.1812-4. Terrain data is taken from the SRTM digital elevation model. A median field strength of 56dBµV/m at 10m would correspond to a pixel availability of 95% for typical DTT parameters and is representative of typical European coverage limits.

Figure 2: KTV coverage prediction (Source: Plum Consulting)

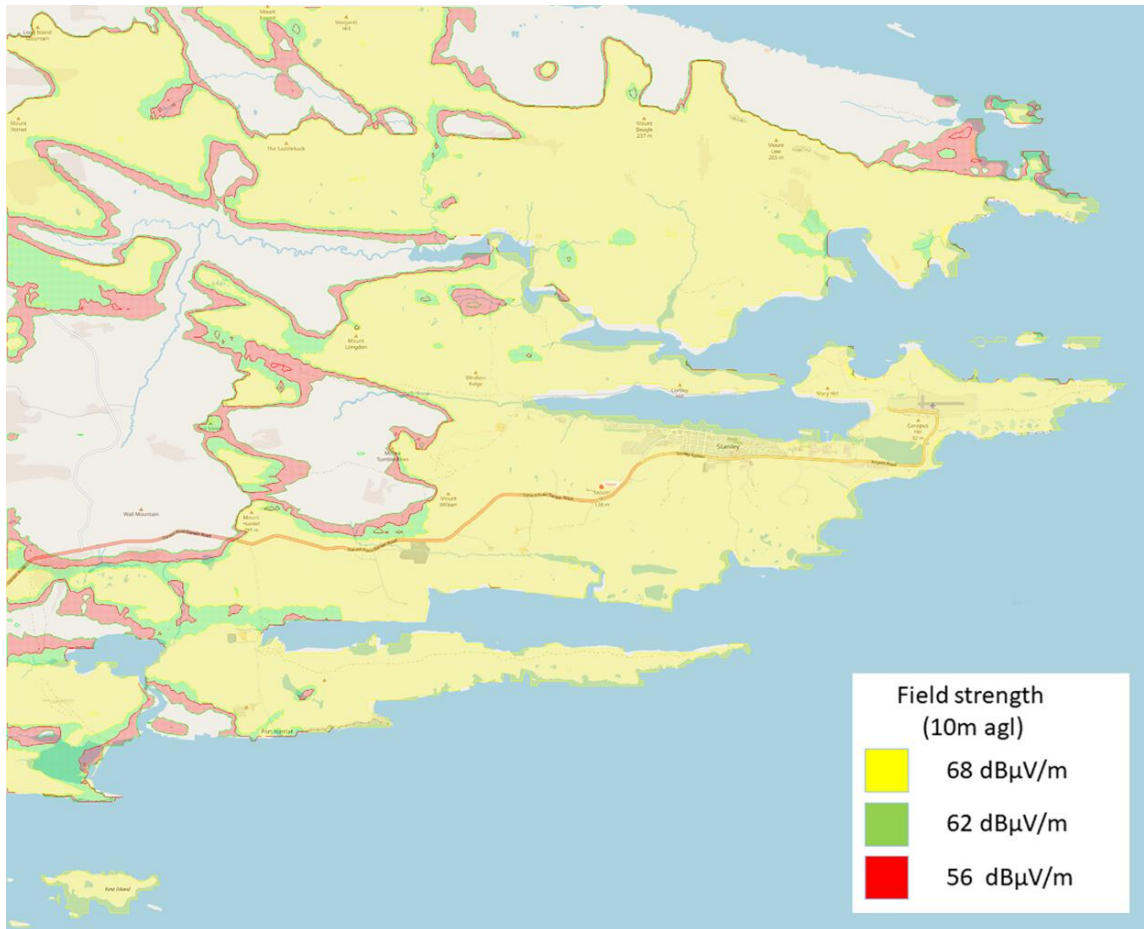


<sup>9</sup> Transmitter parameters were provided by KTV.

## 4.2 Digital TV- BFBS

It was noted from discussions with KTV that BFBS is also providing free to air services from Sapper Hill. However, it is understood that there have been no interference issues since the LTE base stations have been operational probably due to the BFBS transmitter operating at 514 MHz. It also uses a higher transmitter power of 550 watts ERP but due to the longer propagation distances to viewers it is not considered that this higher power is an indicator of the need to increase the KTV output ERP. This is demonstrated in Figure 3 below which provides the predicted coverage for Sapper Hill and indicates that the signal strength levels are comparable in Stanley with those of KTV.

Figure 3: BFBS (Sapper Hill) coverage prediction (Source: Plum Consulting)



## 4.3 LTE 800 - Sure

It is understood from Sure that in 2015 there were lengthy discussions between the Falkland Islands Government (FIG), Cartesian and Sure on the use of the 800 MHz band for the provision of mobile services based on it providing the best trade off in terms of range and building penetration. There are 4 LTE 800 base stations installed and fully deployed since mid-September 2018 in Stanley at the Earth Station, the Fire Station, H. Jones and Gordon Lines Packaway sites. It is understood that the H Jones and Gordon Lines Packaway sites are in the shadow of a hill to the east of Stanley. The Fire Station is nearly directly to the north of the KTV transmitter site and Earth Station to the west. Each site transmits 40 watts and uses the frequencies 791-821 MHz in the down-link. Earth Station and H Jones base stations use 3 sector antennas and at the other sites use omni-directional antennas.



## 4.4 What is the problem

The fundamental problem being experienced is that TV receiving systems are being overloaded by the very high field strengths due to the LTE transmissions, which fall within the original design bandwidth of the TVs and aerial systems. Once this overloading has occurred, it will make it impossible for the TV receiver to decode any DTT signals, regardless of the power or frequency.

This problem is specific to KTV as they are using the upper frequencies available for DTT (Band V) whereas BFBS's frequency is considerably lower (Band IV), providing significant frequency separation and hence additional resilience to interference. It is, however, slightly surprising that no cases have been reported for BFBS; in the UK, where masthead amplifiers were overloaded, this would typically affect channels received at all DTT frequencies.

## 5 Possible Solutions

For completeness we consider a number of possible solutions below but note that the installation of filters is likely to be the preferred option based on the outcome, to date, in the Falklands and best practice elsewhere. It is assumed that the deployment of the LTE 800 network is in accordance with the CEPT requirements mentioned in Section 2 as equipment vendors will have needed to meet such conditions for deployment in other countries.

### 5.1 Modification of the LTE network

The nature of the problem implies that it is pointless to attempt to solve the issue simply by changing the frequencies, or increasing the power, of the DTT signals as explained further in 5.4 and 5.5. The first requirement is to solve the problem of overload by the LTE signal. Options that can, presumably, be ruled out are to move the LTE transmissions to another LTE band (probably implying poorer geographical coverage and cost of replacing installed equipment) or changing the LTE network topology to use sites further away from residential locations.

### 5.2 Filtering of LTE Signals

If the present network of 800 MHz LTE sites is a given, the starting point must be efficient filtering of the LTE signals prior to any amplification in the TV receive system. In many cases, this will imply the need to work aloft, unpicking the cabling between aerials and masthead amplifiers, and the use of professional-grade (environmental suitable) filters. Where there is no amplification, the consumer-grade 'indoor' filters can be used at the back of the set.

This is the approach adopted in the UK and by other Administrations to resolve the majority of interference complaints. It is also understood that this has worked well in the Falkland Islands with the majority, if not all, problems being resolved by KTV, and in some cases Sure, installing filters between the TV aerial, any amplifiers and the receiver. It is assumed that two types of filters are being utilised – one suitable for indoor installation and the other for outdoor<sup>10</sup>.

The use of suitable filtering should allow KTV to utilise all their licensed frequencies including the two upper ones currently not deployed.

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<sup>10</sup> It is, however, understood from KTV that "40 customers have been attended with about 28 filters fitted and a number of installations modified to overcome the interference temporarily awaiting a permanent solution". There has been no indication from KTV that the permanent solution will not be achieved through filtering.

### 5.3 Upgrade Receiver Installations

it seems, based on information provided by KTV, that the majority of receive aerials have been fitted by KTV to a high standard (log-periodic aerials, high-quality RG6 downlead) so whilst this might have been a solution in many cases elsewhere we do not see that would be the case in the Falklands. However, Sure did note that there may be some installations that are sub-optimal, for example, due to aerial pointing caused by corrosion and wind damage and resolving these should help mitigate the problem.

Where masthead amplifiers are necessary, due to high losses on non-line-of-sight paths, it may be possible to replace existing units suffering overloading with higher quality devices having a greater dynamic range and input filtering to reject LTE signal.

### 5.4 Increase Power of the TV Signals

In cases where the correct fitment of filters does not resolve the problem it will probably be necessary to remove any aerial amplifiers from the TV system, or, if these are not fitted, to add coaxial attenuators. It is understood that the path from many domestic aerials in Stanley to either of the TV transmitters (KTV or the Freeview mast on Sapper Hill) is non-line-of-sight. This implies that the amplifiers may be needed to overcome the path losses. If amplifiers can no longer be used due to the risk of overload by LTE, it then becomes necessary to consider increasing the power of the TV signals. It is suggested that an increase of 10dB (i.e. to 50W power in the case of KTV) is the minimum that would be worth considering, but if this was to be pursued, it would probably be worth undertaking a simple field strength survey to determine the extent of service deficiencies in a quantitative way. It should be stressed that a DTT power increase should not be considered until filters have generally been fitted and amplifiers removed, as to do so will only increase the problems seen due to receiver overload.

One alternative to a power increase might be to change the DTT service to a lower-order modulation (i.e. from 64-QAM to 16-QAM or even QPSK). This would have the same effect on the link budget as a power increase, but with no additional risk of overload, or the expense of new amplifiers. The obvious drawback is that more transmitters would be required, as each multiplex would have a lower capacity and this would result in less efficient spectrum use<sup>11</sup>.

### 5.5 Move TV Channels in the Band

Because (i) filters will tend to give greater isolation for a wider frequency spacing and (ii) because a non-overloaded receiver will be less sensitive to LTE interference when tuned to lower channels, there may be some advantage in moving the DTT transmissions to lower channels in the band (e.g. Channels 21-34<sup>12</sup>). It is noted that BFBS channels have not experienced the same interference. This is likely to be a rather second-order effect; it is understood that the present system covers only the upper TV channels so this might be an expensive option, giving little benefit.

## 6 Our Recommendations

In summary, based on the information provided and our own experience, the approach adopted to date of filter fitment should be continued as it is understood there may be some additional cases since households have returned from holiday. Where appropriate the fitting of filters can be accompanied by the removal of amplifiers if the TV signal is sufficient to allow this. This work, particularly the fitting of filters to amplified systems, is inevitably time-consuming and, therefore, expensive and will require the supply of sufficient professional external waterproof filters. Further action will depend on the extent of remaining cases of interference but currently we understand this approach is solving the problem.

<sup>11</sup> However, with the amount of spectrum available in the Falkland Islands this is unlikely to be an issue. The need for additional transmitters, however, would increase the cost to KTV of delivering services.

<sup>12</sup> It is noted that the Sapper Hill BFBS channels have not experienced the same interference issues as those of KTV and this may be, in part, due to the greater frequency separation from the Sure LTE 800 frequencies.

A detailed log of cases, giving locations, type of system (amplified or not, coax type, aerial type & location) and impact of filter should be sought.

We also think that there are some lessons that can be taken from this problem in case a similar problem manifests itself:

1. There should be a log maintained of all interference cases detailing the problem and how it was resolved and who dealt with it. Currently it does not appear that there is anyone who has a full picture of the 800 MHz interference problem, for example number of households impacted, their location, type of system and what has been done and whether the problem was resolved.
2. The need for advance planning of the introduction of new services, especially where there is already information and evidence of potential problems of which mobile operators would be aware. The aim should be to minimise disruption to existing customers as far as possible by identifying in advance potential problem geographic areas and ensuring where there are solutions (in this case filters) that they are available without delay.
3. Where required, formally consulting with interested parties before putting plans into action.

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