ICT Decision 2008-4

Grand Cayman, 10 October 2008

Decision on the Location of FM Transmitters in Grand Cayman

Overview

Since 2005, the Authority has consulted extensively with the FM broadcasting industry and an independent technical consultant to identify the specific causes of interference in the FM band in the George Town area, as well as possible solutions. In this decision, the Authority finds that the presence of FM transmission facilities in George Town is generating blanketing and intermodulation interference in George Town and therefore preventing a significant number of listeners from receiving their choice of FM radio stations. Furthermore, the Authority finds that similar interference is likely to arise if an FM broadcaster is permitted to operate a transmission facility in the West Bay area. The Authority therefore determines that FM transmission facilities will no longer authorized in the George Town and West Bay districts.

Christian Communication Association (CCA) and dms Broadcasting Ltd. have already been notified that they will be required to relocate the Heaven 97.7 FM (Heaven), Gospel 88.7 FM (Gospel) and Cayrock 96.5 FM (Cayrock) transmitters out of the George Town and West Bay districts. However, the Authority considers that, while the relocation of these transmitters may take several months to implement, the present intermodulation at 98.9 MHz cannot be allowed to continue. Therefore, on 26 September 2008, CCA was ordered to address this intermodulation no later than 30 September 2008. Shortly thereafter, the Authority conducted testing which confirmed that there was significant improvement in the amount of intermodulationn at 98.9 MHz. The Authority considers, however, that this problem will only be fully rectified once the Heaven transmitter has been relocated. Accordingly, the Authority hereby confirms that Heaven must relocate its transmitter out of the George Town and West Bay districts no later than 31 October 2008. Should the Authority find that the intermodulation has been rectified, CCA and dms will be required to relocate their transmitters no later than 15 July 2009. If, however, the Authority finds that there is still a significant amount of interference, the Authority may order CCA and dms to relocate the Gospel and Cayrock transmitters prior to 15 July 2009. The Authority also determines that, in the future, applicants for FM broadcasting licenses will be expected to transmit from outside the George Town and West Bay districts.

(Note: This overview is provided for the convenience of the reader and does not constitute part of the Decision. For details and reasons for the conclusions, the reader is referred to the various parts of the Decision.)

Background

1. Following damage to buildings, equipment and towers caused by Hurricane Ivan in September 2004, the majority of FM broadcasters, including Paramount Media Services Ltd. (Paramount), Cerentis Broadcasting Systems Ltd (Cerentis), and Hurley's Entertainment Corporation (Hurley's), relocated their transmitters and antennae to temporary locations in the George Town area. Shortly thereafter, the Information and Communications Technology Authority (the Authority) received a small number of informal complaints, stating that one or more of the relocated stations were "drowning out" other stations. Because of the unusual post-hurricane circumstances, the Authority chose only to advise the appropriate broadcaster of the complaint and to encourage all broadcasters to return to approved sites and operating procedures as quickly as possible.

2. On or about 4 April 2005, dms Broadcasting Ltd. (dms) commenced testing transmissions from its three new stations, Hot 104.1 FM (Hot), Kiss 106.1 FM (Kiss) and X-107.1 FM (X-107), from Government's communications tower in downtown George Town. dms had been licensed by the Authority on 15 July 2004. A verbal complaint alleging interference by dms was immediately made by Radio Cayman, whose offices and studios are located adjacent to Government's communications tower. This became a formal complaint on 6 April 2005 following preliminary discussions between the parties involved. Similar concerns about the new dms broadcasts were emailed to the Authority by Hurley's. On 10 June 2005, dms also filed a complaint alleging that Radio Cayman's transmissions from the Government tower in Northward was causing interference across the entire upper spectrum that impacted most listeners in the surrounding area.

Process

3. In accordance with section 9 of the ICTA (Dispute Resolution) Regulations, 2003, the Authority elected to deal with all the above complaints as if they were a single dispute. During the week commencing 4th April 2005, the Authority had a number of meetings with dms, Radio Cayman and Government representatives to discuss the blanketing of receivers in the immediate vicinity of Government's communications tower in George Town.

The 2005 Report

4. Following an inconclusive preliminary investigation by Government's Office of Telecommunications (OFTEL), and due to the differing technical opinions of Broadcasters and the need to review the entire FM broadcasting spectrum, the Authority decided to engage the services of Mr. David Maxson of Broadcast Signal Lab, Massachusetts, to carry out an independent assessment for the Authority. Mr. Maxson arrived in Grand Cayman on 28 April 2005 and departed on 1 May 2005. He carried out measurements over three days and met with

commercial FM broadcasters. (No representatives of Cerentis or Paramount were able to attend.) His first report was received by the Authority on 6 May 2005.

5. Mr. Maxson's report described the interference resulting from the addition of the dms FM stations in George Town as "blanketing" interference. According to Mr. Maxson, blanketing interference occurs when the signal levels of radio stations are not compatible with the characteristics of many common types of radio receivers. He noted that these radios have a tendency to get overloaded by the strong signal levels from the nearby tower. This type of interference is a common phenomenon in the vicinity of FM broadcast facilities, particularly those in populated areas with low antenna heights. Mr. Maxson added that some of the interference in George Town may also be caused by "intermodulation", which is a separate but related interference mechanism. Generally speaking, intermodulation increases undesired signal levels by mixing several radio signals inside the radio. This phenomenon, in turn, produces energy at frequencies that are the sums and differences of the fundamental frequencies, similar to musical overtones and undertones.

6. In order to minimize interference in Grand Cayman, Mr. Maxson made several recommendations. He noted, in particular, that a shared FM transmission facility with enhanced antenna height (e.g. 400-foot tower) located in a central and unpopulated area would minimize the likelihood of interference and maximize island-wide coverage. He also recommended that a map for new frequency assignments be developed prior to issuance of further licenses.

7. Shortly after receiving Mr. Maxson's report, the Authority requested comments on the report from all FM broadcasting licensees. Responses were received from Cerentis, dms, OFTEL, Panorama and Radio Cayman. The FM broadcasting licensees were generally supportive of Mr. Maxson's conclusions and recommendations. The majority recognized that the transmission facilities in George Town were generating significant amount of blanketing and intermodulation. Most of them also agreed that the relocation of these transmitters to a central and unpopulated location would rectify, or at least minimize, this blanketing and intermodulation.

8. During the summer and fall of 2005, the Authority collaborated with the FM broadcasting community to implement Mr. Maxson's recommendations. Several stations were relocated from temporary rooftop facilities in or near George Town to towers in Newlands. Hurley's (owner of Rooster 101.9 FM and Z-99.9 FM) and Cerentis (then owner of Ocean 95.5 FM) relocated their transmitters to a tower operated by Caycom Ltd. (Caycom). Paramount (owner of Spin 94.9 FM and Vibe 98.9 FM) also relocated the transmitters for its two radio stations to a tower owned by United Telecommunication Services Ltd. (Unitel), which is located approximately 600 yards to the north of the Caycom tower. Various steps were also taken to minimize spurious emissions from existing transmitters.

The 2006 Report

9. In early 2006, the Authority requested that Mr. Maxson conduct further analysis to assess the situation following the changes in broadcasters' facilities. A follow-up survey was conducted in March 2006 and Mr. Maxson's report was received by the Authority on 10 April 2006.

10. This report noted that the blanketing interference in George Town had been substantially reduced as a result of the relocation of the Cerentis, Hurley's and Paramount transmitters to Newlands. It noted, however, that the blanketing interference caused by the dms radio stations in George Town (i.e. Hot, Kiss and X-107, plus Style 96.5 FM, which had recently been acquired from Style and was subsequently renamed Cayrock) was still significant. Mr. Maxson also estimated that at least 500 residential size buildings were within the George Town blanketing area of these stations, in addition to numerous government and business-oriented buildings. Mr. Maxson also noted that no station fully served the island with reliable coverage.

11. Mr. Maxson's report recommended a number of measures to minimize this interference and promote island-wide coverage. He reiterated his previous recommendation that the transmitters be relocated on a single centralized tower with higher elevation. Furthermore, Mr. Maxson recommended several measures to improve spectrum hygiene, including the installation of filters and the recalibration or repairs to transmission equipment (e.g. exciters).

12. Following the receipt of this report, a number of measures were implemented to address the issues identified by Mr. Maxson. dms relocated three of its transmitters (Hot, Kiss and X-107) from the Government tower in George Town to the Government tower in Northward, in response to the interference concerns identified by Mr. Maxson. The Authority also investigated a complaint filed by Paramount alleging a specific interference product at 98.9 MHz.

The 2008 Reports

13. During the fall of 2007, the Authority requested that a further survey be conducted by Mr. Maxson to assess the impact of these developments on the FM broadcasting sector. In addition, Mr. Maxson was also asked to investigate the cause of the specific interference product at 98.9 MHz highlighted by Paramount's complaint. Lastly, Mr. Maxson was asked to provide some advice on the implications of having a new FM transmitter on North West Point Road in West Bay operated by West Point Radio. Mr. Maxson performed his survey during the week of 25 November 2007 and submitted his main report on 29 February 2008. A separate report on the West Point Radio application was received by the Authority on 30 January 2008.

14. These reports concluded that, with the removal of Hot, Kiss and X-107, the interference situation in George Town had significantly improved. It also noted that the use of three separate towers in the centre of the island (one tower in Northward and two towers in Newlands) had centralized blanketing interference to two less densely developed locations and therefore reduced the number of blanketed listeners. Mr. Maxson also reported that, even within these two blanketed areas, inexpensive receivers are more likely to be able to receive the Northward and Newlands radio signals because all signals are received at similar power levels. By contrast, Mr. Maxson's data demonstrated that, in George Town, there is a significant disparity between the power levels of the radio stations transmitting from George Town versus those transmitting from the centre of the island. Mr. Maxson noted that, while this near-far problem was a significant contributor to the blanketing interference in George Town, it was nearly non-existent in Newlands.

15. Furthermore, Mr. Maxson noted that the island-wide coverage of the stations transmitting from Northward and Newlands is robust – with good stereo performance in George Town and satisfactory monophonic reception to nearly the entire island. He reported, however, that the signal levels are generally weaker in West Bay than the rest of the island. According to Mr. Maxson, five radio stations are well below ITU accepted levels for good monophonic reception in West Bay, i.e. Heaven 97.7 FM (Heaven), Gospel 88.7 FM (Gospel), Cayrock 96.5 FM (Cayrock), Radio Cayman 88.9 FM (Radio Cayman 1) and Spin 94.9 FM (Spin).

16. Despite these improvements, Mr. Maxson found that blanketing interference was still present in George Town due to the remaining three FM transmitters (Cayrock, Heaven and Gospel). He noted that while this interference appears not to be as pervasive as the interference caused by the former dms facilities (Hot, Kiss and X-107), it was still pronounced and widespread enough to circumscribe hundreds of residences. Furthermore, if the three remaining stations in George Town (licensed to operate at 250 watts for Gospel, 1 KW for Cayrock and 2 KW for Heaven) were to increase power to cover the entire island (between 2 KW and 6 KW, for instance), their collective interference potential would be as significant as that of the former dms facilities. Mr. Maxson also reported that Paramount's Vibe 98.9 FM (Vibe) falls on a frequency that corresponds to the intermodulation product of 96.5 MHz and 97.7 MHz. This intermodulation phenomenon, depending on the radio and its location, was experienced as much as 1.5 miles from the GKF Industrial Park transmitter site.

17. Mr. Maxson also found that the approval of West Point Radio's application would create significant blanketing interference in West Bay, an area which is currently outside the blanketing area of the existing broadcasters. He estimated, based on criteria developed by the FCC, that a 1 KW transmitter would create a blanketing area of approximately 1800 feet, and a 3 KW transmitter (allowing for antenna

gain) would create a blanketing area of approximately 3000 feet. This blanketing area includes approximately 150-300 residential structures.

18. Mr. Maxson noted that a requirement to move the remaining George Town stations and the proposed West Point Radio station to Northward or Newlands would be consistent with the desire to centralize blanketing interference to one (or two) locations on the island and to achieve island-wide universal service for each station. Furthermore, he concluded that the relocation of these transmitters would minimize the risk of intermodulation in George Town (including the intermodulation product at 98.9 MHz). Mr. Maxson also made a number of technical recommendations to reduce spurious emissions by FM transmission facilities in Grand Cayman, including repairs to the Spin exciter, installation of bandpass filtering, adoption of an emissions mask, etc.

19. The Authority circulated the report to the FM broadcasting industry on 5 March 2008 and requested comments no later than 28 March 2008. Comments were received from Christian Communication Association (CCA), dms, OFTEL, Paramount, Radio Cayman and West Point Radio.

20. CCA stated that the interference in George Town is essentially an intermodulation problem, not a blanketing problem. According to CCA, the best way to address this interference is to change the frequency of either Cayrock or Heaven. A voluntarily change of Heaven's frequency to 97.5 MHz, for instance, would move the intermodulation product to 98.5 MHz, taking it out of the passband of most radios, and probably eliminating that source of interference for Vibe. CCA noted that a move of both the Cayrock and CCA transmitters to another location would not eliminate the intermodulation product for Vibe.

21. In response to Mr. Maxson's report, dms filed a brief report prepared by Mike Hagan, an independent consulting engineer retained by dms. Mr. Hagan noted that many of the observations made in Mr. Maxson's report are consistent with dms' own island-wide coverage study conducted in 2007 using a purpose-built, GPS-integrated signal quality and strength measurement system. However, Mr. Hagan argued that the report erroneously treated the three remaining George Town stations as identical. According to Mr. Hagan, Mr. Maxson failed to recognize that Cayrock's power level is half that of Heaven (1 KW versus 2 KW), that it uses a directional (skewed bowtie) distribution pattern to minimize blanketing (versus a circular pattern for Heaven) and that its frequency is not located in close proximity to another radio station. Mr. Hagan argued that, as a result of these factors, the footprint of receiver-induced interference issues caused by Cayrock is among the smallest of all the stations on the island.

22. With respect to the intermodulation product at 98.9 MHz, Mr. Hagan noted that, while it is possible that Cayrock is generating the observed spur, it is also possible that Heaven is generating this spur. In his opinion, the mere fact that a station's frequency is mathematically related to an errant signal does not mean that the

mixing is occurring in that station's transmission system. He agreed that this issue needs to be addressed as soon as possible and offered his assistance to find the source of this problem.

23. In a brief email, OFTEL confirmed that it had read the report and did not have any adverse comments on Mr. Maxson's findings.

24. Paramount agreed with Mr. Maxson that the mixing of the Cayrock and Heaven signals is likely to cause an intermodulation product at 98.9 MHz. However, it disagreed with Mr. Maxson's assertion that the Spin exciter is generating spurious emissions. Paramount noted that the exciter was sent back to the manufacturer and found to be in good working condition. According to Paramount, Mr. Maxson's statement that the exciter is generating spurious emissions is not based on direct testing and analysis of the exciter in an "RF Isolated" environment.

25. Radio Cayman noted that it had received complaints about intermittent interruption in its signal in the area of the Butterfield Roundabout in the Industrial Park area. It also recognized that there are interference issues with the Radio Cayman 1 transmitter and noted that it is in the process of acquiring a new transmitter. Radio Cayman also noted that it will be conducting an evaluation of its antenna pattern.

26. West Point Radio questioned the validity of Mr. Maxson's findings that West Point Radio would create significant blanketing interference in West Bay. It noted that some of Mr. Maxson's tests were conducted in locations which are subject to interference by the CUC electrical transmission system and that no test was conducted in the highly populated areas of West Bay. West Point Radio also highlighted the fact that all of the existing FM broadcasters have poor coverage in the West Bay area. According to West Point Radio, this indicates that the interference in George Town would not be affected by West Point Radio's signal.

27. On 25 April 2008, the Authority received a brief reply from Mr. Maxson to the above-mentioned submissions. Mr. Maxson recognized, as suggested by CCA, that the blanketing interference in George Town is interrelated with the intermodulation mechanism at 98.9 MHz. However, irrespective of whether this interference is called blanketing or intermodulation, Mr. Maxson considers that it is the proximity and strength of the undesired signals that is promoting the experience of interference. In response to dms' assertion that he failed to properly distinguish the three remaining George Town stations, Mr. Maxson noted that a 50% reduction in power levels (2 KW versus 1 KW transmitter power output) only reduces the blanketing radius by 30%. He also noted that the differences in antenna patterns do not necessarily have any impact on the blanketed area.

28. Mr. Maxson also reiterated that the spurious emissions straddling 94.9 MHz are generated at the Spin transmission facility (not from another location, as suggested by Paramount). He also made several recommendations to assist

Paramount in identifying and resolving the spur emanating from the Paramount exciter. Lastly, Mr. Maxson reiterated that there was clear evidence of blanketing in West Bay as a result of West Point Radio transmissions. He noted that his data was not affected by the presence of CUC transmission facilities and that, with a presumably omnidirectional antenna, the blanketing effects would appear symmetrically around the tower site, including in the directions of other residences. He also noted that the poor coverage of the FM broadcasters in West Bay does not obviate the potential for interference from West Point Radio's proposed facility at 94.3 FM. Even with upgraded power levels from the George Town stations, the West Point Radio's proposed facility would still create a blanketing area in West Bay.

Other Reports

29. Throughout the summer of 2008, the Authority conducted further research and consultation on blanketing and interference issues. In July 2008 the Authority's Staff conducted some testing of West Point Radio's transmission facility to confirm the existence of blanketing interference. These tests indicated that West Point Radio's transmission facility generated substantial blanketing interference, particularly in lower quality radio receivers (e.g. alarm clocks, boomboxes) and in the bottom half of the radio dial (i.e. the stations in the 87.9-97.7 MHz range were more likely to be blanketed). Paramount also confirmed that repairs and adjustments had been made to the Spin exciter and, as a result, that it is no longer generating spurious emissions.

30. In early September 2008, the Authority also requested further advice from Mr. Maxson on the possible relocation of the Heaven and Gospel transmitters to the Unitel tower in Prospect (corner of Shamrock Road and Marina Drive). Mr. Maxson advised the Authority that such a move would not significantly reduce the blanketing area in Grand Cayman (i.e. it would simply replace the blanketing area in George Town with a similar one in Prospect). He also noted that the Unitel and Caycom towers in Newlands would be more suitable for these stations.

Authority's Analysis and Determinations

31. In reaching a decision in this proceeding, the Authority is guided by section 9 of the Information and Communications Technology Authority Law (2006 Revision) (the Law) which states:

> 9. (1) Subject to this Law, the Authority has power to do all things necessary or convenient to be done for or in connection with the performance of its functions under this Law.
>
> (2) For the purposes of this section, the Authority shall -
>
> (a) allocate the electromagnetic spectrum for facilities and specified services within the Islands, or between the Islands and elsewhere;

(b) determine methods for assigning the electromagnetic spectrum;
(c) issue licences authorising the use of specified portions of the electromagnetic spectrum, including those used on any ship, aircraft, vessel or other floating or airborne contrivance or spacecraft registered in the Islands; and
(d) institute procedures for ensuring the compliance by licensees with any obligations regarding the use of the electromagnetic spectrum, imposed by or under the licence, this Law or any regulations made hereunder.

32. The Authority also notes that matters relating to interference are prescribed in the Information and Communication Technology Authority (Interference and Equipment Standardisation) Regulations, 2004 (the Regulations). Section 3 of the Interference Regulations reads as follows:

> 3. No person shall use apparatus in such a manner as to cause direct or indirect harmful interference with any ICT Network or ICT Service, whether public or private.

33. The terms "apparatus" and "harmful interference" are defined as follows in section 2 of the Regulations:

> "apparatus" means a product enabling communication, or a relevant component thereof, which is utilized in any manner whatsoever as part of an ICT Network or a product, or a relevant portion thereof, enabling communication by means of the emission and/or reception of radio waves utilizing the electromagnetic spectrum allocated to terrestrial/space radiocommunication, or both;
> (…)
> "harmful interference" means interference, including system degradation which endangers the functioning of an ICT Network or ICT Service or which otherwise seriously degrades, obstructs or repeatedly interrupts an ICT Network or ICT Service;

34. The Authority notes that some licensees have argued in the past that radio receivers should not be considered part of an ICT Network (or Service) and therefore that blanketing cannot be considered to be "harmful interference" as defined in the Regulations. The Authority disagrees on several counts. Firstly, in any ICT Network the terminating device is normally considered to be an essential part of that network. Without a terminating device, the ICT Service being provided over the network cannot be delivered. Examples of terminating devices include telephone handsets, computers and, as in this case, radio receivers. More significantly, the Regulations specify in section 2 that "interference, including system degradation, which….seriously degrades, obstructs or repeatedly interrupts an …ICT Service" is harmful interference. Further, section 3 specifies

that "no person shall use any apparatus in such a manner as to cause direct or indirect harmful interference with any ….ICT Service, whether public or private". The ICT Service in this case is the broadcasting service being provided by other licensees. It is the Authority's view that blanketing is preventing some listeners from receiving their choice of ICT Service. Blanketing is therefore "harmful".

35. The Authority accepts the conclusion drawn by Mr. Maxson in his various reports that the presence of FM transmission facilities in George Town is generating blanketing interference and intermodulation in George Town and thereby preventing several hundred residences (and a large number of listeners in nearby cars with low quality radio receivers) from receiving their choice of FM radio stations. Furthermore, the Authority finds that similar interference is likely to arise if any FM broadcaster is permitted to operate a transmission facility in the West Bay area.

36. The Authority cannot find any persuasive reason, of a technical or policy nature, to allow FM stations to disenfranchise such a large proportion of listeners. Indeed, to do so would not be in the public interest. This is particularly true with respect to Radio Cayman. As the official Government radio station, it is used at times to convey to the population-at-large important Government announcements and public safety information, such as hurricane warnings. The Authority considers that these broadcasts must not be "blocked" by other stations. Moreover, in the present highly competitive FM broadcasting environment in the Cayman Islands, it would be counter to the Authority's mandate for it to allow some broadcasters to lose advertising revenue because their signal cannot be received in some areas of George Town due to the blanketing effect of other stations. To maintain equity, either all stations should be allowed to transmit from the populated areas – with the resulting increase in blanketing – or all should be made to relocate to less populated areas. Only the latter policy makes sense. The Authority therefore adopts a policy that prohibits the location of FM transmitters within the George Town and West Bay districts.

37. While the Authority agrees that co-locating all FM broadcasters on a single tower with a 400-500 foot elevation in a low populated area would be an ideal solution, it is unclear whether this goal will be achieved in the near future. In the meantime, the Authority considers that the most viable option is to regroup the radio stations on a small number of towers, ideally no more than three, located in unpopulated areas and in close proximity to one another. As noted by Mr. Maxson, this option would minimize the size of the blanketing area and the number of listeners subject to blanketing interference. The Authority considers that the use of transmitters in the area west of the George Town district would satisfy these requirements. Furthermore, the Authority considers that having FM transmission facilities in locations closer to the centre of George Town (e.g. Prospect) would not reduce the number of blanketed listeners as these areas are increasingly populated.

38. The Authority recognizes that this solution is not perfect. Once the three remaining stations in George Town have relocated, the residents of the Bodden Town, North Side and East End districts may experience some level of blanketing. However, the Authority considers that, for Grand Cayman as a whole (including the Bodden Town, North Side and East End districts), the advantages of this solution outweigh the disadvantages for several reasons. Firstly, the blanketed area will be smaller given the similarity in the power levels of the FM signals (i.e. the near-far problem that is currently affecting George Town will not be significant in these districts) and the close proximity of the Newlands and Northward towers, which will concentrate the blanketed area. Secondly, the number of blanketed listeners will decrease substantially given the smaller population of the Bodden Town, North Side and East End districts. Thirdly, the radio stations relocated to these districts will have better island-wide coverage. Lastly, the Authority considers that, by grouping several radio stations on the same towers, the FM broadcasting industry may be able to reduce its electricity consumption and operating costs by using combiners to join the signals of more than one transmitter on a single antenna.

39. In light of the above, the Authority wrote to CCA and dms on 11 July 2008 to confirm that the Heaven, Gospel and Cayrock transmitters must be relocated out of the George Town and West Bay districts. In that letter, the Authority noted that the intermodulation at 98.9 MHz could not be allowed to continue until the relocation of the three transmitters was completed as it was having a direct and immediate impact on Vibe. As a result, the letter set out a process to identify a temporary solution to the intermodulation problem, prior the relocation of the three transmitters. Over the course of the summer of 2008, a number of options were examined by the Authority, including a change in Heaven's frequency from 97.7 MHz to 97.5 MHz and a reduction in Heaven's power level.

40. On 26 September 2008, after several months of discussions, the Authority issued an order under section 9 of the Law and section 6 of the Regulations. The Authority ordered CCA to address the intermodulation problem by whatever means it deemed appropriate including a reduction in Heaven's power level, a change in Heaven's frequency from 97.7 MHz to 97.5 MHz, a recalibration or adjustment to the Heaven transmission equipment, or the end of all transmissions at 97.7 MHz pending the relocation of the Heaven transmitter. The order also noted that the Authority would conduct testing of the FM broadcasting spectrum to determine whether there was still a significant amount of intermodulation after the change.

41. On 29 September 2008, CCA notified the Authority that it had reduced Heaven's power level, from 2 KW to 1 KW, and that it intended to relocate the Heaven transmitter to Newlands before the end of October. Shortly thereafter, the Authority conducted several tests in the area surrounding the CCA and dms transmitters, which revealed a significant improvement in the intermodulation level at 98.9 MHz. Despite this improvement, however, the Authority is of the

view that this problem will only be fully rectified once the Heaven transmitter has been relocated. Therefore, the Authority hereby confirms that Heaven must relocate its transmitter out of the George Town and West Bay districts no later than 31 October 2008.

42. The Authority will conduct further testing after the Heaven transmitter has been relocated to confirm that the intermodulation product has been rectified. Should the Authority find that the intermodulation has been rectified, CCA and dms will be required to relocate their transmitters no later than 15 July 2009. If, however, the Authority finds that there is still a significant amount of interference, the Authority may order CCA and dms to relocate the Gospel and Cayrock transmitters prior to 15 July 2009.

43. The Authority also determines that, in the future, all applications for FM radio licenses will only be approved if the proposed transmission facilities are located outside of the George Town and West Bay districts.

Further Process

44. Within 90 days of the relocation of the Gospel, Cayrock and Heaven transmitters out of George Town and West Bay, the Authority will commission a further independent technical survey of all FM broadcasting installations, and of the FM spectrum. Once that survey is complete, the Authority will determine whether any adjustments are required to the above-mentioned decision to ensure interference free, island-wide coverage by each FM station.