

**FINAL DECISION OF
THE COMMUNICATIONS AUTHORITY**

**DISRUPTION OF THE MOBILE DATA SERVICES OF
HUTCHISON TELEPHONE COMPANY LIMITED
ON 22 JANUARY 2014**

Telecommunications Licensee Investigated:	Hutchison Telephone Company Limited (“HTCL”)
Issue:	There was a disruption of the mobile data services of HTCL on 22 January 2014
Relevant Instruments:	General Condition (“GC”) 5.1 of HTCL’s Unified Carrier Licence No. 004
Decision:	No breach of GC 5.1 of HTCL’s Unified Carrier Licence No. 004
Sanction	N/A
Case Reference:	LM T10/14 in OFCA/R/R/134/2 C

BACKGROUND

At around 10:30 pm on 22 January 2014, the Office of the Communications Authority (“OFCA”) received enquiry from the media about disruption of the mobile data services of HTCL at various locations. OFCA immediately contacted HTCL to check out the situation. After confirming with HTCL that a service disruption had occurred, OFCA activated the Emergency Response System¹ and kept in close contact with HTCL to monitor the situation.

¹ Emergency Response System is the communication arrangement for maintaining contacts among OFCA and all the major public telecommunications network service operators when there is a risk of possible network congestion problem or network outage which may affect the general public.

THE SERVICE DISRUPTION

2. According to HTCL, at 9:53 pm on 22 January 2014, its network operations centre (“NOC”) was alerted by system alarms that one of the Internet Protocol (“IP”) network routing components, viz. a core gateway switch (“Core Switch”) installed in one of HTCL’s two switching centres, had malfunctioned. The Core Switch acts as the main gateway router responsible for routing mobile data traffic to and from end users within HTCL’s mobile data network. Owing to the malfunction of the Core Switch, a portion of HTCL’s customers of 2G, 3G and 4G mobile data services were unable to access the Internet with their mobile devices.

3. According to HTCL, the disruption was not specific to any particular area of Hong Kong. The incident affected around 200 000 of HTCL’s customers of 2G, 3G and 4G mobile data services (representing about 6.1% of its customer base).² HTCL emphasized that the incident only affected mobile data services and, throughout the entire disruption period, mobile voice service, short message service (“SMS”) and other value-added services of HTCL remained normal.

4. HTCL claimed that, once the problem was confirmed to be caused by a faulty supervisor module in the Core Switch at around 10:45 pm, it immediately executed a manual switchover to enable the standby Core Switch to take up the function of routing mobile data traffic. HTCL also reported that after it had completed the manual switchover at 11:00 pm, the affected mobile data services started to resume progressively and were fully restored at 0:30 am on 23 January 2014.

OFCA’S INVESTIGATION

5. As the service disruption had affected around 200 000 of HTCL’s customers of 2G, 3G and 4G mobile data services for over two hours, OFCA considers it necessary to conduct an investigation into the incident to –

² According to the 2013 Interim Report of Hutchison Telecommunications Hong Kong Holdings Limited (i.e. the parent company of HTCL), HTCL has a total of 3.3 million customers in Hong Kong as at end June 2013.

- (a) examine whether HTCL has breached GC 5.1 of its Unified Carrier Licence which specifies that –

“5.1 The licensee shall, subject to Schedule 1 to this licence and any special conditions of this licence relating to the provision of the service, at all times during the validity period of this licence operate, maintain and provide a good, efficient and continuous service in a manner satisfactory to the Authority...”; and

- (b) review the actions taken by HTCL in handling the incident (including the communications with OFCA, customers and the media, and the efficiency of service restoration etc.) to examine whether there are any areas requiring HTCL to make improvements.

6. In the course of OFCA’s investigation, HTCL submitted, as per OFCA’s request, a preliminary report³ on 27 January 2014 and a full report⁴ on 13 February 2014. OFCA has carefully examined the reports. As part of the investigation, OFCA has also examined the 34 consumer complaints it received concerning the disruption of HTCL’s mobile data services. Most of the complaints were about dissatisfaction of the service disruption and the difficulties in reaching HTCL’s customer hotline during the period of service disruption.

7. OFCA completed its investigation and submitted its findings to the Communications Authority (“CA”) on 22 April 2014. Having considered the findings of OFCA, the CA approved the Provisional Decision which was issued to HTCL on 30 April 2014 for its representations. HTCL submitted on 14 May 2014 that it had no comment on the CA’s Provisional Decision.

³ The preliminary report of HTCL may be downloaded from OFCA’s website at http://www.ofca.gov.hk/filemanager/ofca/en/content_723/htcl_report_201401.pdf.

⁴ The full report of HTCL may be downloaded from OFCA’s website at http://www.ofca.gov.hk/filemanager/ofca/en/content_723/htcl_report_20140214_full.pdf.

Issues Examined During the Investigation

The Cause of the Incident and the Adequacy of HTCL's Preventive Measures

8. HTCL reported that the incident was caused by a faulty supervisor module in the Core Switch which was installed in one of HTCL's two switching centres. HTCL claimed that the supervisor module of the Core Switch had defective memory and was partially functional (in contrast to a total failure) during the period of service disruption. In this regard, the Core Switch failed to handle some of the mobile data traffic within HTCL's mobile data network and, as a result, a portion of the customers of HTCL's 2G, 3G and 4G mobile data services could not access the Internet with their mobile devices during the disruption period. Since the faulty Core Switch was only deployed for the provision of mobile data services, other services of HTCL including mobile voice service, SMS and value-added services were unaffected.

9. HTCL claimed that the resilience design of its data network was in line with the common industry standard. There had been a "dual" protection mechanism equipped at the equipment level (i.e. the availability of a standby Core Switch at each switching centre to take over the routing function in case of the failure of the active Core Switch) and at the site level (i.e. the availability of a pair of active and standby Core Switches installed in another switching centre at a different physical location to take over the routing function in case of the malfunction of the other switching centre). As the faulty supervisor module was partially functional (in contrast to a total failure) during the disruption period, the resilience mechanism had not been triggered to implement the automatic switchover to the standby Core Switch at the same switching centre nor to the Core Switches at the other switching centre to prevent the disruption from occurring.

10. HTCL reported that both the software and the hardware of the Core Switches were supplied by Cisco System Inc, a reputable telecommunications equipment vendor. HTCL emphasized that, according to the report of the vendor, the incident was caused by a hardware problem of the supervisory module which had never shown up in Hong Kong or other regions before. HTCL claimed that the service disruption was caused by circumstances beyond its control.

11. HTCL also claimed that it had made its best endeavours to maintain the stability and reliability of the Core Switch after it was put into service. There were regular preventive maintenance and health checking procedures in place for the Core Switch, and the software of the Core Switch was also up-to-date. According to HTCL, the most recent major software upgrade of the Core Switch was done in 2008, and the current version of the software is within the product life cycle of the software product released by the vendor.

12. In order to prevent similar incident from occurring again in future, HTCL submitted that –

- (a) it had performed health check for all Core Switches and their supervisor modules;
- (b) it had reviewed the alarm system with the vendor and would make improvement to ensure that any similar problem with the Core Switch could be detected promptly in future;
- (c) it would conduct a full review of its network architecture to enhance the network stability and reliability; and
- (d) it would review its crisis management procedures to improve its ability in responding to critical network incident.

OFCA's Assessment

13. OFCA notes that the root cause of the incident was the hardware problem of the Core Switch. As the Core Switch was supplied by a reputable telecommunications equipment vendor and the incident was caused by a hardware problem which had not arisen before, OFCA agrees that the available evidence suggests that the service disruption was due to circumstances reasonably beyond HTCL's control. OFCA observes that HTCL has taken reasonable measures to maintain the healthiness and stability of the Core Switch after it was put into service. According to the information supplied by HTCL, there are regular maintenance and health checking procedures in place to ensure the proper functioning of the Core

Switch, including carrying out housekeeping procedures for the Core Switch every day and performing health checking every 4 hours. The software of the Core Switch is also up-to-date.

14. OFCA also notes that HTCL has adopted a resilient network design with site level and equipment level redundancy. There are two switching centres in operation and each of them is equipped with a pair of Core Switches (i.e. one active and one standby). Despite having such a redundancy arrangement, the disruption still occurred. According to HTCL's explanation, the main reason was that the faulty supervisor module of the Core Switch was found to be partially functional instead of totally failed and hence the automatic switchover had not been triggered. OFCA accepts that such a scenario is reasonably outside the normal design consideration of the vendor and, given the fact that the problem had not shown up before, the vendor could not have been reasonably prepared for the occurrence of such a problem beforehand.

15. In conclusion, having examined the cause of the incident and the preventive measures taken by HTCL, OFCA accepts that the service disruption, though undesirable, was due to circumstances reasonably beyond HTCL's control. OFCA notes that HTCL has taken reasonable preventive measures to ensure the healthiness and stability of its data network system and made provision of redundancy arrangement to prepare for the failure of Core Switch.

Time and Actions Taken by HTCL to Restore Services

16. HTCL submitted that, once the NOC was alerted by the system alarms that a Core Switch had malfunctioned at 9:53 pm on 22 January 2014, it immediately escalated the problem to the network support team for action. In response, the network support team had attempted to resolve the problem by carrying out a series of emergency checking and troubleshooting procedures, including –

- conducting call tests to confirm the service disruption;
- checking the healthiness of other mobile network element (i.e. the Accounting Server) to isolate the root cause of the problem; and
- inspecting the status of the Core Switch concerned onsite.

17. HTCL also escalated the issue to the vendor and worked with it closely to identify the root cause of the problem. Once the problem was confirmed to be caused by a faulty module in the Core Switch at around 10:45 pm on 22 January 2014 (i.e. about 50 minutes after the NOC was alerted by alarms), HTCL immediately decided to activate the standby Core Switch by executing a manual switchover. After the completion of the manual switchover, the affected services started to resume progressively and were fully recovered at 0:30 am on 23 January 2014.

OFCA's Assessment

18. OFCA notes that, once HTCL's NOC was alerted by system alarms, it had quickly responded and referred the matter to its network support team. The network support team had attempted to resolve the problem. HTCL had also worked closely with the vendor to trace the root cause of the problem. Although HTCL had taken approximately 50 minutes to identify the root cause of the problem, having regard to the complexity of HTCL's data network and HTCL had to carry out various checking procedures and tests (as listed out in paragraph 15 above) to trace the source of the problem, OFCA considers that the time taken by HTCL to identify the root cause of the problem was acceptable.

19. OFCA also notes that, after the root cause of the problem was identified, HTCL had promptly decided to disable the problematic Core Switch and executed a manual switchover to the standby Core Switch at the same switching centre. The affected mobile data services started to resume progressively after the switchover was executed and were fully recovered at 0:30 am on 23 January 2014. As HTCL had arranged redundancy provision for the Core Switch in advance, it could effectively shorten the outage time and minimize the impact on customers.

20. Overall speaking, OFCA considers that the time and actions taken by HTCL to restore the affected mobile data services are acceptable.

HTCL's Communications with OFCA over the Service Disruption

21. According to the "Guidelines for Cable-based External Fixed Telecommunications Network Services Operators and Internet Service

Providers for Reporting Network and Service Outages” (the “Guidelines”) issued on 19 July 2011, a network operator is required to report to OFCA in the event of network or service outage. The Guidelines also specify that in the event of any degradation of Internet access services or failure of critical components (e.g. router or switch) affecting or potentially affecting 10,000 or more users for more than 30 minutes, the network operator concerned should report the outage to OFCA within one hour from the happening of the outage if the outage occurs on weekdays during the period from 8:30 am to 1:00 am of the next day.

22. The service disruption was first detected by HTCL at 9:53 pm on 22 January 2014, a weekday. It resulted in around 200 000 of HTCL’s customers having difficulty in using mobile data services for over two hours. Pursuant to the Guidelines, HTCL should notify OFCA of the incident by 10:53 pm. According to OFCA’s record, the first contact between HTCL and OFCA was at 10:52 pm, when OFCA called HTCL’s NOC following the receipt of media enquiries.

23. According to the incident report, HTCL identified the root cause of incident at 10:45 pm and executed the manual switchover to the standby Core Switch at 11:00 pm on 22 January 2014. However, when our duty officer contacted the NOC of HTCL at around 10:55 pm, 11:15 pm and 11:25 pm seeking an update of the status of the incident, HTCL supplied no information about the progress of troubleshooting and only reported that the problem was still under investigation. At 0:10 am on 23 January 2014, the NOC of HTCL took the initiative to inform OFCA that a part of the mobile data network of HTCL had disruption.

24. At around 1:30 am on 23 January 2014, HTCL informed OFCA that the affected services had been fully recovered from 0:30 am.

OFCA’s Assessment

25. OFCA notes that although on OFCA’s initiative HTCL had notified OFCA of the occurrence of the incident within the timeframe stipulated in the Guidelines, it had not been very responsive in keeping OFCA informed of the updated status of the incident during the period of disruption. OFCA considers that HTCL should improve the manner in which it handled the communications with OFCA. HTCL should remind its

staff of the importance of timely communications with OFCA, and that under all circumstances they must make their best endeavours to provide the most updated information to OFCA, in order for OFCA to make an accurate assessment on the severity of the incident and its impacts on the public, and to consider whether any assistance should be provided to HTCL to deal with the problem.

26. Overall speaking, OFCA considers that the manner in which HTCL handled its communications with OFCA on the incident is only marginally acceptable. It is necessary for HTCL to make improvement.

HTCL's Communications with Customers and the Media

27. HTCL submitted that it had communicated with its customers about the service disruption through the following channels –

- (a) at 0:50 am on 23 January 2014, HTCL posted a message about the service disruption on HTCL's customer service page on the Facebook;
- (b) at 0:52 am on 23 January 2014, HTCL issued a statement informing the media about the service disruption;
- (c) at 0:55 am on 23 January 2014, HTCL posted the same message about the service disruption on HTCL's website (i.e. www.three.com.hk); and
- (d) at 2:15 am on 23 January 2014, HTCL updated its hotline's Interactive Voice Response System ("IVRS") with a voice message about the service disruption.

28. HTCL also submitted that it had mobilised all necessary manpower at the call centre to cope with the surge in customer enquires.

29. According to HTCL, it has received a total of 1 202 enquires and 60 complaints regarding the incident. OFCA has received a total of 34 complaints from the public about the incident. OFCA has also received enquiries from the media. The complaints can be broadly classified into the following three areas –

- (a) HTCL failed to provide reliable telecommunications services;
- (b) HTCL's hotline was always engaged; and
- (c) HTCL failed to notify customers of the service disruption in a timely manner, and the details of the incident were not provided to customers until the disruption was over.

OFCA's Assessment

30. OFCA notes that the first notification made by HTCL to its customers (by posting a message on HTCL's customer service page on the Facebook) was at 0:50 am on 23 January 2014 after the service disruption was over (i.e. almost three hours after the occurrence of the service disruption). During the period between the start of the service disruption (i.e. at 9:53 pm on 22 January 2014) and 0:50 am on 23 January 2014, no information about the service disruption had been released by HTCL to its customers. The affected customers therefore did not know what had happened with HTCL's mobile data services and when the services would resume normal. Some HTCL's customers had tried to call HTCL's hotline during the period but could not get through to HTCL staff. OFCA considers that HTCL should improve its arrangements to notify the affected customers and the media as early as possible (e.g. shortly after the time when it communicated with OFCA at 10:52 pm on 22 January 2014).

31. According to OFCA's record, the Communications Authority ("CA") had advised HTCL before to review its internal procedures to ensure more timely dissemination of information to its customers and the media in the event of service disruption. In October 2012, after completing the investigation into a service outage of HTCL, the CA had drawn HTCL's attention to this issue and advised HTCL to make improvement.⁵ It seems that the improvement made by HTCL is not sufficient.

⁵ Please refer to the investigation report of HTCL's outage incident on 29 June 2012, which can be downloaded from http://www.coms-auth.hk/filemanager/common/policies_regulations/ca_decisions/in201205.pdf

32. In conclusion, OFCA considers that HTCL had only notified its customers and the media of the service disruption in a marginally acceptable manner. HTCL should further improve its arrangements in notifying customers and the media in the event of service disruption.

THE CA'S CONSIDERATION AND DECISION

33. After examining the facts of the case and the assessment of OFCA and the representations of HTCL, the CA considers that HTCL has –

- (a) taken reasonable preventive measures to ensure the healthiness and stability of its data network system, and made provision of redundancy arrangement to prepare for the failure of Core Switch. The service disruption was caused by circumstances reasonably beyond the control of HTCL;
- (b) taken effective actions to identify the cause of the problem and has restored the affected services within an acceptable timeframe;
- (c) reported the service disruption to OFCA within the timeframe stipulated in the Guidelines but the manner in which HTCL handled the communications with OFCA was only marginally acceptable and would need further improvements; and
- (d) notified its customers and the media of the service disruption, but the manner in which HTCL handled the communications with the customers and the media was only marginally acceptable and would need further improvements.

34. Overall speaking, the CA considers that there has been no breach of HTCL of GC 5.1 of its Unified Carrier Licence No. 004, which requires it to provide a good, efficient and continuous service in a manner satisfactory to the CA.

IMPROVEMENT MEASURES

35. Notwithstanding the finding of no breach by HTCL of GC 5.1 of its Unified Carrier Licence No. 004, the CA considers that HTCL should implement the following suggested measures to prevent the recurrence of similar incident and to improve the manner in which it handles the communications with OFCA, the customers and the media in future. HTCL should –

- (a) ensure that the improvements to its alarm system, network architecture and the crisis management procedures (as stated in paragraphs 12(b) to (d) above) are completed with due diligence at the earliest time possible;
- (b) remind its staff of the importance of timely communications with OFCA, and that under all circumstances they must make their best endeavours to provide the most updated information to OFCA as soon as possible; and
- (c) review its internal procedures to ensure more timely dissemination of information to its customers and the media in the event of service disruption. The target should be to notify customers and the media at the time shortly after the first report of the incident to OFCA.

36. HTCL is required to report to OFCA the progress of implementing the above improvement measures until they are accomplished.

The Communications Authority
June 2014