

**FINAL DECISION OF
THE COMMUNICATIONS AUTHORITY**

**INVESTIGATION INTO
HKT'S NETWORK OUTAGE ON 13 APRIL 2012**

Telecommunications Licensee Investigated:	PCCW-HKT Telephone Limited and Hong Kong Telecommunications (HKT) Limited (collectively "HKT")
Issue:	There was an outage of HKT's network and disruption of its telecommunications services on 13 April 2012
Relevant Instruments:	General Condition ("GC") 5.1 of HKT's Unified Carrier Licence No. 025
Decision:	No breach of GC 5.1 of HKT's Unified Carrier Licence No. 025
Sanction	N/A
Case Reference:	OFCA/R/R/134/2 C

BACKGROUND

At around 4:18 pm on 13 April 2012, the Office of the Communications Authority ("OFCA") received reports from the public of disruption to the commercial and residential broadband Internet access services provided by HKT at various locations. OFCA immediately contacted HKT to check out the position. After confirming with HKT of the network outage, OFCA activated the Emergency Response System¹ and kept in close contact with HKT to monitor the situation.

¹ Emergency Reporting 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 NETWORK OUTAGE

2. According to HKT, on 13 April 2012 at 3:45 pm, three of its cross-harbour fibre cable routings at the Causeway Bay Typhoon Shelter Section were damaged by a construction contractor called China State Construction Engineering (HK) Limited (the “Contractor”), which was employed by the Highways Department for the Central-Wan Chai Bypass Tunnel project. These three fibre cables connected the Lockart Exchange and the Mongkok Exchange, the Jordan Exchange and the Telecom House Exchange, and the Hung Hom Exchange and the Victoria Exchange respectively.

3. HKT reported that the cable breakage was detected by its Network Operations Centre. Once HKT had identified that the fault location was at Hung Hing Road in Causeway Bay, it immediately sent an engineering team to the site and requested the Contractor to stop all site works. At 4:05 pm, HKT started to divert traffic to other routes. At 4:30 pm, HKT’s engineering team arrived at the site and confirmed that boring works had been carried out by the Contractor at the fault location (see photos in **Appendix**).

4. HKT estimates that the cable damage affected around 4,000 active residential broadband customers in the New Territories West region who should have experienced slow connection speeds rather than a total loss of service. In addition, it also affected other users in various geographic areas, including (a) about 9,000 commercial broadband services customers (who should have experienced a complete suspension of Internet access service), (b) about 4,500 customers of the One Communications services² (i.e. mainly affecting the Internet Protocol (“IP”) Telephony services); and (c) about 150 active Now TV customers. HKT emphasized that no user of the circuit-switched public telephone service (i.e. traditional voice service) was affected by the outage.

² One Communications services offers integrated solution to business customers, including broadband services, Wi-Fi services, business telephony (i.e. voice over IP) services, unified-messaging services and fixed/mobile convergence features. For details, please refer to http://www.pccwone.com/eng/Product_ip.html.

5. HKT claimed that over 90% of the commercial and residential broadband services customers affected had their services restored to normal at around 7:15 pm on 13 April 2012 after the completion of its broadband traffic diversion. The affected Now TV service resumed at 10:19 pm on 13 April 2012 after the fibre cable between the Lockhart Exchange and the Mongkok Exchange was repaired, and all affected services were recovered after the completion of repair work of all damaged fibre cables at 1:15 am on 14 April 2012.

THE INVESTIGATION

6. As the outage was not a minor one, and a number of HKT's customers had been affected, OFCA has conducted an investigation into the incident to –

- (a) examine whether HKT has been in breach of 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.....”

- (b) review the actions taken by HKT in handling the network outage, its communication with OFCA, the affected customers and the media, and the service restoration, with a view to identifying areas that require improvements by HKT and the enhancement measures needed.

7. In the course of OFCA's investigation, HKT has as per OFCA's request submitted a preliminary report³ on the incident on 15 April 2012 and

³ The preliminary report of HKT may be downloaded from OFCA's website at http://www.ofca.gov.hk/filemanager/ofca/common/media/HKT_report_20120415.pdf.

a full report⁴ on 4 May 2012. OFCA has studied the reports carefully. As part of the investigation, OFCA has also examined the six consumer complaints it received since 13 April 2012 concerning the outage of HKT's network. They were mainly about the disruption of HKT's broadband Internet access services during the outage period. OFCA has also contacted the media to enquire about the manner in which HKT had responded to their enquiries during the outage period. In general, the media had not complained against HKT. They said that after they had contacted the Public Relations Department of HKT some time between 4:00 pm and 5:00 pm, HKT formally advised them of the service outage at around 6:00 pm on 13 April 2012.

8. OFCA completed its investigation and submitted its findings to the Communications Authority ("CA") on 30 May 2012. Having considered the findings of OFCA, the CA issued its Provisional Decision to HKT on 31 May 2012 and invited it to make representations within 14 days. HKT submitted its representations to OFCA on 13 June 2012.

Issues Examined During the Investigation

The Adequacy of HKT's Preventive Measures against Cable Damage and its Arrangement of Cable Diversity

9. HKT reported that the outage was caused by the damage of three fibre cables by the Contractor whom was not employed by HKT. It emphasized that it was the fault of the Contractor which was outside HKT's control and HKT was the victim who suffered in the incident. In HKT's opinion, the outage should never have happened if the Contractor had taken adequate precautions before carrying out the boring works.

10. HKT submitted that it had implemented a series of preventive measures against accidental damage of cable facilities by the excavation works carried out by the Contractor for the Central-Wan Chai Bypass Tunnel project but the Contractor still committed the fault. The preventive measures include –

⁴ The full report of HKT may be downloaded from OFCA's website at http://www.ofca.gov.hk/filemanager/ofca/common/Industry/telecom/fbs/outage/hkt_report_201205.pdf.

- (a) providing the Contractor with information about the location of the underground cable facilities and issuing excavation guidelines to the Contractor (four times) at the beginning of the project;
- (b) attending the Underground Utilities Liaison Meeting held by the Contractor (three times) to keep track of the works of the Contractor and repeatedly emphasizing the importance of cable protection to the Contractor;
- (c) providing comments on the measures proposed by the Contractor for the protection of underground cable facilities;
- (d) advising the Contractor to locate the underground cable by hand prior to the commencement of excavation to minimize the risk of damaging the underground cables; and
- (e) visiting the site regularly during the course of project implementation to monitor the works of the Contractor.

11. According to HKT, it also offered on-site assistance to the Contractor upon request. HKT alleged that with the availability of the relevant information and assistance offered by HKT, the Contractor should have located and protected the underground cable facilities before the excavation and the cable damage should never have happened.

12. HKT also indicated in its full report to OFCA that it would make a damage claim against the Contractor. In addition, it had also written to the Secretary for Commerce and Economic Development requesting legislative amendments for better protection of telecommunications facilities by imposing financial penalties or criminal liabilities on parties who have damaged telecommunications lines or installations.

13. As regards the cable diversity arrangement, HKT reported that it had made provision for alternative fibre cable routings for all major platforms within HKT's network beforehand. HKT claimed that it was due to such an arrangement that the damage of the three cross-harbour routings had not

affected the public telephone service between Hong Kong Island and Kowloon/New Territories. However, despite that alternative fibre cable routings were in place, two broadband service platforms were still affected by the incident, one of which was serving at the time the commercial broadband services and the voice application of the One Communications services, and it was fully disrupted because both of the resilience paths were damaged. The other affected platform was serving at the time the residential broadband services for New Territories West region, but luckily only two out of the four equipped routing paths were damaged so there had not been a complete service disruption and the affected customers only experienced slow throughput when using Internet access service during the outage period.

14. HKT also claimed that, in order to draw to the workers' attention the existence of HKT's underground plant nearby and caution them to excavate carefully, the Plant Protection Officer of HKT had stuck and displayed warning posters (in A4 size) at the construction site.

15. To substantiate its claim that it has adopted adequate preventive measures against accidental damage of underground cable facilities, HKT has submitted to OFCA the following documents which it had issued to the Contractor –

- (a) the utility record plans indicating the position of HKT's underground facilities in the excavation area;
- (b) HKT's excavation guidelines;
- (c) the letters issued by HKT to the Contractor advising it to locate the underground cables by hand excavation prior to the commencement of excavation to minimize the risk of damaging the underground cables and reminding it to convey all relevant information to the workers including sub-contractors; and
- (d) the notes of meetings between HKT and the Contractor.

OFCA's Assessment

16. OFCA has reviewed the actions taken by HKT and examined the

documents it submitted. In general, OFCA is satisfied that HKT has taken the necessary preventive measures against the damage of its underground cables by excavation works carried out by the Contractor.

17. OFCA also notes that HKT has made provision for cable diversity in its backbone network and has planned alternative routing for the concerned cross-harbour cables. This arrangement enables HKT, in response to the outage, to divert traffic within a short period of time and minimize the impact on affected customers. OFCA notes that with the cable diversity arrangement in place, a relatively small percentage of HKT's customers (i.e. about 1.3%, representing 17,650 affected customers out of the total customer base of HKT of around 1.4 million)⁵ were affected by the incident and that there was no impact on the public telephone service between Hong Kong Island and Kowloon/New Territories.

18. OFCA agrees that the cause of HKT's outage was due to circumstances beyond HKT's control. While OFCA in general finds the preventive measures implemented by HKT against accidental damage of underground cables and its arrangement of cable diversity satisfactory, there may be scope for HKT to make improvement in the cable diversity arrangement. As it has been shown clearly in the present case, despite that the two affected platforms were served with diversified cables, given the routing paths converge at the same physical location, there is still a risk of having both routing paths damaged at that very converged location. OFCA suggests that HKT should review its cable diversity arrangement in order to achieve an even higher level of resilience for these three fibre cable routes.

Actions Taken by HKT to Restore Services

19. HKT submitted that, as soon as the detection of the fibre cables damage at approximately 3:45 pm on 13 April 2012, its engineers were alerted by the cable monitoring system⁶ commissioned by HKT. The cable

⁵ According to the information published by HKT Trust and HKT Limited, HKT had a total of 1,401,000 broadband services subscribers as of 30 June 2011. For details, please refer to the prospectus they issued for the Global Offering of Share Stapled Units at <http://www.hkexnews.hk/listedco/listconews/sehk/2011/1116/LTN20111116015.pdf>.

⁶ According to HKT, the system includes the Optical Cable Network Monitoring System and the Automatic Cable Pressurization Monitoring System, which enables the Network Operation Centre to detect cable outage through real-time monitoring of the pressure conditions of the cables. The system can also identify the location of the damaged cables in 15 to 20 minutes.

monitoring system also enabled HKT to identify the fault location within a short period of time (i.e. in 15 to 20 minutes), after which HKT immediately sent engineers to the site and started diverting traffic. Over 90% of the commercial and residential broadband services customers affected had their services restored to normal at around 7:15 pm that evening. HKT also reported that its engineers and technical staff worked overnight on 13 April 2012 to repair the damaged cables and expeditiously completed the works at around 1:15 am on 14 April 2012 in order that the affected services may resume operation before the rise of traffic loads during business hours later that morning.

20. HKT emphasized that it had invested money to commission the Optical Cable Network Monitoring System and the Automatic Cable Pressurization Monitoring System for alarm/pressure detection and speedy identification of the location of cable damages. Without these systems, HKT would need to take longer time to notice the occurrence of cable damage and to identify the fault location. Besides, the speedy identification of the fault location enabled HKT to initiate the diversion of traffic in 20 minutes from the outage and for its staff to arrive at the site in 45 minutes, which had effectively helped HKT shorten the outage time and speed up the works for the service restoration.

21. According to HKT, the cable damage had affected over 40 km fibre cable paths and over 10 exchanges. In addition to carrying out restoration and repair works on site, HKT had to send engineering staff to the affected exchanges to conduct optical path power measurement and patching works. HKT reported that it had been very efficient in mobilizing its staff to carry out the restoration and repair works thereby minimizing the outage time.

OFCA's Assessment

22. OFCA is satisfied with the timeliness and efficiency of HKT in detecting the cable damage and identifying the location of the damaged cables. OFCA notes that the commissioning by HKT of the Optical Cable Network Monitoring System and the Automatic Cable Pressurization Monitoring System has enhanced its ability in network monitoring and facilitated its service restoration work.

23. OFCA also notes that the rectification actions taken by HKT after the cable damage was detected were carried out and completed within a reasonable timeframe. The diversion of traffic, which was activated in 20 minutes after the outage occurred, was efficient and had helped to reduce the inconvenience to and minimize the impact on affected customers. HKT restored the services to over 90% of the affected commercial and residential broadband services customers in about three hours. Although the full recovery of all affected services took a longer while to complete (not until 1:15 am on 14 April 2012), having regard to the complication of the case and the amount of work involved (i.e. over 40 km of fibre cable and 10 exchanges were affected), OFCA considers that the time taken by HKT for the restoration of services is within an acceptable timeframe.

24. In general, OFCA is of the view that HKT has taken appropriate actions in response to the cable damage and expedited the service restoration time to minimize the impact on customers.

HKT's Communication with OFCA over the Network Outage

25. According to the "Guidelines for Fixed and Mobile Network Operators for Reporting Network Outage" issued on 17 June 2008 and the "Guidelines for Cable-based External Fixed Telecommunications Network Services Operators and Internet Service Providers for Reporting Network and Service Outages" issued on 19 July 2011 (collectively called the "Guidelines"), 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 broadband services or failure of critical components affecting/potentially affecting 10,000 or more users for more than 30 minutes, the network operator concerned is required to report the outage to OFCA within one hour if the outage occurs on weekdays during the period from 8:30 am to 1:00 am of the next day. Furthermore, in the event of outage of IP telephony services affecting 2,000 to 5,000 users for more than 120 minutes, the operator concerned is required to report the outage to OFCA within one hour after the triggering criteria are met, if the outage occurs on weekdays during the period from 7:30 am to 9:00 pm.

26. The outage of HKT on 13 April 2012 caused service degradation

of broadband services to a total of 13,000 active broadband services consumers (including both residential and commercial users) and another 4,500 active users of IP telephony services. Pursuant to the Guidelines, HKT should notify OFCA about the outage of (a) broadband services by 4:45 pm (i.e. one hour after the cables were damaged at around 3:45 pm), and (b) IP telephony services by 6:45 pm. According to the records of OFCA, HKT informed OFCA of the outage at 4:39 pm regarding both services.

OFCA's Assessment

27. HKT had notified OFCA of the outage within the timeframe stipulated in the Guidelines and had kept OFCA updated of progress of its restoration works closely during the outage period. HKT had also been cooperative and responsive to OFCA's enquiries throughout the outage period. In general, OFCA considers the arrangements of HKT in communicating with OFCA throughout the network outage satisfactory.

HKT's Communication with Customers and the Media over the Network Outage

28. HKT said that it had communicated with its customers about the service disruption through the following channels on the day of the outage –

- (a) at 3:50 pm, notified frontline staff of the outage to enable them to answer customer inquiries with updated information correctly;
- (b) at 5:50 pm, posted a message about the service disruption on HKT's customer service page on the Facebook; and
- (c) at 6:00 pm, formally informed the media of the outage.

OFCA's Assessment

29. OFCA observes that HKT notified its frontline staff of the outage within five minutes after the outage had occurred. The efficient action of HKT in this respect had provided its frontline staff with the relevant information to properly respond to customer enquiries during the outage

period. OFCA also notes that in comparison, the notifications made by HKT on the Facebook and to the media had been less expeditious. Had those notifications been provided shortly after HKT had notified its frontline staff, OFCA believes that the advice to the public on the service disruption would have been more timely and effective. OFCA suggests that HKT should review its procedures for the issue of notifications on social media networks (e.g. the Facebook) and to the media with a view to expediting the dissemination of information to its affected customers on the service disruption.

THE CA'S ASSESSMENT AND DECISION

30. The CA affirms OFCA's view that GC 5.1 of HKT's Unified Carrier Licence No. 025 imposes an unequivocal obligation on HKT to provide a good, efficient and continuous service in a manner satisfactory to the CA.

31. After examining the facts of the case, the CA endorses OFCA's assessment that HKT has –

- (a) taken reasonable precautionary measures to prevent the damage of its underground cable facilities and to make provision of cable diversity. The damage of the three fibre routings was caused by circumstances beyond the control of HKT;
- (b) put in place an effective system to monitor the operation of its network and has restored the affected services within an acceptable timeframe;
- (c) reported the network outage to OFCA within the timeframe stipulated in the Guidelines and cooperated with OFCA during the outage period; and
- (d) notified its customers and the media of the outage within an acceptable timeframe.

32. On the basis of the above, the CA is of the view that there has

been no breach of HKT of GC 5.1 of its licence, requiring it to operate, maintain and provide a good, efficient and continuous service in a manner satisfactory to the CA.

IMPROVEMENT MEASURES

33. Although the overall arrangements of HKT in handling the outage are satisfactory, the CA is of the view that there is scope for HKT to introduce improvements, as follows, to further minimize the risk of network outage and enhance its capability in handling similar incidents in future –

- (a) review its cable diversity arrangement in order to achieve an even higher level of resilience for the three fibre cable routings; and
- (b) streamline its procedures for the issue of notifications on social media networks (e.g. the Facebook) and to the media in order to expedite the dissemination of information about the network/service outage to its affected customers.

The Communications Authority
July 2012

Photo of Cable Location and the Damaged Cables of HKT

