Final Incident Report on Fibre Cable Damage On 13 April 2012

On 15 April 2012, HKT submitted a comprehensive Preliminary Incident Report of the fibre cable damage of 13 April 2012. This Final Incident Report augments that filing. Supplementary information[1], which is commercial and/or HKT proprietary, is being provided to OFCA separately.

Executive Summary

1. On 13 April 2012, at approximately 15:45 three (3) cross-harbour fiber cable routings at Hung Hing Road in the Causeway Bay Typhoon Shelter Section were damaged by a construction contractor (i.e. China State Construction Engineering (HK) Limited) (the "Contractor") employed by the Highways Department for the Central – Wan Chai Bypass Tunnel project. The 3 damaged fibre cable routings were Lockart to Mongkok (LKT-MKK), Jordan to Telecom House (JDN-THT) and Hung Hom to Victoria (HHM-VTA).

2. The incident was detected by our Network Operations Centre (NOC) and we immediately sent engineering teams into the field to locate the exact location of the cable cut. We also began diverting traffic via other routes to minimise any customer impact, and alerted frontline staff so that they could better respond to customer inquiries. In addition we posted a message on our facebook customer service page and responded to media inquiries. We updated our messages on this incident as new facts came to hand.

3. We estimate that about 4,000 active residential broadband customers in the NT West region were affected, with the primary effect being slow service rather than a total loss of service. About 150 active nowTV customers were also impacted. We estimate that about 9,000 active commercial broadband and 4,500 One Communications customers (voice application) were also affected. By 19:15, over 90% of both commercial and residential broadband services had been restored to normal service.

4. We are very disappointed that this incident occurred despite our efforts to warn the Central – Wan Chai Bypass Tunnel project contractor of the proximity of our infrastructure and the risks that their works posed. Before the project, HKT provided the project owner, consultants and concerned contractors with our plant marking information in accordance with excavation guidelines. We also offered on-site assistance upon request. The main Contractor held coordination meetings with concerned parties to discuss work details before the project was commenced. The main Contractor should have located and protected the existing underground facilities before the excavation. It is regrettable that our efforts were ignored and our customers suffered inconvenience and service disruption.

[1] Supplementary information including correspondences and meeting notes with relevant project contractors and the cable routings of affected services.

Actions taken and time of restoration of services

5. Event log of the incident on 13 April 2012:

15:45	Our Network Operation Centre (NOC) detected system alarms and cable breakage. We quickly identified the fault location was at Hung Hing Road, Causeway through our Automatic Cable Monitoring System (Note).
16:05	Identified the impact and we immediately started to divert traffic.
16:10	HKT engineers called the Contractor to stop all site works immediately.
16:30	HKT engineers arrived at the construction site and confirmed with the Contractor that boring work had been carried at the fault location (see attached photos).
18:45	Diversion of commercial broadband traffic completed and service resumed.
19:10	Diversion of residential broadband traffic completed and service resumed.
22:19	LKT-MKK cable route repair completed
00:26 (14 Apr)	JDN-THT cable route repair completed.
01:15 (14 Apr)	HHM-VTA cable route repair completed.

Note – HKT has invested in automatic cable pressurization and optical cable network monitoring systems for alarm/pressure detection and speedy location of cable damages – it is clear that without these systems it would have taken longer to identify that damage had occurred and the subsequent identification of the exact location of the damage and subsequent repairs would also have taken much longer.

6. After working through the night of Friday 13 April 2012 HKT's engineers and technical staff were able to fully restore the network so that everything was back to normal before Saturday's traffic loads hit the network.

Types and estimated number of customers affected

7. The fibre cable damage affected residential broadband service to about 4,000 active customers mainly in NT West area. These customers may have experienced a slow response when using the service. About 150 active users of nowTV services in non-specific geographical locations were also affected.

The fibre cable damage affected commercial broadband services in non-specific geographical areas to about 9,000 active customers who faced an Internet service outage. In addition, 4,500 active users of One Communication services (voice application) were affected. The vast majority of the affected commercial broadband and One Communications services were restored to normal service by 18:45.

At 19:15, over 90% of both commercial and residential broadband services had been restored to normal service.

Detection and Restoration of Affected Services

8. HKT has invested in the Optical Cable Network Monitoring System and Automatic Cable Pressurization Monitoring System (ACPMS) which enabled our NOC to detect the incident immediately through real-time monitoring of the alarm/pressure conditions and identified the location of the damaged cables within 15 to 20 minutes.

9. Cable diversity is adopted as the common design in the HKT backbone network with alternative fibre cable routings incorporated for all major platforms. In particular, despite the damage of the three cross-harbour routings during this fibre damage incident, the cable diversity arrangements of the inter-exchange junction routings effectively protected 100% of circuit-switched voice traffic of the switching units between Hong Kong Island and Kowloon/New Territories. Similarly, almost all of the commercial data services (such as MetroIP) were also fully protected by resilience network design.

10. Nevertheless, two broadband service platforms were affected during the fibre cable outage. One of the platforms served the commercial broadband service and the voice application of the One Communications Services. The platform was designed and equipped with two (2) resilience paths. Both resilience paths were damaged during the fibre outage. The other affected platform served the residential broadband service for NT West area. The platform was equipped with four (4) routing paths. Two of the paths were damaged during the fibre outage. However, the remaining two paths were not affected. Overall, customers might have experienced a slow response when using the service.

11. The affected services were restored through traffic diversion via existing spare fibre cable sections. The restoration works involved: (a) identifying priority of physical traffic diversion; (b) selecting new alternative paths; (c) conducting physical fibre core patching work at each involved exchange; (d) commissioning fibre cores for diversion; and (e) carrying out fibre testing and output power measurement. The total fibre cable paths affected were over 40 Km in length (involving over 10 exchanges) and the restoration processes were repeated until the spare fibre cores with similar path loss were located to ensure end-to-end connectivity. HKT engineering staff members were dispatched to different exchanges to conduct optical path power measurement and patching work in parallel to minimize the overall restoration time. The majority of the affected commercial broadband services were restored to normal by 18:45; and by 19:15, over 90% of both commercial and residential broadband services were restored to normal.

Preventive Liaison Works with the Contractor taken by HKT

12. The location where the fibre cable cut occurred in this incident was within the area covered by an excavation permit issued by the Highways Department. We are very disappointed that this incident occurred despite our efforts to educate and warn the relevant parties of the proximity of our infrastructure and the risks that their works posed. Before the project, HKT provided the project owner, consultants and concerned contractors with our plant marking information in accordance with excavation guidelines. We also offered on-site assistance upon request. The main Contractor held coordination meetings with concerned parties to discuss work details before the project was commenced. The Contractor should have located and protected the existing underground facilities before the excavation. It is regrettable that our efforts were ignored and our customers suffered inconvenience and service disruption.

13. In summary, HKT had taken the following measures to prevent possible damage on our cable facilities by the excavation work carried out by the Contractor:

- Provided marked plant information together with the HKT excavation guidelines to the Contractor at the very beginning of the project;

- Joined the Underground Utilities Liaison Meeting (UULM) held by the Contractor and discussed the details of plant protection;

- Provided comments on the plant protection measures proposed by the Contractor and the plant diversion schedule;

- Clearly reminded the Contractor by letters to locate the plant by hand excavation prior to the commencement of work to minimize possible impact of damaging the telecommunications cables; and

- Attended the site regularly during the course of project implementation to monitor the job progress.

Copy of the relevant correspondences and documents are provided to OFCA separately for reference.

Subsequent and Future action

14. HKT will make a damage claim against the construction Contractor. We will be reminding contractors as to their responsibilities and the importance of fully adhering to all road opening safeguards. We would appreciate OFCA's assistance in reminding contractors that they should always locate and protect existing underground facilities before the excavation. The contractors should contact us first before they start digging in places where our network is located.

15. To further improve our service and mitigate the risks of similar incidents, HKT regularly reviews the major routes within its network to re-confirm cable diversification arrangements. HKT also reviews the inventory of fibre cables (including attenuation characteristic of spare fibre) available to ensure prompt restoration of services in the case of fibre failure. HKT also critically studies each incident to absorb the learnings from each case and to see whether we have scope to improve our network. However there is a practical limit to how much HKT can afford to invest to guard against the carelessness and negligence of third party contractors. Each piece of resilience and strengthening of HKT's network requires considerable investment cost – ultimately these costs are borne by our shareholders and our customers. Also resilience and redundancy is not possible to an infinite degree as there are only a finite number of crossings of Victoria Harbour (in fact the 3 tunnels are the key crossings). Hence it is inevitable that major cables must converge around these crossings. Therefore, it is the firm view of HKT that much more needs to be done in terms of preventing the damage caused by third party contractors in the first place.

16. With this in mind HKT continues to participate in the Utilities Technical Liaison Committee (UTLC) and Joint Utilities Policy Group (JUPG) forums with other utilities companies to discuss and contribute to the formulation of road opening policies and practices in Hong Kong, including practices to avoid damage to underground facilities during construction and associated plant protection measures. HKT also arranges for senior level staff to attend regular project meetings held with major roadwork owners such as the MTR Corporation and the Highways Department for strengthening the preventive measures to avoid similar cable damage from happening in the future. But much more needs to be done and it can only be done by legislative changes.

<u>The Urgent Need for Legislation</u>

17. There can be no doubt that telecommunications services play a critical role in the lives of all Hong Kong residents and the Hong Kong economy. Individuals, businesses and public services all place heavy reliance on the smooth and proper functioning of their telecommunications services. World class infrastructure is also one of the key reasons that Hong Kong is a regional and global business hub and our position as a major financial centre. Any disruption to these services due to careless contractors is simply not acceptable.

18. Hong Kong's critical dependency on its telecommunications networks has most recently been emphasized by OFCA:

> *With the advent of the information age, telecommunications networks are increasingly becoming the critical infrastructures of our society. Whether established by wireline or wireless technology, telecommunications networks are relied upon for the transmission of messages, delivery of contents and support of applications not only to satisfy the communications needs of the public, but also to ensure the normal transactions of the day-to-day business activities and the proper functioning of*

essential public services. They are essential for the well-being of our society and are one of the key ingredients for social and economic growth.[2]

19. The Permanent Secretary for Commerce and Economic Development (Communications and Technology) ("PSCT") in a recent speech stated:

Data centres are the brains of businesses in this digital era. We know how much care global enterprises, like Google, will take to ensure the safety and high availability of their data centres. They are willing to invest hundreds of millions of dollars in their data centres just to have peace of mind – to eliminate the slightest risk of any possible failure in their mission-critical operations. As a prime location for setting up data centres in the region, Hong Kong can give you this peace of mind.

According to the Data Centre Risk Index jointly published by two international consulting firms earlier this year, Hong Kong is the safest place in Asia for setting up data centres, and ranks 4th in the world. We regard data centres as critical infrastructure, and they are well supported here with our excellent telecommunications networks, reliable power supply and competent IT professionals.[3]

20. The Hong Kong Government has acted wisely to protect other suppliers of critical infrastructure services such as electricity and gas by imposing, not just fines, but also criminal sanctions on those who fail to exercise due care and disrupt these vital services. Similar provisions exist regarding public sewers whereby the Authority may prosecute a person for negligently damaging a sewer or drain. Damages to MTR or tramways may also be subject to criminal liability. By comparison, persons who disrupt telecommunications networks do <u>not</u> face criminal penalties. Indeed, at the present time only repair costs are recoverable under the law. It is time to change this situation.

21. The Hong Kong Government must redress this imbalance so that all of Hong Kong's critical infrastructure can be fully protected. There is no reason why telecommunications facilities should be treated any differently to that of other utilities. Hong Kong cannot afford to have significant periods of service outage caused by contractors who are more interested in rushing jobs to get completion bonuses or to avoid late penalties (or are simply careless) than protecting critical infrastructure. Stronger deterrents in the form of financial penalties and criminal sanctions need to be built into the law in order to ensure that persons conducting work in the vicinity of telecommunications facilities are not careless or negligent. This is particularly important if Hong Kong is to maintain its standing as a business and services center, the telecommunications hub for Asia, and to establish itself as a base for data centre, cloud computing and other advanced telecommunications services.

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[2] See paragraph 7 of consultation paper issued by OFCA on 15 March 2012 concerning: *Inclusion of a "Fit and Proper Person" Criterion as One of the Licensing Criteria for Public Telecommunications Services*.

[3] Speech by PSCT at ground-breaking ceremony of Google's data centre on 8 December 2011.

22. All operators, like HKT, have built contingency plans into their networks to cater for situations where their cables might be damaged. However, it is better to address the root of the problem: contractors with tight deadlines, completion bonuses and/or penalties for over-running who, under existing legislation, only face minimal damage claims if a telecommunications line is cut. Existing provisions under the Telecommunications Ordinance require the party who has damaged a cable to compensate the network owner for the cost of repairs only, but this does not in any way act as a deterrent to ensure that contractors are more careful when conducting works around telecommunications lines or installations.

23. In short, contractors have very little incentive, unlike when dealing with other utility infrastructure, to exercise due diligence. This is reflected by the significant number of incidents of cable damage experienced by HKT in the past. In 2010 and 2011, there was around 1 case each month. In 2012 so far, HKT has already experienced 5 cases of cable damage. Clearly, this is a serious problem that is not improving and needs to be addressed.

24. By letter dated 27 April 2012, HKT wrote to the Secretary for Commerce and Economic Development urging legislative amendments so that telecommunications facilities are protected just like other important infrastructure, and persons who damage telecommunications lines or installations are subject to substantial financial penalties as well as criminal liability. This should go a long way towards encouraging contractors to be more careful in the future when carrying out work near telecommunications installations. In this regard, HKT would note that criminal penalties for damaging telecommunications facilities are already imposed in overseas jurisdictions such as Singapore.[4]

Conclusions

- This incident would never have happened if the Contractor on the Central – Wan Chai Bypass Tunnel project had taken adequate precautions

- Early detection and determination of the exact location of the cause of the damage was possible because HKT has invested in automatic cable pressurization and optical cable network monitoring systems for alarm/pressure detection

- Traffic diversion was possible within HKT's network because of redundant routings and this helped to alleviate customer inconvenience and service impacts

- Repairs were attended to promptly and services and the network were restored efficiently

[4] Under Section 49 of Singapore's Telecommunications Act, any person who in the course of work damages a telecommunications line is liable to be fined up to S$1 million and/or to imprisonment for up to 5 years.

- Customer communications were appropriate

- Clearly HKT regrets that its customers were affected by the actions of the Contractor and we will continue to educate and remind contractors of their obligations, and to involve us whenever there is a danger that they may put our network at risk. We would appreciate OFCA's assistance in reminding contractors and project owners of their obligations so that these sorts of incidents can be avoided

- Furthermore, in order to substantially reduce incidents like this in the future HKT believes that persons who damage telecommunications lines or installations should be subject to substantial financial penalties as well as criminal liability. HKT has written to the Secretary for Commerce and Economic Development urging legislative amendments to this effect because it is in the public interest that telecommunications networks are not damaged, and services not interrupted, by careless and negligent third party contractors.

Hong Kong Telecommunications (HKT) Limited
Date: 4 May 2012

Attachment

PCCW ENGINEERING

Damage Location

1

PCCW ENGINEERING

Cable Damage by Boring Machine

Boring Machine

Boring Head

Damaged Cable

2