For Discussion
On 15 January 2007

Legislative Council Panel on Information Technology and Broadcasting

Disruption of External Telecommunications Services Due to Earthquakes near Taiwan on 26 and 27 December 2006

Purpose

This paper briefs Members on the impact on external telecommunications services affected by the submarine cable damages caused by earthquakes near Taiwan on 26th and 27th December 2006[1].

Background

2. Due to a series of earthquakes south-southeast of Gaoxiong, Taiwan which began at around 8:26 p.m. Hong Kong time on 26th December 2006, nearly all the submarine cables passing through the earthquake region were damaged and broken. According to the reports submitted by telecommunications operators on 27 December to OFTA, the following 7 submarine cable systems broke down one by one at different times from 26th December night to 27th December morning. These cable systems account for about 90% of the total capacity of the cable systems that pass through the earthquake region, and the damages mainly affected connections to Taiwan, South Korea, Japan and North America.

Name of Cable System	Areas Connected by the Cable System
Asia Pacific Cable Network ("APCN")	Hong Kong, Taiwan, South Korea, Japan, Thailand, the Philippines, Malaysia and Singapore

[1] According to the Hong Kong Observatory, the after-quakes associated with the earthquakes on 26th December were also recorded around 10 a.m. in the morning of 27th December 2006.

Name of Cable System	Areas Connected by the Cable System
Asia Pacific Cable Network 2 ("APCN2")	Hong Kong, Mainland China, Taiwan, South Korea, Japan, the Philippines, Malaysia and Singapore
Flag North Asia Loop ("FNAL") / Reach North Asia Loop ("RNAL")	Hong Kong, Mainland China, Taiwan, South Korea and Japan
Flag Europe Asia ("FEA")	Hong Kong, Mainland China, South Korea, Japan, Thailand, South Asia, Middle East and Western Europe
SEA-ME-WE-3 ("SMW3")	Hong Kong, Mainland China, Taiwan, South Korea, Japan, South East Asia, Middle East and the Western Europe
C2C Submarine Cable ("C2C")	Hong Kong, Mainland China, Taiwan, South Korea, Japan, the Philippines, Singapore and the US
East Asia Crossing ("EAC")	Hong Kong, Taiwan, South Korea, Singapore, the Philippines and Japan

4. There are 21 cable-based external fixed telecommunications network services (FTNS) operators in Hong Kong. They are licensed by OFTA to provide capacity for external telecommunications to local FTNS operators, external voice service providers and Internet service providers. But the cable-based external FTNS operators are not necessarily the owners or operators of submarine cables (cable operators) – some of those cable-based external FTNS operators just buy or lease capacity from cable operators.

5. OFTA understood that the first 6 cable systems were totally damaged as far as the leg connecting Hong Kong via the Luzon Strait with Taiwan, South Korea, Japan and North America in the easterly direction is concerned, while EAC has one cable link in the Luzon Strait that has remained unaffected. This resulted in serious disruption to external telecommunications services in Hong Kong including IDD services, roaming services and Internet access to overseas websites. Local telecommunications services were not affected.

Service Recovery

6. Since the earthquakes on 26th and 27th December 2006, the telecommunications operators have been implementing contingency measures to maximise the throughput of the existing facilities and using alternative routings to pass traffic through other directions. They have made arrangements to obtain as much capacity as possible to North America via Europe, Singapore, Australia and Mainland China.

7. The contingency measures taken by various telecommunications operators have resulted in effective restoration of voice call services. For example, IDD services and roaming services to most of the countries/territories (except Taiwan and South Korea) resumed normal on 28th December 2006 and those to Taiwan and South Korea also resumed normal on 31st December 2006.

8. There has been continued improvement in the Internet access to overseas websites since the earthquakes, although the access during the peak period approaching midnight is still generally slower than normal. Furthermore, some real-time applications such as IP telephony may be adversely affected by the longer-than-usual response time as Internet traffic has to go through longer alternative routes. As of 5th January 2007, the major Internet service providers have recovered about 80% of their international connection capacity. This recovered capacity enabled reasonable levels of Internet access services to be provided to their customers before the submarine cables are repaired and resumed operation.

9. In the daily updates issued by OFTA to the public during 27th December 2006 to 4th January 2007, the public had been advised to minimise non-essential visits to overseas websites, uploading or downloading large files to/from these websites, and other non-essential activities which demand large bandwidth over international connections, such as playing on-line games, video conferencing, other real-time multimedia services and P2P file sharing. If undertaken by many users, such activities could put significant stress on the recovered international connection capacity and should therefore be minimised as far as possible during this period to increase the possibility of all users receiving reasonable levels of services with the recovered capacity.

Cable Repairing Work

10. Cable operators have been engaging in urgent repairs of the damaged cables. According to the repairing schedules submitted by operators to OFTA, one damaged cable system will first be brought back to normal operation by the middle of this month. This should alleviate the congestion. The repair of the other damaged systems is expected to be completed progressively by the end of January or the beginning of February 2007, if environment and weather permit.

11. Based on past experience, the work of repairing a submarine cable may require 5 - 10 days. However, the following factors may affect the completion date of the cable repairing work.

(i) Cable repair ships may not be available at the nearest depots. It takes time to coordinate the availability and schedule of cable repair ships at other depots.

(ii) Generally, it takes one to three days to load new cables and equipment onto the repair ship before it sets sail for the scene. On this occasion, since the damages to the submarine cables caused by the earthquakes are substantial, it is necessary to load large quantities of cables and equipment onto the repair ships and this makes the loading process longer than usual.

(iii) In some cases, where there are not sufficient cables or equipment in one depot, the repair ships may need to sail to other depots to load the required cables or equipment and this incurs extra time.

(iv) Inclement weather conditions at the high sea may add to the difficulty of the repair work.

(v) One of the repair ships has encountered some technical problems since 30th December 2006 and is no longer serviceable. It takes time for the cable operator to arrange for another ship to conduct the repair work.

Mechanisms of Outage Reporting by Operators to OFTA

12. The existing mechanisms for reporting major network outage to OFTA by licensees cover services provided by fixed and mobile network operators only as these services are generally considered to have the most immediate impact on the mass public. The fixed and mobile network operators are now required to submit reports to OFTA within the specified time following defined major outages. Reporting on the outage of submarine cable systems is currently not required under the existing mechanisms as cable outage in the past normally did not have significant impact on telecommunications services because of availability of backup and alternative routings. Reporting on outage of Internet access services is also not required under the existing mechanisms. Nonetheless, OFTA may request the public telecommunications operators to report faults on an ad hoc basis, whether or not the services concerned are covered by the existing mechanisms for outage reporting.

13. As explained in the previous paragraph, Internet service providers and cable-based external FTNS operators currently do not fall under the outage reporting mechanisms. OFTA therefore had not received any report from the operators in the evening of 26th December or morning of 27th December about the cable damages. As soon as OFTA received public and media enquiries, OFTA immediately proceeded to ask the operators, in the morning of 27 th September 2006, to submit information about whether there was outage with Internet and IDD services, the extent and the cause. OFTA did not have a relatively comprehensive picture of the situation until the written reports were received from the relevant operators in the late afternoon. OFTA first updated electronic media that day at 5:30 pm. The press statement was sent to the Information Services Department at 6:16 pm for issue to the public. The chronology of request for information by OFTA on 27th September 2006 is attached in the Annex.

Way Forward

14. In the light of this incident, OFTA considers that there is an urgent need to review the existing outage reporting mechanisms. OFTA has convened a meeting on 3rd January 2007 with local and external FTNS

operators, which included cable-based FTNS operators, Internet service providers, local and external voice service providers. Twenty five operators attended the meeting and provided inputs on the latest situation on service recovery and cable repairing work. Some operators who were able to quickly restore their services shared their experience on the measures that they had taken.

15. Subsequent to the meeting on 3rd January 2007, two working groups have been convened to review the outage reporting mechanisms, one for cable-based external FTNS operators and the other for Internet service providers. The outage reporting mechanisms will be finalised by the two working groups as soon as possible and be implemented in February 2007.

16. In addition to the two working groups mentioned above, OFTA will also initiate discussions with individual operators to gain a better understanding of their existing contingency measures and future plans on investments on new cables. Such improvements, if any, would need to take into account the commercial factors too. The operators will be urged to take serious steps to map out contingency plans to ensure sufficient capabilities and effective diversity.

17. Members' views on the above issues are welcome.

Office of the Telecommunications Authority
9 January 2007

Annex

The following is a chronology of the work of OFTA on 27th December 2006 concerning information collection and dissemination about the disruption of external telecommunications services on that day:

Time	Action	Remarks
9:25 am	Received first public enquiry	The enquiry was about failure to use Internet service and how to lodge a complaint.
9:45 am	Received second public enquiry	This enquiry was about failure to use the Internet service and whether this might be caused by the earthquakes. This caller and the one above were the customers of the same Internet service provider.
	Received first enquiry from the media	The enquiry was about whether Internet traffic had been affected by the earthquakes, whether some submarine cables were damaged, the number of cables affected and magnitude of outage.
10:15 am and onwards	OFTA made enquiries with local and external FTNS operators	
10:00 am	Received 3 more enquiries from the media	One of the enquiries asked whether IDD calls, in addition to Internet service, had also been affected by cable damage.

	Responded that - • OFTA had also received information from the public and the media that there was outage with Internet access and IDD calls, and • OFTA was checking with network operators to obtain relevant information, and that specific information about the scope and the cause was not yet available. The above response had been provided to the media and the public by OFTA during the office hours on 27 December until a formal press release, which gave more specific information, was ready later on that day.	
12:30 pm	Received a total of 16 enquiries from the media (cumulative since 9:45 am)	They asked whether IDD and Internet access outage were caused by the earthquake, the magnitude of the outage, the number of cables damaged, etc.
	Received 30 public enquiries by phone and by email between 9:30 and 12:30 pm	These callers told us that they had failed to use the Internet services that morning to access both local and overseas web sites and would like to know why. Three Internet service providers were involved. Some said their service providers explained that the problems had been caused by the earthquakes. They wanted to confirm this with OFTA. Some asked OFTA if they could get refunds.
12:50 pm	Received a public enquiry about	

	failure to make IDD calls and what to do	
2:47 pm	Received the first written report from a local FTNS operator.	
3:40 pm	Received the first report from a major external FTNS operator.	
3:00 pm to 7:30 pm	Received more information and written replies from local FTNS operators.	
	Analysed and collated the information collected.	
5:30 pm	A senior directorate officer conducted telephone interviews with 6 radio and TV news agencies and an editorial writer of a newspaper up to 7:30 pm	From 5:15 pm, when OFTA had a better picture of what happened during the day, the scale of the outage and the action that operators were taking, OFTA put the following into action: responded to further media enquiries, interviews and prepared press statement.
6:16 pm	Sent a press statement in English to the Information Services Department for issue	
7: 15 pm	Sent a press statement in Chinese to the Information Services Department for issue	
	Continued to respond to the media over the phone	