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Panel on Information Technology and Broadcasting

Meeting on 14 April 2008

**Background brief on issues relating to Internet disruptions
caused by earthquake damage to undersea cables**

Purpose

This paper gives an account of the issues relating to the Internet disruptions caused by earthquakes near Taiwan on 26th and 27th December 2006 and summarizes members' concerns on the subject matter.

Background

2. Due to a series of earthquakes south-southeast of Gaoxiong, Taiwan on 26th and 27th December 2006, six out of the seven easterly submarine cable systems connecting Hong Kong via the Luzon Strait with Taiwan, South Korea, Japan and North America¹ were totally damaged, resulting in serious disruption to external telecommunications services in Hong Kong including IDD services, roaming services and Internet access to overseas websites.

3. To cope with the serious submarine cable outage, Internet service providers (ISPs) used different means to acquire external network bandwidth to alleviate the problem of capacity loss, including:

- (a) acquiring bandwidth from other cable-based External Fixed Telecommunications Network Services (EFTNS) operators who had spare capacity;
- (b) acquiring bandwidth of the overland cables (via the Mainland);
- (c) prioritizing the access of bandwidth for different services and

¹ These seven cable systems are Asia Pacific Cable Network (APCN), Asia Pacific Cable Network 2 (APCN2), Flag North Asia Loop/Reach North Asia Loop (RNAL), Flag Europe Asia (FEA), SEA-ME-WE-3 (SMW3), C2C Submarine Cable (C2C) and East Asia Crossing (EAC).

limiting the access of high bandwidth applications;

- (d) re-dimensioning the network configuration and bypassing faulty external networks and the affected submarine cable systems with a view to re-arranging traffic flow to achieve maximum performance; and
- (e) provisioning with foreign operators at the overseas point of presence in order to get the additional bandwidth.

4. According to the Office of the Telecommunications Authority (OFTA), the ISPs managed to increase the bandwidth progressively since 28 December 2006 and had recovered about 80% of their international bandwidth on 3 January 2007. As the damaged submarine cable systems were repaired and resumed normal operation progressively by 29 January 2007, the Internet services in Hong Kong resumed normal soon afterwards.

Panel's discussion

5. The unprecedented Internet outage had caused wide public concern. The Panel held two meetings on 15 January and 17 April 2007 to receive briefings by the Administration on the impact of the incident and measures to improve Hong Kong's preparedness to cope with similar incidents.

Deputations' views

6. The Panel also received views from industry players and the public at the meeting held on 15 January 2007. In gist, there were common views among the industry players that the notification system on Internet outage incidents should be strengthened. A number of enhancement measures were proposed, such as the establishment of a Centralized Bandwidth Backup Pool, the development of additional submarine cable and inter-Governmental cooperation between Hong Kong and regional countries for establishing an effective precautionary mechanism as well as putting in place contingency plans. A summary of the deputations' suggestions and the Administration's responses is at **Appendix I**.

Outage reporting mechanism and contingency plan

7. At the two Panel meetings held in January and April 2007, members noted the Administration's explanation that before the incident, reporting on the outage of submarine cable systems or Internet access services was not required. Noting the earthquakes began at around 8:26 p.m. on 26th December 2006 but OFTA's statement informing the public of the incident was issued as late as 6:16 p.m. on 27th December 2006, members expressed grave concern about OFTA's slow reaction which had aggravated the congestion problem as members of the public had not been timely informed of the situation, and hence their competition

for limited services had worsened the network congestion problem. Members were of the view that the Administration should make public announcement as soon as possible so that users could choose alternative means for communication.

8. In response, the Administration stressed that submarine cable damages occurred at different times after initial earthquake on 26th December 2006 and significant impact on external telecommunications services of Hong Kong did not occur until the early hours of 27th December 2006 when a substantial proportion of the diverted routes was also disrupted. It also explained that time had also been taken to obtain reports from local operators before accurate information could be provided to the media and the public for useful reference. In the light of the incident and deputations' views that the Administration should review the reporting mechanisms among OFTA and the operators, OFTA subsequently worked with the EFTNS operators and ISPs to formulate new guidelines for reporting submarine cable system outages, external telecommunications services outages and Internet service outages with a view to strengthening the communications and coordination among different parties. In general, in the event of major submarine cable system outage or disruption in external telecommunications or Internet services, the operators concerned would be required to report to OFTA within two hours from the confirmation of the incident or within four hours from the happening of the incident. OFTA would assess the significance of impact on the territory and determine whether public alert to be issued by OFTA was warranted.

9. Noting the scale of cable outage on 26 December 2006 was unprecedented, members however criticized that the Administration had failed to put in place a contingency plan during such incident and emergency such as Internet/IDD service failures, etc. In view of deputations' suggestion that OFTA should liaise with the telecommunications services regulators of those countries affected by the Incident for establishing an effective precautionary mechanism as well as putting in place contingency plans, members urged OFTA to critically review its role and responsibilities in ensuring Internet services in Hong Kong.

Telecommunications infrastructure

10. Members also noted that there were industry proposals to install new submarine cable systems landing at Hong Kong and that OFTA would undertake to offer possible assistance to the submarine cable industry, including facilitation of the operator in the development of cable landing stations. In this connection, members shared deputations' suggestion that the Government and OFTA should provide proactive assistance to local operators on their access to the Mainland telecommunications infrastructure for temporary "transiting" arrangements in case of emergency.

11. In response, OFTA had initiated discussions with the Ministry of Information Industry of the Mainland to explore the possibility of additional arrangements, on top of what had already been put in place by existing commercial agreement, for backup capacity by using overland cables to connect

Hong Kong to other countries via the Mainland's cable systems so as to provide more effective route diversity.

Assistance to small and medium-sized enterprises (SMEs)

12. Members reckoned that the incident cast severe impact on SMEs' operation and hence their suffering of great losses. They considered that proactive assistance be provided to help SMEs overcome difficulties caused by the Internet outage. Members also shared deputations' view that the Administration should join hands with the IT industry to step up education for SMEs and general domestic users on this front. Although OFTA had attended the meeting of the SME Committee to collect views on the difficulties SMEs experienced during the incident, members commented that specific measures should be taken by the Administration to ascertain the losses of SMEs due to the Internet outage and concrete plans should be drawn up to help them overcome similar incidents in future. Consideration should be given to issuing guideline to help SMEs improve their IT applications in this respect.

Questions raised at Council meetings

13. Two Council questions were raised at the meetings held on 24 and 31 January 2007. Members expressed grave concern about the economic losses caused to Hong Kong, in particular, the SMEs, by the incident and urged the Administration to map out appropriate contingency plans to reduce the potential impact of natural disasters to the provision of external telecommunications services in Hong Kong.

Issues to be followed up at the Panel meeting on 14 April 2008

14. To facilitate discussion, the Panel has requested:

- (a) OFTA to provide written information on its contingency plan in response to emergency and on its dissemination of information to the public in the event of disruptions in IDD and Internet services, etc; and
- (b) the Administration to provide information on the damages and losses suffered by SMEs as a result of the Internet outage and on any specific measures which would be taken by the Administration to help SMEs.

15. The Administration will brief the Panel on the subject matter at the Panel meeting to be held on 14 April 2008.

Relevant papers

16. A list of relevant papers is at **Appendix II**.

Council Business Division 1
Legislative Council Secretariat
8 April 2008

OFTA's Responses to Deputations' Suggestions in Relation to the Incident

(Annex to the Administration's paper discussed at the Panel meeting on 17 April 2007)

	Deputations' Suggestions	OFTA's Responses
1.	<p><u>Reporting Mechanism</u> OFTA should review the reporting mechanisms among OFTA and the operators.</p>	<p>Immediately after the Incident, OFTA had convened a meeting on 3 January 2007 to review the outage reporting mechanisms with the local and EFTNS operators as well as the ISPs. After the meeting, OFTA established two working groups to review the outage reporting mechanisms for cable-based EFTNS operators and ISPs respectively. In consultation with the two working groups, OFTA had formulated new guidelines for reporting submarine cable system outages, external telecommunications services outages and Internet service outages with a view to strengthening communications and coordination between the operators and OFTA. The guidelines have been effective since 28 February 2007.</p>

	Deputations' Suggestions	OFTA's Responses
2.	<p><u>Centralised Bandwidth Backup Pool</u></p> <p>OFTA should consider purchasing backup bandwidth capacity from international carriers in order to provide a Centralized Bandwidth Backup pool.</p> <p>Instead of purchasing bandwidth capacity for consumption by citizens, the Government should consider providing financial incentives to promote route diversity.</p>	<p>The Incident has confirmed that market mechanisms are working effectively. Though the recovery rates might be different, the operators managed to restore the affected services promptly in response to the market demand. The proposal on centralised bandwidth arrangement is not appropriate. This is because such proposal will not only affect market operation, but also impair operators' incentive for investment in backup capacity. Nonetheless, OFTA is liaising with the Mainland authorities on the feasibility of additional arrangements, on top of what have already been achieved under commercial agreements, for overland cable capacity for backup use of the Hong Kong ISPs. There are also announced plans of the industry about installation of more submarine cable systems in the Asian region. Please see item (3) below.</p>

	<u>Deputations' Suggestions</u>	OFTA's Responses
3.	<p><u>Additional Submarine Cable</u></p> <p>The Government should take the lead in installing an additional submarine cable with funding subsidised by other governments joining the venture or by increasing the Universal Service Contributions.</p>	<p>OFTA notes that a number of companies and consortiums in the private sector have announced plans to install new submarine cable systems to connect Asia and the US including (i) the Asia American Gateway (AAG), (ii) EAC Pacific and (iii) the Trans-Pacific Express (TPE).</p> <p>The AAG will link South East Asia with the US. It is currently planned to be routed via, among others, Hong Kong. Hong Kong can also be connected to the planned EAC Pacific through the existing submarine cables. As the TPE will have landing points in the Mainland at Qingdao and Shanghai, Hong Kong can be connected to the TPE through the Mainland's overland cables. According to the announced plans, the AAG, EAC Pacific and the TPE are scheduled to be completed by 2008.</p> <p>Noting that the companies and consortiums in the private sector already have active plans to build new cable systems to increase the route diversity in the region that bypass the Luzon Strait, OFTA considers that the current</p>

	<u>Deputations' Suggestions</u>	OFTA's Responses
		market-led approach should be maintained and that unnecessary market intervention should be avoided. OFTA will offer possible assistance to the interested operators, including facilitation in the development of suitable cable landing stations.
4.	<p><u>Compulsory Interconnection and Promoting Sharing of Resources among ISPs</u></p> <p>During contingency, interconnection among networks of ISPs should be made compulsory.</p>	<p>Under the Telecommunications Ordinance, the Telecommunications Authority may direct a licensee to coordinate and cooperate with another licensee to share the use of the bandwidth facility only when the facility is a “bottleneck”. However, the outages in question did not give rise to bottleneck situations as there were a number of alternative routings such as overland cables to the Mainland in the north and submarine cables to the westerly and southerly directions for traffic diversity. Operators could enhance mutual cooperation to further strengthen their contingency measures. The Government should avoid interfering with the operators' commercial negotiation processes.</p>

	<u>Deputations' Suggestions</u>	OFTA's Responses
5.	<p><u>Telecommunications Infrastructure</u></p> <p>The Government and OFTA should provide proactive assistance to local operators on their access to the Mainland telecommunications market and facilitate the development of the telecommunications infrastructure.</p>	<p>According to some operators, during the Incident, they had made temporary arrangements to use the Mainland's overland cables for re-routing the Hong Kong traffic to the cable landing stations at Shanghai, Shantou and Qingdao and then delivering it to the submarine cable systems. OFTA has initiated discussions with the Mainland authorities about "transiting" arrangements, on top of what have already been achieved on a commercial basis, via Mainland's over-land cable to the Mainland's cable landing points for connection to the submarine cable systems so as to provide more effective route diversity.</p>
6.	<p><u>Inter-Governmental Precautionary Mechanism and Contingency Plan</u></p> <p>OFTA should liaise with the telecommunications services regulators of those countries affected by the Incident for establishing an effective precautionary mechanism as well as putting in place contingency plans.</p>	<p>OFTA had met with the Ministry of Information Industry (MII) of the Mainland China and the IDA of Singapore. Among other things, OFTA discussed the feasibility of exchanging information with them when similar problems arise in future. OFTA will continue to explore possible</p>

	<u>Deputations' Suggestions</u>	OFTA's Responses
		cooperation in this regard.
7.	<p data-bbox="259 395 1133 483"><u>Community Awareness and Education in Business Continuity</u></p> <p data-bbox="259 491 1133 627">The Administration should join hands with the IT industry to step up education for SMEs and general domestic users.</p>	<p data-bbox="1155 491 2029 1018">OFTA attended the meeting of the Small and Medium Enterprises (SMEs) Committee of the Trade and Industry Department in February 2007 and discussed with the SME representatives about the impacts to SMEs caused by the Incident as well as the assistance that they needed to cope with similar circumstances. OFTA took the opportunity to offer advice to the SMEs on how to improve their communications links with their business partners and on service agreement terms to be entered with ISPs to ensure adequate access to the Internet during critical network outages.</p> <p data-bbox="1155 1074 2029 1303">Meanwhile OGCIO is coordinating with the relevant parties in enhancing the SME Information Security Guidelines with content including business continuity planning, management and incident response for catering for adverse events such as service disruption of the</p>

	<u>Deputations' Suggestions</u>	OFTA's Responses
		<p>Internet. A booklet on the issue will be published within months. In addition, OGCIIO is also collaborating with the Hong Kong Computer Emergency Response Team to conduct an Information Security Survey on SMEs by May 2007 that will also cover aspects of business continuity planning. OFTA will provide assistance to OGCIIO on the telecommunications issues as necessary.</p>
8.	<p><u>Information on Outages, Undersea Cables and International Bandwidth</u> The public should be notified of any network incidents 180 minutes after the occurrence and ISPs should publicise business information on the undersea cables and international bandwidth suppliers they use, so that consumers can make informed choices.</p>	<p>OFTA shares the views that early notification and timely dissemination of information to the public will be an effective tool to help alleviate public anxiety and misunderstanding. The operators, having the first-hand information on the operational status of their networks and services, should take a more proactive role in disseminating prompt information and advice to their customers through hotlines or websites as appropriate. Where the outages fall within the reporting criteria, the operators concerned should, in addition to providing information and advice to their customers, report to OFTA</p>

	<u>Deputations' Suggestions</u>	OFTA's Responses
		<p>within the specified timeframe. Upon receiving such information, OFTA will promptly inform the public and provide guidance where necessary, if the outages have significant and territory-wide implications. OFTA also welcome Hong Kong Internet Service Provider Association's suggestion to offer more service packages to consumers.</p>
9.	<p><u>PCCW's Contingency Measures</u> Whether PCCW had implemented any contingency measures during the recent network outage, and whether it had any difficulties in acquiring bandwidth from other ISPs during this incident, etc</p>	<p>The Internet market is very competitive in Hong Kong and PCCW is only one of the ISPs. According to the submitted incident reports, prior to the incident, all the ISPs have already had contingency plans in force, including backup facilities and traffic diversity measures to deal with cable outages, network congestion and etc. However, the scale of cable outage on 26 December 2006 was unprecedented. The seven cable systems passing through the Luzon Strait failed to perform mutual backup as they were all damaged with only one cable link surviving from the incident. Nonetheless, the ISPs managed to restore service connection after a few days</p>

	<u>Deputations' Suggestions</u>	OFTA's Responses
		from the Incident and their restoration capability was on par with their peers in other places in the Asian region. The Internet services in Hong Kong and other Asian countries fully recovered when the damaged submarine cable systems were progressively restored by 29 January 2007.

Appendix II

List of relevant papers

Committee	Paper	LC Paper No.
Meeting of Panel on Information Technology and Broadcasting (ITB Panel) on 15 January 2007	✧ Administration's paper : "Disruption of External Telecommunications Services Due to Earthquakes near Taiwan on 26 and 27 December 2006"	CB(1)697/06-07(01)
	✧ Minutes of meeting	CB(1)1063/06-07
Meeting of the Legislative Council on 24 January 2007	✧ Question No. 10 on "External telecommunications services in Hong Kong"	Hansard
Meeting of the Legislative Council on 31 January 2007	✧ Question No. 16 on "Submarine cables damaged by earthquake"	Hansard
Meeting of ITB Panel on 17 April 2007	✧ Administration's paper : "Report on the Disruptions of Internet Services due to Earthquakes near Taiwan on 26 and 27 December 2006"	CB(1)1298/06-07(10)
	✧ Minutes of meeting	CB(1)1818/06-07