Hong Kong Rebounding from Recent Natural Disasters
Typhoon Morakot and Earthquake

in

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(A)
General Information

Submarine cables play a vital role in carrying the bulk of Internet and communications traffic to all parts of the World. Most major intra-Asia submarine cables are landed in Hong Kong and lie in the cable intensive seabed between Taiwan and the Philippines where natural disasters like earthquakes and typhoon are known natural phenomenon. Now we can add deep-sea mudslide as an additional one and it is likely to have a high frequency of occurrence. Natural disasters in this region will continue to make submarine cables vulnerable. The cable cut caused by Typhoon Morakot induced deep-sea mudslide and earthquake that followed between August 9 and August 17, 2009 had impacted the telecommunication connectivity in the region, where a total of nine submarine cables including APCN, APCN2, C2C, EAC, FEA, FNAL/RNAL and SMW-3 (Attachment 1, 1a-1g) were severed among Hong Kong, China, Taiwan and other parts of South-East Asia.

Typhoon Morakot

Typhoon Morakot battered Taiwan from August 8 to August 9, 2009. It was recorded as the most catastrophic typhoon in the decade. The typhoon itself was not predicted to be powerful before the onslaught. Yet its rain intensity made it the deadliest typhoon in recent history. It dumped around 2700mm of rainfall within 2 hours at the peak of the storm. This amount of rainfall was most intense in record and brought havoc to the Southern part of Taiwan, leaving 500 deaths and 192 reported missing. The storm produced torrential rainfall and triggered massive landslide of mud and rocks. An enormous mudslide in Xiaolin Village in Jiasian Township, Kaohsiung County buried the entire village. The estimated economic loss reached NT$110 billion ($3.3 billion USD) on land which was apparent and obvious.

The typhoon had not only caused damage to human lives and property on land, but also caused subsurface earth movement deep under the sea that damaged submarine cables which were not visual. The immediate impact and cost consequence to the telecom industry were just as severe. An undersea mudslide had first damaged three submarine cables (EAC, C2C and SMW-3) soon as Typhoon Morakot pounded the East coast of Taiwan on August 9 (Attachment 2). Turbulent currents produced by Typhoon Morakot as it traveled down the Penghu Canyon and Manila Trench off South-West Taiwan (Attachment 3) had then triggered another wave of mud and rubbles rush into the sea causing deep-sea mud flow. This further lead to a series of submarine cable faults (APCN, APCN2, FEA, FNAL/RNAL) reported on August 12, morning.
The Earthquake

On August 17, 2009, 00:05hr GMT, earthquake measured 6.5 magnitude on the Richter Scale by Taiwan’s Central Weather Bureau occurred near the East coast of Taiwan, 187.7 km ESE of Hualien (Attachment 4). The earthquake struck at 11km under sea had severed the FNAL/RNAL submarine cable and further impacted the already slowed Internet service in the region. The cable cut had restricted access to foreign websites such as Yahoo US homepage and MSN.com to users in Hong Kong and the Mainland China for two days.

Things happened in hkcolo Colocation Center

In HKCOLO, the impacts of both events were minimal. We had only received an enquiry from a client reporting an unstable circuit connection to Subic Bay via APCN2. The ticket was closed soon after a loopback and BER test. The instability was proved to be temporary. The combined impact of Typhoon Morakot and the Earthquake was much smaller than what we experienced from the Taiwan Earthquake in December 26, 2006 (please click the link to see the report in our Feb 28, 2007 eNewsletter for that event)* when an earthquake severed six submarine cables altogether. The industry had learnt from the painful experience. New mechanism and infrastructure have been provisioned and readied for possible rerouting and restoration of traffic. As a result, impact was minimized and an acceptable level of data and voice traffic were maintained despite being badly affected. Though catastrophic failure has been avoided, the outages nevertheless had slowed Internet access in Hong Kong, the Mainland China and Taiwan.

Facts of the cable systems

Cable system APCN was disrupted on 12 August 2009, with telecommunication connectivity to China and parts of South-East Asia including Hong Kong, Singapore and the Philippines affected.

Cable system APCN2 reported a fault in its Segment 7, a cable leg which stretches between Shantou, China and Hong Kong on 12 August 2009, 03:50hr GMT. The fault followed two earlier service disruptions due to Typhoon Morakot. The first one was along Segment 7 between Hong Kong and Taiwan. The other was on Segment 1, which connects Hong Kong to Singapore and Malaysia. The cable cut had affected the connection speed to sites hosted outside of the region for users in the Asia-Pacific region. Restoration work has since been completed for its Segment 1 and 7. During the process, Internet traffic was diverted to other cable systems within an
acceptable level of network connectivity for the affected regions. Nevertheless, users in South-East Asia had noticed and complained about the slow access to some US websites.

Cable systems EAC & C2C experienced double faults off the coast of Taiwan during the same period. The first sign of damage came on 8 August 2009, 17:37hr GMT, when an alarm signaled disruptions in Segment D, linking Taiwan and Hong Kong. All the traffic on Segment D was then transferred to Segment C. However, Segment C then suffered from a disruption roughly 12 hours later as Typhoon Morakot slammed into the Southern part of Taiwan. Services experienced interruption but then quickly recovered with rerouting through the protected routes of the cable.

Cable system FNAL/RNAL was affected by the deep-sea mudslide on 12 August with service of Segment D suspended at 06:56hr GMT. The repair work was to be carried out sequential to the repairing work of EAC. However, before that happened, Segment E, which was acting as the redundant backup route, was severed on 17 August 2009, 06:15hr GMT by an earthquake near Hualien. All traffic on FNAL was down with no further backup as the next backup from FEA also failed due to the same earthquake. The traffic connecting Taiwan to Korea, which carries traffic to Japan and onward to the US was then totally blocked. The outage ended at 22:00hr GMT on the same day when another route was found and commissioned.

Cable system FEA was severed on 12 August 2009, 08:12hr GMT, the cable Segment P1 between Hong Kong and Korea was defective affecting 8G of traffic.

Cable system SMW3 was the first cable damaged by the deep-sea mud flow on 9 August 2009 as Typhoon Morakot started to batter the East coast of Taiwan. Segment 1.7 and 1.8 connected to Taiwan near the East coast city of Taitung were also severed by the undersea mud flow.

Other Devastating Natural Disasters happened in the Pacific region between August and October

Natural disasters such as earthquake, undersea mud flow and tsunami in various magnitudes often happen within this part of the Pacific Region, as this is the region of instability in the vicinity of the Pacific Ring of Fire. The South-Western part of Ryukyu Islands, Japan and the Southern part of Hualien, Taiwan are locations where earthquakes are highly likely to occur. However, submarine cables are not always prone to these natural hazards. For example, after the occurrence of an earthquake near the South-Western part of Ryukyu
Islands on August 17, 2009 which severed FNAL/RNAL, a few more earthquakes ranging from 5.6 to 5.3 magnitude on the Richter scale happened at the same location on August 18, 19, and 20 of 2009 have no damage or impact to the cables laid in the same seabed.

On September 30, 2009, an earthquake with a magnitude between 8.0 and 8.3 on the Richter scale struck about 20 miles below the ocean floor, 125 miles from Samoa and 120 miles from American Samoa in the South Pacific at 02:25HKT. The earthquake triggered towering tsunami of 15 to 20 feet high and swept ashore on Samoa and American Samoa flattening villages and taken hundreds of lives. Despite the devastating damages as well as outages to local power and communication infrastructure on land, no damages and disruptions had been reported for the adjacent submarine cables.

Traffic re-routing mechanisms are in place

Since the Taiwan earthquake in December 2006, cable operators in the region had learnt from their experience of what to do and what alternative routes to take during crisis. Detailed information of what traffic goes where is difficult to obtain during this recent disaster. It is because many of the prior arrangements were in place and dealt with the situation well despite the multiple and sequential cable cuts. And due to the sensitivities of such information which obviously involves collaboration among competing providers, cable operators were not publicizing much about how they had re-directed their traffic. It is speculated that none of them wanted to take advantage of their rivalries’ vulnerabilities during the unexpected outage or risk their own in case of disaster. They preferred to compete in calm water rather than in hot water where results would be erratic and highly unpredictable.

The submarine cable industry was badly affected during the event, but their contingency plans worked very well. It was only through many different and indirect sources that we learnt a bulk of traffic might have been channeled via CT’s cross border land cable to the North to cross the Pacific. Another bulk was routed through the newly commissioned TATA cable which, purely by chance, happened not to be disrupted. The TATA cable utilization was ramped up from nil before August 8 to more than 300G in a month. There were likely other cable operators who helped out during the crisis but they too were not publicizing too much of their details.

The Telecom Authority (OFTA) of Hong Kong has also taken this “not-so-serious” crisis in strides. Criticism of OFTA was almost muted since the
general public was not seriously affected or not affected in a prolonged period. By and large, OFTA was perceived to be on top of the whole situation.

**Possible Impact**

Although the general public was not too severely affected, the impact on the submarine cable operators cannot be ignored. This is a first real test after the cable operators realigned themselves after the Taiwan earthquake in 2006. The general lack of prolong and serious interruption would point to the workability of the current alignment of operators. And in future planning, cable operators will likely sought after major hubs to land their cables so that they can divert their traffic much easier. And users of submarine cables would likely choose those that have connection to major hubs. This impact will attract even more new cables to land in Hong Kong or another major hub in the region. It will also cause many existing cables which do not have a landing in a major hub in the region to build a spur to connect to this major hub. This new major hub bound connection would allow them a choice of refuge in time of crisis. This trend will likely benefit Hong Kong and Singapore but will most likely benefit Hong Kong as Hong Kong has an alternate route via land cable through the Mainland China. Although it will be painfully expensive for the severed cable to route their traffic via their competitors’ cables, they would still prefer it in time of crisis so as not to be wiped off the cable map by a disaster.

Since Hong Kong is a major submarine cable landing hub, the quest for more landing stations will likely go up now that the contingency plans installed by the cable operators were proved to be working. The HKSAR Government, however, should not feel complacent though because Hong Kong is not the only choice.

**Submarine cable operators’ tasks after a natural disaster**

Other than avoiding being wiped off the cable map in time of crisis, cable operators are also looking for means to a quicker recovery. This is a part where there are no easy solutions. We have discussed with a handful of operators and noted that they have many tasks immediately after a disaster. Although the sample group we talked to is too small and by no means representative, we nevertheless list the top three of their tasks in the immediate aftermath of a disaster to shed light on the situation.

1. Re-routing of traffic to cables not damaged in the disaster.
2. Obtaining permission to go into sovereign waters to do the physical repair.
3. To entertain OFTA’s quest for repair and update information.

Point 1 and 2 are at no surprise. Point 3 came as a complete surprise and we scrambled to find the reason. We will address it in more details in the following parts of this paper.

**Insights**

To help operators deal with these tasks, there are things we conceive that the government can do and not do. For Task 1, the government can sit back and let the cable operators sort this out on their own. And there has not been much demand from the industry that the government should do anything extra. Operators in the industry will work out their contingency plans and perfect them after each natural disaster. What the government should pay special attention to is that the high land price in Hong Kong is rendering many industries operating in a high cost environment. While this is fine as long as their existing business can make profits, they do have an option to expand elsewhere when conditions elsewhere are more favourable.

For Task 2, it is no easy task and understanding this issue would require knowledge of politics. We do not think we have the resources to survey the industry to find out more of the need or to investigate whether the government can deal with it or how to deal with it. We would recommend the government to commission a study to find out. The government should also be in a better position to understand whether or how it can work on this and deal with sovereign matters in time of crisis. The HKSAR Government has been promoting Hong Kong as the command center of air traffic activities which certainly straddle many sovereign regions in the vicinity. If it can handle the air which is so dynamic, there is no reason it cannot handle the static cables on the ocean floor. This would promote Hong Kong as a regional command center for submarine cables. The Airport Authority is set up to handle air traffic control proactively. OFTA can also become proactive in time of crisis. After all, its preparation work would need to be finished long before the next crisis and such help would not tarnish its image or policy of non-intervention in the private sector.

For Task 3, the department heads of submarine cable operators often complained that during crisis, phone calls from OFTA rang off the hook all the time. OFTA knows who to contact and the person who is to answer to these phone calls is the one in charge and supposedly to have all the first hand information. He or she is often torn among entertaining the regulators, his or
her screaming boss and the work in the sea. In time of crisis, the first 4 hours are the most critical to the department head of a submarine cable operator. He or she needs about an hour to direct or wait for his subordinates to investigate the problem and extent of the damage. The next hour is needed in asking questions and making assessments. The third hour would be used to report and discuss the problem with the headquarters on the assessment of damage in details and most importantly to ask for permission or resources for the remedial work or kicking a contingency plan in place. The fourth hour would then be used to direct work and activate contingency plans. It is often that during these four hours, the department head would need to answer to phone calls from OFTA asking for information that he or she does not have or action plans which have not yet been endorsed by the headquarter. OFTA had thus often obtained information or undertakings which were intentionally or unintentionally ambiguous and confusing.

**Recommendations for Hong Kong**

While it is always our position that the government should do as little as possible in the normal operation of the telecom market, we would like to propose four tasks for the government to undertake in anticipation of a flurry of activities or even the emergence of a new way of operation. This is not intervention of a free market but, rather, to undertake activities to pave the way for a more developed market or a well aligned market. In here, we would like to recommend four tasks for the HKSAR Government to undertake.

**A simple and small task** the government can undertake is to have regular meetings with cable operators when there is no crisis. The purpose of the meetings would be to work out a reporting format and an updating interval for the dissemination of information in time of crisis. Naturally, the report and the updates would then become part of the contingency plan. There would be manpower or resources catering to this and the important department head will just need to task one of the subordinates to look after the accuracy and timing of the information dissemination. He or she can then concentrate in dealing with the situation on the ground or on the ocean floor. Now we have already seen that the private sector can do their job well in working out their contingency plans. We can safely assume that the government required information dissemination can be worked into the contingency plans as well. The important thing the private sector seems to bring out is that they want their dealing with the government to be as little as possible and as orderly as possible especially in time of crisis.

**An important task** to be undertaken by the HKSAR Government is the...
assessment of a longer term competitive advantage or disadvantage. We have mentioned in “Insights” that high land cost is impeding the growth of the industry in Hong Kong. The HKSAR Government has announced on September 22, 2009 to release the potential of over 1,000 industrial buildings. Since the relaxation for redevelopment and conversion with a nil waiver fee for the change of use apply to a wide range of use, it is unlikely that the telecom industry will be benefited much from it given the huge initial investment and the long return period. Places where the telecom industry can make use of will only increase marginally when other uses will likely generate a quicker return. Positive implications to landing cables in Hong Kong will likely be nil. With all the good intentions, there seems little this policy can do to reduce the cost of landing a cable in Hong Kong although the benefit it brings to other industries is tremendous. A more distinct policy towards the industry must be adopted to address the issue. Or the industry will continue to suffocate. In this, we think the government should investigate and come up with a policy that is unique to the industry.

In addition to this high land cost, the HKSAR Government must also carry out an internal assessment whether it can or want to become a regional command center for submarine cables. The command can be in planning, backup logistics and hubbing. There is no example from other places to follow but there emerges a need for a government to coordinate repair, maintenance and development of new cables in this region. A coordination of repair with neighboring sovereignty seems to be a natural place to start. The work of coordination must be well in advance of the next disaster for it to work. The government will still be non-intervening but facilitating an orderly and prompt reaction to disasters.

An urgent task that the government must also do is to investigate a worrying trend of international companies side-stepping Hong Kong in the expansion of their electronic service or PoP establishment in Asia. These are high end users of submarine cables and data centers and they bring valuable employment and technology to a region. Ever since a year ago and in spite of the financial tsunami, a neighboring region of Hong Kong has been enjoying brisk business of PoP establishment. And looking at Hong Kong in the past year, new PoP establishment is almost not heard of. We may excuse ourselves that the reason is the financial crisis. But then why are other economies benefiting during the same period? We suspect that the reason will eventually find its way back to the high land cost but we are otherwise unsure. The government must take initiative to find out the root cause and deal with it. Or Hong Kong will lose its attractiveness as a regional hubbing center and for electronic services. When this attractiveness is no longer in place, the industry will also suffer as a consequence.
A suggested task for the government to look at is to make Hong Kong a regional center for standards and code of practice. Hong Kong is a unique place in Asia. Standards imported are simply not always applicable or practical in Hong Kong. Take for example, TIA 942 data center standard is written in the USA and referred to by most electronic centres as requirements. Its tiering standards are most applicable to regions with large open space and abundance of land. Land is scarce in Hong Kong and one can hardly find a tier 4 data center in the territory. When international companies look for an expansion in Asia, there simply is no such service from Hong Kong and they have to look elsewhere. Most data centers in Hong Kong can actually provide a service as good as, if not better than, a Tier 4 data center in the USA. For another example, two risers 20m apart in a building in Hong Kong can just afford the same protection and redundancy as two vertical risers 20m apart in a Tier 4 TIA 942 building in the USA. Studying the basics and first principles will allow Hong Kong to develop a set of standard to afford the same protection and redundancy. But in the absence of a comparable standard, high-end customers will likely side-step Hong Kong. The government should work with research institutions to study these standards, go back to the first principles, and work out comparable standards suitable for use in Hong Kong. If other regions accept the standards, Hong Kong will emerge again a high-end center for electronic service, a leader in setting standards and an ideal place again for setting up a desirable PoP.

Remarks

While we are just dealing with the aftermath of some natural disasters, the discussion with players in the industries does bring out a whole lot of additional issues. We have covered these issues briefly in the “Insights” and the “Recommendations”. They are all intertwined and must be studied as a whole. We do not know if Hong Kong can become a command center or fare better when the private sector develops further. A study in this will make it clearer. We do not know why international electronic service pops have not chosen Hong Kong for the whole period we have mentioned. Was it cost, lack of high-end Tier 4 facilities or other reasons? We do not know for sure. Only what is evident is Hong Kong was not chosen. For being still an important hubbing centre in the region, there are challenges and opportunities ahead of Hong Kong. At this moment, not we as a party in the industry, nor the HKSAR Government, nor the competitor of Hong Kong know what all the facts are and where the competition lies. What is for sure, though, is Hong Kong is now not being tested merely for its leadership in the industry but also the speed it reacts to a new environment. For this, a forward-looking study for the industry must be commissioned quickly.
End Notes

* Report on "The Taiwan Earthquake on December 26, 2006" -

# The HKSAR Government has announced on September 22, 2009 in a Legislative
Council Brief (File Ref.: DEVB(DOO)7-01) “Optimising the Use of Industrial Buildings to
Meet Hong Kong’s Changing Economic and Social Needs” to release the potential of over
1,000 industrial buildings." -
Attachment 1: East Asia Submarine Cable Map
Attachment 1a: APCN
Attachment 1d: EAC
Attachment 1e: FEA
Attachment 2: Typhoon Morakot (August 9, 2009)
Attachment 3: Typhoon Morakot (August 12, 2009)
Attachment 4: Taiwan Earthquake (17 August, 2009)