

ISPs response to cable outages

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Agenda

- **Immediate impacts to ISPs**
- **ISPs responses to fixing the problem**
- **Why this could have happened**
- **Various Proposals**

Immediate Impacts

- Usually ISPs have redundant connections. But the incident makes all connections congested
- The nature of IP: Congestion to a certain level drastically increases packet loss, render TCP connections idle

Immediate Impacts

- **Web Browsing Extremely Slow**
- **TCP connections stops – VOIP, Instant Messaging**
- **DNS Lookup fails – DNS is interwoven to almost all IP applications**
- **Inbound and outbound e-mail very slow**

Immediate Impacts

- **Customer keeps retrying sending and receiving e-mails, increases the load of mail servers**
- **Retries further congest the links**

ISPs' responses

- **Re-prioritize inbound and outbound traffic among up streams – E-mail, Web Browsing, P2P, TCP/UDP**
- **Suppression of less important traffic**
- **Employ auto proxies for web traffic**
- **Increases DNS global expiry length to lessen DNS timeouts**

ISPs' responses

- **Purchase direct peering bandwidth to US via cables and satellites**
- **Commercial Dealings of bandwidth among ISPs and transit providers**
- **Call for temporary stop of P2P and high bandwidth applications**

Why this could have happened

- **Natural Selection of Route For Under-sea cable construction – HK, Southern and Northern TW, Korea, JP, US**
- **Construction cost and maintenance reasons**
- **Earth Quake is a natural disaster – Liability not on cable constructor. No incentive to route via redundant path**



Hong Kong
Internet Service
Providers Association

Why this could have happened

- Risk of mass cable breakage borne by the society - externality
- Problem fixing automatically happened by the market mechanism
- Similar incidents happened in San Francisco bay area earthquake – Subsequently service providers sells on Quake preventive services and data centers

Various Proposals

- **Similar externality effect of Internet service compared to environment pollution**
- **Some SMEs doing millions of business over a cheap DSL line**
- **Big social cost borne when mass cable break – More severe when society become more and more digital**

Various Proposals

- **Public Education – Let end users understand the risk of the Internet, and creates room for premium services**
- **Promotion of tiered service levels by ISPs**
- **Installation of copies of root DNS servers in HK, for .net/.org/.com etc.**

Backup by Public Money

- It was proposed that government should purchase backup facility for use by ISPs
- Has its merit of solving the “negative externality” problem
- But one can claim the problem can be solved by the market, as is this time, and market will improve in response to this incident

Interconnection between ISPs

- **Already is a case at the local level, via HKIX**
- **At the international level, sharing of bandwidth provides disincentives – Free Rider problem ? Competition Issues ?**
- **Already happened between some ISPs and carriers, via commercial deal in this short period of time.**

Labeling of ISPs resilience level

- Provides a form of resilience level information to end users
- But Internet is very dynamic, and resilience level is not easily measurable. Having ten upstream does not imply more resilience than one with two.
- Not easily measurable and observable

Broadband and Internet subsidy by public money

- **Broadband penetration in HK is already high compared to other economies**
- **Prices already very low**
- **But could study the model of universal WiFi service – Dividing the territory into many areas each to be bided by various operators**

Broadband and Internet subsidy by public money

- **Competition ensured by periodic bidding**
- **Ensure sufficient number of operators**
- **But still many problems – When it involves public money**
- **OFTA should be consistent – Relief license constraints to let the market introduce WiFi and WiMax**