

# Could Ash Cloud or Deep-Sea Current Overwhelm the Internet?

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## Observations

24-hour monitoring of network paths from Hong Kong to Europe, UK, Australia, Japan, etc.

MRV - A Measurement Result Viewer

Realtime View Monthly Report Trouble Shooting Settings

Welcome, guest. [Logout]

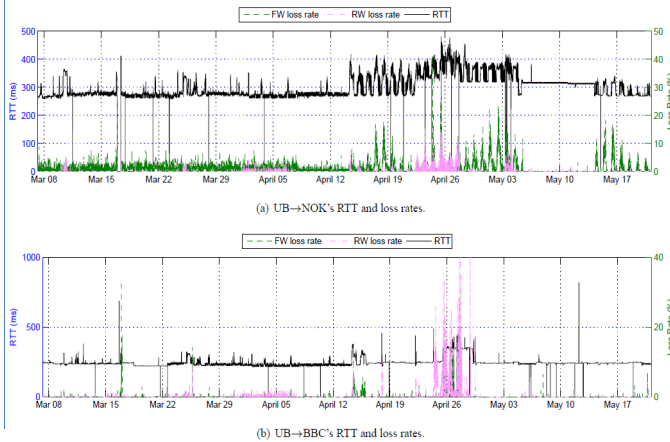
TUE 26-09-2010 2:59:45 (UTC)

Home > Round Trip Time

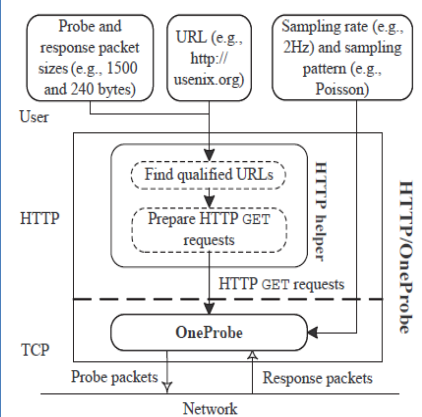
Choose Other Metrics Round Trip Time

Name	URL	UB	UF	UC	UA	UH	UE	UD	UG
HKIX(HK)									
minggao	www.minggao.com	2.21	1.15	2.53	2.33	2.72	2.57	2.57	2.57
abnet	www.abnet.com	22.78	22.29	23.38	23.38	24.48	23.38	23.38	23.38
pcow	www.pcow.com	4.16	3.11	4.11	4.11	4.56	4.56	4.56	4.56
wifiucc	wifiucc.edu.hk	1.15	1.14	1.17	1.18	1.18	1.18	1.18	1.18
HKIX(ASOGNET)									
twgrid	www.twgrid.org	2.22	2.21	2.21	2.21	2.21	2.21	2.21	2.21
HKIX(KREONET)									
ktc	ktc.gist.ac.kr	2.14	2.17	2.14	2.14	2.17	2.17	2.17	2.17
kreonet	www.kreonet.net	2.13	2.13	2.13	2.13	2.13	2.13	2.13	2.13
Internet(China)									
taobao	www.taobao.com	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16
appserver	appserver.lenovo.com.cn	1.17	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Internet(England)									
eng2	www.ztraveluk.co.uk	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12
eng4	www.elfmap.co.uk	2.22	2.23	2.23	2.23	2.23	2.23	2.23	2.23
eng3	www.maps-of-britain.co.uk	2.22	2.23	2.23	2.23	2.23	2.23	2.23	2.23
bbc	www.bbc.co.uk	2.22	2.23	2.23	2.23	2.23	2.23	2.23	2.23
Internet(Finland)									
nokia	www.nokia.com	2.14	2.14	2.14	2.14	2.14	2.14	2.14	2.14
Internet(USA)									
cpan	www.cpan.org	2.12	2.11	2.11	2.11	2.11	2.11	2.11	2.11
cbbank	www.cbbank.com	2.04	2.03	2.03	2.04	2.11	2.03	2.03	2.03
NITimes	graphics.nytimes.com	1.23	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Internet(Japan)									
nissan	www.nissan.co.jp	2.13	2.14	2.13	2.13	2.13	2.13	2.13	2.13
fujitsu	img.jp.fujitsu.com	1.14	1.16	1.16	1.16	1.16	1.16	1.16	1.16
tomita	www.farm-tomita.co.jp	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17
Internet(Australia)									

The RTTs and forward-path loss rates surged on around 14 April for the paths to NOK in Finland and lasted till 3 May.



HTTP/OneProbe measurement



"Design and Implementation of TCP Data Probes for Reliable Network Path Monitoring," Proc. USENIX Annual Tech. Conf., June 2009.

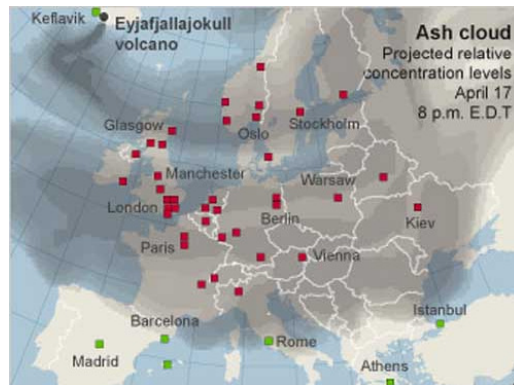
## Our Initial Interpretation

The explosive eruption of ashes from the Eyjafjallajökull volcano in Iceland started on 14 April 2010.



Source: [http://www.huffingtonpost.com/steven-mesler/olafur-eliasson-in-iceland\\_b\\_642672.html](http://www.huffingtonpost.com/steven-mesler/olafur-eliasson-in-iceland_b_642672.html)

Air traffic to and from the UK and many European countries were seriously affected during 15-23 April.



Source: <http://www.crystalinks.com/volcanoarticles.html>

For path-quality degradation caused indirectly by the volcano ashes:

- The duration of the air traffic interruption overlaps with the period of path-quality degradation.
- The traffic from Citrix' GoToMeeting web-conferencing service was doubled in the first week after the airspace was closed.
- According to Akamai, the overall web traffic in the northern Europe was well above normal levels.

Against path-quality degradation caused indirectly by the volcano ashes:

- The onsets of the path congestion and air traffic disruption do not entirely match.
- Some of the peak loss rate and RTT occurred on weekends.
- Path congestion can still be observed at the end of the measurement period.

## Our Second Interpretation

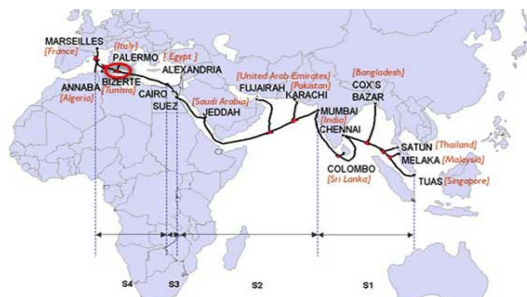
Traceroute analysis

- On 14 Apr 2010 07:18:00 GMT: the forward paths to ENG, NOK, and BBC went through the same provider FLAG (AS15412).
- On 16 Apr 2010 07:39:00 GMT: the BBC paths changed from FLAG to GLOBEINTERNET (AS6453).
- Both FLAG's and GLOBEINTERNET's next AS hop were London IX.
- After the change, the BBC path saw very stable RTT and insignificant packet losses.
- The only AS that was common to the affected paths is the FLAG network which did not appear in other unaffected paths.



A submarine cable fault

- A SeaMeWe-4 cable cut on 14th April in the Mediterranean Sea
- A more plausible explanation for the path congestion is the result of taking on additional traffic diverted from the SeaMeWe-4 cable.



Source: <http://propakistani.pk/2010/04/24/sea-me-we-4-repair-may-take-another-4-days/>

Take-home lessons

- A forensic analysis of path-quality degradation requires a very careful examination of network data and other external sources.
- Measuring end-to-end network paths actively is necessary for monitoring critical network infrastructure.
- Correlating the measurement of multiple paths for the same destination is very useful for locating the problematic AS.
- Correlating IP routes with end-to-end path measurement is necessary for diagnosing path problems.

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