

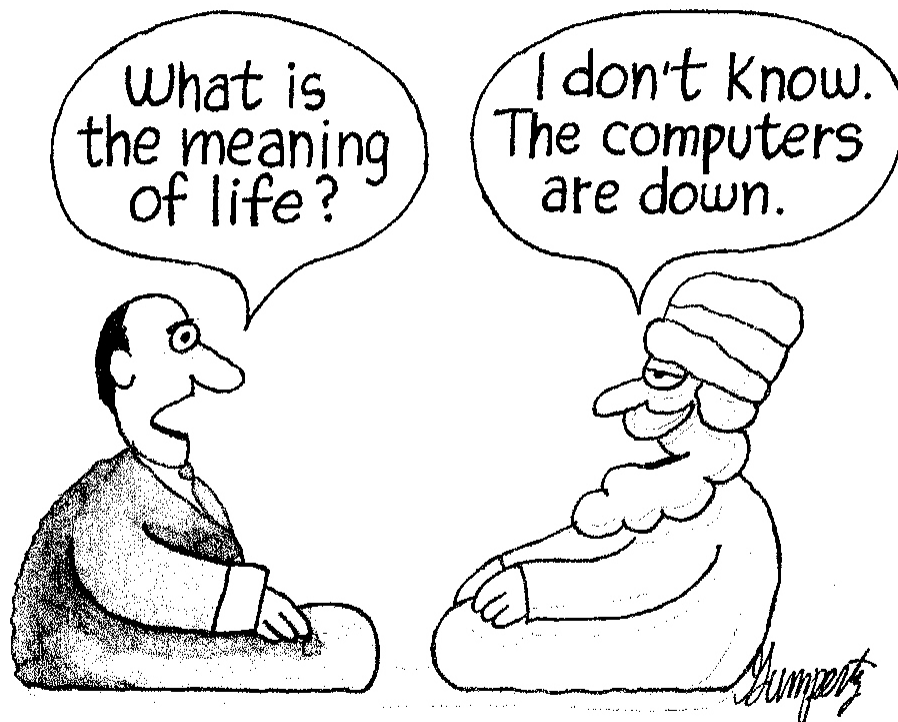
# Computer networking in the real world

To err is human, but to really foul things up requires a computer.



# Computer networking saves the day

or how technology helped an NUS  
student recover a highly prized  
possession 😊



# Computer networking wreaks havoc

or how Pakistan took down the  
mighty YouTube with one simple  
advertisement

Mehul Motani, 2012

Computer Networking in the Real World

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Mehul Motani, 2012

Computer Networking in the Real World  
*"On the Internet, nobody knows you're a dog."*

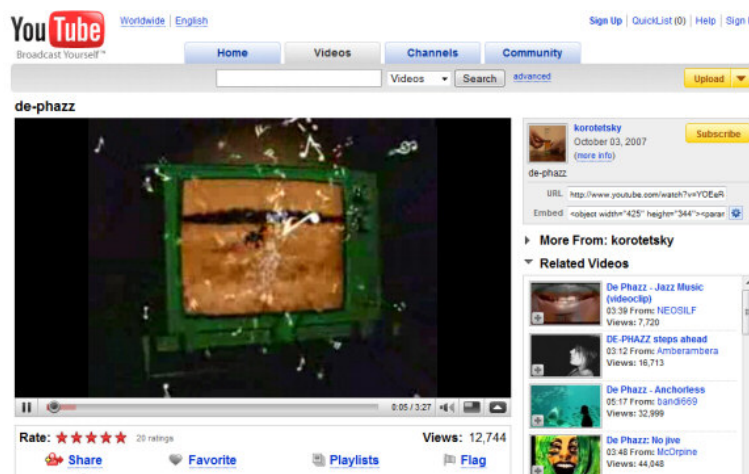
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# Weakness in Internet Routing

- Lack of Origin Authentication
  - Who own the IP address?
  - Who sent the packet?
- Route Hijacking
  - An arbitrary node/router originates a route for a range of IP addresses it does not own
  - Route is advertised to its neighbors via BGP
  - Propagated to the entire internet
  - Traffic is diverted from original destination

## YouTube.com: 208.65.152.0/22



## Pakistan blocks YouTube for 'blasphemous' content: officials

(AFP) – Feb 24, 2008

ISLAMABAD (AFP) — Pakistan has ordered all Internet service providers to block the YouTube website for containing "blasphemous" content and material considered offensive to Islam, officials said Sunday.

An inter-ministerial committee has decided to block YouTube because it contained "blasphemous content, videos and documents," a government official told AFP.

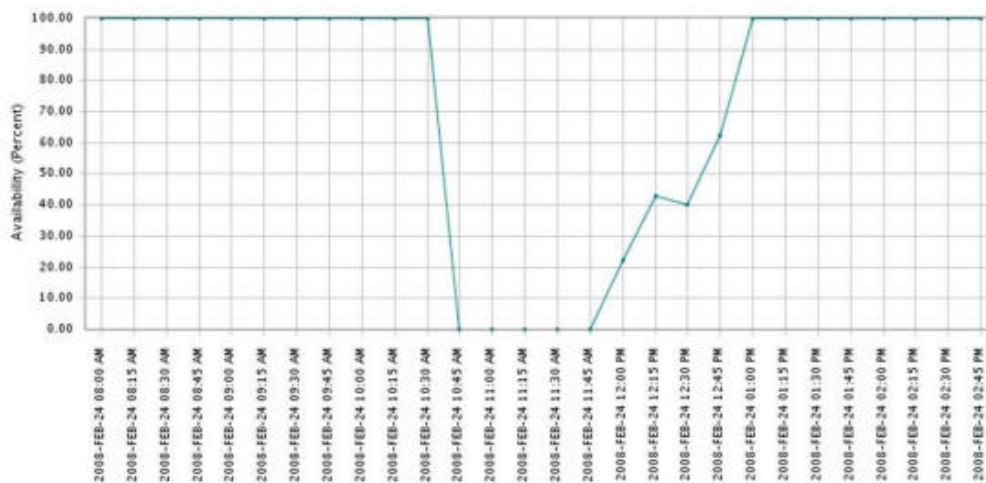
"The site will remain blocked till further orders," he said.

Other officials said the site had been blocked because it contained controversial sketches of the Prophet Mohammed which were republished by Danish newspapers earlier this month.

## Sunday, 24 February 2008 18:47:00 UTC

- Pakistan Telecom Advertises [208.65.153.0/24](#)
- This was leaked to its ISP, PCCW (AS 3491)
- PCCW (AS 3491) advertised this route to its neighbors ...
- Recall YouTube is advertising [208.65.152.0/22](#)
- What will happen?
  - Think of longest prefix matching!

# YouTube Availability



## Epidemic Spread

- 18:47:45 - First evidence of hijacked route propagating in Asia, AS path 3491 17557
- 18:49:00 - Several big trans-Pacific providers carrying hijacked route (9 ASNs)
- 18:49:30 - All providers who will carry the hijacked route have it (total 97 ASNs)

## 20:07:25 UTC

- YouTube, AS 36561 advertises the /24 that has been hijacked to its providers
- Does this solve the problem?

## 20:18:43 UTC

- AS36561 (YouTube) starts announcing 208.65.153.128/25 and 208.65.153.0/25.
- Because of the longest prefix match rule, every router that receives these announcements will send the traffic to YouTube.

# 20:59:39 UTC

- AS3491 (PCCW Global) withdraws all prefixes originated by AS17557 (Pakistan Telecom), thus stopping the hijack of 208.65.153.0/24

## Event Timeline

18:47:00 Uninterrupted videos of Exploding jello  
18:47:45 First evidence of hijacked route propagating in Asia, AS path 3491 17557  
18:48:00 Several big trans-Pacific providers carrying hijacked route (9 ASNs)  
18:48:30 Several DFZ providers now carrying the bad route (and 47 ASNs)  
18:49:00 Most of the DFZ now carrying the bad route (and 93 ASNs)  
18:49:30 All providers who will carry the hijacked route have it (total 97 ASNs)  
20:07:25 YouTube, AS 36561 advertises the /24 that has been hijacked to its providers  
20:07:30 Several DFZ providers stop carrying the erroneous route  
20:08:00 Many downstream providers also drop the bad route  
20:08:30 And a total of 40 some-odd providers have stopped using the hijacked route  
20:18:43 And now, two more specific /25 routes are first seen from 36561  
20:19:37 25 more providers prefer the /25 routes from 36561  
20:28:12 Peers of 36561 start seeing the routes that were advertised to transit at 20:07  
20:50:59 Evidence of attempted prepending, AS path was 3491 17557 17557  
20:59:39 Hijacked prefix is withdrawn by 3491, who disconnect 17557  
21:00:00 The world rejoices ...



# More Information

- [http://news.cnet.com/8301-10784\\_3-9878655-7.html](http://news.cnet.com/8301-10784_3-9878655-7.html)
- <http://www.ripe.net/news/study-youtube-hijacking.html>
- <http://www.youtube.com/watch?v=IzLPKuAOe50>