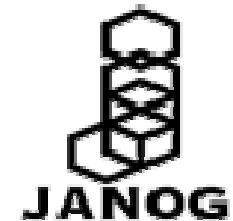


**INTEROP**  
TOKYO | JUNE 5-9, 2006



## Interop 2006 Tokyo Janog Special Session

ユーザの動向から考える  
ISPのトラフィックマネージメント

Traffic Managementの現状と今後

7 June 2006

河野 美也 Miya Kohno (mkohno@cisco.com)

# Agenda

- Introduction
- 現在のTraffic Management手法 -- status check
- Net Neutralityについて
- これからのインターネット

# Introduction (1) -1/2

<http://www.janog.gr.jp/ml/200402.month/index.html>

あたりの、「flow-based routing (Re: FYI: かしこい(?)ネット機器)」スレッド

および、

<http://www.janog.gr.jp/meeting/interop2004/>

で何を言いたかったかというと、

「インターネット」のセントラルドグマのようなもの(\*)を、一旦脱構築しよう。

その上で、これからのことを考えよう。

(\*)「極力単純なネットワークに対してインテリジェントな端末機器が接続されるStupid Network」© 前村

# Introduction (1) – 2/2

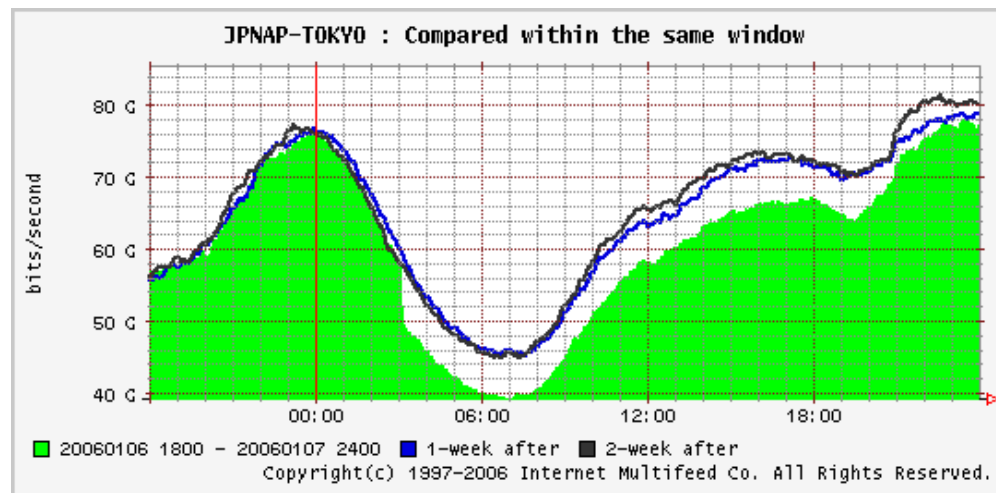
あれから2年....。

最近のISPの取り組み。

- インフラセキュリティ対策
  - Inbound Filtering
  - Source Validation
- トラフィック量による規制
- OP25B対策
- URL filtering
- ファイル交換ソフト(Winny, etc.)のトラフィック規制
- ...
  
- **記事多数:**
- [http://www.plala.or.jp/access/living/releases/nr06\\_mar/0060316\\_2.html](http://www.plala.or.jp/access/living/releases/nr06_mar/0060316_2.html)
- <http://itpro.nikkeibp.co.jp/article/OPINION/20060424/236095/>
- <http://itpro.nikkeibp.co.jp/article/NEWS/20060317/232754/>
- <http://internet.watch.impress.co.jp/cda/news/2006/04/28/11840.html>
- <http://itpro.nikkeibp.co.jp/article/OPINION/20060424/236095/>
- .....

# Introduction (2) -1/4

## 2006年1月7日のTraffic減



<http://www.mfeed.co.jp/20060107.png>

日本だけ？

# Introduction (2) -2/4

**“thanks for the interesting information. however, we did not see any traffic drop in the backbone in China.”**

**– Xing Li, Cernet China**

**“We do only passive measurements at the NCC. From the active measurements I regularly check there is no evidence of significant changes around these dates. I suggest to check with CAIDA but I do not expect conclusive results really.”**

**– Daniel Kerrenberg, RIPE**

# Introduction (2) -3/4

“we did not see this traffic dip in Sweden. OTOH one of the largest FTTH providers in Sweden upgraded their 10Mbps customers to 100Mbps during the christmas-New Year time-period so we had an enormous increase in traffic following those days and including Jan 7th.

P2P traffic is according to in-official measurements 50-80% of traffic in Sweden (you get anyone to confirm due to the legal nature and pressure from the rights holders). If this would have been the case I would assume that we would have seen it. If you want to, I can check with AMS-IX and Linx and see what data they have for that time- period. I could also go and look at some of the network-internal traffic stats of the Swedish ISPs.

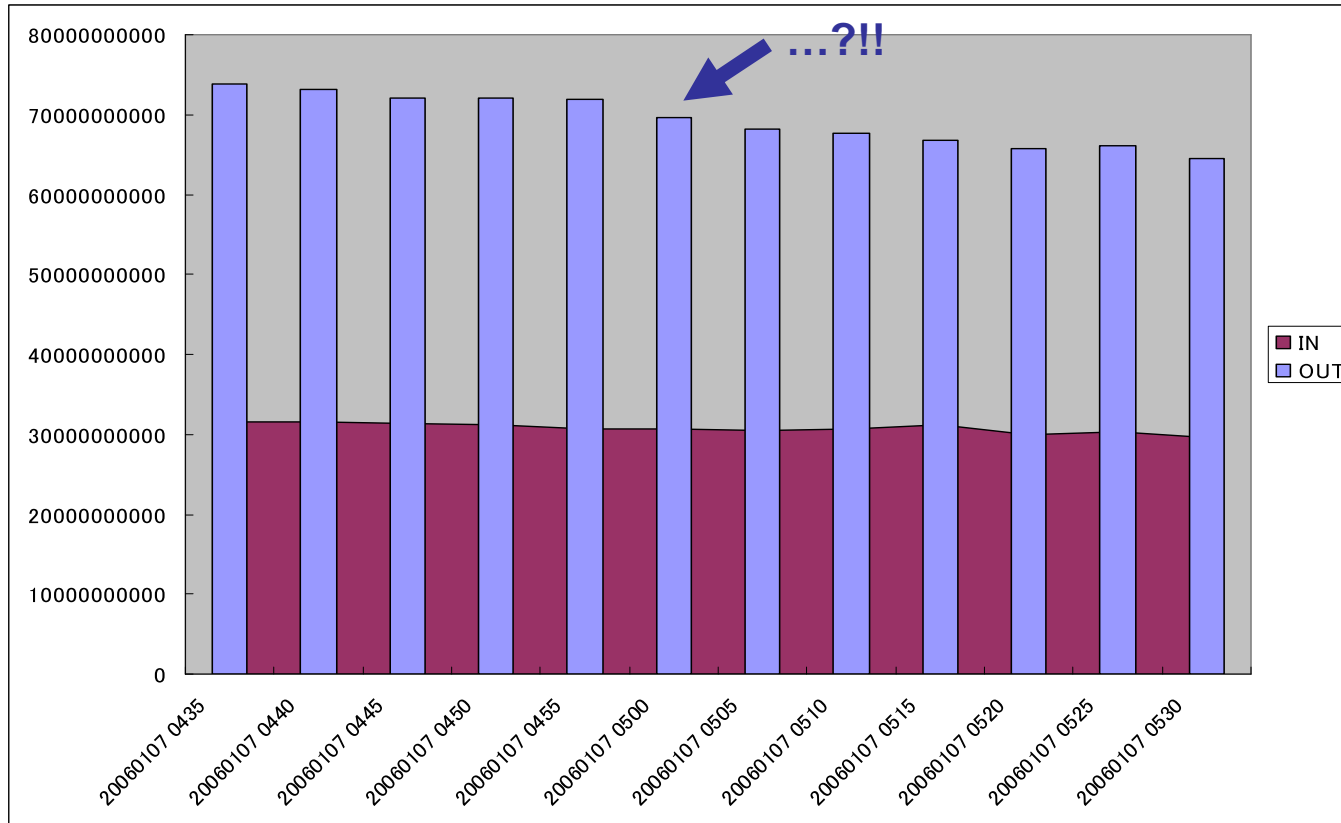
I do agree it sounds intriguing. At the same time, a 20% drop in traffic world-wide (which is what I would expect a Windows update to be) should have been noticable on NANOG by itself. That said, there is precedent. When Finnish police took down the biggest torrent server, traffic across the FICIX (the Finish Internet exchange) dropped with 20-25%. It did recover eventually though.”

– Kurtis Erik Lindqvist, Sweden

# Introduction (2) -4/4

“ Well here’s some raw data from Australia - where the relevant time is 0500. I could see a 2% drop at around 500 if pressed, but frankly its not very obvious and its nowhere near 20%.”

--- Geoff Houston, APNIC, Australia





# Traffic Management手法あれこれ

- 検出
  - Queue
  - Netflow, Flexible netflow
  - ACL matching
  - Flexible Packet Matching
  - DPI (Deep Packet Inspection)

# Traffic Management手法あれこれ

- 制御
  - Report
  - Mark down
  - Rate Limiting
  - Redirect
  - Drop

これらの組合せ, Aggregation

+

Dynamic Enforcement

# Logical Flow – DPIの例

(1) Packets classified into bi-directional flows

(2) Flows classified by application / content:

- TCP state machine,
- Signature detection,
- Application tracking / classification

(3) Flow mapped to subscriber-context

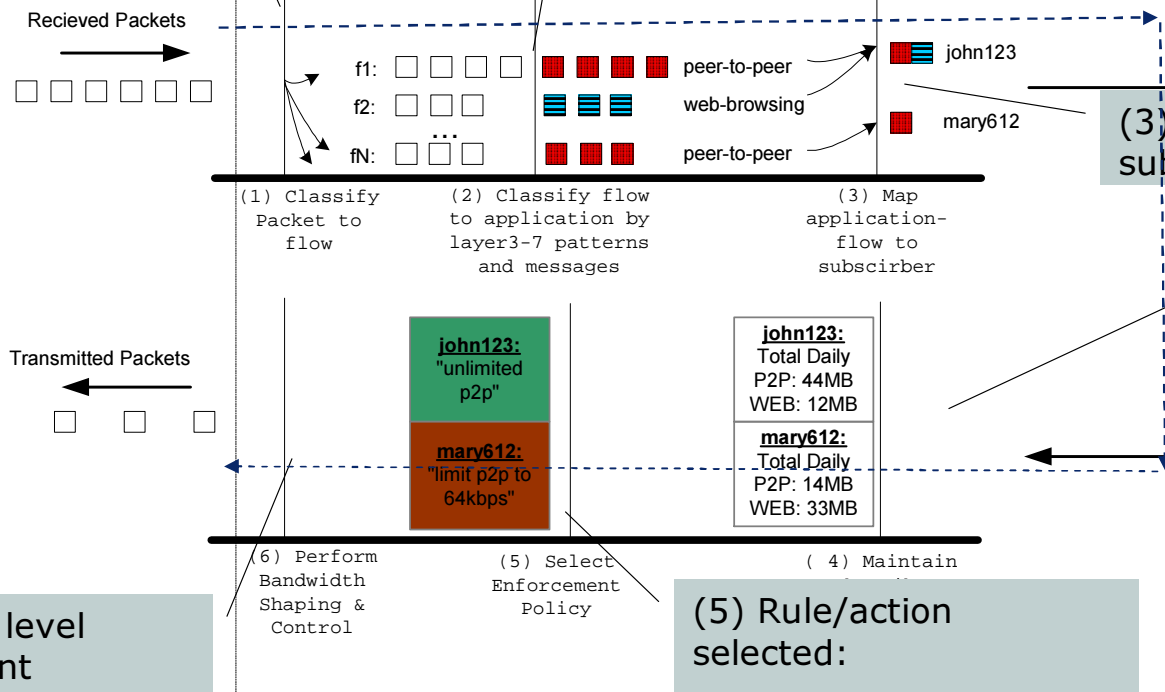
(4) Subscriber state:

- Policy Package
- Usage/Quota

(5) Rule/action selected:

- Block, redirect, BW control, queue, mark, report

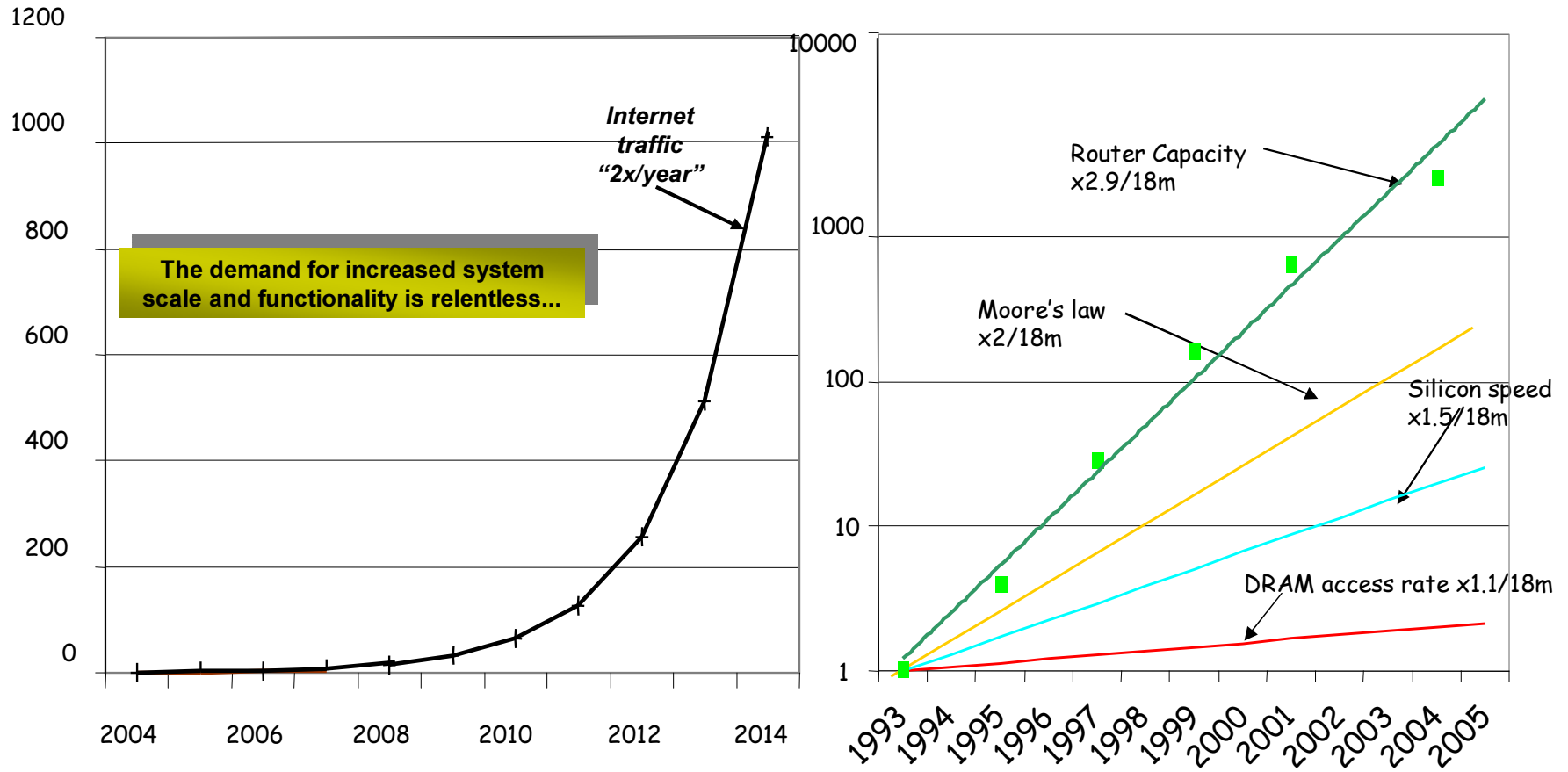
(6) Packet level enforcement



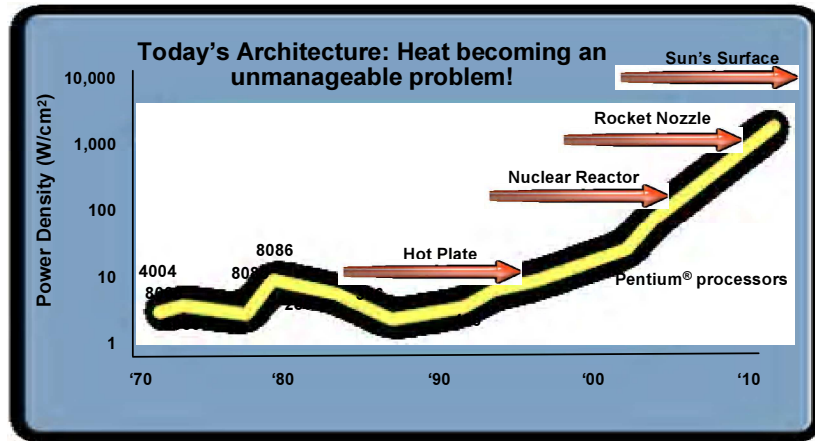
# Technical Challenge

- Capacity
  - DPI rate : 現状1G x n。今見えているroadmapは10Gまで
- Encapsulation
  - IPv6
  - Tunnel (MPLS, PPP, L2TP, IPsec...)
- Power !!!

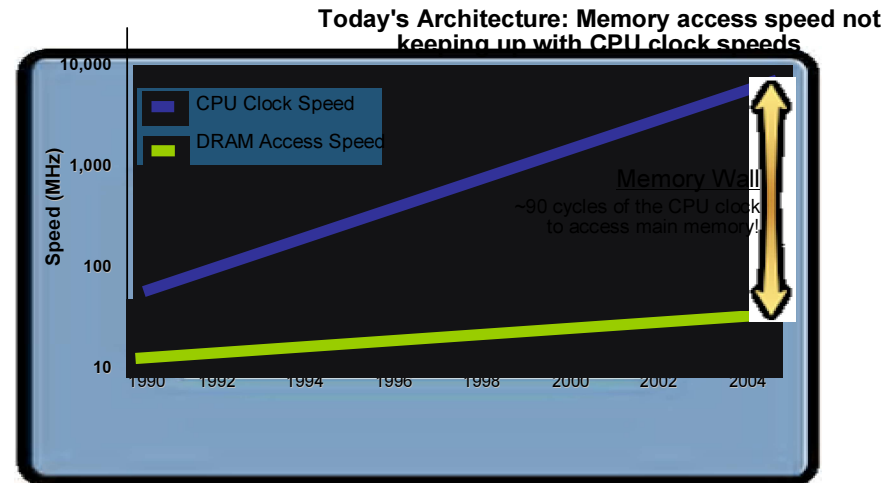
# Growth Growth Growth.....



# What do we do? The Intel perspective...



Intel Developer Forum, Spring 2004 - Pat Gelsinger



Modern Microprocessors - Jason Patterson

"... we see a very significant shift in what architectures will look like in the future ... fundamentally the way we've begun to look at doing that is to move from instruction level concurrency to ... multiple cores per die. But we're going to continue to go beyond there. And that just won't be in our server lines in the future; this will permeate every architecture that we build. *All will have*

Intel Developer Forum, Spring 2004  
 Pat Gelsinger  
 Chief Technology Officer, Senior Vice President  
 Intel Corporation  
 February, 19, 2004

## Intel Cancels Top-Speed Pentium 4 Chip

Thu Oct 14, 6:50 PM ET Technology - Reuters  
 By Daniel Sorid

Intel ... canceled plans to introduce its highest-speed desktop computer chip, ending for now a 25-year run that has seen the speeds of Intel's microprocessors increase by more than 750 times.

# Net Neutrality ?

インフラ企業(Verizion, AT&T/SBC等の大手電話会社、Cable会社等)が、トラフィックの流れを制御できる立場を利用して:

- 垂直統合型ビジネス(Voice, Video)を推進
- Managed ServiceとUnmanaged Serviceの差別化を実施

すると、

- ネットの中立性、公正性が失われる。
- ユーザの選択の自由を排除する。
- 新たなイノベーションを疎外する。

<http://www.thenation.com/doc/20060213/chester>

[http://www.infoworld.com/article/06/01/18/74297\\_HNnetneutrality\\_1.html](http://www.infoworld.com/article/06/01/18/74297_HNnetneutrality_1.html)

<http://googleblog.blogspot.com/2005/11/vint-cerf-speaks-out-on-net-neutrality.html>

<http://www.itsournet.org/>

<http://www.dontregulate.org/>

# Net Neutrality ?

## インフラ企業の立場:

- インフラ増強のための設備投資が回収できない。
- サービス提供企業のみ収益(広告収入)が上がる構造。
- “Radical Net Neutrality proposals would chill the investment climate for broadband networks, deter and delay broadband rollout and lock in today’s Internet architecture and levels of performance” -  
--Tom Tauke, Executive VP, Verizon Communications

<http://www.washingtonpost.com/wp-dyn/content/article/2006/02/06/AR2006020601624.html>

<http://itpro.nikkeibp.co.jp/article/NEWS/20060222/230391/>

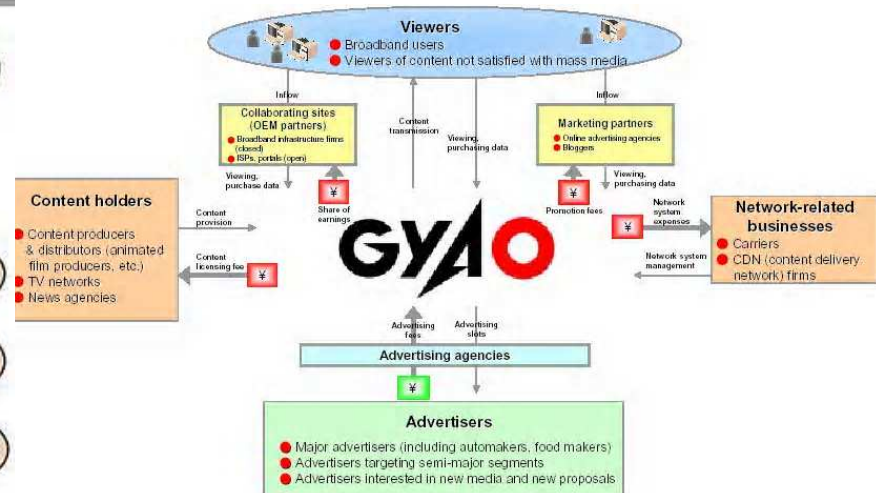
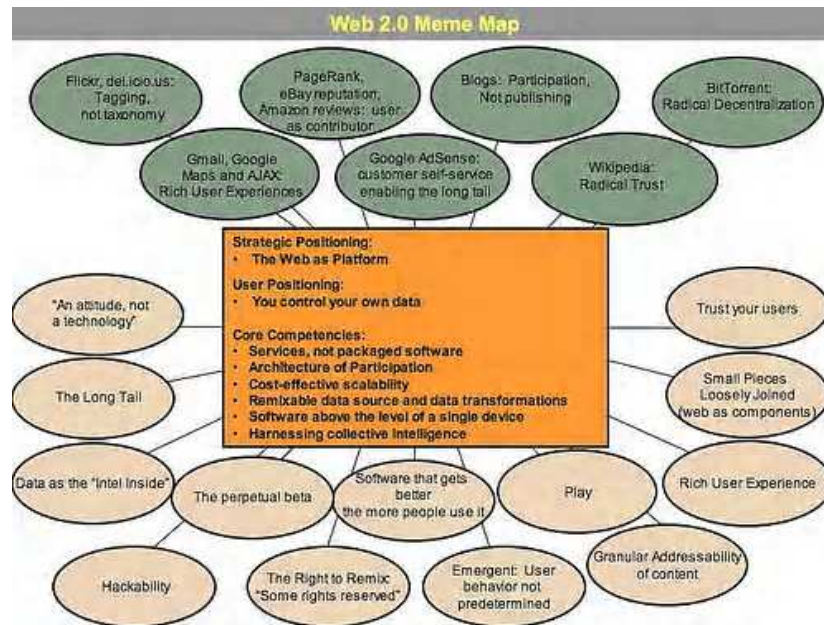
<http://ipcommunications.tmcnet.com/news/2006/06/06/167765.htm>



# 新しいビジネスモデル

- Google
- Yahoo, eBay
- Skype
- Gyo
- Web2.0

<http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html?page=1#mememap>



# 関連する議論

Isenberg:

<http://netparadox.com/>

The best network is worst profitable..

Houston:

<http://www.potaroo.net/ispcol/2006-02/converged.html>

The Converged Utopia of the old world carrier industry remains only as a piece of dull, unimaginative, monolithic mythology within this industry.

Computer Networkingからの発想と通信事業者の視点との違い

# Net Neutrality議論に思うこと

- ちょっとあおりすぎではないだろうか。

当事者(通信事業者、Google, eBay等)は、さほど極端なことはいっていないのに、イデオロギーが先走っている感じ。

持ちつ持たれつの関係なのに。(インフラがなければコンテンツが流れない。←→ コンテンツがなければインフラの意味がない。)

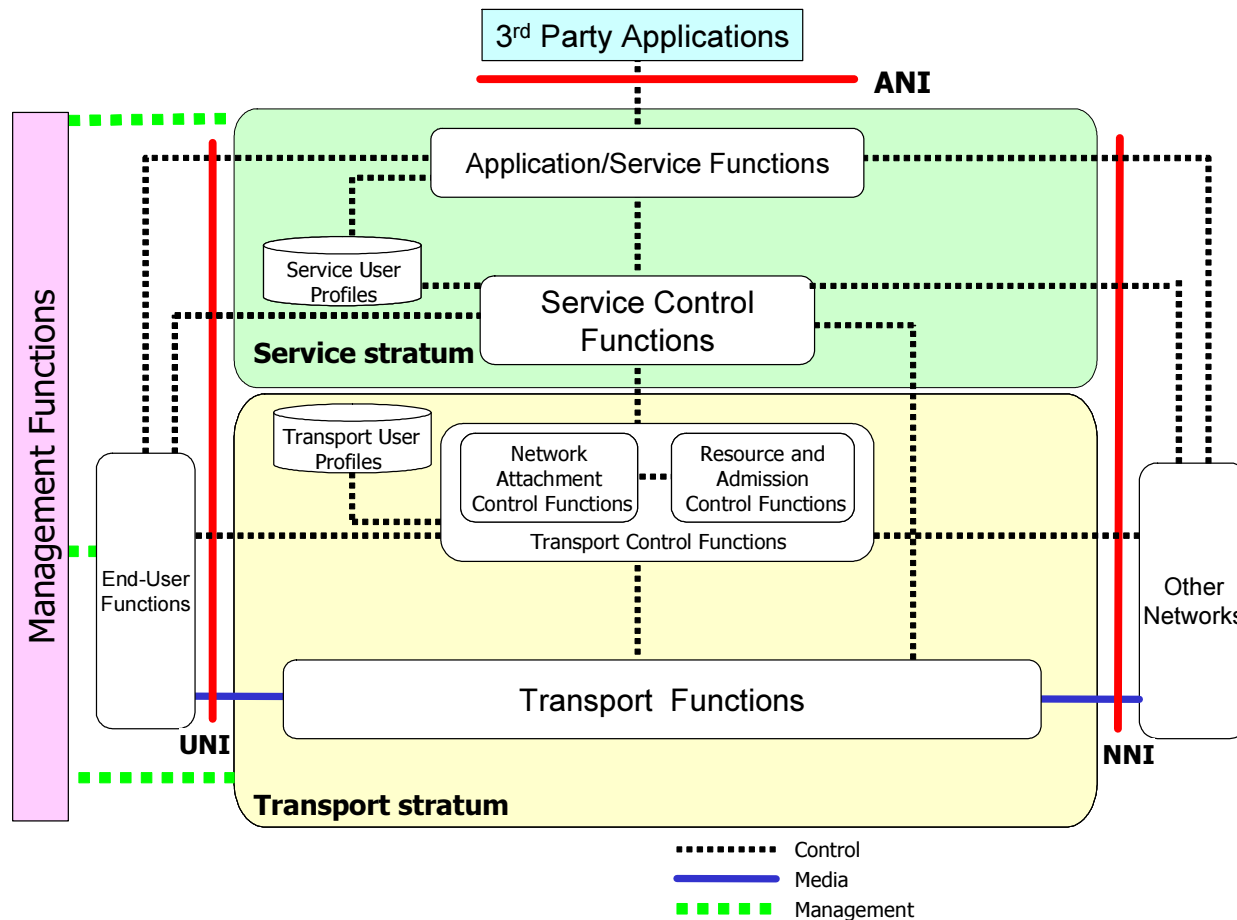
- 中立性(Neutrality)は重要。公平性(Fairness)やセキュリティも重要。

See also [http://cellistmiya.typepad.jp/blog/2006/06/post\\_f0e4.html](http://cellistmiya.typepad.jp/blog/2006/06/post_f0e4.html) ☺

# これからのインターネット

- 失いたくない「インターネットの良さ」
  - Innovation、新アプリケーション、新サービス出現の余地
  - つながる、便利、
  - 自由、平等、博愛(?!)
  - Flexibility、Generality、Openness
  - Robustness
- 新しいInternet ?!
  - NGN
  - GENI
  - IPv6によるrevolution
- Conflict? Coexistence? Convergence?

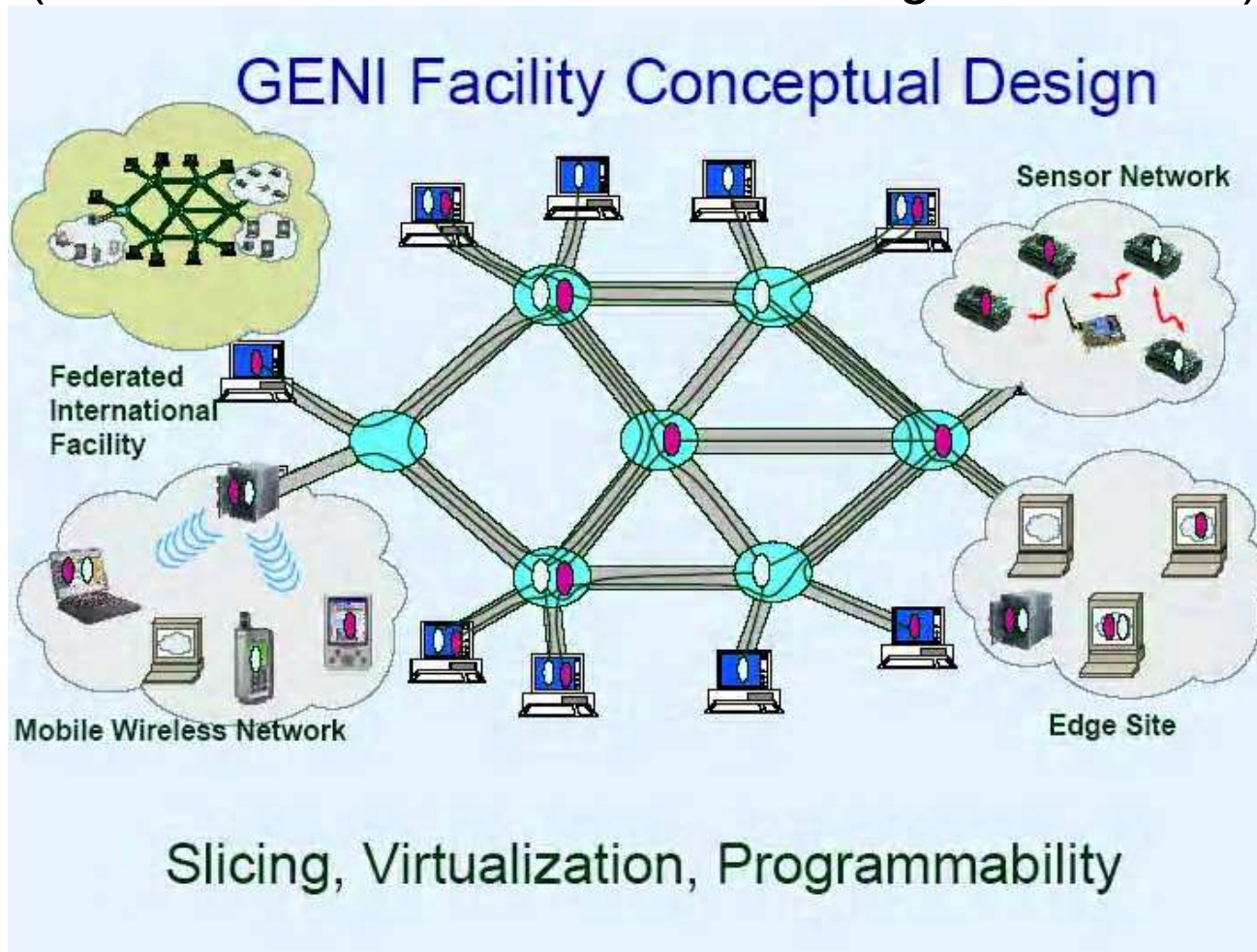
# ITU-T NGN Architecture Overview



Note: UNI/NNI/ANI are not meant to represent any specific interfaces.

# GENI

(Global Environment for Networking Innovations)



<http://www.nsf.gov/cise/geni/>

# Revolution by IPv6 ?!

- Maybe IPv6 is the catalyst towards shifting the Internet infrastructure industry a further giant leap into a future of commodity utility plumbing!

-- by Geoff Houston

<http://www.potaroo.net/>

# 拮抗する要素

- 品質保証
  - <-> (品質は悪くてもよいから)とにかくつながる
- Traffic Management
  - <-> (パケットの種類に関わらず)とにかくつながる
- ルーティングポリシー
  - <-> (パケットがどこから来ようと)とにかくつながる
- セキュリティ・規制の強化
  - <-> Innovation、新アプリケーションの阻害 (Grid, P2P..) ?

Simplicity, Robustness, Innovation  Intelligence, Explicitness, Control

やるかやらないか、ではなく、どこまで、どのようにやるかが問題。



# よい均衡点を見つけるために

- 視点
  - ユーザの視点
  - 様々なStakeholderの視点
  - 鳥瞰した視点
  - 非協力型ゲームからの脱却
- 技術的問題だけでなく、
  - 公共経済学的な均衡点の模索  
信頼できる第三者認証機関、Net Neutrality議論への建設的な解決