

What Rules for IP-enabled NGNs?

Next Generation Networks - Investment & Regulation

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Robert Shaw
Deputy Head
ITU Strategy and Policy Unit



Some Background Materials



- **ITU Strategy and Policy Unit NGN site:**
www.itu.int/spu/ngn/
 - **What Rules for IP-enabled NGNs?** workshop (March 2006)
 - Background papers (e.g., interconnection, universal service)
 - Presentations and contributions, video archives
 - Survey of ongoing NGN policy and regulatory proceedings
 - Some of my talk derived from material contributed to that meeting (particularly Scott Marcus' excellent background paper reviewing possible NGN interconnection models)

Next Generation Networks - Investment & Regulation

- *Agenda Assertion:* Europe is lagging behind the US and Asia in ICT investment.
 - How do we incentivise incumbents and new entrants to make appropriate investments in access and core NGNs?
 - What should the regulatory framework be and to what extent do we need to adopt regulatory holidays, sunset clauses, or other approaches to help ensure a dynamic and innovative sector?
 - Or should NGNs be treated in a similar way to existing networks, with an emphasis on regulating where there is SMP and in particular where there are enduring bottlenecks?

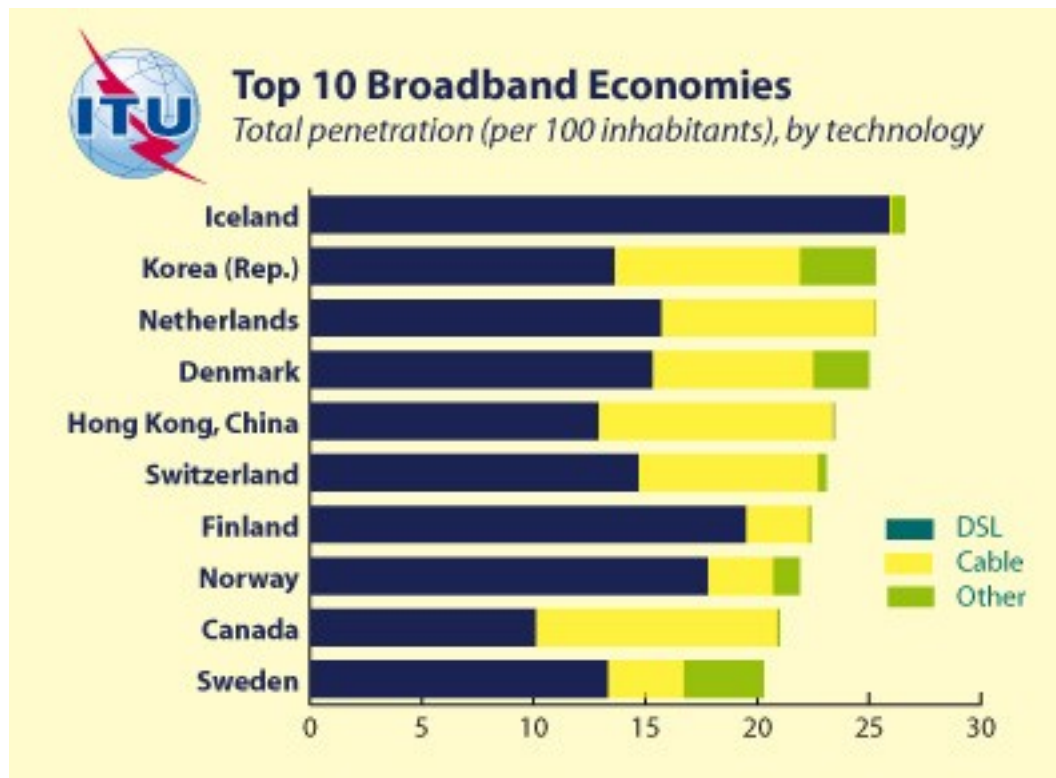
Yet some European markets look very competitive on early Triple Play moves

Table 1. Triple-play pricing with unlimited PSTN calling plans, September 2005

Company	Type	Country	Price USD (PPP)	Price USD	Down (kbit/s)	Bit Cap (MB)	TV Chan
Free Telecom	ADSL	France	32.50	36.72	20 000		93
Casema	Cable	Netherlands	48.43	53.75	10 000		42
Versatel	ADSL	Netherlands	60.62	67.28	20 000		1
Kabel Deutschland	Cable	Germany	68.77	78.40	6 200		38
Cablecom	Cable	Switzerland	71.83	102.72	2 000		87
TeliaSonera	ADSL	Sweden	75.00	92.25	24 000		23
Dansk Bredbånd	FTTB	Denmark	78.87	112.78	10 000		30
France Telecom	ADSL	France	78.98	89.25	8 000		34
Lyse	Fibre	Norway	80.86	120.48	4 000		23
Mstar	Fibre	USA	90.26	90.26	15 000		24
Smart Telecom	Fibre	Ireland	91.38	122.44	2 000		70
Noos	Cable	France	91.89	103.83	10 000		100
Telenor	ADSL	Norway	98.54	146.83	4 000		25
TDC	ADSL	Denmark	100.68	143.97	4 096		18
Telewest	Cable	UK	106.50	119.28	1 000		100
Belgacom	ADSL	Belgium	113.54	124.89	4 000	30 000	42
SBC	ADSL	USA	124.97	124.97	3 000		60
Homechoice	ADSL	UK	129.89	145.47	8 000		55
Cogeco	Cable	Canada	144.05	151.25	10 000	30 000	88
Comcast	Cable	USA	149.79	149.79	6 000		70

- Source: <http://www.oecd.org/dataoecd/47/32/36546318.pdf>

Yet some European markets looks competitive in Broadband Provisioning (2006)



Yet broadband is comparatively cheap (and looks to be getting cheaper) in number of European markets

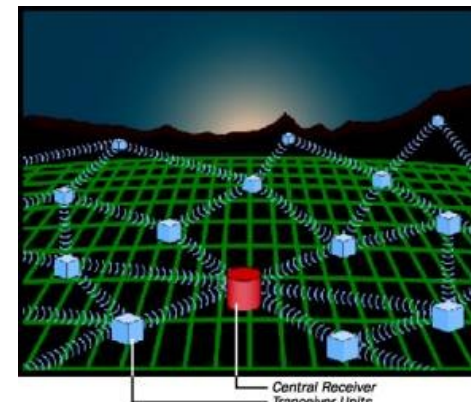
<i>Economy</i>	<i>Company</i>	<i>Speed kbit/s</i>	<i>Price per month US\$</i>	<i>US\$ per 100 kbit/s</i>	<i>Change 2005-06</i>
Japan	Yahoo BB	51'200	36.00	0.07	-12.5%
Korea (Rep.)	Hanaro	51'200	40.59	0.08	--
Netherlands	Internet Access Ned.	20'480	27.97	0.14	-81.3%
Taiwan, China	Chunghwa	12'288	22.67	0.18	--
Sweden	Bredbandsbolaget	24'576	56.08	0.23	-6.5%
Singapore	StarHub	30'720	73.17	0.24	-85.0%
Italy	Libero	12'288	37.23	0.30	-73.8%
Finland	Elisa	24'576	85.64	0.36	-51.4%
France	Free	10'240	37.29	0.36	-90.1%
United States	Comcast	4'096	20.00	0.49	--
Germany	Freenet.de	6'016	30.95	0.52	--
United Kingdom	Pipex	8'128	50.89	0.63	-53.6%
Hong Kong, China	Netvigator	6'144	51.17	0.83	-0.1%
Portugal	Sapo	8'128	75.82	0.93	-0.8%
Canada	Bell	4'096	41.26	1.01	-3.93%
Average		18'278	44.33	0.43	-45.5%
Best practice (top 20%)		40'960	27.59	0.10	-46.9%

Big Questions

- Is the *Agenda Assertion* correct?
- Does something need to be done?
- Start with looking at big picture trends
- What are NGNs?
- What's interconnection mean in an NGN world?
- What is most effective course for policy makers and regulators to promote their deployment?

Big picture trends

- Birth of Broadband
 - 250 million global broadband subscribers in about 6 years
- Growth in wireless networks and mobile data services
- Mobile overtakes fixed (2002)
- Convergence of IP-based networks with telephone & mobile networks
- End game: towards ubiquitous, pervasive, grid, mesh, wireless networks
 - anywhere, anytime, anything



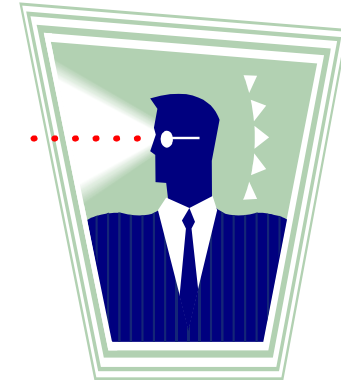
What are NGNs?

- Faced with separate infrastructures for voice and data businesses, convergence and growing competition, almost all telecommunication operators and equipment manufacturers are making substantial investments in what can be referred to as IP-Enabled Next Generation Networks (NGNs).
- IP-based NGNs represent the “marriage” of the Public Switched Telephone Network (PSTN) with the world of the Internet
 - an extensive area of standardization within ITU
- In the coming years, IP-enabled NGNs will be deployed by numerous service providers around the globe



NGN Visions Differ

- PSTN on steroids? Internet on steroids?
- To fix the internet security mess?
- Monetize the internet? Emulate mobile players?
- Revenge of the telcos? Walled gardens?
- Attempt to move “up the value chain” into audiovisual content services
 - from “dumb pipe” provider into “content”
 - e.g., much of current US telecom legislation revision activity is about carriers getting video franchises
- Is this a wise strategy?



NGN Core & Access Networks

- NGN access versus core networks (source: ECTA)
 - NGN access: “the deployment of fibre into the local loop, either to the incumbent’s street cabinet ... or the deployment of fibre all the way to customer premises (typically apartment blocks rather than individual houses).
 - NGN core: “the replacement of legacy transmission and switching equipment by IP technology in the core, or backbone, network. This involves changing telephony switches and installing routers and Voice over IP equipment.”

NGN Intelligent Infrastructures

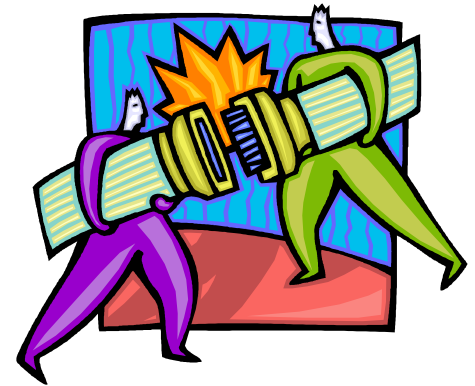
- NGN core and access network infrastructures will be supplemented with an “intelligent infrastructure” or a “business layer” for IP networks capable of providing QoS, reliability and security assurances for multiple service scenarios across service providers
- With growing security problems, imagine this will necessarily be “out-of-band” (like mobile)
- Basis for identity, authentication, DRM, access to resources and new intercarrier/service compensation mechanisms...
- Watch initiatives like **IPSphere Forum**
 - <http://www.ipsphereforum.org>

IP-enabled NGNs means wave of major challenges for national policy makers and regulators

- Technologies and architecture of IP-enabled NGNs are fundamentally different from the PSTN
- This means new services, network topologies, associated costs and commercial models
- It is also likely to lead to development of new and different kinds of IP-based interconnection arrangements that are service-based, capacity-based or even IPR rights-based (e.g., for audiovisual content crossing IPR border regimes)

NGN Regulatory forbearance?

- Incumbent carriers state that commercial models for IP-enabled NGNs are at an early and evolutionary phase and that it is too early to discuss open access or wholesale mandated interconnection regimes.
- Also argued that IP-enabled NGNs, particularly the deployment of high-speed access networks (e.g. FTTx, VDSL), require massive investments and that “national regulatory moratoria” for incumbents are appropriate
- As Brian Williamson has shown in previous presentation and market capitalization of actors demonstrate, capital markets appear to agree...



Value Redistribution in the Industry

INNOVATOR	EPS (\$)	MKT CAP (\$B)
MCIW	-11.22	6.5
SPRINT/NXTL	-0.31	34
VERIO/NTT	1.98	71.6
LEVEL3	-0.74	1.9
SBC/T	1.41	78
QWEST	-0.45	7.7
COGENT	-7.42	0.2
GLBC	-13.84	0.3
SAVVIS	-0.90	0.12
ABOVENET	n/a	n/a
WILTEL	n/a	n/a
TELEGLOBE	-0.74	0.2
C&W	0.70	4.7B
TWTELCOM	-1.12	1.0
(TWARNER)	0.48	82
XO	-2.18	0.4

INNOVATOR	EPS (\$)	MKT CAP (\$B)
CISCO	0.87	108
GOOGLE	3.41	97
AMAZON	1.25	19
YAHOO	1.07	49
EBAY	0.73	51
JUNIPER	0.53	13
APPLE	1.56	47.
INTEL	1.33	141
VERISIGN	0.93	6.15
DELL	1.27	76.3
MICROSOFT	1.12	269B

source: finance.yahoo.com, 25 oct 2005

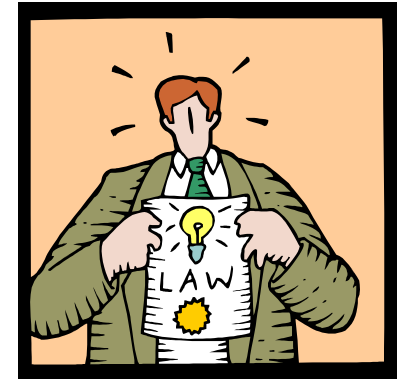
Kim Claffey – CAIDA – ARIN XVI IPv4 Roundtable – 26 October 2005

Source: Geoff Huston, Convergence at http://www.ptc06.org/program/public/proceedings/Geoff_Huston_slides_M21.pdf



Others say not so fast...

- Competitive providers argue the opposite, saying that regulators need to ask whether, in the absence of wholesale economic regulation, will market dynamics be sufficient to ensure a competitive environment?
- They are worried that without immediate attention by regulators to NGNs, carriers will rapidly vertically integrate services and that bottlenecks will emerge, particularly for delivery of **audiovisual content**...
- But is it just the traditional carriers that we need to be worried about?



What about these guys?



- Mega-internet service providers like Google, MSN, eBay and Yahoo
 - strong brands, deep pockets
 - entering audiovisual content business
 - Most internet traffic will be video in a few years
 - entering voice markets and some infrastructure provisioning

But who pays for the infrastructure?



- “The Internet can't be free in that sense, because we and the cable companies have made an investment and for a Google or Yahoo! or Vonage or anybody to expect to use these pipes [for] free is nuts!”
 - Ed Whitacre, CEO of AT&T

Double standards at play?

- “Let's see if I can summarize [network neutrality debates]
 - BAD: Verizon and SBC want to charge for "premium" access to their network.
 - GOOD: Yahoo and AOL want to charge for "premium" access to their network/servers



What am I missing here?”

- *Rick Adams, founder of UUNet, first US ISP*
- Ironic that large internet applications providers now argue for economic regulation....

Doubtful that policy makers and regulators understand what interconnection means in a multi-service NGN environment

- Extensive economics literature exists about interconnection in the traditional PSTN world
- An emerging literature deals with interconnection in the world of the IP-based networks like the internet (peering, transit, private IXPs)
- Very different interconnection arrangements prevail in the two worlds.
 - Different technology
 - Different regulatory history
 - Different industry structure

Interconnection economic models

- Is it tenable to continue to distinguish voice (including VoIP) as a service needing to be treated with a distinct set of policy, legislative and regulatory provisions?
- What should happen “when worlds collide?”
- We are in *very early stages* of understanding the relationships between these two worlds

So it's back to basics...

- Why do we regulate?
 - Manage limited resources (spectrum, numbers)
 - Market failures: Market power
 - Market failures: Desirable capabilities that would not be deployed without intervention
 - But policy makers and regulators have a shifting role in building “information economies”
 - is it promoting competition “über alles”, or
 - is it to promote the development of infrastructure industries (e.g., like power, water, sewage, transport)?
 - Not the same thing...

Distinguishing types of regulation

- **Symmetric**, e.g.,
 - Universal service and access
 - Consumer emergency calls (E112/E911)
 - Consumer protection and privacy (e.g. SPAM, SPIM)
 - Quality of services
 - Authenticated caller or sender identification
 - Data protection and privacy issues
- **Asymmetric**
 - e.g., open access, wholesale economic regulation
 - clear that one size does not fit all across different economies because of different starting conditions (is there any facilities-based competition?)

Market power and interconnection

- Migrations to NGN will not eliminate SMP.
- Market power associated with last mile bottlenecks will continue to be a significant regulatory concern for foreseeable future
- Perfect example is current U.S. network neutrality debates
- Reflects lack of competition for broadband internet access
 - US is currently ranked 15th in world economies
 - no open access, limited choice and higher prices for consumers
- The network neutrality debate is just shifting the open access debate to a higher network layer
 - the internet was never neutral to all applications (see the original paper on Network Neutrality by Tim Wu)
 - http://papers.ssrn.com/sol3/papers.cfm?abstract_id=388863

On the other hand...

- Migration to IP-based NGNs put pressure on interconnection arrangements that are widely at variance with cost
- Competition in services (particularly from internet application providers) will expand opportunities to bypass inefficient interconnection arrangements through competitive infrastructure provisioning
- Trying to address market inefficiencies in NGN interconnection arrangements through *ex ante* regulation is likely to be extremely difficult
 - particularly as this must be service-specific

Lines of Defense

- First line of defense for policy makers and regulatory authorities might be to focus on competitiveness in underlying access and transport markets, especially as regards consumer broadband internet access and high capacity internet transit
- In Europe where there is a lack of facilities based possible competition (e.g., cable), unbundling and service-based competition has demonstrated success (e.g., France)

Summary

- Too early: different visions of what NGNs are...
- We also don't understand NGN architectures enough to understand what will represent bottlenecks
- We don't understand the collision of the PSTN and IP interconnection regimes enough to address asymmetric economic regulation in NGNs

Summary cont'd

- If underlying markets for consumer broadband internet access and internet transit are effectively competitive (which may require effective regulation), an NGN IP-like interconnection regime of private unregulated arrangements is likely to emerge and be more efficient and consistent with consumer welfare, than a regulated NGN interconnection regime

Thank you

International Telecommunication Union