

Creating a Regulatory Framework for New Technologies



Pricing and Interconnection Challenges

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How Markets Work™

Consortium



The following consortium worked on the ICT Regulation Toolkit on “Regulating Competition, Interconnection and Prices”:

- NERA Economic Consulting
 - www.nera.com
- Castalia Strategic Advisors
 - www.castalia.fr
- Kalba International
 - www.kalbainternational.com

VoIP, IP, and NGN networks



- In this presentation, I will use the terms VoIP, IP, and NGN networks interchangeably.
- While there are differences in what the terms refer to, the effect upon regulatory practices is similar.
- VoIP is the most common implementation from a consumer's point of view and so I will use that term more generally to refer to all these new developments and their effect.

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How will VoIP affect today's pricing and interconnection practices?



- Implications of VoIP for regulators
- Trends in VoIP regulation
- Differential regulation of VoIP and conventional telephony
- Implications for interconnection pricing

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Implications of VoIP for Regulators



- Decisions on the regulatory status, availability, and price of VoIP services will directly affect the economic viability and future regulatory status of incumbent operators.
- Potential to erode the market share and profitability of incumbents.
 - VoIP services can traverse the telephone network without detection. Thus, even where regulators permit only limited or no VoIP services, incumbent operators will still face competition from this source. Incumbent operators may no longer be able to expect voice traffic to generate lucrative revenues and profits.
- In response to this competitive pressure, incumbents may seek regulatory relief. For example, incumbent operators may approach regulators seeking:
 - Regulatory parity with new entrants, for example by removing asymmetric regulation not imposed on other operators, or
 - Protection from competition, for example by banning or seeking to limit VoIP services.
- Finally, regulators will have to consider how best to encourage incumbent operators to retrofit their existing networks and install new digital plant, optimized for switching and routing data (of which VoIP will be a significant component in the future).

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Trends in VoIP regulation



- In many countries Internet telephony is only lightly regulated, on the basis that it is an “enhanced” or “value added” service (consistent with regulatory treatment of the Internet generally).
- As VoIP is increasing, and is becoming a closer substitute for conventional voice telephony, regulators may be less inclined to exempt VoIP from regulatory requirements. This is particularly the case where VoIP services are close substitutes for traditional telephony, for example where VoIP operators seek telephone number assignments and number portability.
- However, regulators have generally kept to a “light-handed” approach and have targeted regulatory interventions to specific matters, such as access to telephone numbers, number portability, access to emergency services, universal service, and national security.

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EU “light touch” policy



- “[T]he European Commission intends to ensure, jointly with the national regulators, that throughout the EU, the roll-out of new IP-based services will not be hindered by regulatory hurdles.”
- Urges NRAs to forbear with respect to user’s rights and service provider’s obligations.
- Favors market-based solutions to problems such as access to emergency services (particularly geographic location of caller).
- Similar problems arose with the introduction of mobile telephony services, and solutions eventually have been found.

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Hong Kong approach



- Policy and licensing
 - Class 1 (conventional telephony) and Class 2 (must inform consumers of limitations)
- Numbering resources
 - Class 1 (8 digit with prefix 2 or 3)
 - Class 2 (8 digit with prefix 57 or 58)
- Interconnection and charge settlement
 - Any operator with access to numbering resources must provide any to any connectivity
 - Market forces will ensure access
- Consumer protection and other issues (emergency services, responsibility for backup power supply, and general customer protection)

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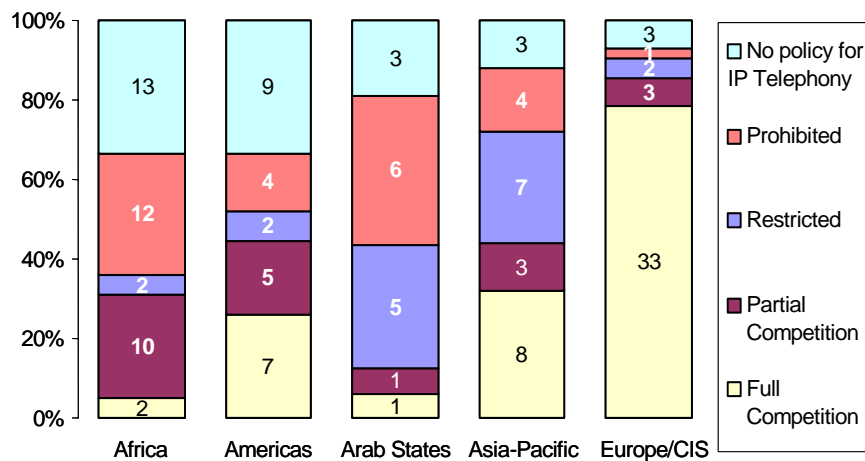
Can regulators restrict VoIP?



- Increasing VoIP traffic will undermine the profitability of incumbent operators, and sources of revenue such as international accounting rate settlements. As a result many governments prohibit or try to limit VoIP services.
- ITU 2004 Regulatory Survey:
 - 37 nations restrict VoIP to licensed Public Telecommunications Operators, including Azerbaijan, Jordan, Costa Rica, Cote D'Ivoire, Egypt, Ethiopia, and Ghana.
 - 49 nations allow full competition.
- In practice, a ban on VoIP services cannot be enforced.
 - Some commentators estimate the volume of “grey market” VoIP services at 30 to 50 percent of international voice traffic.
 - China initially banned Internet telephony, however, despite the ban VoIP services have flourished. The Chinese government is reviewing the situation, and proposes to allow computer to computer VoIP (but not computer to PSTN VoIP).

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Regulatory status of IP telephony, 2005 (ITU survey)



Source: ITU World Telecommunication Regulatory Database (2005 questionnaire).

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VoIP interconnection and pricing



- Few countries have addressed these subjects directly as of yet.
- VoIP operators have found suitable commercial arrangements.
- At this point, interconnection arrangements are still predominantly priced on a per-call or per-minute basis.

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Differential Regulation of VoIP and Conventional Telephony



- Many countries regulate information services and traditional telecommunications services differently.
- Differential regulatory treatment creates opportunities for arbitrage. It also encourages incumbent network operators to:
 - Focus new investment into unregulated broadband networks, and
 - Migrate services (including voice telephony using VoIP) onto those new networks wherever possible.
- This behavior achieves operational savings, and also qualifies voice telephony traffic for a lower level of regulation.
- The result will be an increase in the volume of information services, and a reduction in the volume of voice telephony minutes of use that are subject to interconnection charges, or international accounting rate settlements. Network operators' traditional sources of revenues will erode, forcing regulators to rethink how network operators should be permitted to recover their costs.

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Cost Recovery



Traditional Telecoms Cost Recovery

- Cost recovery subject to significant regulation and government oversight. Settlements are generally transparent.
- Network operators provide transmission, possibly with service enhancements.
- Settlements based on traffic flows and charged on minutes of use. (May include a fixed component to recover non-traffic sensitive costs.)
- International traffic settled on measured traffic volumes, and a “half-circuit” approach to sharing the costs of the international link.
- Settlements typically operate on a destination specific basis.
- Under the accounting rate settlement model, the same system applies for all network operators, regardless of size, traffic volume, or geographical reach. (As traffic moves away from the accounting rate model, larger operators will be able to negotiate cheaper access arrangements.)

Internet Cost Recovery

- Little or no regulatory oversight. ISP contracts are typically subject to non-disclosure agreements, making it difficult for outsiders to determine access terms and conditions.
- ISPs combine transmission and content, making it difficult to decouple the costs of each element.
- Cost recovery based on link capacity. Charged on bandwidth and derived throughput of the link.
- ISP network access provides onward transit to many other networks and destinations. In the extreme this provides global reach. ISPs can exploit this access to reduce their costs, using “hot potato routing”.
- ISPs use different charging models, depending on the characteristics (and bargaining power) of the ISPs involved.

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Implications of VoIP for Interconnection Pricing



- The opportunities for arbitrage that VoIP creates will put pressure to:
 - Move towards cost-based pricing for interconnection
 - Adopt uniform charges for access
- Cost-based pricing
 - Rate rebalancing
 - More transparent funding of universal service obligations
- Uniform access charges
 - Single per-minute rate for calls in a wide geographic area
 - Flat monthly rate for unlimited local and long distance calls
 - Eliminate distance sensitive prices

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AT&T offer in Chicago (double play)



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A More Sustainable Charging Regime



- Regulators will need to:
 - Eliminate regulatory asymmetries that treat services differently based on the technology used (VoIP or conventional voice), or the type of provider.
 - Decide whether VoIP providers offering equivalent service to conventional voice telephony should pay the same charges and regulatory fees as other network operators.
- Changes in technology and telecommunications network cost structures mean that per minute pricing may be becoming an inefficient cost recovery mechanism. As more services are delivered as packets over digital networks, minutes of use are no longer an important cost driver.
- The premise that the calling party is the sole cost causer may no longer be valid. The Calling Party Pays approach to call pricing (and interconnection charges) may no longer reflect actual cost causation.

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Arbitrage Opportunities



- Traditional network operators often charge different interconnection rates, depending on the type of call or type of service provider involved. Often this reflects differences in regulatory treatment between service providers. This creates opportunities for service providers to engage in arbitrage (either legally or illegally).
- Certain features of VoIP traffic create additional arbitrage opportunities. VoIP traffic can readily enter the Internet without traversing the PSTN. Opportunities also exist for terminating VoIP traffic without traversing the PSTN, or through undetected transit of the PSTN. Even when a PSTN operator is able to detect VoIP traffic, it may not be able to differentiate between local, domestic, and international VoIP calls for billing purposes.

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Pricing Mechanisms for VoIP Interconnection



- Cost drivers for VoIP:
 - Per minute cost recovery has a number of weaknesses in a VoIP world. Call duration has no meaningful relationship to the costs of a VoIP call. Charging on a per minute basis creates opportunities for VoIP operators to engage in regulatory arbitrage, or to avoid interconnection charges.
 - As VoIP traffic increases, interconnection charges based on bandwidth used would better reflect underlying cost drivers, and would be more consistent with economic efficiency.
- Cost-reflective interconnection pricing for VoIP could involve:
 - End user payments
 - Unbundling
 - Cost based VoIP origination and termination charges
- Reciprocal payment obligations

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Interconnection between Internet Service Providers



- Peering model – reciprocal access to each other and free exchange of traffic
 - Initial government development
 - Move to commercial development
 - Essentially a Bill and Keep arrangement
- Hierarchical structure developed
 - Smaller ISPs treated as customers
 - Tier-2 ISPs provide link to Tier-1 ISPs Network Access Point or Point of Presence

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Models for Internet Interconnection



- Peering arrangements
 - “Sender Keeps All” or “Bill and Keep”
 - Makes sense when two ISPs have roughly the same characteristics and traffic volumes
 - How does an ISP qualify for peering status?
 - Negotiated privately
- Transit arrangements
 - Larger ISPs sell access to their networks, customers, and other ISP networks
 - Charges are capacity based
 - Negotiated privately

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VoIP Clearinghouses and other commercially-negotiated arrangements



- Clearinghouse can provide single point of contact for termination of traffic to hundreds of service providers across the world
- Handoffs between PSTN and IP networks
- Help PSTN carriers identify VoIP users and traffic
- Managing VoIP traffic
- Network monitoring
- Managing QoS issues

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VoIP applications



- Applications that run entirely over the Internet
- Applications that connect with the Public Switched Telephone Network at one end of the call
- Applications that connect with the Public Switched Telephone Network at both ends of the call

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Elements of VoIP service



- Customer location
 - Internet connection (DSL, cable modem, wireless)
 - Telephone (softphone or traditional with adapter)
- Internet carries the call between the customer and the VoIP provider
- Gateway between Internet and PSTN
- PSTN carries the call to the called party

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Sending and Receiving Calls



- Additional equipment is required at the user location to connect traditional telephones to the broadband connection.
- The VoIP provider needs to interface with other telecommunications operators to be able to receive and send calls.
 - Numbers
 - Links
 - Routing
 - Emergency services

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Leapfrogging Opportunity?



- Could traditional call-based, per-minute priced interconnection be dispensed with?
- How would Vonage interconnect with Skype, for example?
 - SIP (Session Initiation Protocol) (or something similar) enables Vonage to find a Vonage-registered phone and could enable Vonage to find a Skype-registered phone or any other VoIP phone.
 - As long as both parties are connected to the Internet, the call could be connected and would flow over the various physical facilities that comprise the Internet
- Network providers could connect as Internet providers.

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Network neutrality



- Extensive discussion of this recently as conditions for approval of mergers between telecoms operators are defined.
- Operators are offering premium services
 - Prioritizing bitstreams
 - Offering different quality of service guarantees
 - Premium service, instead of best efforts service
 - Vertical integration of new features and services by network operators with broadband pipes
- Is this discrimination that violates a tradition of network neutrality?
- Should preemptive regulation be imposed or is vertical integration an essential part of the development of competition?

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