

Telecom Technology and Regulation

Robert C. Atkinson
Director of Policy Research
Columbia Institute for Tele-Information (CITI)

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CITI's "Remedies for Telecom Recovery" Project

Was the Telecom "Bust" a:

One-Time "***Perfect Storm***"

or

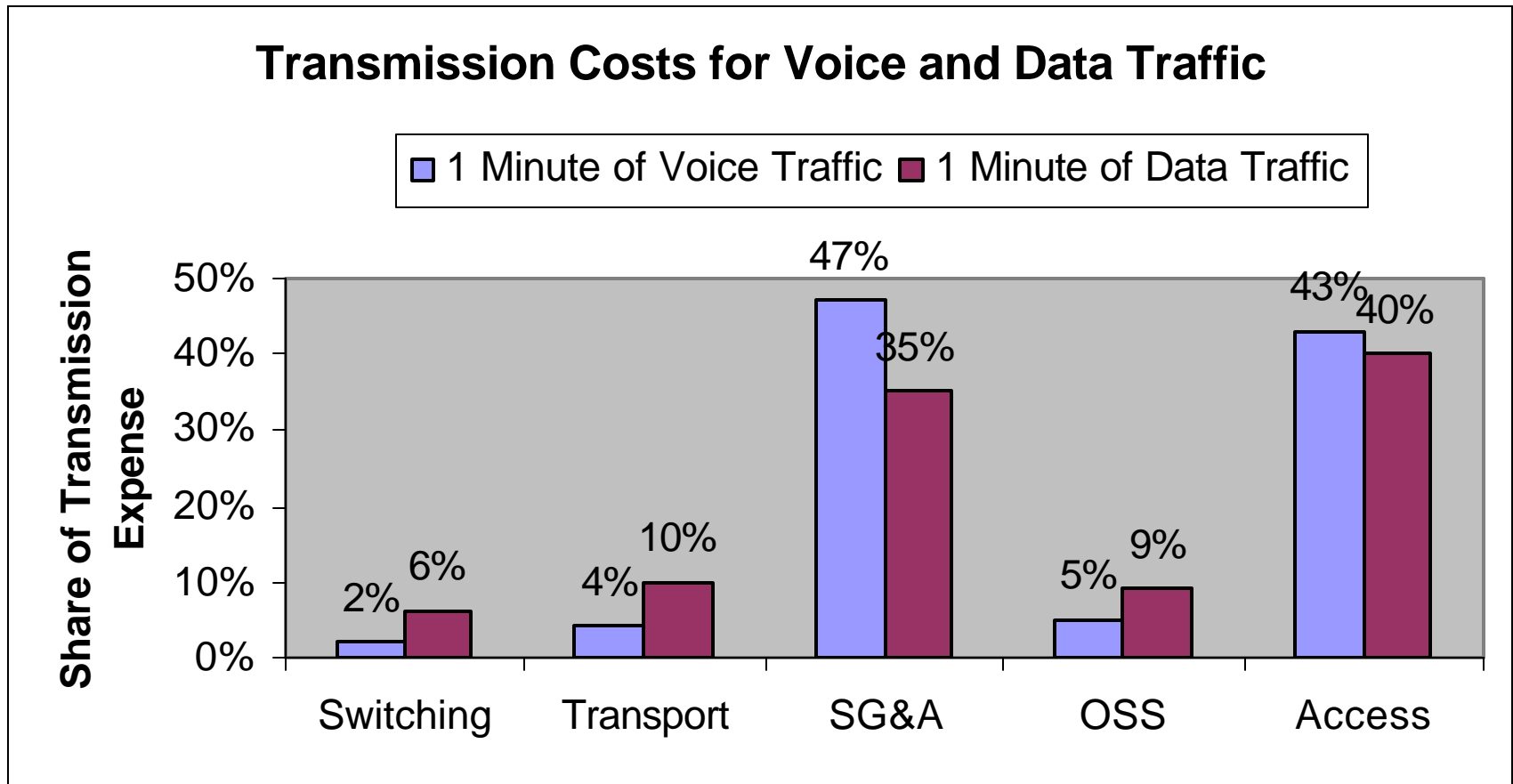
Symptom of ***Fundamental Instability?***

Causes of Fundamental Instability Have a “Technology” Component

- Combination of competition and economies of scale
 - Attempts to gain advantage of scale lead to overcapacity in supply
- Products and services with commodity characteristics
- Low marginal, high fixed costs leading to price wars
 - Inelastic demand
 - Price deflation
- Wall Street’s short term perspective
- Continual technology shocks

Can Technology Make a
Difference to Existing Telecom
Services?

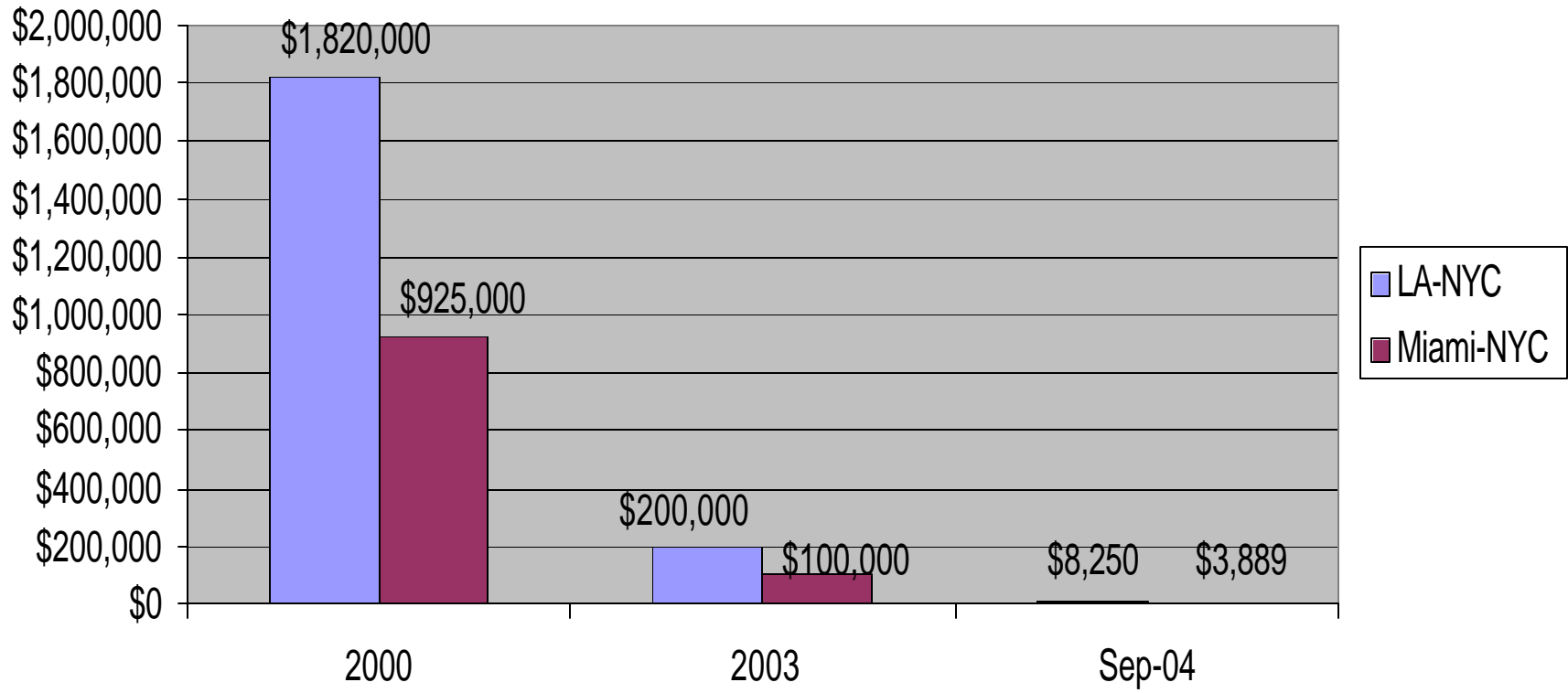
SG&A and Access (Not “Network”) Are Major Cost Components



The Long Haul Capacity Glut

U.S. Domestic Long-Haul Capacity Pricing

Monthly STM-1 Lease Prices



VoIP

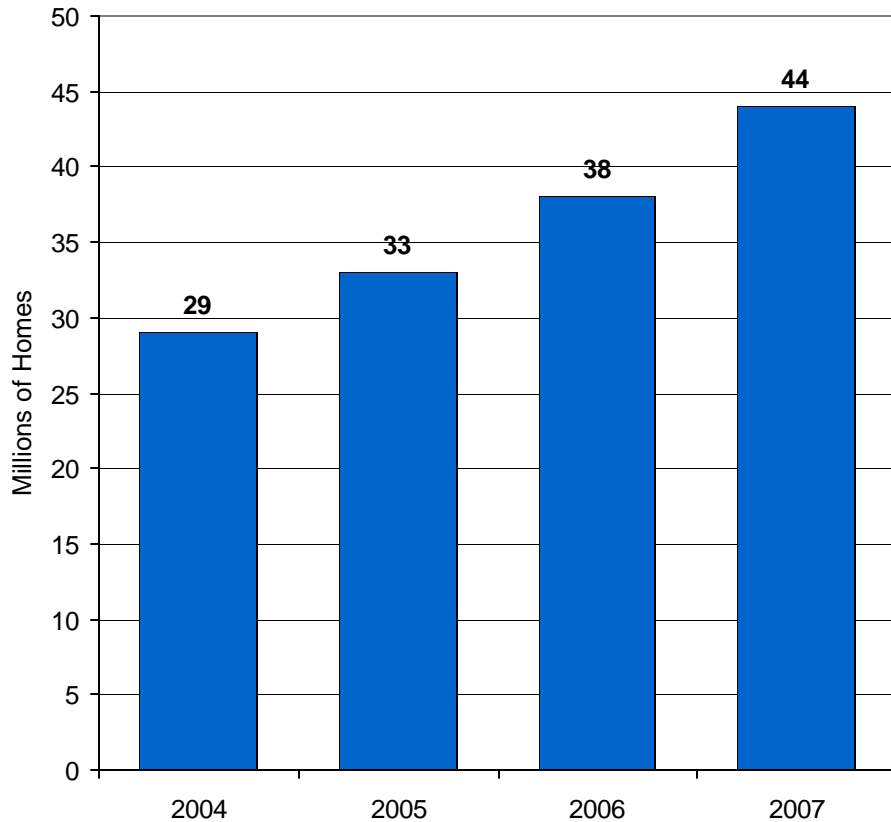
Killer App?...or App That Kills?

Low Incremental Cost to Add VoIP

- \$10-\$12 expense per sub per month
 - \$5/mo. for external expenses (collo, recip comp)
 - \$5-\$7/mo. for internal expenses (backbone, sales, back office, depreciation, G&A)
- Low capital (as low as \$100/sub)
 - \$50M for national infrastructure for 1M subs (collos, routers, back office)
 - \$50 incremental per add'l sub (CPE)

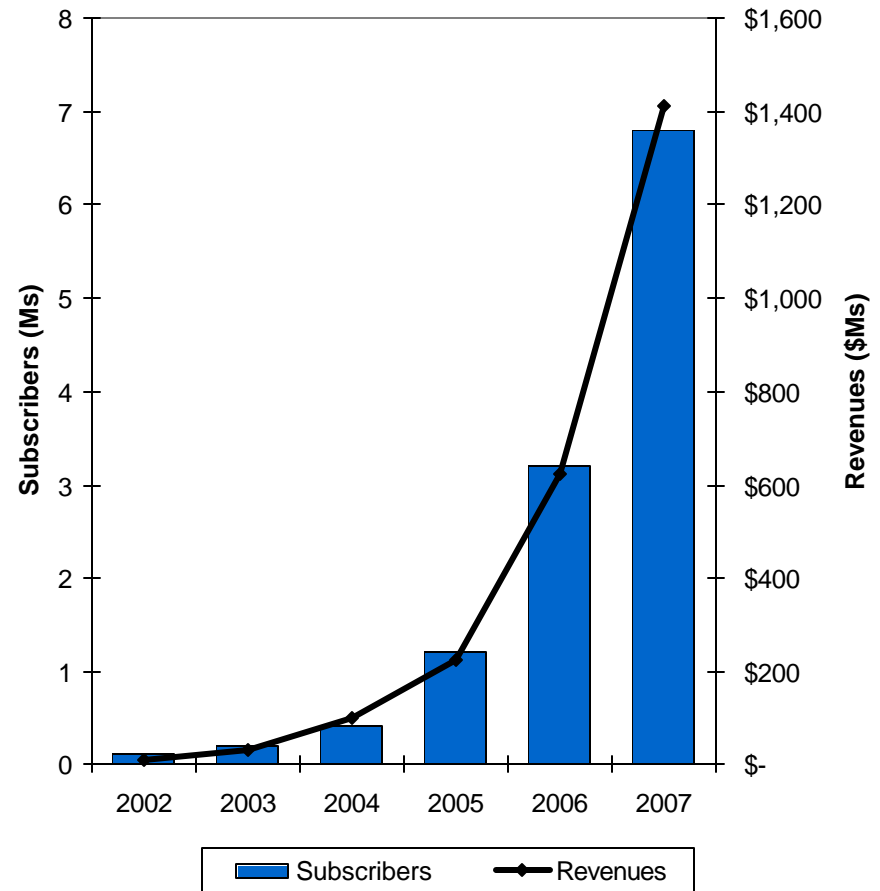
VoIP Will Be a Function of Broadband Growth

Residential Broadband Subscribers



Source: AT&T, Wall Street Estimates

Residential VoIP Growth



Source: Frost & Sullivan Research

BPL

*More Than A Scientific Curiosity, But
Is It (Finally) the Long-Awaited Third Wire
to Every Home?*

Observations From CITI Workshops

- BPL works technically
 - Technology will undoubtedly improve, become less costly
- Major operational and cost barriers to large scale deployment will be the usual “non-network” problems:
 - Branding, sales, order processing, truck rolls, installation, OSS, interconnection, billing...
 - And, where is the BPL service “bundle”?

BPL Is Risky

- BPL is a major business risk because:
 - Mass market BPL won't be an entrepreneurial, ground-up business: for heavyweights only.
 - BPL will have to compete as “third to market” against telco and cable “monopolies”
 - After the telecom “bust,” investors are unlikely to fund major BPL initiatives not backed in some fashion by a very strong, ***committed*** strategic player
 - Regulatory uncertainty (RF interference, utility cost allocation) adds risk

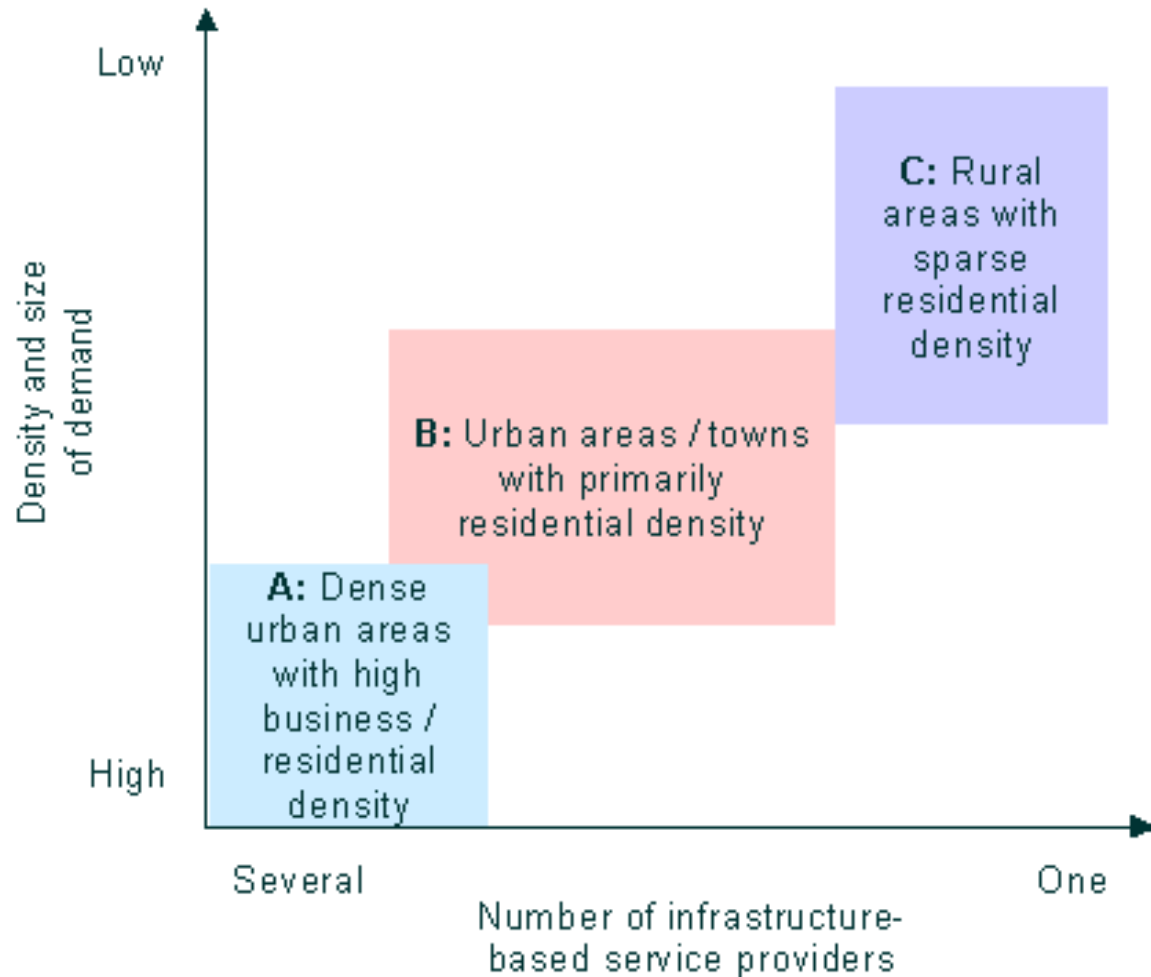
BPL's Future

- Will a strategic champion – probably an IOU – quickly do “whatever it takes” to make BPL happen in major markets?
 - How will its investors react?
 - How will telcos and cablecos react?
- If not, BPL is likely to be relegated to markets where utility is not investor-owned, typically
 - Rural areas
 - Municipal-owned systems

Are Multiple Broadband Infrastructures Sustainable?

Competition, Duopoly or Monopoly?

Can Multiple Broadband Infrastructures Be Sustained?



Source: Analysys Group

Are Multiple Local Broadband Infrastructures Sustainable?

- Key question for regulators, investors, application/content providers and management
 - Will return justify huge capital risk?
 - Fewer infrastructures/less competition=lower risk
 - Where will the return come from?
 - Basic services or value-added?
 - Who captures the value?
 - Infrastructure operators or content providers?

Are Multiple Local Broadband Infrastructures Sustainable?

- Will “entertainment over BB” (IPTV) be the critical determinant?
 - Can “wireless” (other than satellite) deliver TV to the masses?
 - If not, is wireless only for mobile Internet access?
 - Will “telco TV” work technically?
 - Will “telco TV” beat cable TV/cable IPTV in quality, convenience, content and cost/price?
 - Will telco and cable settle into a comfortable non-price duopoly...or could one be the “last man standing”?

Conclusions

Some Factors to Keep in Mind

- Customers rarely care about technology
 - ... inducing technology adoption inertia
- It is risky and difficult for service providers to adopt and integrate new technology
 - ... adding more technology adoption inertia
- Technology deployment is “circumstantial”
 - ... differences in geography, service-provider stage of development, market density, etc.
means no technology is optimal everywhere, for everyone, all the time.

A Future of Cyclical Instability

- Recent “bust” will inevitably (but temporarily):
 - raise industry concentration
 - slow innovation
 - reduce capacity expansion
 - raise (or stabilize) prices
 - reduce investment in network upgrades
- Telecom industry will enter a phase of less intra-platform competition: a more oligopolistic market structure...
- Followed by a cycle of IP-induced enthusiasm, expansion, competition,...(collapse?)
 - VoIP is just the tip of the iceberg...IPTV is coming

Challenges for the Telecom Industry

- **Fundamental instability will continue...**
 - Intensity will be cyclical
 - Technology influence will be a cyclical
- **So coping with fundamental instability will be the challenge for**
 - Managers
 - Employees
 - Regulators
 - Investors
- **Coping means “*being adept at adapting*” rather than trying to control instability**