Remedies for Telecom Recovery

Restoring Network Dynamism

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1990s Were the “Golden Age” of Networks

• More electronic information
• More users
• More innovation (faster, cheaper, more functionality)

But after 2000...

Telecom Industry Woes

– Failure of new entrants
– Crisis of long distance carriers
– Debt overhang and line-loss of incumbents
– Employment declines beyond productivity increases
– Stock market collapse
– Investment standstill and limited access to capital markets
– Equipment industry collapse
– R&D slowdown
– Internet and data growth slowdown
### U.S. Industry Revenues

- Wireline revenues have been declining since 2000, while wireless sales are slowing down.

- Only segment showing revenue growth in that period was data, and that growth slowed from 22% to 5%.

### European Debt

- The cumulative debt of the seven top EU telecom firms was greater than the GDP of Belgium, with little result.

### European Revenues and Forecasts

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### US Telecom Capital Spending

- The cumulative debt of the seven top EU telecom firms was greater than the GDP of Belgium, with little result.
High Capacity Lease Rates 2000-2002

- OC-3 lease prices:
  - LA-NYC: $1.82m $0.2m
  - Miami-NYC: $925,000 $100,000
- Average drop per year about 66%

SOURCE: US Internet Geography, Telegeography, 2003

Impact on R&D 2001-2002

<table>
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<tr>
<th>R&amp;D</th>
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<tr>
<td>Cisco</td>
<td>-8.7%</td>
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<tr>
<td>Motorola</td>
<td>-12.40%</td>
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<tr>
<td>Nortel</td>
<td>-28.1%</td>
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<td>Lucent</td>
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<td>Agilent</td>
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<td>Coming</td>
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<td>Broadcom</td>
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<td>Avaya</td>
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<tr>
<td>3Com</td>
<td>-46.7%</td>
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<td>JDS Uniphase</td>
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Source: CBS MarketWatch
Impact on Jobs
(Communication Service Providers)

Jobs Lost
- Jan 2001 – Dec 2002: 135,000
- Feb 2003: 6,169
- March 2003: 2,428
- April 2003: 11,397

Free Cash Flow Recovery

U.S. Telecommunications Players WACC vs. ROIC
2002

- Most carriers in the United States have a return on invested capital below their WACC

ILEC Cash Flow Improvement in 2003
- Based on investment stand-still, and deferment of investment decisions on FTTH
- Used for dividend to support share price
- Emerging challenge of VOIP will add revenue pressure
- Even a return to old investment level is a decline relative to growing traffic levels and importance

Source: Shuper (2003); Booz Allen Hamilton analysis
The Worst Is Yet to Come

- Debt bomb ticking
- Costlier access to financial markets
- Equipment firms’ bankruptcies
- Job losses to offshore outsourcing
- R&D standstill and innovation slowdown
- Inefficient mergers coming apart
- Wireless saturation
- Continuing commoditization, price deflation
- Decline in service quality

Conclusion:

- There is an unprecedented present crisis in a vital infrastructure industry. Potential future crises are looming

Telecom’s Paradox

- Telecom industry is in crisis in the midst of technological progress and strong user demand

Contributing Causes

- Slowing economy
- Disappointing growth of Internet
- Shocks of corporate malfeasance, Sept. 11
- Moore’s Law outpacing demand
- Regulatory lags and uncertainty
- Credit cycles
- Investor mis-judgement
- Management over-estimation
A One-Time “Perfect Storm” or
Fundamental Instability?

Fundamental Instability Due to:
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
• Lags in supply and in regulation
• Wall Street’s short term perspective
  – Credit cycles based on equity prices
• Technology shocks

Price Commodification
• Problem now for IXCs and IP backbones
• Emerging for wireless as it approaches saturation
• Local service:
  – Next, through VoIP over broadband
• Trend to IP networks will accelerate commodification of core while value added grows at edge and in applications

Chronic Instability
• Not new to other network industries such as airlines
• But it is an entirely new phenomenon in telecom
  – Management, investors and regulators have little experience or expertise in dealing with it
Natural Oligopoly?

• Conclusion from the recent worldwide experience: equilibrium for telecom networks is not infrastructure competition but oligopoly
• Survivors must cover fixed costs
  – Example: Cable TV, with more limited competition, is profitable and invests strongly
• To be clear: this is not a preference or policy recommendation, but a prediction of business strategy

Remedies for Telecom Recovery

• Revenue Remedies- Demand Stimulation
• Liquidity Remedies- Growing Net Income Industry-wide
• Competitive Remedies- Platform Competition

Potential BB Demand Drivers

– VoIP
– File sharing of music and video
– Flat-rate pricing
– Internet TV
– Interactive games
– Corporate IP networks
– Desktop videoconferencing
– Embedded N/Ws, sensors
– Machine to machine communication
– Interactive multi-media entertainment

Potential BB Demand Drivers

– E-business & marketing
– Distance education
– Tele-medicine
– Adult entertainment
– Massively distributed computing, e.g. grid-computing
– Web services (e.g. semantic web)
Gov’t Policies to Remove Barriers to Broadband Demand

- Loosen Intellectual Property Rights,
  - e.g. temporary “fair use”/compulsory license for older films and music sent over broadband for 5 years, then return to present license system
- Facilitate micro-payment systems through leadership of Fed with banks, credit card firms, etc
- Facilitate tele-work, distance education, tele-medicine through removal of restrictive liability rules, etc.
- Enable VoIP, IPTV, etc.

Gov’t Policies to Encourage Broadband Demand

- Identify and eliminate government bottlenecks to broadband applications and network deployment
  - Rights of way, tower siting, etc
- Government as a lead broadband user, and information service provider
  - Exec Orders to every agency to utilize advanced services
  - E-government initiatives

Broadband Goals

- Industry and government should set ambitious infrastructure targets to guide policy and investment (and provide mutually reinforcing confidence)
  - 1 Mbps in 100 million households in 2010
    - see also Technet initiative
  - 1 Gigabit to 10 million users in 2010.
    - see also Cenic initiative
- Not a government “industrial policy” but eliminating barriers

Improving Industry Liquidity
Increase Liquidity

- A more oligopolistic market structure is an obvious managerial and investor strategy to increase liquidity.
- Government/Consumer Reaction:
  - Less desirable than wide-open competition, but better than traditional monopoly.
- Key Issue: static/monopolistic or a dynamic/competitive oligopoly?
- Key Determinant: openness to entrants.

Generating Infrastructure Investment Funding In Other Ways

- Example: Infrastructure Upgrade Account
  - $7B/year if all service providers (telecom, cable, wireless) required to charge $1 per month per subscriber and keep proceeds in segregated account.
  - Account to be used for incremental infrastructure investment (audited) or R&D above provider’s average annual five-year infrastructure/R&D expenditures.
- Less likely to be competed away.

Generating Infrastructure Investment Funding In Other Ways

- Government support for network resiliency
  - Particularly where compliance with government resiliency and restoration requirements impose additional costs on service providers.

Most Likely Market Structure to Emerge

- 3 major regional wireline carriers, probably centered around RBOCs.
- 3 national retail IXCs, possibly vertically integrated or allied with major wireless, LEC, or cable platform operators.
- Several wholesale IXCs and specialized business carriers (CLECs) are also likely.
Most Likely Market Structure to Emerge

- 3 national wireless carriers, 2 of which are independent of RBOCs
- 1 national coalition of cable companies for telecom services

Inter-Platform Competition Essential and Likely

- Wireline (LECs, IXCs)
- Wireless (Mobile and WiFi)
- Cable (BB and VoIP)
- Powerline, satellite, less prevalent

Platform Competition Is Sustainable

- Each platform is sufficiently different to have some market power (generating some profitability) in its home niche.
  - wireless in mobile communications
  - cable in multichannel video
  - telecom wireline in 2-way fixed communications
- Safeguards through actual and potential competition and regulation

Principles of Platform Competition

- Symmetry in treatment of 3 platforms of infrastructure (technology neutrality)
  - Cable: only telecom & BB parts, not traditional video services
- Non-discrimination for content, applications, and service providers, particularly broadband ISPs and the services they provide (content neutrality)
Principles of Platform Competition

- Open equipment attachment (hardware neutrality)
- Cross-platform interconnection (interconnection neutrality)
- Contribution to and eligibility for Universal Service support (US neutrality)
- Platform-to-platform number portability
- Services can be bundled
  - But the basic service of each platform (POTS; basic cable; mobile voice access) must also be offered unbundled

Inter-platform consolidation?

- To maintain inter-platform competition, consolidation among three major network platforms should be discouraged.
  - Exception: Where duplicative infrastructure upgrades such as FTTH are not feasible (e.g., rural areas), a wireline consolidation (LEC and cable) should be acceptable, but through a separate jointly owned infrastructure organization which wholesales to service providers.

Wireless-Wireline Separation?

- To ensure platform competition, should wireless operations be divested from wireline?
  - Not with current six wireless competitors
  - But presumptively necessary if:
    - Wireless consolidates into three or fewer companies, two or more of which are controlled by main wireline platforms (ILECs)
    - Wireline platform is not subject to effective competition (i.e., two or fewer wireline infrastructure competitors in ILECs’ traditional franchise area)

Regulatory Policy
Regulatory Principles

- Converge rules as platforms converge
- Accept some cyclicality in regulation, too, depending on state of industry
  - Example: automatic counter-cyclical adjustments to price cap formulae (if price regulation continues)
- Encourage experimentation so policy decisions can be based on evidence rather than predictions

Streamline Regulatory Process

- Reduce FCC to one Commissioner
  - Renewable two year term
  - Special safeguards for media content issues
- Impose meaningful penalties for dilatory abuse of process
- All appeals to one court (D.C. Circuit)
- Commercial arbitration of all carrier-to-carrier issues, consistent with FCC and State regulations

Deregulate Retail Prices

- Immediately deregulate all retail prices
  - Retail markets disciplined by:
    • Wholesale arrangements (UNE-P/resale)
    • Wireless
    • VoIP
  - Re-impose price regulation only in markets where actual/potential competition is demonstrably unable to discipline
  - Use Universal Services subsidies, not retail and wholesale price manipulations, to keep low income/high cost consumers on network

Wholesale Price Regulation

- No regulation necessary where effective wholesale competition or multiple retail facility-based providers clearly exist
- Where such competition does not exist, application of wholesale pricing laws and regulations through commercial arbitration of bilateral interconnection agreements
### Interconnection Agreements for All Carrier-to-Carrier Matters
- Bilateral agreements, not regulatory intervention, must be the primary vehicle for establishing all carrier-to-carrier arrangements
  - UNEs, Reciprocal Compensation, Access Charges, Performance Stds, etc.
- Binding “baseball” arbitration by State-appointed commercial arbitrators in absence of voluntary agreement
  - Granular, market-specific arbitrations
  - Based on federal & state rules and laws

### Loss of Licenses
- License implies government acceptance, and is relied upon by investors, customers, business partners
  - A license requires “good character” and “fair dealing”
  - FCC has revoked licenses for consumer fraud (“slamming & cramming”) and mis-statements (RKO’s broadcast licenses)
- If all employees and investors understand that corporate behavior may lead to loss of licenses, they will be more interested in the company’s ethical behavior

### Taxes: Principles
- End use of telecom bills as tax collection vehicle for governmental revenues.
- Any special taxation or license auction of telecom should directly benefit telecom and IT sector development
  - Trust fund mechanism with safeguards
Tax Credits for Recovery

• Incentives for
  – Resiliency investments
  – Broadband investments
  – Tele-work and tele-medicine
  – R&D
• Permit ILECs to purchase CLECs’ unusable tax credits to reduce ILEC taxes while CLECs gain capital infusion
  – Benefits to be invested in infrastructure

Reform Universal Service

• Start with 1996 Act’s strong commitment to universal service
• Treat Universal Service as a social subsidy program; separate collection from disbursement
  – Part of subsidies paid directly to income-qualified subscribers (vouchers), other part to high cost service providers (rural)

Universal Service

• Cap overall total size (federal and state) at x% of telecom revenues
• Split subsidy between ongoing price subsidy and one-time support of broadband investment and upgrade

Universal Service

• Contributions from all platforms including cable telecom services, VoIP, cellular, based on phone numbers and revenues
• Support to all platforms that are offering affordable local service to all in a market
• Support available to qualified users as a portable voucher
Managerial Strategies for Recovery

Likely Management Strategies for Recovery

- Industry consolidation and intra-industry collaboration to raise prices and reduce costs
- Enhance corporate governance, organization and processes
- Innovation to differentiate service
- Grow demand
- IP network emphasis supporting edge applications

Management Strategy: Industry Restructuring

- Horizontal consolidation, especially in wireless
- Integrate (bundle) wireless, local and toll
- Disintegrate intra-firm value chain: develop intermediate markets for goods and services purchased by telecommunications service providers
  - Outsource engineering, data center, network ops
  - Systems integration

Industry Seeking Benefits from Consolidation

- Reduced pricing pressure and churn
- Returns to scale
- Transfer of best practices across organizations
- Rationalization of wireless/wireline substitution
Implementation Difficulties

- Low valuations
- Shareholder agreements
- Regulatory risks
- Free-rider syndrome
- Fear of loss of control over key cost elements or differentiators of the customer experience

Public Policy Concerns

- Consolidation is likely to increase prices, market power
- Intra-platform consolidation must therefore be accompanied by effective inter-platform competition…
  - or a separate wholesale infrastructure

Intra-Platform Collaborations

- Universal network sharing
- Wholesale/retail structure
- Industry-sponsored technical organization
  - Standard setting
  - Certification
  - OSS
  - Billing

Intra-Platform Collaborations

- Wireless and wireline collaboration to develop industry-wide IT operation solutions
- Coordinating technology development (Wireless JV for refurbishing of handsets)
  - Bulk discounts
  - Common specs
  - Reverse logistics
Implementation Difficulties

- Carriers’ reluctance to share source of competitive advantage
- Impairment of capital value
- Technical and executional complexity
- Difficulty in designing collaborative mechanisms given different maturity stages of companies

Management Strategy: Increasing Overall Revenues

- Improve management of customer base
  - Modeling of customer lifetime value
  - Growing share of wallet
- Emphasize product bundling and develop new integrated offerings
  - Cross platform residential offerings
  - Incremental functionality beyond bundled discounting
- Introduce commercial offerings of resilient, fault/tolerant network services

Management Strategy: Increasing Margins

- Reduce carriers’ general and administrative costs
  - De-layer organization structure
  - Consolidate regional overheads
  - Standardize and automate discrete tasks
  - Deploy shared services
- Optimize the supply chain
  - Introduce collaborative manufacturer-retailer practices in CPE/handsets and network equipment and publishing

Management Strategy: Increasing Margins

- Reduce retailing costs
  - Explore mass-merchant channels
  - Redefine role of company stores
- Redesign the carrier organization for downward flexibility
  - Scalable technology
  - Flexible labor costs
  - Flexible capital structure
Implementation Difficulties

• Limited IT functionality of legacy systems
• Ability to drive cross-functional organization streamlining efforts
• Labor issues

Labor Issues

• Probably biggest management challenge for incumbents
• Problems to resolve:
  – Labor costs, outsourcing
  – Pension deficits
• Opportunities
  – Growth in BB, FTTH, Mobile
  – Contracts should tie to productivity growth new services and new infrastructure

Basic Research in Telecom

The Crisis in Telecom

Basic Research

• Research fragmented by Bell breakup
  – Free rider problem: let others do the work
• Increased emphasis on short-term relevance
  – Research is long leadtime investment
• Financial crisis at traditional telecom manufacturers
  – Lucent, Nortel, Corning, Siemens, Alcatel
The Crisis in Telecom Basic Research

- Reduction by nearly half in total number of researchers at telecom industry labs
- R&D by other industries (components, IT devices) not a full substitute
- Little R&D by network operators
- Consequently, long-term technology base of telecom industry is at risk

Encouraging Basic Research

- Create a national telecom research initiative, including:
  - A national lab (privately managed but with broad-based support including government R&D grants)
  - Support for industrial research labs and universities
- Encourage and promote basic research at industry labs though appropriate tax credits.
- Increase priority of telecom-related basic research sponsored by NSF and DARPA.

National Research Initiative Details

- Funding required: $300-400 million per year, initially.
- Broad-based, long-term funding through earmarking a portion (about 10%) of the existing Federal telecom excise tax.
- Additional funding, over time, from:
  - endowment created from royalties on patents and inventions
  - Spectrum auction fund
  - Infrastructure Investment Accounts

Network Resiliency
Network Resiliency

- Important
- Costly
- Federal government:
  - Encourage multi-platform infrastructure for its natural resiliency
  - Require and fund spare capacity
  - Require priority system by all platforms
  - R&D support for resiliency technology

Resiliency

- Federal government:
  - Support peer-to-peer wireless standards
  - Open access to unused government spectrum, with user charges
  - Fund E-911
  - Fund expansion of wireless into low-density areas as contribution to resiliency

Resiliency

- States:
  - Encourage local Mutual Aid arrangements among platforms
  - Support local emergency information systems and content
- Users:
  - Large users, ISPs, and other telecom-dependent organizations must be involved in resiliency planning and cost.

Financial Remedies
Improve Valuations

• Traditional DCF must be baseline
  – Avoid measures based on “eye balls”, buildings passed, system capacity, market potential
  – DCF results must be transparent and public
• Augment DCF with
  – Scenario planning
  – Real options
• Encourage academic modeling of valuation of network and internet firms

Better Analysis and Information

• Disclosure of conflicts/dual roles by “thought leaders” such as:
  – Financial analysts
  – Auditors
  – Consultants
  – Journalists
  – Academics
• Collection and quick dissemination of accurate traffic volume data by FCC or industry association

Voluntary Industry Codes

• To restore confidence in integrity of industry data
• Companies develop codes of conduct:
  – Accounting standards & practices
  – Sales & marketing practices
  – Officers’ & directors’ conduct and compensation
• Violations would be factor in FCC licensing and SEC enforcement

Conclusions & Summary

Roadmap to Recovery
• Present contraction will inevitably:
  – raise industry concentration
  – slow innovation
  – reduce capacity expansion
  – raise prices
  – reduce investment in network upgrade
• Telecom industry will enter phase of less intra-platform competition, a more oligopolistic market structure

Conclusion

• Telecom industry will be turned around by:
  – New revenues from increased broadband demand
  – Consolidation
  – Stable or higher prices
  – Platform competition
  – Efficiency improvements/cost reductions

Roadmap to Recovery: Regulatory Process & Self-Regulation

• Streamline regulatory process through
  – binding arbitration
  – D.C court sole appellate review
  – single-commissioner FCC
• Make loss of licenses a realistic consequence of mis-reporting
• Industry codes on accounting standards, marketing practices, governance
• Collection & quick dissemination of traffic volume data

Roadmap to Recovery: Industry Strategies

• Consolidation
• Infrastructure sharing
• IP network strategy
• Differentiation
• Bundling
• Encourage applications through open access
• Invest in investor trust through corporate reforms and transparency
• Create intermediate markets through outsourcing and systems integration
Industry Strategies (con’t)

• Create national footprints through out-of-region wireless, IX, VOIP, IP generally
• Industry-sponsored tech organization for operations
• Wholesale, retail business structure
• Reduce retailing costs through non-merchant channels
• Redesign organization for downward flexibility
• Reduce job losses through BB expansion and internal labor mobility

Roadmap to Recovery—Industry Structure

• Accept industry consolidation and infrastructure sharing, within antitrust limits
• Strongly accelerate retail and wholesale inter-platform competition between wireline, wireless, and cable
  – Protect competition among platforms.
  – Or, for a consolidated platform, require a separated wholesale utility
  – Regulatory neutrality among platforms

Roadmap to Recovery: Prices

• Abolish retail price regulation in most areas
• No wholesale regulation where where effective wholesale competition or multiple retail facility-based providers clearly exist
  – Where less, maintain access regulation
  – Agreements by negotiation and binding “baseball” arbitration based on regulations

Roadmap to Recovery: Creating Demand

• New demand is key to recovery
• Industry innovation to differentiate service
• National build-out targets for BB by industry and government
• Facilitate BB applications:
  – Loosen IPR restrictions temporarily
  – Identity/remove bottlenecks to BB applications
  – Tax credits for R&D telework, distance educations, applications, telemedicine
• Support for rural BB connectivity
Roadmap to Recovery: Taxes, Universal Service, R&D

- Use of telecom-specific taxes, charges and license auctions only for network trust funds.
- Cap universal service size at a percentage of overall revenues
- Tax credits for upgrades
- Infrastructure upgrade account charged on every phone number, earmarked for incremental upgrade by carriers
- Create national telecom lab, increase funding of R&D and resiliency

“Competition policy must take account of our broadband deployment goals and that we have to calibrate our judgments and, most importantly our expectations”