Scarce Resources: Spectrum Management & Numbering Issues

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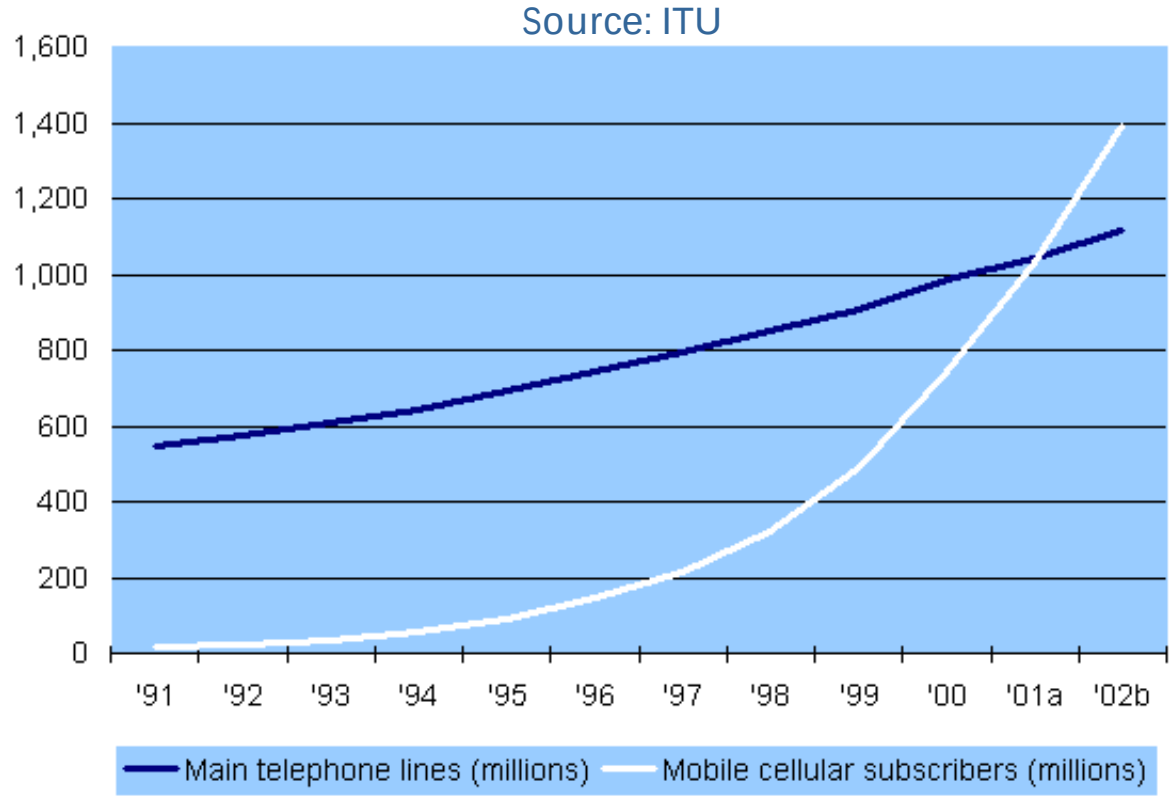
Introduction

- Spectrum Management
  - Explosion of Usage for Spectrum
  - National Security
  - Promotion of Wireless Technologies
  - Public Safety
- Numbering Management
  - Rapid Growth of Competition
  - New and Advanced Services
  - Carrier Pre-selection
  - Number Portability

Explosion of Mobile Subscribers and Numbers

Breakdown between mobile and fixed line subscribers



Spectrum: The Need for Proper Management

- Promotion of industry development
- Rapid growth of competition and the advances in new telecommunications services
  - movement towards introducing market based mechanisms
- Protection of consumers
- Maturity of the telecommunications markets and the intensity of spectrum use
- Aligning national interests with those of the private sector
- International harmonization
  - regional, GATS/WTO

Technological Issues

- Interference Management
- Division of Spectrum (e.g., defense)
- Migration of bands (e.g., GSM to IMT-2000)
- Wideband Systems (e.g., 28Ghz to 40 Ghz)
- WCDMA, CDMA 2000
- Interoperability

Market Based Mechanism

- Auctions
  - largely began in 1990's as a market based allocation method (e.g., U.S.A, U.K, Germany)
- Pros
  - final decision as to who should get the available licenses among the interested firms
  - forces bidders to implement a viable business plan
  - open and fair mechanism
- Cons
  - auction prices place a financial burden on the winning bidders
  - may limit the winners' ability to build out their networks and finance the introduction of new services
  - license fees will may lead to higher consumer prices if there is insufficient competition
- Spectrum Trading
  - common characteristics of spectrum assets; enables operators trade spectrum as assets (currently there is not a liquid market)

Hands-On Regulation

- Beauty Contests (e.g., France, South Korea)
- Pro
  - government control
  - Selective award, greater requirement
  - Generally lower licensing cost to operators
- Con
  - Generally fails to produce a transparent outcome
  - extensive administrative costs in the review procedures
  - May result in inefficient pricing, either ex-ante for licenses or ex-post in the market provision of services
- Financial Requirements
- Technical Requirements

Spectrum Regulatory Issues

- Technology Standards
  - greatest spectral efficiency (homogeneous standards)
  - Popular bandwidth between 900 MHz and 2200 MHz
- Spectrum Harmonization
  - Interoperability
  - Free interference
- Licensing
  - Mandating of standards
  - Mandating of services
  - objective, transparent, non-discriminatory

Thinking Points

- Adopt a more flexible approach to spectrum management
- Adoption of a less service dependent licensing approach
- Take a close look at the market dynamics
- Consider the engineers (Technology Developments)
- There’s more than one way to “Regulate”
- Administrative Competency and Flexibility

Numbering Management

- Goal: ensure availability of adequate numbers and appropriate numbering mechanisms
  - fair, transparent and non-discriminatory basis
  - essential condition for effective competition, innovation and consumer choice
  - a dual competition and convergence purpose

Numbering Schemes and Mechanisms

- Numbering Schemes are Nation-specific
- Number Pooling (allocation)
- Code Sharing
- Alphanumeric dialing
- Fair application

“numbering plans and procedures are applied in a manner that gives fair and equal treatment to all providers of publicly available telecommunications services”

-EC Directive on Interconnection

Examples of Fixed Costs of Numbering Management

- Software development
- Switch upgrades (Installing and Engineering)
- Administrative and billing systems
- Databases Cost (national NPDB)

Independent Numbering Manager

- North American Numbering Plan (NANP) Administration
- Numbering environment are mostly developed at the national level
  - To a lesser extent—coordination across regional (e.g. EC), organizational and global basis (e.g., pan-European Services)

e.g., Numbering Administrator

- Formerly a database management division of Lockheed Martin
- Original administrator of 1-800 database
- Spun off in November 1999
- Responsible for 8 geographical regions
- Compensated by Telecom Carriers

Regulatory Extensions

- Carrier Selection / Carrier pre-selection
  - Imposed on fixed or mobile
  - Imposed on those with significant market power
  - Cost mechanism
  - Technical feasibility
  - Billing
  - Timing
- Number portability (e.g., service, location)
  - Type of services
  - Cost sharing
  - Technical issues
  - Timing

Categories of Costs

- Shared industry costs
  - Third-party administrator’s to build and operate the regional databases
- Carrier-specific costs
  - The cost of portability capable switch software-direct cost
  - Indirect carrier-specific costs (treated as network upgrade)
  - Upgrades to Advanced Intelligent Network (AIN) and Signaling System 7 (SS7) technologies-indirect cost

Goals of Cost Allocation

- The initial cost of providing number portability, preselection should not be a barrier to local competition (CN)
- Costs should be borne by incumbent LECs, competitive LECs, CMRS providers, IXCs, and resellers (CN)

Examples of Call-Related Costs of Number Portability

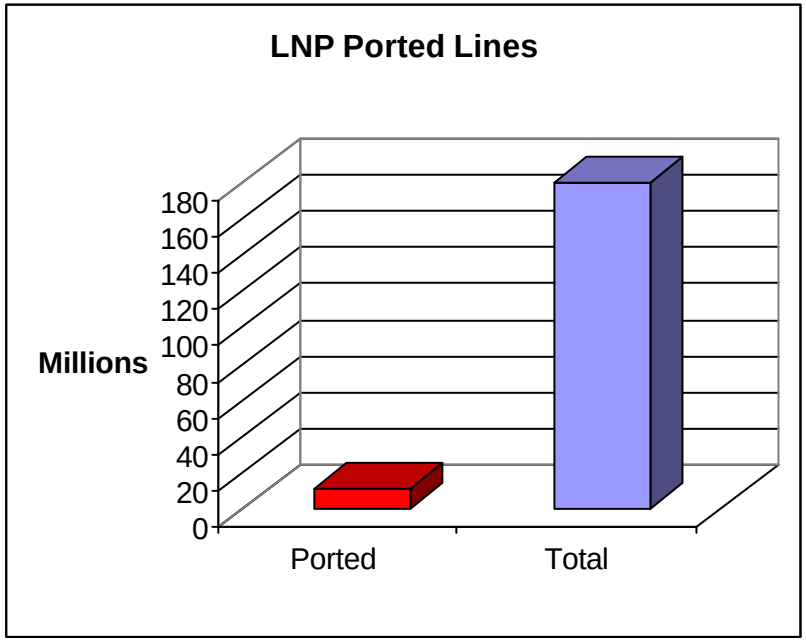
- Vary with call port orders, volume and call type
  - additional switching, transmission, etc.
  - Software upgrades
  - physical labor
- Estimated with
  - costs associated with network elements for each call type
  - call volume data
  - call-type distribution data

Regulatory Basis

- Competitive Neutrality (CN) --not a causative basis, but rather, a promotion of competition
- Cost causative basis--the purchaser of a service pays at least the incremental cost of providing that service. (not applicable)

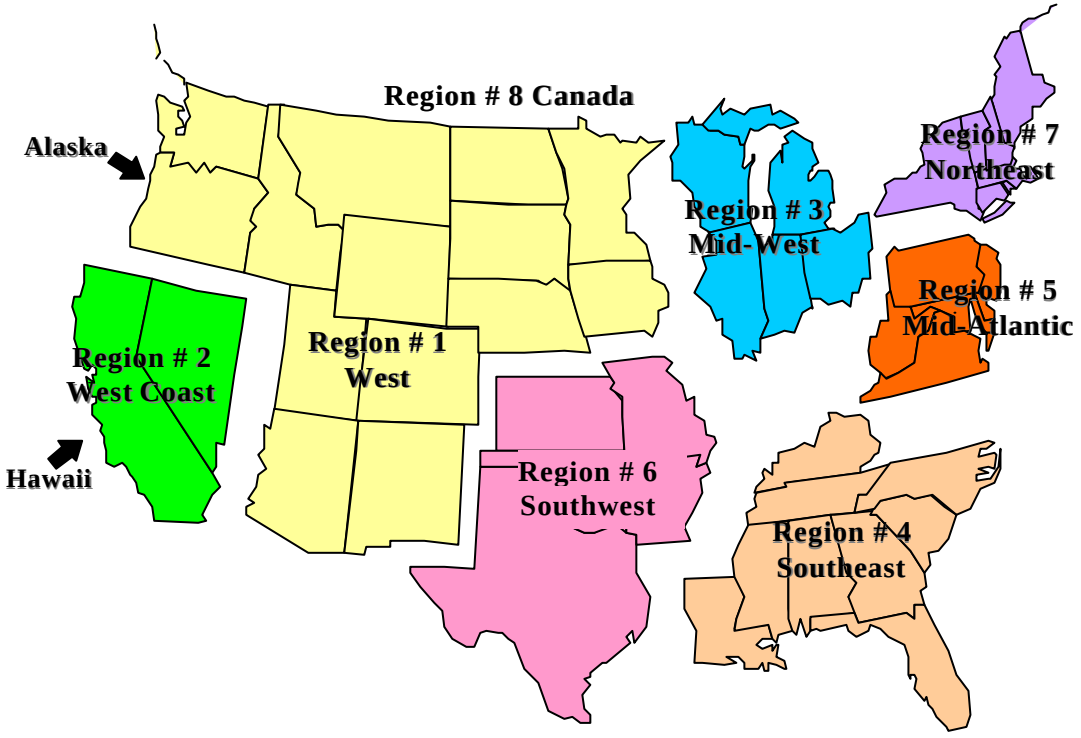
Case in Point: Ported Numbers in the U.S.

- Over 11 million landline numbers ported in the U.S. as of the end of 2000
- The total landline numbers are approximately 180 million landlines



Management Example - The U.S.

- North American Numbering Plan Billing and Collection, Inc. (NBANC) and Number Portability Administration Center (NPAC) Regions



e.g., FCC Rulings on Cost Recovery

Interim LNP	Long Term LNP
States may utilize various recovery mechanisms Allocating incremental costs based on: (a) the number of ported numbers, (b) the number of active telephone numbers, (c) the number of active telephone lines, (d) gross telecommunications revenues net of charges paid to other carriers; and (e) each carrier bearing its own costs (success is not clear)	A federal cost recovery mechanism Allocation based on end-user telecom revenues (success is not clear)

Thinking Points

- Open national numbering plans to competition
- Plan for requirements and coordination, looking ahead to international markets
- Evaluate the cost of pre-selection, NP to landline and mobile operators
- Closely monitor the numbering situation
- Consider independent Numbering Administrator
- Administrative Competency and Flexibility