



ANALYSIS GROUP  
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# Market Allocation of Radio Spectrum

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# Overview

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## How Should Radio Spectrum Be Managed?

- **Current Approach in the U.S.**
- **Access Regimes versus Property Regimes**
- **Tragedy of the Anti-Market**
  - **Example: TV Band Reallocation in the United States**
- **Rationalizing Marginal Analysis**





## Current Approach in the U.S.

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## The Conventional Trichotomous Framework

- **“Exclusive use”**
- **“Commons”**
- **“Command-and-control”**





# Access Regimes versus Property Regimes

# Access Regime: How Spectrum Resource is Appropriated

- **Ex: Non-exclusive Wi-Fi access in license-exempt band**
  - Regulator defines sharing rules, equipment approval
  - Enforces power limits, technology constraints
- **Ex: Exclusive Rights Held by Mobile Phone Carriers**
  - Spectrum sharing rules largely delegated
  - Licensee chooses technology, price of access, etc.
  - Market reassigns spectrum appropriation rights
    - Handset makers
    - Data network overlays
    - Application providers
    - Cellular subscribers



# Property Regimes

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- **Open Access: Exploitation without Limit**
- **State Property: Limits Set by Government**
- **Common Property: Limits Set by Group of Owners**
- **Private Property: Limits Set by Single Owner**



# Private Property Efficiencies

- **“Open Access” inefficient**
  - All spectrum rules, including unlicensed regulations, seek to exclude certain types of behavior so as to productively coordinate use
- **Policy/Property Choice: best process for discovering optimal spectrum sharing rules**
- **Private Property → reveals opportunity costs**
  - Decision makers—including governmental—gain information
- **Competition allows access regime competition**
  - Subscription versus not; pricing schedules; 3<sup>rd</sup> party apps
- **Property regime avoids**
  - wasteful government warehousing
  - delays of case-by-case regulatory determinations
  - political influence competition for allocations (rent-seeking)





# Tragedy of the Anti-Market

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## **Non-market Allocation Fails to Internalize Costs/Benefits**

- **Example: U.S. allocation in the 3650 MHz – 3700 MHz band**

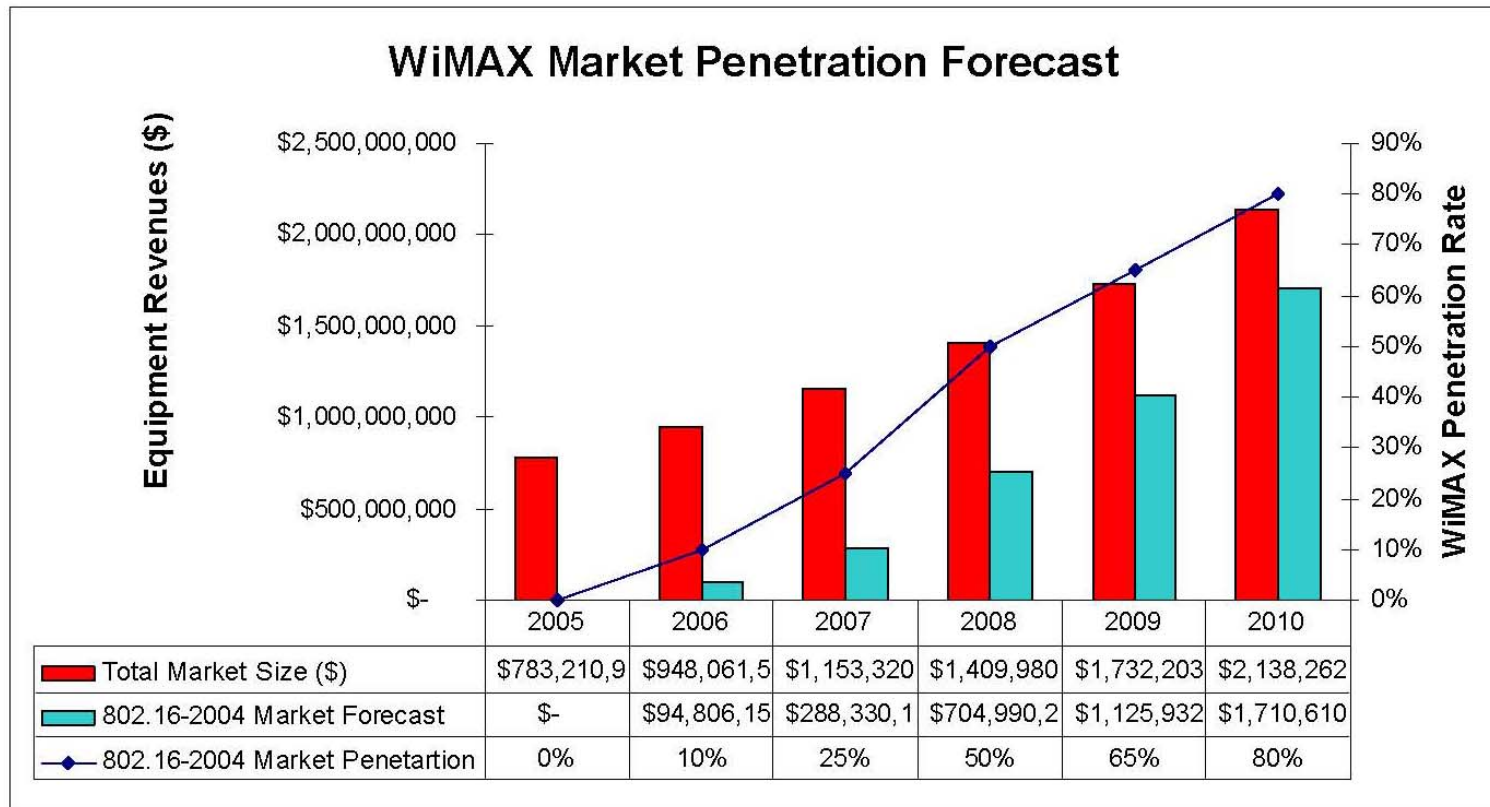
**The FCC proposes unlimited entry with a registration requirement (non-exclusive license) and a requirement to “make every effort” to refrain from interfering with other licensees.**



# Tragedy of the Anti-Market

Source: Maravedis

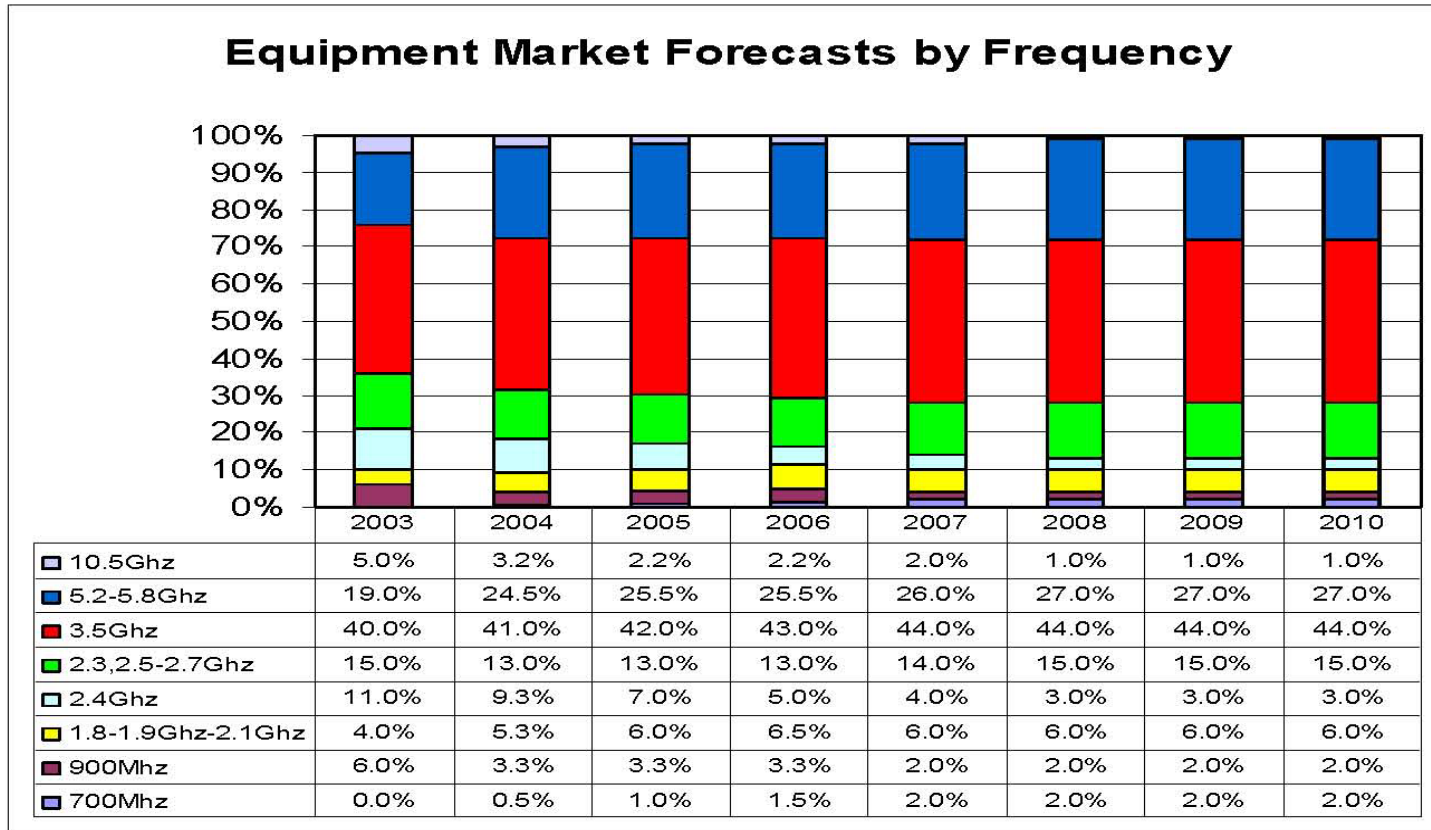
Exhibit 75: The WiMAX Market Penetration in \$ 2005-2010



# Tragedy of the Anti-Market

Source: Maravedis

Exhibit 76: BWA Market Size Forecasts by Frequency 2005-2010



# Tragedy of the Anti-Market

## Administrative Allocation Leads to:

- **Political Determination of Spectrum Sharing Rules**
  - Incumbent satellite earth stations → large exclusion zones
  - Entrants → smaller exclusion zones
  - Power limits, technology constraints, competitive solutions excluded by fiat
- **Manufacturers, Service Providers Investment Incentives**
  - Deterred – according to Intel, Alvarion
  - Non-exclusive rules pre-empt efficient coordination of spectrum use in this band
  - Block U.S. WiMAX development in the 3.5 GHz band





# TV Band Reallocation in the United States

## U.S. DTV Transition Now in 20<sup>th</sup> Year

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- **By 2009, only ~ 10% of TV HHs will rely on off-air reception**
- **Eliminating terrestrial broadcasts would create \$Trillions in consumer benefits, but cost only a few \$Billions**
- **Short of that, relocating broadcast transmitters would allow *most* DTV spectrum to provide valuable alternatives**



## Post Transition, 294 MHz Still Allocated to DTV

- **Within the 294 is abundant, valuable “white space”**
- **The FCC is administratively weighing a “commons” vs. an “exclusive use” allocation for underlays or overlays**
  - **Delays of case-by-case destroy social value**
  - **Costs of “unlicensed” not subject to rational feedback**
- **Rationalization impossible under the FCC broadcasting and license-exempt allocation rules**
  - **Efficient transactions prohibited**
  - **No way to co-locate TV transmitters given non-exclusive rights**
- **Private Spectrum regime would enable rights holders to efficiently reorganize the TV band, sharing gains from trade**



# Rationalizing Marginal Analysis

- **Within current framework, marginal analysis generally favors liberal licensing for new allocations**
- **More fundamentally, private property rights need to rationalize the process of marginal analysis**
- **With active spectrum markets, opportunity costs revealed**
- **Abundant, competitive services unleashed by removing regulatory barriers**
- **If “commons” under-supplied, they can be transparently supplied by firms, non-profits, or public agencies**

