



# **Modern Beats Obsolete**

## **In Spurring Economic Growth & Innovation**

*Modernize Obsolete Communications Law & Spectrum Management*

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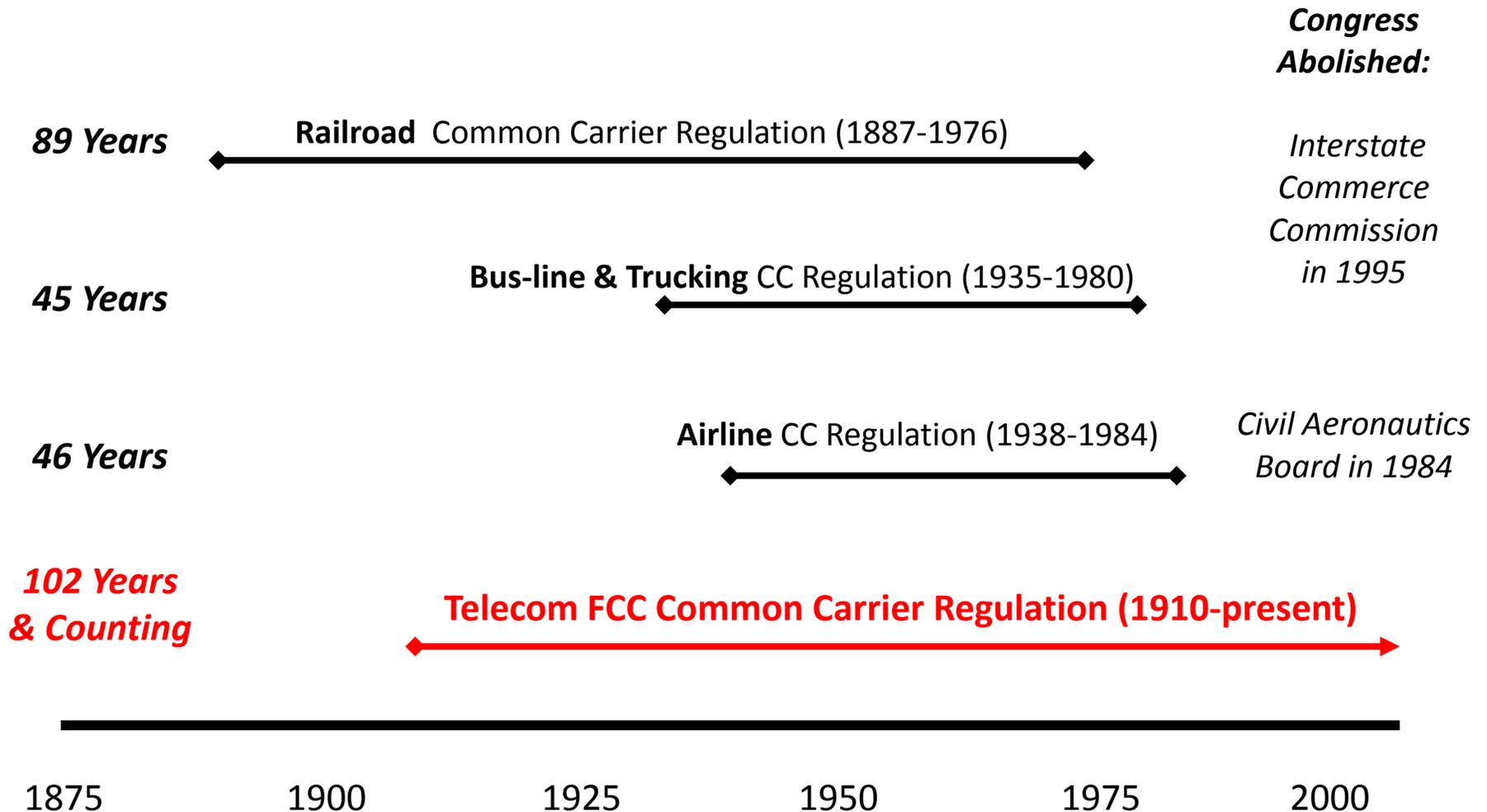
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# What Makes Law Obsolete?

- **1881 analog telephone, and 1912 radio, technological presumptions,**
  - Despite their obsolescence with the advent of the TV, transistors, satellites, microchips, computers, fiber optics, cellular, Internet, smart-phones, etc.
- **1887 railroad common carrier regulation presumption,**
  - Despite the ending of such regulation for railroads 36 years ago;
- **1934 telephone subsidy system presumption,**
  - Despite achieving the goal of universal service ~20 years ago;
- **1940's antiquated management of national resources,**
  - Despite 20 years of obvious, ever-increasing commercial demand for more spectrum auctions of the Federal government's spectrum hoard;
- **1984 AT&T break-up presumption,**
  - That local and long distance voice services were separate, despite voice being an "app" and long distance being a free integrated feature in the broadband IP all-distance world for several years;
- **1992 cable monopoly presumption,**
  - Made obsolete by the 40% share loss to DBS & Telco video-competition; &
- **1996 un-bundling-competition law**
  - Made obsolete by the mass CLEC bankruptcies, a trillion dollar fiber bubble, and the loss of two-thirds of monopoly voice PSTN customers to cable, wireless and Internet competition.

# FCC Common Carrier Regulation Is an Historical Anomaly



Sources: FCC, U.S. Govt.

# How Did This Anomaly Happen?

- Politically, telecom was treated differently than other common “carrier” technologies: railroads, trucks, buses and airlines.
  - In the 1913 “Kingsbury Commitment” the U.S. government politically decided to approve of a *national* monopoly with rate-of-return, common-carrier regulation, in return for a business commitment to deliver subsidized universal phone service at reasonable rates.
  - The 1934 Communications Act then codified this 1913 political agreement to legally sanction a national monopoly in return for subsidized ubiquitous telephone service.
- In contrast the Government did not grant railroads, trucking, bus-lines or airlines *national* monopolies in return for serving every American.
  - The Government also recognized new technologies made common carrier regulation obsolete;
  - Thus they de-regulated: railroads in 1976, trucking and bus-lines in 1980, and airlines in 1984; and abolished the Civil Aeronautics Board in 1984 and the Interstate Commerce Commission in 1995.
- When other common carrier industries were de-regulated in the 1970s because of competition, the Government-sanctioned monopoly was embroiled in an antitrust suit;
  - The Government’s unique political grant of a national monopoly for telephone eventually created barriers for technology-enabled competition and fostered AT&T’s inherent anti-competitive behavior.
  - New microwave communications technology, created long distance competition to AT&T, but to enable it, the DOJ had to sue and breakup AT&T into a long distance company, an equipment company, and seven local phone “Bells.”
- When Congress passed the 1996 Telecom Act, the government’s political grant of a national telephone monopoly ended and telecom competition was the new law of the land.
- Resultant facilities-based voice competition from cable, wireless, and Internet has led to a two-thirds loss in market share and created the predicate for ending common carrier regulation of voice like the Government ended common carrier regulation for railroads, trucking, buses and airlines.

# The Law Ignores Five Technology Changes

1. The sea change from inefficient **analog** to ever-increasingly-efficient **digital** computer/Internet technologies;
2. The virtuous [Moore's Law](#) ~50 year trend of microchip performance doubling every ~18 months;
3. The virtuous [Cooper's Law](#) ~104 year trend of radio transmission efficiency doubling every ~30 months;
4. The virtuous steady efficiency gains in **digital compression innovation** that enable the same wire line or wireless spectrum to transmit increasingly more throughput or effective bandwidth over time; and
5. **Internet convergence** from *single*-service technology silos (telecom, broadcast, cable, satellite, & wireless) to *converged* voice/data/video services Internet technology platforms and facilities.

# Five Ways the Law Has Held America Back

- 1. Telephone service** changed little in 50 years;
  - (1934-1984);
- 2. Cell phone** took 33 years to get to market;
  - (1949-1982);
- 3. Internet packet-switching** took 25 years to commercialize;
  - (1969-1994);
- 4. PC modem** took 25 years to be broadly commercialized;
  - (1977- 2002); &
- 5. Broadband service** took 17 years to be broadly commercialized;
  - (1988-2005).

# From Monopoly to Competitive Economics

- *Legacy* law assumes an analog electrical *continuous* voltage function technology.
  - For telecom that means dedicated continuous end-to-end telephone circuits between locations;
  - While very durable, the analog PSTN is highly-inefficient relative to digital networks.
- *Legacy* law does not explicitly recognize today's digital technology, which is the opposite of analog in being the *discrete/discontinuous* voltage technology function of computers;
  - A discrete, discontinuous technology is an infinitely interchangeable building-block technology;
  - Digital allows near infinite functional integration of data/voice/video and every info type;
  - Digital is orders of magnitude more efficient and functional than analog technology:
    - Digital harnesses Moore's Law doubling of chip performance every ~18 months, which creates a virtuous ever-increasing capability to get more efficiency/capacity out of the same wire/cable or radio spectrum over time.
- At bottom, with every Moore's Law cycle, digital tech has gotten at least twice as efficient as analog technology. To put this in perspective digital technology has gotten *at least*:
  - ~1,000 times more efficient since the 1996 Telecom Act;
  - ~8,000 times more efficient since the 1992 Cable Act, and
  - ~256,000 times more efficient since the 1984 breakup of AT&T and the 1984 Cable Act.
- Simply, the transition from analog continuous to digital discontinuous technology is a transition from analog monopoly economics to digital competitive economics because:
  - A national ~\$200b analog continuous PSTN network worked most efficiently as a monopoly network because it was extremely complicated for regulators to unbundle competitively;
  - Whereas digital discontinuous Internet protocol technology enables engineers to easily and quickly configure devices, transmission technologies, and networks, increasingly efficiently over time.
  - **Digital technology enables robust facilities-based communications competition.**

# What's the Harm from Obsolete Law?

1. Limits **user** benefits, savings & productivity
  - By discouraging adoption and commercialization of *existing* innovations;
2. Discourages *new* innovations for **users**
  - That could solve niche user wants, needs, and means with one-size-fits-all limits;
3. Slows technological, Internet and commercial progress
  - By forcing bandwidth performance to lag computing and storage performance;
4. Burdens investment and economic growth
  - By assuming analog monopolies and not digital competitive communications;
5. Renders infrastructure and property less valuable and attractive
  - As its usefulness can't stay current and competitive; and
6. Disadvantages American competitiveness
  - When foreign competitors aren't burdened with the same drag of obsolete law.

# Spectrum Management Is an Historical Anomaly

To manage and conserve natural resources and Federal lands, Congress created the **Department of Interior** in 1849.

## LAND

To more efficiently manage the Federal workforce, Congress created the **Civil Service Commission** in 1883 and modernized it in 1979 as the **Office of Personnel Management**

## PERSONNEL

To efficiently manage costs and operations of Federal buildings, offices, and vehicles, Congress created the **General Services Administration (GSA)** in 1949.

## BUILDINGS

To efficiently manage Government communications costs, the GSA created the **Federal Telecom Service** in 1960

## TELECOM

To efficiently and effectively manage the nation's resources (except radio spectrum), Congress created the **Office of Management and Budget (OMB)** in the Executive Office of the President in 1970

## BUDGET

**Still NO modern management of radio SPECTRUM In 2012**

1850

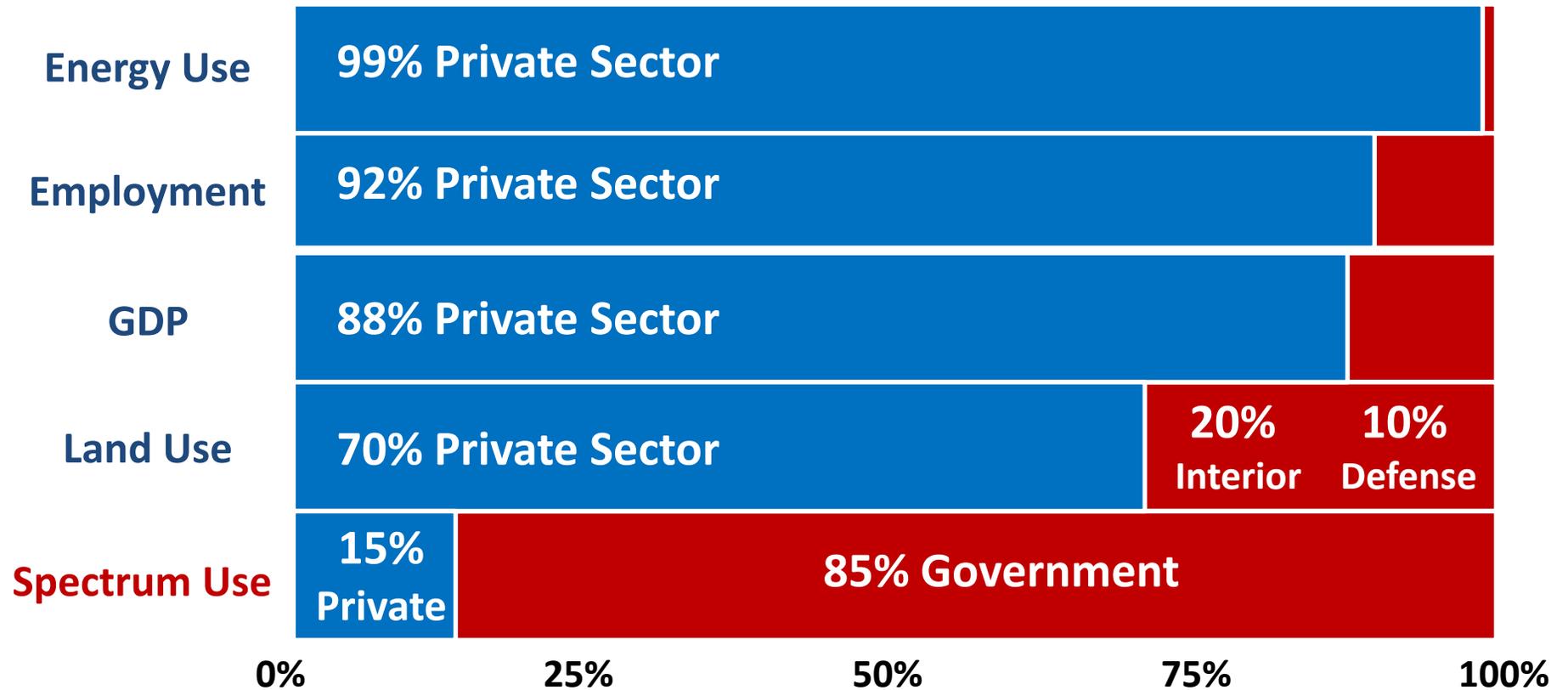
1900

1950

2000

Sources: NTIA,  
U.S. Govt.

# Spectrum Is a Resource Management Outlier



**Private vs. Government Share**

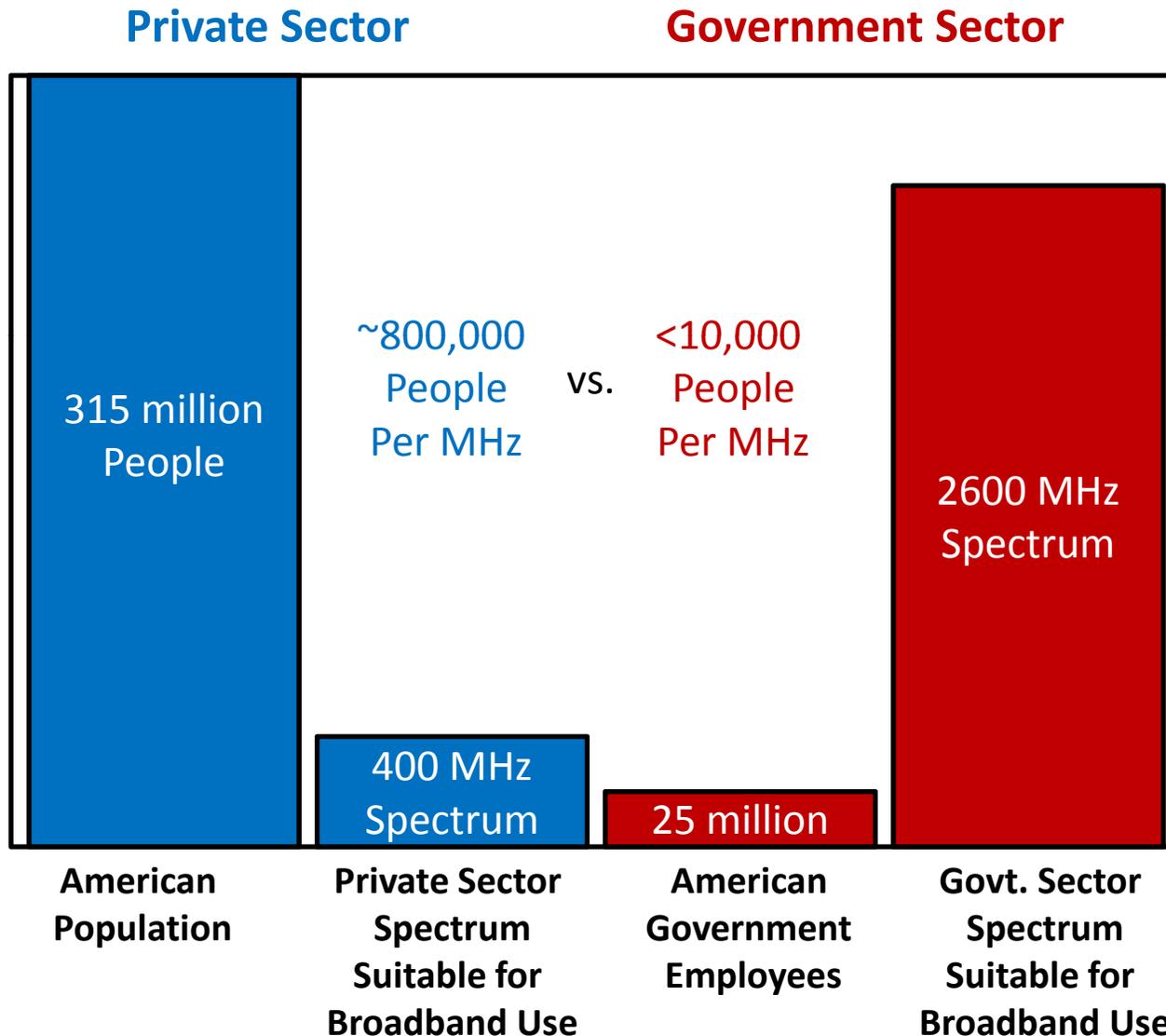
*Sources: DOE, CEA, Interior, & NTIA*

# Spectrum Is the Worst-Managed Resource

- Shockingly in 2012, there remains no accountable Federal manager of radio spectrum,
  - Despite spectrum being the 21<sup>st</sup> century's most valuable natural resource and the essential fuel of the private sector mobile technology revolution of smart phones, tablets and the Internet of things.
- Equally shocking is that the Federal Government's spectrum inventory management system hasn't changed materially since 1992, despite:
  - American wireless subscribers [growing](#) 3,000% from 11 million connections to 331 million;
  - Congress revolutionizing the economics of spectrum by mandating public auction of spectrum to the highest bidder; and
  - The exponential explosion of demand for wireless driven by: the Internet, smart phones, tablets, and video streaming technology.
- Most shocking of all is that a national resource that can enable a ~trillion dollars plus in economic activity is so wasted and backwardly-managed as if it is not important to America's future.

# Obvious Waste of Government Spectrum

Private Sector Spectrum Utilization is >80 Times Higher Than Government Sector



*Note:  
Over 100 years,  
30 Government  
agencies  
incrementally  
received 3,000  
spectrum  
allocations  
with minimal  
accountability  
or oversight*

**Sources:**  
U.S. Census  
Bureau,  
CEA, & NTIA

# How Did This Anomaly Happen?

- The basic legal authority for the Federal Government to manage the inventory of radio spectrum and assign who can use what radio frequencies for what use is obsolete. It hasn't substantively [changed](#) since 1934, despite the:
  - Advent of the TV, radar, microwave communications, satellites, cell-phones, the Internet, smart phones or tablets; and
  - Fact that these technology changes have created vastly more private sector demand for radio spectrum than there is supply for private sector use.
- The current Federal steward of radio frequency assignment authority is the low-level [Office of Spectrum Management](#) buried in the Office of the Assistant Secretary of Commerce for Communications and Information.
  - While ostensibly it has the responsibility for "managing" the Federal spectrum inventory and assignments, it has minimal legal or delegated authority, power, or clout to actually efficiently or effectively manage the Nation's spectrum for the benefit of the Nation or the U.S. taxpaying public.
  - In reality, they are a caretaker/bookkeeper of the nation's spectrum, not a manager of it; no one is.
- Since virtually all broadband-suitable frequencies have already been assigned to a government bureaucracy for free, the current ad hoc [committee process](#) of managing spectrum is dysfunctional, because it has those who already use the spectrum effectively deciding whether or not they have to give it up.
  - Not surprisingly, any government entity that was assigned a valuable frequency for free in the past -- long before spectrum became so valuable and scarce -- is loathe to give it up.
  - Moreover, they also appreciate that there is seldom anyone paying attention in the Executive Branch or Congress, which has the power to get it reassigned to a higher or better use.

# Why is U.S. Spectrum Management Dysfunctional?

- There is no modern management of this resource or process.
  - No coherent Federal policy that spectrum is a valuable scarce resource that needs to be conserved, well-managed and put to its highest and best use for the Nation and the American taxpayer.
  - No OMB-level review -- independent of the departments and agencies that control the spectrum -- to verify that it is being responsibly managed.
  - No formal annual spectrum budget process in the executive or legislative branch, where Government spectrum holders have to justify their continued use of the spectrum, defend why they can't share their spectrum with other bureaucracies, or why they can't clear it for public auction.
  - No regular audit or official accountability process to ensure that this valuable spectrum is being efficiently-used, fully-utilized and not wasted.
  - No required economic opportunity-cost analysis or cost-benefit analysis of Federal spectrum use.
- As long as there is no requirement for Government bureaucracies to pay annually for the value enjoyed from their spectrum use, like they have to pay for the energy, personnel and other resources that they use, spectrum will be managed in a dysfunctional manner and bureaucracies will not understand or appreciate the alternative value this scarce resource has to the private sector.
  - Simply, if a valuable scarce resource is perpetually free to use by a lucky select few, it will be wasted and hoarded.

# Conclusion

- Obsolete law/regulation/spectrum management increasingly is a:
  - **Dead end** with no future; it mandates that communications live in past;
  - **Unnecessary drag** slowing investment & innovation, as it forces innovation 'round pegs' into obsolete 'square holes';
  - **Nonsensical waste** of precious time and resources, as it generates uncertainty, busy work, and red tape;
  - **Cost sinkhole** as it mandates subsidized obsolete service availability everywhere when demand is collapsing rapidly;
  - **Counter-productive** "government may I?" burden on too much communications-driven economic activity; and
  - **Absurdly dysfunctional** part of an otherwise efficient and free market Internet ecosystem.
- The status quo of U.S. communications policy has become an increasingly absurd "[Rube Goldberg machine](#)"
  - Of complex rules, regulations and red tape that make simple technological and business tasks unnecessarily convoluted and inefficient.
- **Bottom Line: U.S. Communications policy is in obvious and urgent need of modernization for the 21<sup>st</sup> Century Internet and mobile economy.**

# Recommendations

## Modernize Obsolete Law & Regulation

1. Modernize communications law/regulation to be consumer-centric and technology-neutral.
  - Don't premise future laws or regulations on *static technology-specific assumptions or policy* that will become obsolete with tech change, but on *dynamic technology-neutral assumptions or policy* that are unaffected by technology change.
  - If there is a need for a transitional technology-specific law/regulation it should be temporary and have a hard sunset date.
2. Proactively cull out legacy law and regulations that are a barrier to or impede the IP transition and competition; and ensure they are both sunset-ed and not applied to the Internet ecosystem.

## Modernize Obsolete Government Spectrum Management

1. Get much more Government spectrum to private sector auction soonest.
  - The Government should reclaim **an additional 1650 MHz** of spectrum suitable for broadband use for private sector use by 2032 -- to transition from controlling 85% of the Nation's spectrum today to <30% by 2032.
2. By law or executive order establish that:
  - Spectrum is a valuable resource to be utilized efficiently and put to its highest and best use for the Nation;
  - OMB manages government spectrum allocations, finds under-utilized spectrum for auction to lower the deficit;
  - OMB accords a monetary value to spectrum and requires those using it to pay market rates for the value received from their spectrum use, like they pay for other resources they use like energy, personnel, etc.
  - Ensures that all Government spectrum users annually justify their continued use of the spectrum, defend why they can't share it with other government entities, or why they can't clear it for public auction.
  - Guards against spectrum waste via a process that ensures that this valuable spectrum is being efficiently-used, fully-utilized and not wasted via: audits, economic opportunity-cost analysis & cost-benefit analysis.

# Appendix: NetCompetition, Precursor LLC, & Scott Cleland

- **NetCompetition** is a pro-competition e-forum supported by broadband interests that promotes competitive Internet choices for consumers.
  - See: [www.NetCompetition.org](http://www.NetCompetition.org) ;
- **Precursor LLC** is an industry research consultancy for Fortune 500 companies specializing in the future of Internet: competition, privacy, security, property rights, innovation and algorithmic markets.
  - See: [www.Precursor.com](http://www.Precursor.com) ;
- **Scott Cleland** is a precursor: a research analyst with a track record of industry firsts. He is Chairman of NetCompetition, President of Precursor<sup>®</sup> LLC, and author of the widely-read PrecursorBlog. During the George H. W. Bush Administration, he served as Deputy United States Coordinator for Communications and Information Policy at the U.S. Department of State. Eight Congressional subcommittees have sought Cleland's expert testimony and *Institutional Investor* twice ranked him the #1 independent telecom analyst. Scott Cleland has been profiled in *Fortune*, *National Journal*, *Barrons*, *WSJ's Smart Money*, and *Investors Business Daily*.
  - See: [www.ScottCleland.com](http://www.ScottCleland.com)